Statement before the House Committee on Financial Services

Devalued, Denied, and Disrespected: How Home Appraisal Bias and Discrimination Are Hurting Homeowners and Communities of Color

Faulty Evidence and Misdiagnosed Solutions

Why centralizing appraisal standards and criteria under a new federal agency as proposed under the Fair Appraisal and Inequity Reform Act is not justified

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Chairwoman Waters and Ranking Member McHenry, and distinguished Members of the Committee, thank you for the opportunity to testify today.

Executive Summary:

The case for centralizing appraisal standards and criteria under a new federal agency as proposed under the Fair Appraisal and Inequity Reform Act is not justified. It is based on unsubstantiated claims of systemic bias and racism in the housing finance sector and represents and unwarranted power grab by the federal government and one giant step towards the federal government setting fiat home values. Upending the appraisal process risks mis-valuating millions of properties, which could have serious repercussions for minority neighborhoods and rural areas, where home sales are sparser.

Last week's report by the Interagency Task Force on Property Appraisal and Valuation Equity (PAVE) alleged "inequities within current home lending and appraisal processes" for communities of color.

The work cited by PAVE contained serious red flags that were obvious from a cursory look. The work of the AEI Housing Center has also debunked the Brookings study and Freddie Mac exploratory note, which were both heavily relied on in the PAVE report and this hearing's memo. Most importantly, these studies conflate race with socio-economic status (SES), i.e. income, buying power, marriage rates, credit scores, etc. Once adjusted for differences in SES, race-based gaps found in these studies either entirely or substantially disappear, which raises serious questions regarding a race-based explanation.[1]

While individual appraiser bias certainly exists, the PAVE report admits that "the exact number of instances of valuation bias is difficult to assess." We have undertaken a study with over 240,000 loans for which we knew the race of the borrowers. Our statistical analysis found that racial bias by appraisers on refinance loans is uncommon and not systemic. These results and our methodology have been confirmed by other academic research.[2] All of this work was ignored by PAVE. Further, research by Fannie Mae, which directly contradicted Freddie Mac's preliminary findings, was so selectively cited this point was lost.

It is questionable how PAVE could arrive at its conclusions when its own report admits a lack of data.[3] Furthermore, this lack of data is the fault of the government. Two years ago, we outlined a statistical approach using existing data that would have allowed FHFA, Fannie Mae, and Freddie Mac to identify bad actors using existing data. This offer was ignored.

Now, two years later we are debating a task force report and draft bill based on cherry-picked data, discredited research, and flawed conclusions, suggesting a lack of interest in getting to the truth and an alternative motive to provide an excuse for centralizing appraisal valuation standards and appraiser criteria in the federal government.[4]

[1] The same critique to the Brookings paper also applies to research by Howell and Korver-Glenn (2021) or a recent Redfin on the same topic.
[2] See Ambrose, Brent W., James Conklin, N. Edward Coulson, Moussa Diop, and Luis A. Lopez. "Does Appraiser and Borrower Race Affect Valuation?." Available at SSRN 3951587 (2021).
[3] In particular, the PAVE report states "lack of access to complete data has been a hindrance to research on appraisal disparities and on the impact of racial and ethnic bias in appraisals."
[4] For our detailed critique of the PAVE report, please see Appendix A1 on page 22.

Instead of this bill, agencies should get to work using existing data. These data should be anonymized and made available to independent researchers to verify as a bipartisan group of Senators agreed at last week's Senate Banking hearing.[5] This would allow bad actors, whether racially biased or incompetent, to be removed immediately from the profession, as they should.

Additionally, since PAVE has misdiagnosed the problem, its proposed agency actions will not address racial and ethnic differences in homeownership rate, financial returns of owning a home, or median wealth. Instead it will likely make these differences worse or divert attention from finding effective solutions.

Rather than discredited claims of systemic appraiser bias, homeowners and communities of color are being hurt by the combination of low SES, which certainly reflects a legacy of past racism and lingering racial bias, which leaves Blacks at a large income and wealth disadvantage relative to most Whites, and foreclosure-prone federal lending practices.

A recent paper out of the UC Berkley finds that Black and Hispanic homeowners experience lower returns than White homeowners, which it attributes almost entirely to the higher prevalence of distressed home sales – and not appraiser bias. The study finds that "The disparity [in distressed home sales] explains about 40% of the Black-white gap in housing wealth at retirement." The paper also notes that "[i]mportantly, absent financial distress, houses owned by minorities do not appreciate at slower rates than houses owned by non-minorities," which again directly contracts the PAVE report.

Foreclosure-prone affordable housing policies have been targeted at low-income and minority borrowers. These policies subsidize debt by providing excessive leverage and lower rates. Coupled with a supply shortage, the increased demand from additional leverage has fueled unforgiving boom-bust home price cycles. During the Financial Crisis, these policies contributed to over 10 million foreclosures and other forced dispositions, which were proportionally higher in low-income and minority neighborhoods. While higher SES individuals have the wherewithal to withstand economic or personal shocks, low SES individuals do not. Notwithstanding massive subsidies and lending, federal housing policies have not built generational wealth.

The PAVE report even acknowledged the importance of SES, stating that "Much of the gap in rates of homeownership can be traced to socio-economic factors that differ on average between Black and white homeowners." It then proceeded to ignore it in its 21 proposed agency actions, all of which related to appraiser bias. This could have unintended consequences similar to prior housing task forces such as the 1967 Presidential Task Force on Housing and Urban Development, which ended up destroying many American cities, especially Black neighborhoods, or the 1995 National Homeownership Strategy, which ended in millions of foreclosures. Mis-valuing millions of property could have similar consequences, with minorities once again being the victims.

Closing the racial wealth gap requires addressing differences in SES head-on. Housing solutions include a focus on generational wealth building through better mortgage products with more prudent underwriting, increasing supply, and opening up more areas of opportunity for lower-income

[5] Senators Toomey, Tester, Smith, and Brown stressed data transparency for independent researchers in the hearing of the Senate Banking Committee "Strengthening Oversight and Equity in the Appraisal Process" on March 24, 2022.

households. But policy also need to focus on closing gaps in educational attainment, stable families, and public investment relating to minority neighborhoods, among other things.

1) **Evidence on devaluation: A critique of the Brookings study and the Freddie Mac note**

Both the Brookings study and Freddie Mac exploratory note were heavily relied on by PAVE. However, they are fundamentally flawed in that they conflate race with socio-economic status (SES), i.e. income, buying power, marriage rates, credit scores, etc. Furthermore, our analyses show that Black, White or Hispanic households with similar SES all had similar results, raising serious questions regarding a race-based explanation.

In the **Brookings study "The Devaluation of Assets in Black Neighborhoods,"** Perry et al. claimed that:

- *"Homes of similar quality in neighborhoods with similar amenities are worth 23 percent less in majority Black neighborhoods, compared to those with very few or no Black residents."*
- *"Across all majority Black neighborhoods, owner-occupied homes are undervalued by $48,000 per home on average, amounting to $156 billion in cumulative losses." (p. 3)*

This conclusion rests on their claim to have completely controlled for structural characteristics and neighborhood amenities using 23 control variables, therefore, the remainder in the gap has to be due to racial bias.

AEI Housing Center Critique:

After having replicated Perry et al., we add just one additional SES control variable, the Equifax Risk Score for the neighborhood without removing any of their original 23 control variables.[6] We find that ERS alone is able to explain the entirety of the devaluation.[7]

Specification	**% Devaluation**	**# of Tracts**
23 control variables for all tracts	-22.0%	33,066
23 control variables (limited – new baseline)	-21.8%	32,998
23 control variables & ERS control variable	0.3%	32,998

By adding just one additional SES-related explanatory variables, the devaluation found by Perry et al. disappears. Thus, their approach did not fully adjust for structural characteristics and neighborhood

[6] We show that the Equifax Risk Score (ERS) is race neutral and suitable for use as a control variable. The Equifax Risk Score (ERS) is a compilation of Vantage credit scores from 2013, representing a summary metric of the stock of all individuals of any type in a neighborhood with a score. It includes over 220 million scored individuals. In its 2007 "Report to Congress on Credit Scoring and Its Effects on the Availability and Affordability of Credit," the Board of Governors of the Federal Reserve System stated that "credit characteristics included in credit history scoring models do not serve as substitutes, or proxies, for race, ethnicity, or sex" (S-1f). Vantage credit scores are one of two industry standard scores and they are race blind as confirmed by the Fed report.
Based on the above, we don't think Perry and Rothwell's (2021) critique of ERS holds. As we have shown in our initial critique and will also show below, ERS is highly predictive. The fact that the data are propriety credit scores is not disqualifying. Indeed, credit scores are used routinely in empirical work involving mortgage and housing markets. The ERS data are aggregated up from ZIP-7 to census tract and are from November 2021.

[7] Other SES variables such as the share one one-adult borrowers also significantly reduce the gap.

amenities as they claimed and their estimate of devaluation due to racial bias is, at a minimum, seriously overstated.[8]

Further evidence that refutes the Brookings study:

1) We demonstrate clear omitted variable bias in the Brookings study.
2) We show that similar devaluation gaps are present in majority White or White-only tracts across different SES levels.
3) We find that relatively few Black borrowers choose to buy in majority Black tracts. This is especially true for Black borrowers with higher incomes. If constant-quality prices in majority Black tracts were really 23% lower, then why are Black buyers not taking advantage of the price discount in majority Black tracts?
4) There has been progress in racial integration. If home values in majority Black neighborhoods were undervalued all else equal, Black homeowners would not have shifted to areas predominantly non-Black.

For details on these case studies, see pages 37-41 in appendix A2.

We also found that Perry and Rothwell's (2021) rebuttal to our critique supported our claim of omitted variable bias, failed to rebuke our methodology, and never addressed our case studies. We also presented solutions based on our findings.

For the full study, see appendix A2 (starting on page 26) and for our rebuttal to Perry and Rothwell, see appendix A3 (starting on page 53).

In **Freddie Mac's note on "Racial and Ethnic Valuation Gaps in Home Purchase Appraisals"**, Freddie Mac noted "substantial appraisal valuations gaps" for minority versus White tracts. While the note described the research as "exploratory" and "preliminary," the language in the press release that went along with the report was, however, stronger: it spoke of a "persistent problem" and implied causality, which Freddie Mac's note never claimed.

AEI Housing Center Critique:

Using a dataset that substantially replicated Freddie Mac's, we were able to demonstrate that rather than being due to racial discrimination by appraisers, we found Freddie's claim of an "appraisal gap" is much more likely the result of would-be first-time buyer inexperience, socio-economic status (SES), or government actions (in particular a concentration of FHA lending in certain census tracts) with a disparate impact on protected classes.

Our analysis, which goes well beyond Freddie Mac's "exploratory research" which used no control variables, concludes that:

[8] The same critique to the Brookings paper also applies to research by Howell and Korver-Glenn (2021) and a recent Redfin post on the same topic.

- We can explain around 85% for Black tracts and 29% for Latino tracts of the gap through differences in SES, leverage, and borrower characteristics. With the full set of control variables, the Black gap disappears entirely, while the Latino gap falls by half.
- The literature provides strong evidence that an appraiser is likely providing some would-be buyers a consumer benefit by providing an appraised value below the contract price, by alerting such buyer that he or she is overpaying on the home, which then usually triggers a renegotiation. This benefit is greater for borrowers with higher LTVs.[9]
- As noted earlier, high leverage federal programs (especially FHA) and suppressed interest rates tend to drive up prices during a seller's market, as they are quickly capitalized into higher prices. Minority FHA-insured borrowers have the most to gain from the consumer-protection benefits of a low appraisal that leads to a renegotiation. All of this was ignored by PAVE.

For the full study, see appendix A4 (starting on page 67).

Research by **Fannie Mae entitled "Appraising the Appraisal: A closer look at divergent appraisal values for Black and white borrowers refinancing their home"** provides a likely, non-race based explanation for the valuation discrepancy found by Freddie Mac.[10] It is worth noting that Fannie Mae's explanation castes a favorable light on the appraisal industry.

Fannie Mae concluded that for refinance applications "Black borrowers refinancing their home on average received a slightly lower appraisal value relative to automated valuation models" and that "the frequency of 'undervaluation' did not have a notable racial pattern."

Interestingly, Fannie Mae (2022) also rebuked the methodological approach in Freddie Mac's research note that was cited by PAVE as one of the three main studies.[11] Fannie Mae also offered an alternative explanation differences in appraisals such as gentrification, which they are still in the process of studying.

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[9] Further, "when a low appraisal occurs, … the probability of downward renegotiation rises to 55.8% and continues steadily to rise as appraised value falls further short of contract, reaching 79.9% when appraised value is short of contract by seven to 8 %" or that "higher LTV borrowers renegotiate more often, in more than 93% of cases for applications with an LTV of 97 when the appraised value's shortfall from contract is greater than 2%. Renegotiation likelihood drops much lower for LTVs of 70 or less, where the low appraisal is less likely to jeopardize the loan". Finally, a low appraisal "sharply raises the probability of downward price renegotiation" and "shows that high LTV borrowers usually recapture the entire difference between contract and appraised value. Borrowers with lower LTV, including unconstrained borrowers, split this difference, giving up more to the seller as constraints loosen."

[10] Williamson, Jake and Mark Palim. "Appraising the Appraisal: A closer look at divergent appraisal values for Black and white borrowers refinancing their home." (2022).

[11] In particular, Fannie Mae wrote that "We chose to study refinance applications, as opposed to home purchase applications, because the appraiser in a refinance transaction typically interacts directly with the homeowner (i.e., the borrower), establishing a pathway for potential bias to influence the appraisal results. The race or ethnicity of the borrower is often disclosed in the loan data, making it possible to directly observe any correlation with value. On the other hand, in a purchase transaction, the appraiser typically does not interact with the buyer (i.e., the borrower) of the property but rather with the seller or the seller's agent. The availability of racial or ethnic data of sellers and real estate agents is limited, thereby making an analysis of valuation differences by different demographics for purchase transactions limited or incomplete relative to the analysis detailed below using refinance transactions." (p.3)

Research by FHA's Kevin Park (2022) found that "minority applicants are more likely to experience underappraisal, but also … that underappraisal has a small effect on the likelihood of endorsement..."[12]

Research by Kermani and Wong (2021) find that "Importantly, absent financial distress, houses owned by minorities do not appreciate at slower rates than houses owned by non-minorities," which again goes counter to the unsubstantiated assertion that underappraisals or appraiser bias are holding Black wealth back.[13] It is rather the role of the federal government's involvement in the housing market and housing finance that has created problem time and time again (more on this below).

Based on this evidence, it is premature and not justified to proceed with this draft bill which would centralize appraisal standards and criteria under a new federal agency.

2) PAVE has provided no evidence from sources using rigorous analysis to support its assertion that there is a recurring pattern of appraiser discrimination

Recent media stories have highlighted individual instances where a second appraisal came in an average of about $126,000 or 25% higher than the initial appraisal after the Black applicants disguised their race. The implication is that intentional and perhaps unintentional appraisal bias is commonplace and the valuation gaps are large. While the facts alleged may well be true, any policy response must be based on whether the cases are the result of "bad apple" appraisers or systemic racial bias. A literature search found no credible statistical analysis to support a claim systemic racial bias.

AEI Housing Center Critique:

To evaluate the claim of systemic racial bias, we assembled a unique dataset with over 240,000 loans for which we knew the race of the borrowers. We used two different approaches and many different robustness checks to see if on average there is a value difference (or a gap) between refinance loan appraisals for Blacks and Whites. Our approach and methodology have recently been validated by Ambrose et al. (2021). They concluded that "contrary to media allegations, our statistical analysis found that racial bias by appraisers on refinance loans is uncommon and not systemic."[14]

Contrary to the stories in the media, our statistical analysis found that racial bias by appraisers on refinance loans is uncommon and not systemic.

While there is no denying that there are individual cases of racial bias, a count of media reports is not a valid sample upon which to base a conclusion. There is likely selection bias and no ability to conclude the cases are representative of all instances.[15] Appraiser bias cases, such as those cited by the media,

[12] Park, Kevin A. "A Comparison of Mortgage Denial and Default Rates by Race, Ethnicity, and Gender." Ethnicity, and Gender (February 7, 2022) (2022).
[13] Kermani, Amir, and Francis Wong. Racial Disparities in Housing Returns. No. w29306. National Bureau of Economic Research, 2021.
[14] Ambrose, Brent W., James Conklin, N. Edward Coulson, Moussa Diop, and Luis A. Lopez. "Does Appraiser and Borrower Race Affect Valuation?" Available at SSRN 3951587 (2021).
[15] In particular, claims of bias should be set in relationship to the purchase price and an appropriate level of home price appreciation (HPA) for the area. In a story on CNN, a Black homeowner purchased "her home for about $100,000 three years ago and, given home price appreciation in her area, she expected her home's value to be about $185,000 when she applied to refinance." Absent any improvements, this implies an expected average

may well result from "bad apple" appraisers or incompetence on both minority and non-minority appraisals.[16]

Our recommendation to regulators and agencies continues to be that same as we suggested 2 years ago:

- Given that a number of regulators and agencies have access to appraiser names, we have suggested that they use our or similar statistical methods to identify, investigate, and root out both appraisers with racial animus and those that are just plain incompetent.

Our recommendation to stakeholders:

- Propose and implement robust apprenticeship and training programs.
- Work with historically Black colleges.
- Adopt much of the VA appraiser and appraisal process, including the VA appraisal management approach, appraiser vetting, the Tidewater initiative (PAVE did mention this initiative favorably), and appraisal preparation guidance.

For the full study, see appendix A5 (starting on page 88).

Other evidence

Fannie Mae (2022) also concluded that for refinance applications "Black borrowers refinancing their home on average received a slightly lower appraisal value relative to automated valuation models" and that "the frequency of 'undervaluation' did not have a notable racial pattern."[17]Interestingly, Fannie Mae (2022) also rebuked the methodological approach in Freddie Mac's research note that was cited by PAVE as one of the three main studies.[18]

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annual HPA of 23% per year, which is about twice the level of 11% HPA for homes in the low price tier in Indianapolis over the same time period. The first appraisal came in at $125,000 and the second at $115,000, which implies an average annual HPA of 8% and 5%, respectively. Eventually after removing all traces of her race from her home and having a White friend stand in, the third appraisal came in at $259,000, which implies an average annual HPA of 37%, an extraordinary level of appreciation absent substantial improvements or purchase at a bargain price.

[16] This shortcoming may be demonstrated by this simple thought experiment. Take 1000 appraisals and assume 100 (10%) are performed by incompetent appraisers. Further assume for simplicity that there are 800 White borrowers and 200 Black borrowers. Also assume that 80 (10%) of the White and 20 (10%) of the Black borrower appraisals were done by an incompetent appraiser. Now assume that 20 of the White and 5 of the Black borrowers with appraisals done incompetently complain to the media. The media find the stories of 5 Black borrowers to be newsworthy and the stories of the 20 White borrowers not to be of interest. A search of the resulting media reports would come up with 5 stories, all from Black borrowers and all done by incompetent appraisers. And the erroneous conclusion would be that this proves systemic racism by appraisers.

[17] Williamson, Jake and Mark Palim. "Appraising the Appraisal: A closer look at divergent appraisal values for Black and white borrowers refinancing their home." (2022).

[18] In particular, Fannie Mae wrote that "We chose to study refinance applications, as opposed to home purchase applications, because the appraiser in a refinance transaction typically interacts directly with the homeowner (i.e., the borrower), establishing a pathway for potential bias to influence the appraisal results. The race or ethnicity of the borrower is often disclosed in the loan data, making it possible to directly observe any correlation with value. On the other hand, in a purchase transaction, the appraiser typically does not interact with the buyer (i.e., the borrower) of the property but rather with the seller or the seller's agent. The availability of racial or ethnic data of

A FHFA blog post, which was prominently cited by PAVE as evidence of pervasive bias, stated that in their "review of appraisals, we have observed references to race and ethnicity in the 'Neighborhood Description' and other free-form text fields in the appraisal form." FHFA concluded that the use of such references is evidence of bias as the "racial and ethnic composition of the neighborhood should never be a factor that influences the value of a family's home" and released 16 specific examples.

While we all can agree with FHFA's statement that "racial and ethnic composition of the neighborhood should never be a factor that influences the value of a family's home", the blog post failed to provide any specifics as to the frequency of such occurrences. It only stated:

> From millions of appraisals submitted annually, a keyword search resulted in thousands of potential race-related flags. Individual review finds many instances of keywords to be false positives, but the following are [16] examples of references when the appraiser has clearly included race or other protected class references in the appraisal.

The blog post was conspicuous in failing to provide any information that would allow the reader (or PAVE) to determine the frequency of such occurrences. Did it occur 5 times per million (0.0005%) or 50,000 times per million (5%)? The policy solutions would be quite different for the first level of incidence versus the second.

We have outlined a statistical approach that would allow FHFA, Fannie Mae, and Freddie Mac to identify bad actors today, be they biased or incompetent. These data should be anonymized and made available to independent researchers to verify. Bad actors should be removed immediately from the profession by the appropriate regulator. A failure to proceed in this common sense fashion would confirm a lack of interest in getting to the truth and that the real goal is to provide of an excuse to centralize appraisal valuation standards and appraiser criteria in the federal government.

For the outline of this approach, please refer to page 104 in appendix A5.

3) **Many housing task forces and congressional actions have contributed to the racial wealth gap we find ourselves in today. This might serve as a warning for many of today's proposed policies.**

HUD, and its predecessors, have played a major role in perpetuating segregation and racial wealth disparities. As noted by PAVE throughout the 20th century, the "federal…government systematically implemented discriminatory policies that led to housing segregation." Not mentioned by PAVE were:

- the U.S. Commerce Department's role in implementing a zoning regime designed to keep Black and ethnic-minorities out of single-family detached neighborhoods (see Chapter 1, AEI Light Touch Density E-Book),
- the 1949 Housing Act which resulted in the high-rise public housing and urban renewal programs, both of which worked to the great detriment of Black households and neighborhoods,

sellers and real estate agents is limited, thereby making an analysis of valuation differences by different demographics for purchase transactions limited or incomplete relative to the analysis detailed below using refinance transactions." (p.3)

- the 1967 Presidential Task Force on Housing and Urban Development (headed by HUD Secretary Weaver), which proposed a 10-year housing program to eliminate all substandard housing in the U.S., which program was enacted in the 1968 Housing and Urban Development Act, the consequences of which led to HUD and FHA destroying many American cities, especially Black neighborhoods (Cities Destroyed Cash: The FHA Scandal at HUD),
- the Tax Reform Act of 1986, which created the Low Income Housing Tax Credit, which has perpetuated racial segregation (Chicago tax credit program mostly produces affordable housing in poor black areas, March 15, 2021),
- the Federal Housing Enterprises Financial Safety and Soundness Act of 1992, which granted HUD the authority to set affordable housing mandates for Fannie Mae and Freddie Mac, and
- HUD's 1995 National Homeownership Strategy: Partners in the American Dream, which led to over 10 million foreclosures and did much to create the wealth disparities Blacks now face. All of these failures may be traced to HUD, or its predecessor agencies responsible for federal housing policy.

Despite as PAVE claimed "extensive consultation with subject matter experts and leaders across industry, academia, trade and civil rights groups, and government," PAVE ignored a large body of research as outlined above.

And while the PAVE report openly admits that "the exact number of instances of valuation bias is difficult to assess," it arrives at a conclusions that "homeownership is often hindered by inequities within current home lending and appraisal processes, which research shows disproportionately impact people in communities of color." It is questionable at best how PAVE could arrive at its conclusions when its own report states that "lack of access to complete data has been a hindrance to research on appraisal disparities and on the impact of racial and ethnic bias in appraisals."

It seems to suggest that the Biden administration and the media had concluded even before the work of the task force began that there is systemic racial discrimination in the housing market, including systemic racism and bias in housing valuations and property appraisals.

This is clear when, on June 1, 2021, President Biden established the Property Appraisal and Valuation Equity (PAVE) Task Force to be directed by HUD Secretary Marcia Fudge:

> "The Administration will take action to address racial discrimination in the housing market, including by launching a first of-its-kind interagency effort to address inequity in home appraisals, and conducting rulemaking to aggressively combat housing discrimination…."[19]

Again from the readout from PAVE's first meeting held on August 5, 2021 stated:

> "Task Force members discussed how current appraisal practices are a significant contributor to the disparity in housing values. The practice of comparing properties within similar

[19] https://www.whitehouse.gov/briefing-room/statements-releases/2021/06/01/fact-sheet-biden-harris-administration-announces-new-actions-to-build-black-wealth-and-narrow-the-racial-wealth-gap/

neighborhoods can be a proxy for racial demographics, which leads to the perpetuation and exacerbation of the legacy of segregation and redlining."[20]

The above statements are not supported by credible data and research and making housing and valuation policy based upon such statements would likely do lasting harm to minority borrowers (and low-income borrowers generally).

Based on the debunked Brookings and Freddie Mac research and the data availabilities that currently exist, the federal government has not proven the need for a new centralized behemoth. It is highly questionable that PAVE's proposals will address racial and ethnic differences in homeownership rate, financial returns of owning a home, and median wealth. In some cases, they may make these differences worse or take the pressure off in finding effective solutions, which could ultimately end in disaster for minorities, just like many task forces and housing bills before.

4) The importance of socio-economic status (SES)

Rather than PAVE's finding of "inequities within current home lending and appraisal processes, which research shows disproportionately impact people in communities of color" the real culprit are inequities in SES, which PAVE acknowledges when it states that "[m]uch of the gap in rates of homeownership can be traced to socio-economic factors that differ on average between Black and white homeowners." While lower SES certainly reflects a legacy of past racism and lingering racial bias, which leaves Blacks at a large income and wealth disadvantage relative to most Whites, PAVE should have addressed this in its policy recommendations. Thus, the PAVE Action Plan, by misdiagnosing the causes of the racial gap, will likely lead to unintended consequences as the Action Plan does not address the root problem.

We agree with PAVE that we ought to support opportunities for income and wealth growth among lower-income households. PAVE proposed 21 agency actions. However none of them address the root cause of lower SES, and instead addressed unsubstantiated claims of systemic bias and racism in the housing finance sector.

Based on an objective diagnosis of symptoms and causes using rigorous data analysis, we propose the following solutions:

The housing policy solutions are:

- Building generational wealth through sustainable homeownership for low SES households by reducing leverage for aspiring low-income home buyers.
- Increasing supply and reducing income stratification through Light Touch Density.
- Promoting Walkable Oriented Development in existing neighborhoods with a mix of residential and commercial properties.

Other policy solutions, which might be explored, are:[21]

[20] https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/05/readout-of-the-first-interagency-task-force-meeting-on-property-appraisal-and-valuation-equity-pave/

[21] Many thanks to our AEI colleagues Naomi Schaefer Riley and Angela Rachidi for many of these ideas. Please see their thoughtful analysis: https://reason.com/2021/02/24/fix-family-poverty-with-free-markets-for-once/

- Encouraging two parents in households with children (single-parent households have been found to be a significant SES factor by a wide ranch of academic researchers).
- Enacting occupational licensing reforms and allowing small businesses to be run out of one's home (this has been found to be a significant barrier to low SES households).
- More economical childcare by rolling back burdensome government regulations (childcare costs are a significant barrier to gainful employment by low SES households).
- Real school choice for access to quality elementary and secondary education (racial and ethnic minorities would benefit greatly from real school choice).
- Improving access to technical and apprenticeship training (this would open up access by low SES households to these well-paying jobs).
- Encouraging state and local governments to address public investment disparities relating to minority and lower income neighborhoods.

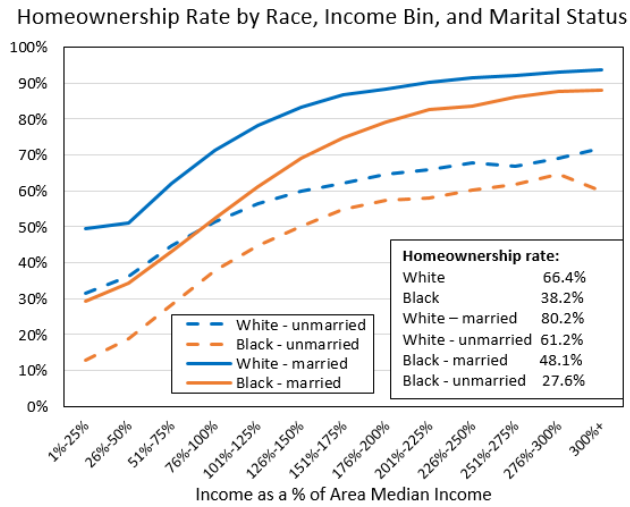
Recognizing the importance of SES factors is key to fashioning appropriate public and private responses. A misdiagnosis that focuses on other factors will not address the root problem and could potentially lead to unintended consequences. We must be mindful that many public policies aimed at addressing racial discrimination have had unintended consequences that have done substantial harm to low-income households generally, and minority households in particular.

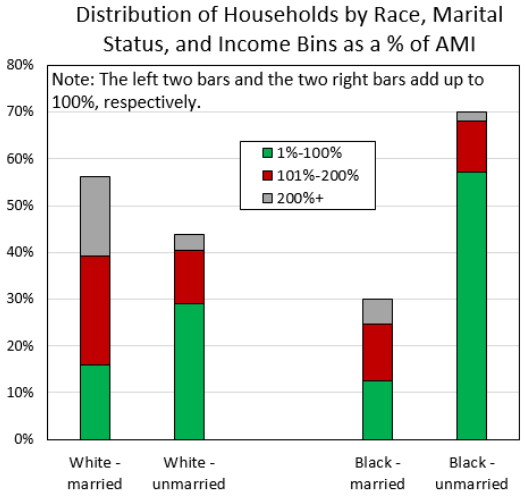
Marital Status and Income Are Key Drivers of the Homeownership Rate by Race

The Black homeownership (HO) rate is much lower than the White HO rate, but the difference gets smaller as income grows. The HO rate for White or Black married households (HH) is much higher than for unmarried White or Black HH (left panel).

There is a big disparity by marital status between Blacks and Whites. Unmarried Black HH comprise 70% of Black HH, and the vast majority are below area median income (right panel).

Policy challenge: Reduce income and marital status disparities between Black and White HH.





Note: Data are for urban household heads aged 25-65 and exclude widowed households.
Source: Census Bureau and AEI Housing Center, www.AEI.org/housing.

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For the full a lengthier discussion of the policy solutions, see appendix A2 (starting on page 26).

5) Foreclosure-prone affordable housing policies have contributed to the racial wealth gap we find ourselves in today.

Foreclosure-prone affordable housing policies for single-family lending have subsidized debt by providing excessive leverage. These policies have been primarily targeted at low-income and minority homebuyers and began in 1954, when Congress authorized the 30-year loan for use on existing FHA home loans. Congress also raised loan-to–value (LTV) limits around the same time. The average FHA loan term and LTV in 1954 was 21.4 years and 79.9%. These rose to 27 years and 90% by 1959.

Congress doubled down on this policy with the passage of the Federal Housing Enterprises Financial Safety and Soundness Act of 1992, which would have a devastating effect. During the Financial Crisis, these policies contributed to at least 10 million or more foreclosures, which were proportionally higher in low-income and minority neighborhoods. For example, the 27% foreclosure rate in low-income census tracts (defined as <80% of area median income) was 1.5 times as high as the 18% foreclosure rate in high-income census tracts (defined as ≥120% of area median income). Similarly, the foreclosure rate of 30% in census tracts with a Black and/or Hispanic share of households of at least 50% was twice as high as the 16% foreclosure rate in census tracts with a Black and/or Hispanic share of households of less than 10%.

Table: Foreclosure Rate by Neighborhood Type

Census Tract to Area Median Income Ratio	Foreclosure Rate
<80%	27%
80% - <120%	22%
≥120%	18%
All	22%

Census Tract Black and/or Hispanic share	Foreclosure Rate
≥50%	30%
20% - <50%	24%
10% - <20%	18%
<10%	16%

Note: Foreclosure rate is for loans originated between 2004 and 2008.
Source: LLMA and AEI Housing Center.

Yet, the homeownership rate in 2020:Q4 was 65.8%, only marginally higher than the rate of 63.0% in 1964:Q4.[22] Today, the federal government's twin legacy of racially-motivated zoning and poorly designed affordable housing policies continue to make the housing market separate and unequal.

This is the paradox of accessible lending: When supply is constrained, credit easing will make entry-level homes less, not more, affordable. Credit easing merely permits one borrower to bid up the price against another would be buyer for a scarce good.[23] Thus, much of the credit easing that these federal policies provided are quickly capitalized into higher home prices. This is especially pertinent for entry-level homes, which are perennially in short supply. This puts upward pressure on home prices, does not expand access, and is dangerous; concepts we have had to learn and relearn.

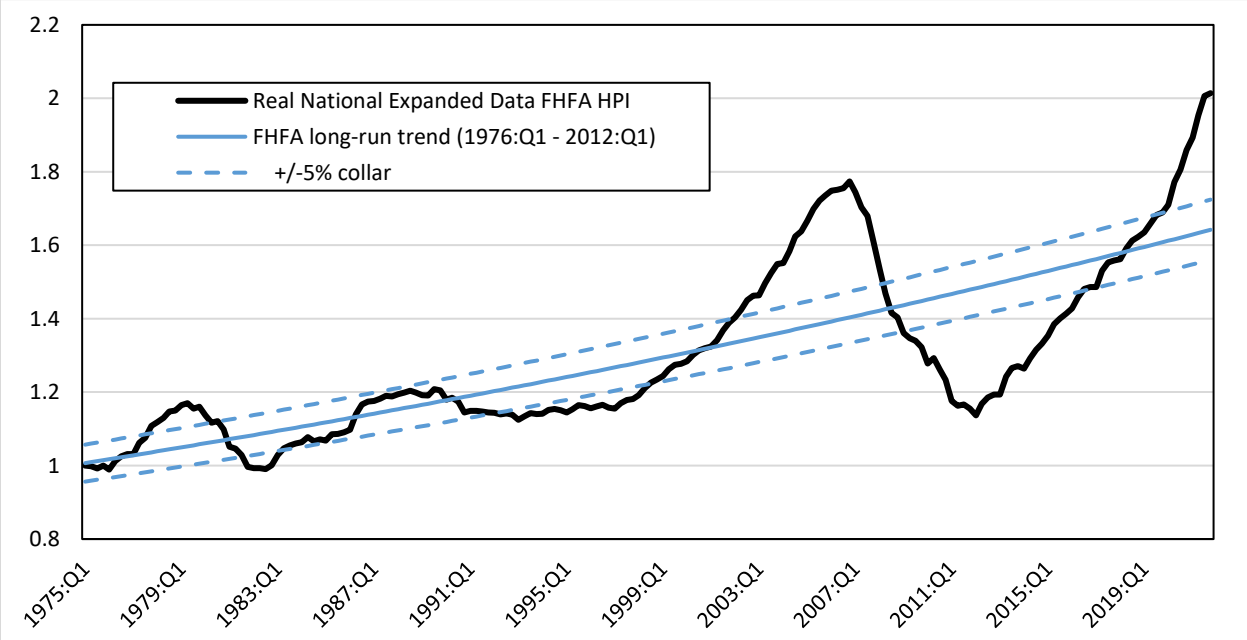
[22] Pinto, "Housing finance fact or fiction? FHA pioneered the 30-year fixed rate mortgage during the Great Depression?" June 2015, https://www.aei.org/economics/housing-finance/housing-finance-fact-or-fiction-fha-pioneered-the-30-year-fixed-rate-mortgage-during-the-great-depression/
[23] Fed Chairman Marriner Eccles, Federal Reserve Bulletin, The Current Inflation Problem, 1947.

An NBER paper by Kermani and Wong (2021) has looked at the evidence in detail. It is worth quoting their abstract in full:[24]

> We document the existence of a racial gap in realized housing returns that is an order of magnitude larger than disparities arising from housing costs alone, and is driven almost entirely by differences in distressed home sales (i.e. foreclosures and short sales). Black and Hispanic homeowners are both more likely to experience a distressed sale and to live in neighborhoods where distressed sales erase more house value. Importantly, absent financial distress, houses owned by minorities do not appreciate at slower rates than houses owned by non-minorities. Racial differences in income stability and liquid wealth explain a large share of the differences in distress. We use quasi-experimental variation in loan modifications to show that policies that restructure mortgages for distressed minorities can increase housing returns and reduce the racial wealth gap.

Yet, merely a decade after the last housing crash, the country is in the midst of yet another housing boom already nine years in the making and which according to Nobel Laureate Robert Shiller was "already gigantic" by 2018.[25] The Federal Housing Finance Agency has developed a measure of the current state of the housing market in terms of the long-term inflation-adjusted home price trend. We are well above the long term trend and home prices are expected to continue to significantly increase in 2021 and likely 2022. An extended price boom not only makes homes unaffordable, but also promotes price volatility and unforgiving mean reversion.

Chart: Inflation-adjusted National Home Price Index with FHFA's Long-run Trend and Collar



Source: FHFA and AEI Housing Center.

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

[25] Robert Shiller, "The Housing Boom Is Already Gigantic. How Long Can It Last?" NYT Dec. 7, 2018.

Based on an objective diagnosis of symptoms and causes using rigorous data analysis, we propose the following solutions:

- Eliminate demand boosters as they create unaffordability until balance between supply and demand has been restored:
    - Congress should task FHA, not the GSEs, with guaranteeing loans for high-risk, low-income borrowers.
        - FHA should limit mortgage default risk at loan origination through the use of shorter loan terms.
        - HUD should study how to increase borrower resiliency by examining the effectiveness of the residual income test, month's reserves at closing, the Massachusetts Housing Finance Agency unemployment program, and a loan with a reserve accumulation component. In all cases, the data should be made available to private researchers for independent study and evaluation.
    - FHFA should set a limit on mortgage default risk at loan origination.
        - The MDR is a comprehensive stressed default rate, which represents the worst-case scenario stress test similar to a car crash test or a hurricane safety rating. The NMDR has shown to be incredible predictive of loan defaults during the COVID- 19 pandemic.[26]
        - The MDR would also help end policies, especially risk layering, that have had a disparate impact on low-income households, especially ones of color, and would therefore affirmatively further fair housing under the Fair Housing Act.
- Shrink the government's footprint in the housing market.
- Do not relax underwriting standards in an overheated housing market
    - It has been tried many times since 1954 and has not worked.
    - There is a growing consensus that the way to make housing more affordable is to increase supply, not to ease credit, increase government subsidies, or suppress interest rates.
    - Yet, rather than shrinking the government's footprint or reducing risk, Fannie has already increased risk layering and FHFA has recently made policy changes that increases GSE competition with the private sector and will lead to greater risk-layering. Many other changes are being discussed such as:
        - June 2021: CFPB delayed the mandatory compliance data of the QM rule until Oct 1, 2022. The CFPB's 2020 replacement of the QM rule with a new standard based on the Average Prime Offer Rate) would similarly relax underwriting requirements and thus promote higher risk loans and unsustainable home price appreciation. The same applies to an expansive stand-alone DTI limit.
        - August 2021: FHA updated its student loan monthly payment calculations.
        - August 2021: FHFA proposed new benchmark level for minority & low-income tracts home purchase in 2022-24.
        - September 2021: Fannie and Freddie suspended limits on second homes and investment properties, and risk layering limits on loans due to higher risk characteristics

[26] https://www.aei.org/housing/mortgage-risk-index/

- September 2021: Fannie started to include rental payment history in its risk assessment processes.
- Possible for 2022:
    - Pressures on FHA are building to lower FHA's current level of mortgage insurance premiums (MIP). Secretary Fudge has for the moment ruled out a cut to the MIP, but if a cut were to be implemented during an overheated housing market, it would have similar consequences as the 2015 MIP cut, which drove up prices and did not materially expand homeownership.[27] A move such as this would restart a dangerous bidding war between FHA and the GSEs, who would be facing higher affordable housing goals for low-income and minority borrowers, which leads a race to the bottom in terms of lending standards.
    - Acting FHFA Director Thompson announced in September 2021 that "the agency is weighing changes to the loan-level price adjustments enacted in 2008 to help the government-sponsored enterprises manage risk."[28]

Each one of these proposals on its own seems innocuous. However, the accumulation and combination of them should raise alarms.

With new leadership at federal agencies and regulators, a concerted effort to lower underwriting standards again – as happened during the 1990s and 2000s – seems to be underway.

Raising the Affordable Housing Goals requires lessening criteria on risk layering, otherwise the goals could not achieve much. At the same time, the effort to bring in higher-risk borrowers requires larger cross-subsidies, which requires lower changes to the LLPAs.

While lower-income Americans are being crowded out of the housing market (more below), bringing them back by lowering underwriting standards through a concerted efforts by federal agencies and regulators is a recipe for disaster and risks creating more housing risk. This will put the exact people the policies are intended to help into harm's way.

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[27] At the time, the FHA claimed that the premium drop would result in 250,000 new first-time buyers over the next three years, and save each FHA buyer $900 annually. Our research found that home prices went up by about 2.5% for FHA borrowers. These borrowers had to use part their new found "wealth" — obtained by paying lower FHA insurance premiums —to pay for the higher house price. Prices also went up for non-FHA buyers in neighborhoods with FHA insured sales. After all, it is one housing market, where borrowers, no matter the financing, compete for houses. This caused the non-FHA buyers, who did not receive the benefit of lower premiums, to largely offset the price increase by buying a home of lesser quality (perhaps a smaller home, a smaller lot, or in a different location) – they were the clear losers. We estimate that about 500,000 of these non-FHA borrowers were first-time homebuyers. Each of these non-FHA homebuyers paid approximately $6,200 extra per house, a total extra payment of about $3.1 billion. From a cost-benefit perspective, this averages to an incredible $180,000 for each of the roughly 17,000 new FHA first-time buyers! The big winners were the realtors who received hundreds of millions of dollars in higher commissions from higher prices. For more, see Davis, Oliner, Peter, and Pinto, The impact of federal housing policy on housing demand and homeownership: Evidence from a quasi-experiment, http://www.aei.org/wp-content/uploads/2018/01/Oliner-homeownership-WP-Update.pdf?x91208

[28] https://www.americanbanker.com/news/fhfa-weighs-cutting-price-adjustment-fees-on-fannie-and-freddie-loans

Equally worrisome are increases to the GSEs appraisal waiver practices, particularly purchase loans. In the past, human appraisals have successfully alerted lower-income and minority borrowers when they were overpaying. An appraisal waiver may simply confirm the negotiated sale price, while the competition between Fannie and Freddie for market share may create a race to the bottom on standards – not to mention that these processes can be gamed, which was commonplace with respect to the GSEs automated underwriting systems in the lead up to the Financial Crisis.

6) The crowding out of low- and moderate-income and minority borrowers

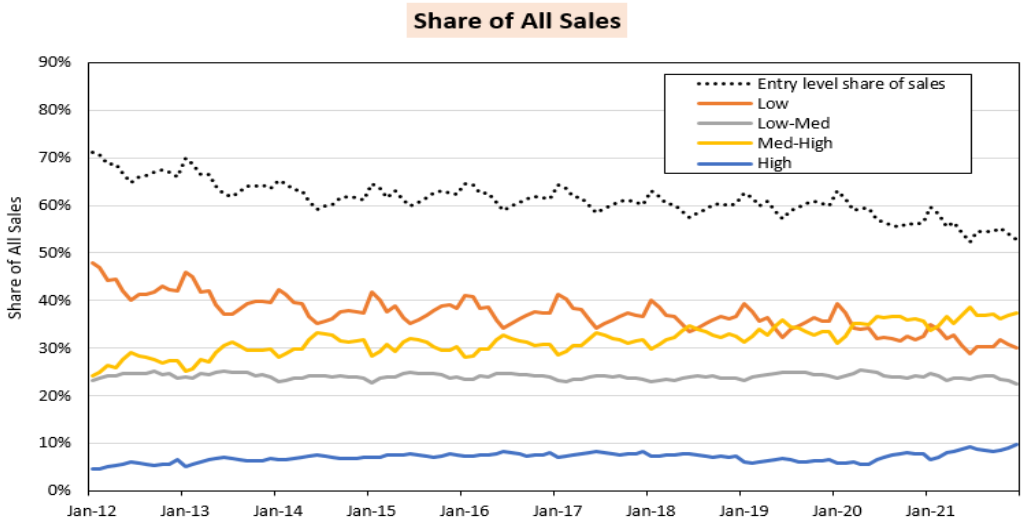
These federal housing policies, including the Fed's role in artificially lowering interest rates through its easy monetary policy during a seller's market, have contributed to rapidly rising home prices. These high prices are having the effect of increasingly crowding out lower-income and minority would-be homebuyers out of the housing market. It begs the question how these individuals should ever be able to accumulate wealth if they cannot get on the first rung of the housing ladder.

Here is a list of data on the recent single-family housing boom, which started in 2012:

- Uninterrupted seller's market since 2012, which is now the longest ever recorded.
- Housing supply is currently at its lowest level ever. In December 2022 the months' supply of low- and low-median price tiers was 0.9 and 1.0 months respectively. Traditionally about 75% of homes at these price points are first-time buyers.
- Since 2012, home price appreciation has far outpaced the growth in market fundamentals (wages, construction cost, rents).
- Since 2012, home prices have appreciated 102%. Entry-level prices are up even more (118%).
- Home price appreciation (HPA) has further accelerated in the aftermath of the pandemic.
    - Since Jan. 2020 prices are up 27%.

<u>Example 1:</u>

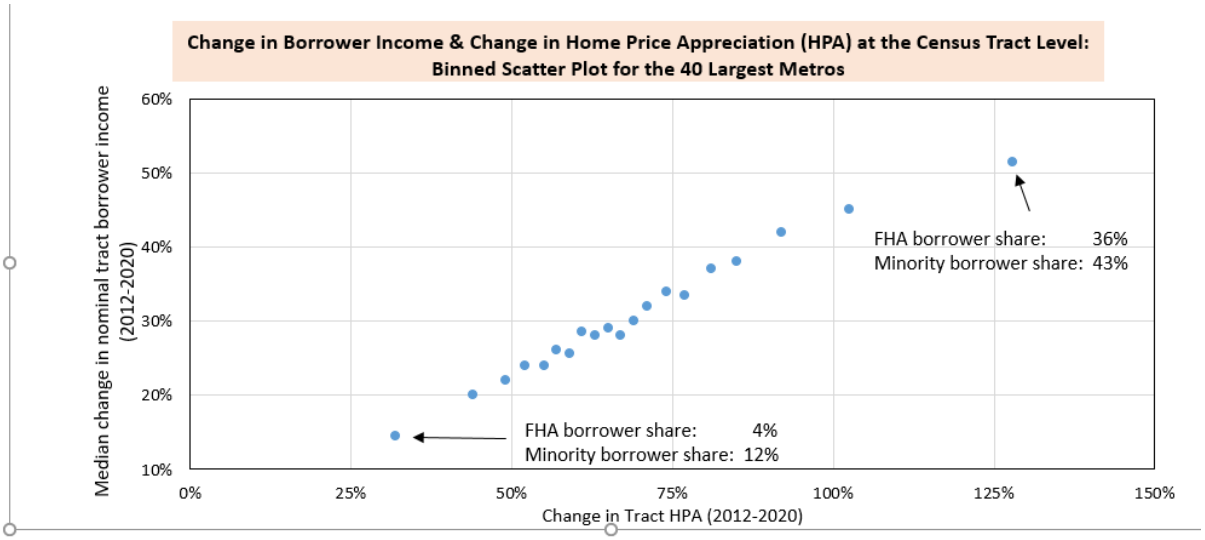
The entry-level share of home sales has been declining from 71% in Jan. 2012 to 53% in Dec. 2021.



Source: AEI Housing Center.

Example 2:

- For census tracts with the fastest HPA (+125% since 2012), we observe borrower income growth (+50%) twice the rate of the national income growth (~27%).
    - Unfortunately, it is highly implausible that the incomes for this group of borrowers has gone up that fast.
    - What is more likely happening is that due to the rapid price spiral, a different mix of buyers is buying in these neighborhoods.
    - For example:
        - In 2012, the borrowers purchasing in census tract A had a median income of $40,000.
        - By 2020, these borrowers should be making $51,000 according to wage statistics from the Atlanta Fed.
        - However in 2020, we observe that the borrowers now purchasing in census tract A have a median income of $61,000.
        - Had the borrowers from 2012 not purchased in 2012, but rather tried to purchase in 2020, their income would not have sufficed to compete with the higher income borrowers that actually purchased in 2020.
- The census tracts with the fastest HPA also had the highest share of FHA purchase loans (an indicator for lower-income) and minority borrowers.



Note: Tracts are weighted by their respective loan counts. Binned scatter plot accounts for differences in metros. FHA and minority borrower shares are for 2020. HPA stands for constant-quality home price appreciation
Source: HMDA and AEI Housing Center, www.AEI.org/housing.

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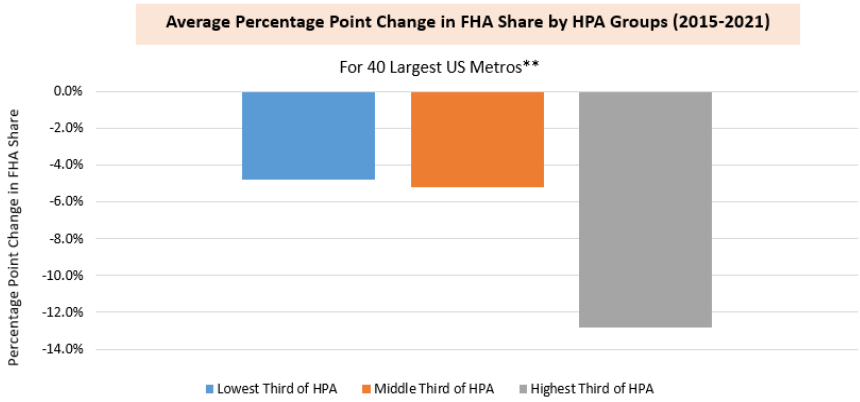
Example 3:

- The top one-third of large metros with the highest growth in HPA have seen a 13 percentage point reduction in FHA purchase loan share compared to a 6 percentage point reduction for the two-thirds of metros with lower levels of HPA.
- Since FHA is a proxy for lower-income and minority borrowers, this trend is indicative of substantial crowding out of low income and minority potential home buyers.



* FHA purchase share is used as a proxy for lower income, minority, first-time, and first-generation borrowers
Metro Cities in Lowest Third HPA Category: Baltimore, MD; Chicago, IL; Cincinnati, OH; Cleveland, OH; Houston, TX; Kansas City, MO; New York, NY; Philadelphia, PA; Pittsburgh, PA; Raleigh, NC; San Antonio, TX; St. Louis, MO; Virginia Beach, VA; Washington, DC.
Metro Cities in the Middle Third HPA Category: Austin, TX; Boston, MA; Cape Coral, FL; Charlotte, NC; Columbus, OH; Dallas, TX; Detroit, MI; Indianapolis, IN; Jacksonville, FL; Los Angeles, CA; Miami, FL; Minneapolis, MN; North Port, FL.
Metro Cities in Highest Third HPA Category: Atlanta, GA; Denver, CO; Las Vegas, NV; Nashville, TN; Orlando, FL; Phoenix, AZ; Portland, OR; Riverside, CA; Sacramento, CA; San Diego, CA; San Francisco, CA; Seattle, WA; Tampa, FL.

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Source: American Community Survey, Public Records, and AEI Housing Center, www.AEI.org/housing.

The conclusion is that because of an out of control price spiral there is increased competition for fewer and fewer affordable homes. Potential entry-level buyers are increasingly pushed to the sidelines as they cannot compete with more deep pocketed individuals, who experience the same competition only higher up the price spectrum, and so on. As home prices rise faster than incomes, it will permanently price low-income and minority households out of areas of opportunity. These trends are indicative of the crowding out of low income and minority potential home buyers, which results from the house price boom due to federal monetary and housing policies. It is a violation of the Fair Housing Act.

Appendices:

AEI Housing Center

Comments on PAVE's "Action Plan to Advance Property Appraisal and Valuation Equity: Closing the Racial Wealth Gap by Addressing Mis-valuations for Families and Communities of Color"

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March 2022

On March 23rd, the Interagency Task Force on Property Appraisal and Valuation Equity and, which is composed of thirteen federal agencies and offices, released its report entitled "Action Plan to Advance Property Appraisal and Valuation Equity: Closing the Racial Wealth Gap by Addressing Mis-valuations for Families and Communities of Color."

Commentary on PAVE's conclusion:

PAVE concluded that "Homeownership is often hindered by inequities within current home lending and appraisal processes, which research shows disproportionately impact people in communities of color."

As noted in the Executive Summary, the report largely rests on three studies for its conclusion: (i) a report by the Brookings Institution, (ii) a note by Freddie Mac, and (iii) a blog post by FHFA.[1] In our work, we have issued lengthy critiques that discredit the first two studies (see our rebuttal to Brookings and to Freddie Mac) and now take the opportunity to respond to the FHFA study.[2] Here is a summary of our findings:

The Brookings and Freddie Mac studies are not based on rigorous data analysis. Most importantly, they conflate race with socio-economic status (SES), i.e. income, buying power, marriage rates, credit scores, etc. **Race-based gaps found in the Brookings and Freddie Mac studies either entirely or substantially disappear when adjusting for differences in SES.** Furthermore, our analyses show that similar gaps are present in majority White or White-only tracts across different SES levels, raising serious questions regarding a race-based explanation.[3] We also addressed a rebuttal from the Brookings authors to our critique. We found that Perry and Rothwell's (2021) rebuttal to our critique supported our claim of omitted variable bias, failed to rebuke our methodology, and never addressed our case studies. We also presented solutions based on our findings. The Freddie Mac study took pains to state that its research was both "exploratory" and "preliminary". Yet PAVE accepted Freddie Mac's findings at face value, even

[1] Interagency Task Force on Property Appraisal and Valuation Equity (PAVE), *Action Plan to Advance Property Appraisal and Valuation Equity: Closing the Racial Wealth Gap by Addressing Mis-valuations for Families and Communities of Color*, March 24, 2022, pp. 2-3.
[2] Despite the AEI Housing Center having undertaken a significant body of research on the topic of racial bias in housing finance over a course of years and notwithstanding efforts to engage with PAVE and some of its members, we were unable to engage with PAVE and our work was not mentioned in the report. Yet, PAVE stated that "[o]ver the past 180 days, the Task Force has undertaken a collaborative and comprehensive approach toward identifying actions to address appraisal bias. This approach involved extensive consultation with subject matter experts and leaders across industry, academia, trade and civil rights groups, and government."
[3] The same critique to the Brookings paper also applies to research by Howell and Korver-Glenn (2021) and a recent Redfin post on the same topic.

though research by Fannie Mae provides a likely, non-race based explanation for the valuation discrepancy found by Freddie Mac. It is worth noting that Fannie Mae's explanation casts a favorable light on the appraisal industry.

This conflation by both Brookings and Freddie Mac is of critical importance. While there is agreement regarding the symptoms observed by PAVE--racial and ethnic differences in the homeownership rate, the financial returns of owning a home, and median wealth levels--ascertaining the causes and workable solutions requires a competition of ideas.[4] PAVE excluded research that was inconvenient or inconsistent with the desired narrative and conclusion.[5]

The FHFA blog post, which we have not addressed until now, stated that in their "review of appraisals, we have observed references to race and ethnicity in the 'Neighborhood Description' and other free-form text fields in the appraisal form." FHFA concluded that the use of such references is evidence of bias as the "racial and ethnic composition of the neighborhood should never be a factor that influences the value of a family's home" and released 16 specific examples.

While we all can agree with FHFA's statement that "racial and ethnic composition of the neighborhood should never be a factor that influences the value of a family's home", the blog post failed to provide any specifics as to the frequency of such occurrences. It only stated:

> From millions of appraisals submitted annually, a keyword search resulted in thousands of potential race-related flags. Individual review finds many instances of keywords to be false positives, but the following are [16] examples of references when the appraiser has clearly included race or other protected class references in the appraisal.

Without more information, one is unable to discern whether this is evidence of a few bad apples or systemic behavior. This is made all the more problematic given that there is other evidence showing no systemic appraisal bias. Unfortunately, PAVE ignored that body of research, to wit:

- AEI Housing Center (2021) found that racial bias by appraisers on refinance loans is uncommon and not systemic. To evaluate the existence of bias, the AEI Housing Center assembled a unique dataset with over 240,000 loans for which we knew the race of the borrowers.
- Ambrose et al. (2021) concluded that "contrary to media allegations, our statistical analysis found that racial bias by appraisers on refinance loans is uncommon and not systemic."[6]
- Fannie Mae (2022) concluded that for refinance applications "Black borrowers refinancing their home on average received a slightly lower appraisal value relative to automated valuation

[4] The University of Wisconsin Board of Regents stated this concept best over 125 years ago: *"Whatever may be the limitations which trammel inquiry elsewhere, we believe that the great state University of Wisconsin should ever encourage that continual and fearless sifting and winnowing by which alone the truth can be found."* https://news.wisc.edu/sifting-and-winnowing-turns-125/

[5] This goes back to when President Biden in his January 26, 2021 "Memorandum on Redressing Our Nation's and the Federal Government's History of Discriminatory Housing Practices and Policies" for the Secretary of HUD cited as fact "a persistent undervaluation of properties owned by families of color." Thus, PAVE would need to conform to the President's stated narrative, notwithstanding strong evidence to the contrary. https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/26/memorandum-on-redressing-our-nations-and-the-federal-governments-history-of-discriminatory-housing-practices-and-policies/

[6] Ambrose, Brent W., James Conklin, N. Edward Coulson, Moussa Diop, and Luis A. Lopez. "Does Appraiser and Borrower Race Affect Valuation?" Available at SSRN 3951587 (2021).

models" and that "the frequency of 'undervaluation' did not have a notable racial pattern."[7]Interestingly, Fannie Mae (2022) also rebuked the methodological approach in Freddie Mac's research note that was cited by PAVE as one of the three main studies.[8]

Our conclusion is that PAVE has misdiagnosed the problem.[9] PAVE proposed 21 agency actions. It is highly questionable that these will address racial and ethnic differences in the homeownership rate, the financial returns of owning a home, or median wealth levels. In some cases, they may make these differences worse or take the pressure off in finding effective solutions. It also must be noted that HUD and its predecessors have played a major role in perpetuating segregation and racial wealth disparities.[10] This alone should give pause to any objective reader of the PAVE report.

Rather than PAVE's finding of "inequities within current home lending and appraisal processes, which research shows disproportionately impact people in communities of color," the real culprit is inequities in SES, which PAVE acknowledges when it states that "[m]uch of the gap in rates of homeownership can be traced to socio-economic factors that differ on average between Black and white homeowners." While lower SES certainly reflects a legacy of past racism and lingering racial bias, which leaves Blacks at a large income and wealth disadvantage relative to most Whites, PAVE should have addressed this in its

[7] Williamson, Jake and Mark Palim. "Appraising the Appraisal: A closer look at divergent appraisal values for Black and white borrowers refinancing their home." (2022).

[8] In particular, Fannie Mae wrote that "[w]e chose to study refinance applications, as opposed to home purchase applications, because the appraiser in a refinance transaction typically interacts directly with the homeowner (i.e., the borrower), establishing a pathway for potential bias to influence the appraisal results. The race or ethnicity of the borrower is often disclosed in the loan data, making it possible to directly observe any correlation with value. On the other hand, in a purchase transaction, the appraiser typically does not interact with the buyer (i.e., the borrower) of the property but rather with the seller or the seller's agent. The availability of racial or ethnic data of sellers and real estate agents is limited, thereby making an analysis of valuation differences by different demographics for purchase transactions limited or incomplete relative to the analysis detailed below using refinance transactions." (p.3)

[9] At times, PAVE tried to have it both ways. On the topic of undervaluation, which is the main focus in the Freddie Mac analysis because of the negative impact on minority home buyers, the PAVE report stated that a lower appraisal can be beneficial to the buyer but hurtful to the seller as "it limits the seller's realized home equity gains and therefore impacts the seller's wealth." (p.15)

[10] As noted by PAVE, throughout the 20th century the "federal…government systematically implemented discriminatory policies that led to housing segregation." Not mentioned by PAVE was the U.S. Commerce Department's role in implementing a zoning regime designed to keep Black and ethnic-minorities out of single-family detached neighborhoods (see Chapter 1, AEI Light Touch Density E-Book), the 1949 Housing Act which resulted in the high-rise public housing and urban renewal programs, both of which worked to the great detriment of Black households and neighborhoods, the 1967 Presidential Task Force on Housing and Urban Development (headed by HUD Secretary Weaver), which proposed a 10-year housing program to eliminate all substandard housing in the U.S. (source: Lyndon Johnson Library), that was enacted in the 1968 Housing and Urban Development Act, the consequences of which led to HUD and FHA destroying many American cities, especially Black neighborhoods (Cities Destroyed Cash: The FHA Scandal at HUD), the Tax Reform Act of 1986, which created the Low Income Housing Tax Credit, which has perpetuated racial segregation (Chicago tax credit program mostly produces affordable housing in poor black areas, March 15, 2021), the Federal Housing Enterprises Financial Safety and Soundness Act of 1992, which granted HUD the authority to set affordable housing mandates for Fannie Mae and Freddie Mac, and HUD's 1995 National Homeownership Strategy: Partners in the American Dream, which led to over 10 million foreclosures and did much to create the wealth disparities Blacks now face. All of these failures may be traced to HUD, or its predecessor agencies responsible for federal housing policy.

policy recommendations. Thus, the PAVE Action Plan, by misdiagnosing the causes of the racial gap, will likely lead to unintended consequences as the Action Plan does not address the root problem.

We agree with PAVE that we ought to support opportunities for income and wealth growth among lower-income households. However, we should address the root cause for lower SES instead of unsubstantiated claims of systemic bias and racism in the housing finance sector.

Based on an objective diagnosis of symptoms and causes using rigorous data analysis, we propose the following solutions:

The housing policy solutions are:

- Building generational wealth through sustainable homeownership for low SES households by reducing leverage for aspiring low-income home buyers.
- Increasing supply and reducing income stratification through Light Touch Density.
- Promoting Walkable Oriented Development in existing neighborhoods with a mix of residential and commercial properties.

Other policy solutions, which might be explored, are:[11]

- Encouraging two parents in households with children (single-parent households have been found to be a significant SES factor by a wide ranch of academic researchers).
- Enacting occupational licensing reforms and allowing small businesses to be run out of one's home (this has been found to be a significant barrier to low SES households).
- More economical childcare by rolling back burdensome government regulations (childcare costs are a significant barrier to gainful employment by low SES households).
- Real school choice for access to quality elementary and secondary education (racial and ethnic minorities would benefit greatly from real school choice).
- Improving access to technical and apprenticeship training (this would open up access by low SES households to these well-paying jobs).
- Encouraging state and local governments to address public investment disparities relating to minority and lower income neighborhoods.

Recognizing the importance of SES factors is key to fashioning appropriate public and private responses. A misdiagnosis that focuses on other factors will not address the root problem and could potentially lead to unintended consequences. We must be mindful that many public policies aimed at addressing racial discrimination have had unintended consequences that have done substantial harm to low-income households generally, and minority households in particular.

[11] Many thanks to our AEI colleagues Naomi Schaefer Riley and Angela Rachidi for many of these ideas. Please see their thoughtful analysis: https://reason.com/2021/02/24/fix-family-poverty-with-free-markets-for-once/.

The Impact of Race and Socio-Economic Status on the Value of Homes by Neighborhood

A Critique of the Brookings Institution's "The Devaluation of Assets in Black Neighborhoods"

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Working Report Discussion Draft

AEI.org/housing

August 5, 2021

The views expressed are those of the authors alone and do not necessarily represent those of the American Enterprise Institute or of any individual who provided comments. We thank Steve Oliner for many contributions to this research and Salim Furth, Gregory Squires, Mark Goldhaber, and Mark Fleming for helpful comments on an earlier draft.

Synopsis

Perry et al.'s "The Devaluation of Assets in Black Neighborhoods" finds a value difference of 23% between <1% Black and majority Black neighborhoods or $156 billion in cumulative losses, which the authors attribute in its entirety to racial bias. Using 23 controls in a regression, they state that these controls account for all differences in structural and neighborhood amenities between neighborhoods (census tracts) with various percentages of Black residents. The authors graciously provided their data and regression code for our test.

While measuring the lingering effects of racism on disparity in home values is impervious to scientific exactitude, the authors' hypothesis and methodology can be tested to determine whether they are in error. We did not find small, inconsequential errors, but rather a massive over-estimate of the disparity attributed exclusively to race.

Our test had three parts. First, we added 1 control to the original 23 and found that this small change reduced the value difference substantially. Second, we applied the authors' regression methodology to just the tracts with a Black share of <1%. There can be no devaluation due to racial bias in this sample. We found a substantial value difference due to omitted socio-economic status (SES) factors such as income and credit score. Third, we confirmed this using 6 variables that proxy for aspects of SES, and found differences up to 51%, including 3 larger than the 23% devaluation the authors found when comparing tracts with Black shares of 50% and 0%. We conclude that what the authors characterize as race-based differences in home values are actually due, in large part, to SES differences. Lower SES certainly reflects a legacy of past racism and lingering racial bias, leaving Blacks at a large income and wealth disadvantage relative to most Whites.

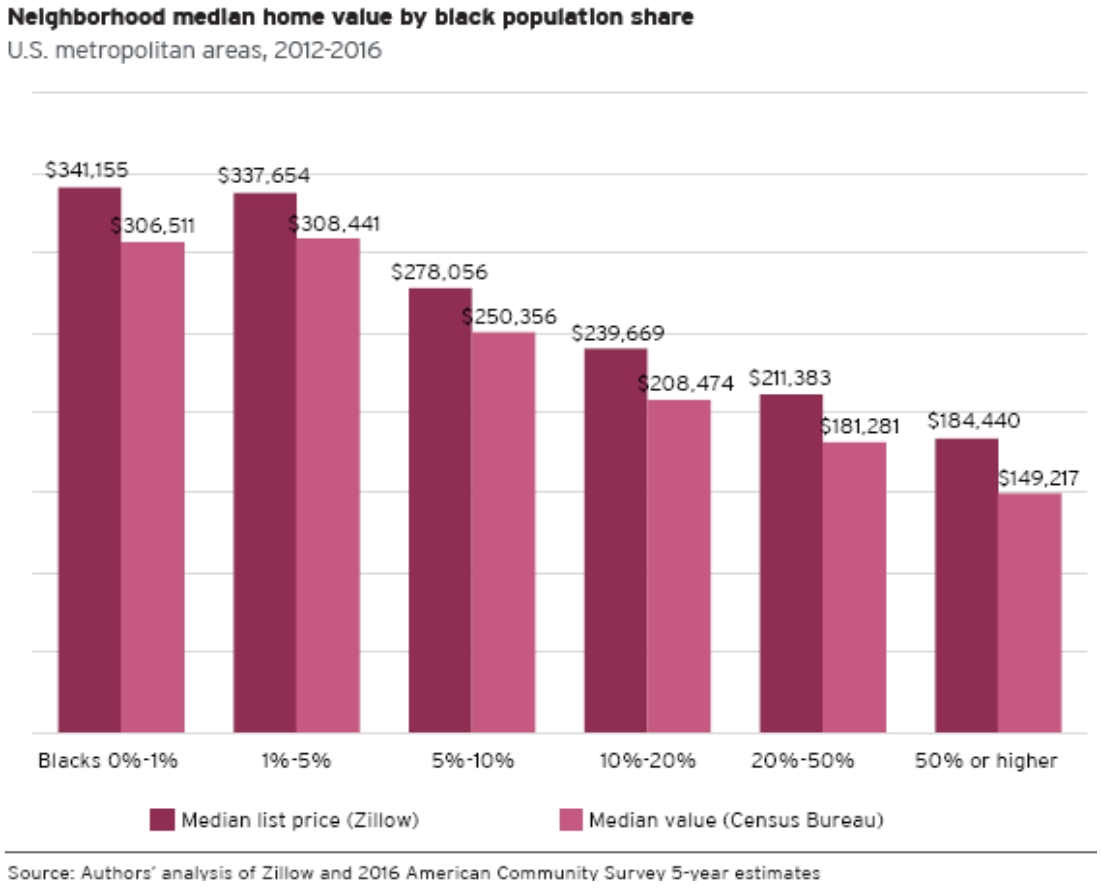
Recognizing the importance of SES factors is key to fashioning appropriate public and private responses. The overarching goal is to promote sustainable access to housing finance and support opportunities for income and wealth growth among lower income households. In so doing, we must be mindful that many past and continuing housing and other policy actions to address racial discrimination have had unintended consequences that have done substantial harm to low-income households generally, and minority households in particular.

Key Takeaways

- Perry et al.'s "The Devaluation of Assets in Black Neighborhoods" has garnered much attention. The study aims to quantify the financial cost of racial discrimination. It finds a value difference of 23% between <1% Black and majority Black neighborhoods or $156 billion in cumulative losses, which the authors attribute in its entirety to racial bias.
- We point out shortcomings in Perry et al.'s methodology and conclude that it is a serious overstatement to attribute a 23% gap in valuations solely to racial bias.
- We are not aiming to provide an alternative point estimate, but rather to show that the current approach has serious shortcomings.
- Our work finds that what Perry et al. characterize as race-based differences in home values are actually, in large part, SES-based differences.
  - Lower SES certainly reflects a legacy of past racism and lingering racial bias, leaving Blacks at a large income (and wealth) disadvantage relative to most Whites.
  - However, if largely SES based, the primary remedy would be policies that work to address the income and wealth gap.
- Our work finds that while much work remains to be done, the focus should be on increasing financial security, creating generational wealth, and shrinking the SES gap through sustainable home ownership. This is largely a buying power issue, not a valuation one. To do otherwise risks repeating the mistakes of the past.
- We also point out that while the country has been making progress in racial integration, stratification along income and SES has been increasing.
- We propose several policy solutions to address this increasing stratification.

Devaluation of Assets in Black Neighborhoods*

"In the average U.S. metropolitan area, homes in neighborhoods where the share of the population is 50 percent Black are valued at roughly half the price as homes in neighborhoods with no Black residents. There is a strong and powerful statistical relationship between the share of the population that is Black and the market value of owner-occupied homes." (p.2)



* Andre Perry, Jonathan Rothwell, and David Harshbarger, The Brookings Institution, *The Devaluation of Assets in Black Neighborhoods*, https://www.brookings.edu/research/devaluation-of-assets-in-black-neighborhoods/, 2018
Note that Perry et al. refer to census tracts as neighborhoods. We generally refer to them as tracts.

Devaluation of Assets in Black Neighborhoods (Cont.)

"Homes of similar quality in neighborhoods with similar amenities are worth 23 percent less in majority Black neighborhoods, compared to those with very few or no Black residents."

Perry et al. attribute this gap entirely to racial discrimination.*

"Across all majority Black neighborhoods, owner-occupied homes are undervalued by $48,000 per home on average, amounting to $156 billion in cumulative losses." (p. 3)

Average devaluation of homes due to location in a neighborhood that is 50% black compared to 0% black

Owner-occupied units in U.S. metropolitan areas, 2012-2016

	Actual price comparison	Adjustments for structural characteristics of home	Adjustments for structural characteristics of home and neighborhood amenities
Census median home value	-55%	-42%	-23%
Zillow median list price of houses per square foot	-35%	-40%	-23%
Zillow median list price of houses	-51%	-44%	-22%

Source: Authors' analysis of 2016 American Community Survey 5-year estimates and median values from Zillow averaged from 2012-2016. See text for list of structural characteristics and neighborhood amenities

Source: Perry et al.

* Howell and Korver-Glenn arrive at a devaluation estimate of 32% for Black and Hispanic neighborhoods after controlling for house and neighborhood characteristics, which is similar to the results in Perry et al. "The Price of Racial Bias" by Redfin arrives at a devaluation estimate of $46,000 after controlling for house and neighborhood characteristics, which is similar to the results in Perry et al. We believe that the same critique outlined herein would apply to Howell and Korver-Glenn and the Redfin study. In the appendix we demonstrate that the 2 specific examples cited in the Redfin study do not withstand close examination.

Devaluation of Assets in Black Neighborhoods (Cont.)

Perry et al. claim to have completely controlled for structural characteristics and neighborhood (tract) amenities using 23 control variables, leaving the black population share to measure racial bias. Of the 23 controls, 16 are statistically significant at the 5% level, 7 are not.

Perry et al.'s framework may be expressed by the following equation:

Home Value = Structural Characteristics + Neighborhood Amenities + Racial Bias

And alternatively:

Racial Bias = Home Value - Structural Characteristics - Neighborhood Amenities

#	Variable	Source	Significant at 5% level?
	Structural Characteristics		
1.	Median rooms	ACS 2012-2016	Y
2.	Median year built		N
3.	Single-family detached share of owner-occupied units		Y
4.	Single-family attached share of owner-occupied units		Y
5.	Mobile homes share of owner-occupied units		Y
6.	Homes with no vehicle availability		N
7.	Homes with gas or electric heating		N
8.	Homes with complete kitchen facilities		Y
	Neighborhood Amenities		
9.	Mean commute of adult workers	ACS 2012-2016	Y
10.	Percent of working adults who carpool to work		Y
11.	Percent of working adults who use public transport		Y
12.	Percent owner-occupied units		N
13.	Population (natural log)		N
14.	Percent of households with children under 18		N
15.	Percent households headed by single mothers with children under 18		Y
16.	Median age of the population		N
17.	EPA Walkability Index	EPA	Y
18.	Number of professional service businesses	County Business Patterns	Y
19.	Number of libraries		Y
20.	Number of museums and historical sites		Y
21.	Number of food and drinking places		Y
22.	Number of gas stations		Y
23.	Proficiency rate of 4^{th}-8^{th} grade public school students	Perry et al.'s Calculations	Y

Source: Perry et al., as replicated by the AEI Housing Center, www.AEI.org/housing. We are grateful to the authors' for providing both their data set and code.

The AEI Housing Center Approach

- Establish a baseline by replicating Perry et al.'s approach using the 23 controls along with the Black population share. We are grateful to the authors for providing both their data set and code.
- Identify and test additional controls that might improve upon Perry et al.'s 23 control approach.
- Conduct a series of case studies, thought experiments and robustness checks to further evaluate both Perry et al.'s and our approaches.
- Analyze the results in a manner that accounts for socio-economic status (SES), which can explain differences in neighborhood home values, thereby expressing our framework as follows:

Home Value = Structure Characteristics + Neighborhood Amenities + SES + Racial Bias

And alternatively:

Racial Bias = Home Value - Structural Characteristics - Neighborhood Amenities – SES

- Develop policy recommendations based upon our findings.

Identifying and Testing Additional Controls that Might Improve upon Perry et al.'s 23 Control Approach

- With 23 control variables, adding two more should be noncontroversial. We add:
  - **One adult borrower share (vs. two or more borrowers)*:**
    - Perry et al. include the shares of single mothers with children under 18 and are home owners.
    - One adult borrower share is similar in kind to single mothers and home owners in that all of these variables are SES proxies.
  - **Average 2013 Equifax Risk Score (ERS)**:**
    - ERS is a credit score code, representing a summary metric of the stock of all residents of any type in a neighborhood with a score.
    - It is another SES proxy.
- Similar to many of the original 23 controls, one adult borrower share and ERS are both highly correlated with income.
- These new SES variables are significant at the 1% level and add new explanatory power.
  - The percentage with kitchen and carpool control variables are now statistically insignificant, increasing the insignificant total to 9 of the 23.

* One adult borrower share comes from 2012-2016 HMDA home purchase loans. Since the source is HMDA, it is a near complete census and highly accurate. This metric is a flow measure as opposed to shares of single mothers with children under 18 and home owners, which are both stock measures.

** The ERS source data are at the ZIP code level and are translated to the neighborhood level using a HUD crosswalk file. We also tested tree canopy coverage and air pollution, but found these variables not to be statistically significant. In terms of tree coverage, there may be too little discernment between neighborhoods and in the case of air pollution, the data are interpolated from a much larger area to the neighborhood level, which may introduce noise.

Housing Center Results (Zillow Data and ZIP-7 ERS)

- We replicate Perry et al. using Zillow's median list price of houses per square foot as the dependent variable (Perry et al.'s preferred specification).
  - We find an initial devaluation of 22.0%.[1] After deleting 68 tracts (0.2% of all tracts) for which ERS or the one adult borrower share are not available, we find a baseline devaluation of 21.8%.
  - Adding ERS as a control reduces the devaluation to -0.3%, a 100% reduction. This devaluation is not significantly different than zero.
- **Conclusion**: By adding just the Equifax Risk Score*, which is an SES-related explanatory variable, the devaluation found by Perry et al. disappears. As a result:
  - Their approach did not, as asserted, fully adjust for structure characteristics and neighborhood amenities.
  - Their estimate of devaluation due to racial bias is, at a minimum, seriously overstated.

Dependent Variable	Specification	% Devaluation	95% Confidence Band	# of Tracts
Zillow median list price of houses per square foot	23 controls for all tracts	-22.0% **	-17.4% to -26.6%	33,066
	23 controls (limited – new baseline)	-21.8% **	-17.2% to -26.4%	32,998
	23 controls & ERS control	0.3%	-0.1% to -10.1%	32,998

[1] When we run the regression using Perry et al.'s data and code, we get 22%, rather than 23%. We have followed up on this minor discrepancy and hinges on slight differences in data that were provided to us.

* For this slide we use the November 2021 Equifax Risk Score (ERS) at the ZIP-7 level. We then aggregate the roughly 700,000 scores up to the tract level. The following slides use the July 2013 ERS at the ZIP-5 level. We then crosswalk the roughly 40,000 scores to the tract level. The ZIP-7 score is much more granular and hence better. We find that it explain the devaluation entirely, while the less granular ZIP-5 ERS leaves some variation unexplained. In future work, we will update the rest of the presentation to the ZIP-7 ERS. Thus, the following slides present likely an overestimate of the true devaluation.

Source: Perry et al. and AEI Housing Center, www.AEI.org/housing.

Housing Center Results (Zillow Data)

- We replicate Perry et al. using Zillow's median list price of houses per square foot as the dependent variable (Perry et al.'s preferred specification).
  - We find an initial devaluation of 22.0%.[1] After deleting 66 tracts (0.2% of all tracts) for which ERS or the one adult borrower share are not available, we find a baseline devaluation of 21.8%.
  - Adding ERS as a control reduces the devaluation to 5.1%, a 76% reduction.
  - Adding one adult borrower share (vs. two or more borrowers) as a control reduces the devaluation to 14.6%, a 33% reduction.
  - Adding both ERS and one adult borrower share yields a devaluation of 1.9%. This devaluation is not significantly different than zero.
- **Conclusion**: By adding just one or two additional SES-related explanatory variables, the devaluation found by Perry et al. drops substantially. As a result:
  - Their approach did not, as asserted, fully adjust for structure characteristics and neighborhood amenities.
  - Their estimate of devaluation due to racial bias is, at a minimum, seriously overstated.

Dependent Variable	Specification	% Devaluation	95% Confidence Band	# of Tracts
Zillow median list price of houses per square foot	23 controls for all tracts	-22.0% **	-17.4% to -26.6%	33,066
	23 controls (limited – new baseline)	-21.8% **	-17.2% to -26.4%	33,000
	23 controls & ERS	-5.1% *	-0.1% to -10.1%	33,000
	23 controls & one adult borrower share	-14.6% **	-10.3% to -18.9%	33,000
	23 controls & ERS & one adult borrower share	-1.9%	3.0% to -6.8%	33,000

[1] When we run the regression using Perry et al.'s data and code, we get 22%, rather than 23%. We are following up on this minor discrepancy.
** denotes significance at the 1% level and * denotes significance at the 5% level.

Source: Perry et al. and AEI Housing Center, www.AEI.org/housing.

Housing Center Results (ACS Data)

- We replicate Perry et al. using the ACS median home value as the dependent variable.
  - We start with a devaluation for 23.2%, which becomes 22.3% after deleting 197 tracts (0.5% of all tracts), which data for our added controls.
  - Adding ERS as a control reduces the devaluation to 12.8%, a 43% reduction.
  - Adding one adult borrower share (vs. two or more borrowers) as a control reduces the devaluation to 13.7%, a 39% reduction.
  - Adding ERS & one adult borrower share as controls reduces the devaluation to 7.6%, a 66% reduction.
  - Adding income bins (to control for differences in buying power) and limiting the sample to 60-110% Area Median Income (AMI) using 10ppt. increments, so as to create more similar treatment and control groups, reduces the devaluation to 15.8%, a 29% reduction (see slide 15 for our reasoning for doing so).
  - Adding ERS, one adult borrower share , and income bins as controls, and limiting the sample to 60-110% AMI reduces the devaluation to 3.8%. This devaluation is not significantly different than zero.
- **Conclusion**: As with Zillow data, adding 1 or 2 additional SES-related explanatory variables results in a significant reduction in devaluation as found by Perry et al. A further reduction occurs with the addition of income bins and limiting sample to 60-110% AMI (both SES).

Dependent Variable	Specification	% Devaluation	95% Confidence Band	# of Tracts
ACS median home value	23 controls for all tracts	-23.2% **	-18.5% to -27.9%	38,303
	23 controls (limited – new baseline)	-22.3% **	-18% to -26.7%	38,106
	23 controls & ERS	-12.8% **	-8.1% to -17.5%	38,106
	23 controls & one adult borrower share	-13.7% **	-9.7% to -17.7%	38,106
	23 controls & ERS & one adult borrower share	-7.6% **	-3.4% to -11.9%	38,106
	23 controls & income bins & 60-110% of AMI	-15.8% **	-11.3% to -20.2%	16,677
	23 controls & income bins & 60-110% of AMI & ERS & one borrower share	-3.8%	0.5% to -8.0%	16,677

** denotes significance at the 1% level.

Source: Perry et al. and AEI Housing Center, www.AEI.org/housing.

Case Study #1: Evidence that the 23 Controls Do Not Work as Intended

- Perry et al. point out that differences in neighborhood (tract) home values are due to structural characteristics, tract amenities, and/or racial bias, yielding:

  Home Value – Structural characteristics – Neighborhood amenities = Racial Bias

- For <1% Black tracts racial bias must be zero, therefore simplifying to:

  Home Value - Structural characteristics - Neighborhood amenities = 0

This simplification allows us to test if Perry et al.'s 23 controls, in actuality, control for all differences in structural characteristics and neighborhood amenities.

If the 23 controls fully account for differences in structural characteristics and neighborhood amenities, there should be little unexplained residual variation across the tracts with less than 1% Black residents.

As the histogram shows, residuals from the regression for these tracts have a mean absolute error (MAE) of 16.2%, which is not near 0% and is about 2/3 of the 23.7% of the within metro variation in value present prior to the application of the 23 controls.

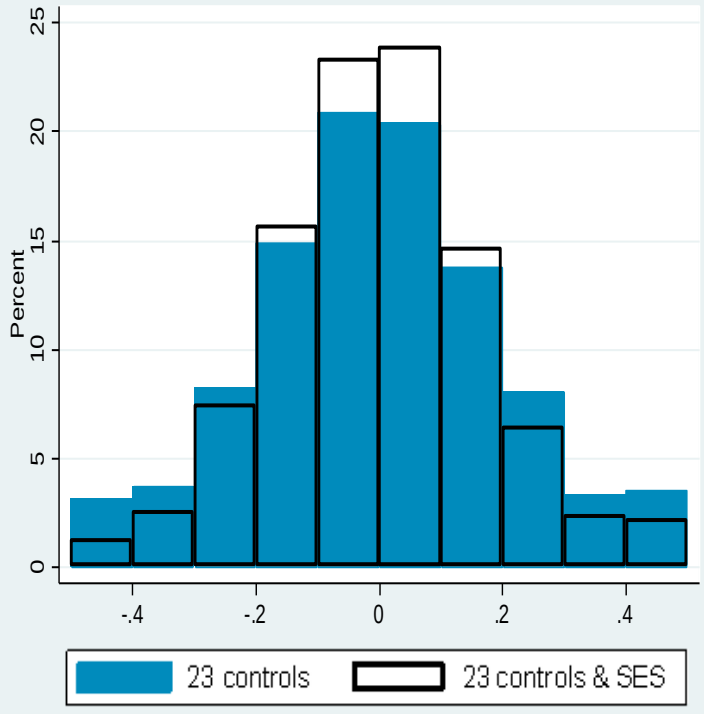
In addition, we test whether the addition of the SES controls improves the fit of the regression by further reducing the MAE. We find that the MAE drops from 16.2% to 13.6%, which is a statistically significant drop at the 1% level.

Conclusions:

1) **The 23 controls fail to capture 2/3 of the value differences in tracts with virtually no Black residents.**
2) **The additional SES control variables have explanatory power beyond the original 23.**

This case study confirms omitted variable bias and raises serious questions about Perry et al.'s overall approach.

Regression Residuals In Log Zillow Median List Price Per Square Foot in <1% Black Neighborhoods



Note: Regression controls for 23 variables and metro fixed effects. Additional SES control variables are Average ERS, share of one adult borrowers, and income bins based on 10ppt. Increments are of Area Median Income (AMI).
Source: Perry et al. and AEI Housing Center, www.AEI.org/housing.

Case Study #2a: An Alternative Explanation

- We have posited that SES plays a far more important role in the value of homes purchased than racial bias in determining the valuation of such homes. We can further demonstrate that based on a simple case study applied to entirely non-Black tracts (<1% Black).
- Since there are no Black residents, there can be no racial discrimination. We substitute the following non-race variables for the Black population share of the tract.
  - Median income (as a % of Area Median Income (AMI))
  - Average Equifax Risk Score (ERS)
  - One adult borrower share
  - Share without a bachelors degree
  - Share not in the labor force
  - Share receiving SNAP (food stamp) benefit
- We measure the devaluation for each of these variables after controlling for Perry et al.'s 23 variables.
- **Conclusion:** In each instance we find a large devaluation based on non-race variables within tracts with <1% Black census tracts. Since the residents of these tracts do not face racial animus, the large devaluations must reflect the fact that lower-SES households end up in less expensive neighborhoods.

Dependent Variable	Replacement Variable	Comparison values[1]	% Devaluation	# of Tracts
Zillow median list price of houses per square foot	Median income (as a % of AMI)	75% vs 200%	-35.4% **	5,340
	Average ERS	675 vs 750	-51.4% **	5,342
	One adult borrower share	70% vs 36%	-20.6% **	5,340
	Share without a bachelors degree	77% vs 32%	-33.5% **	5,342
	Share not in the labor force	33% vs 25%	-2.5%	5,342
	Share receiving SNAP benefits	20% vs 0%	-20.3% **	5,342

[1] Shows the values for each variable used to calculate the devaluation. For example, in the first row, we measure the devaluation of tracts with 30% of residents without a bachelors degree to tracts where all residents have a bachelors degree. The comparison values are chosen to roughly reflect the same percentiles as tracts with no and 50% Black residents.

Note: Regressions control for 23 variables and metro fixed effects in census tracts with < 1% Black residents. The 5,342 tracts are in 118 metros.

** denotes significance at the 1% level and * denotes significance at the 5% level.

Source: Perry et al. and AEI Housing Center, www.AEI.org/housing.

Case Study #2b: An Alternative Explanation

- We have posited that SES plays a far more important role in the value of homes purchased than racial bias in determining the valuation of such homes. We can further demonstrate that based on a simple case study applied to entirely White tracts (≥97.5% White).
- Since there are no Black residents, there can be no racial discrimination. We substitute the following non-race variables for the Black population share of the tract.
  - Median income (as a % of Area Median Income (AMI))
  - Average Equifax Risk Score (ERS)
  - One adult borrower share
  - Share without a bachelors degree
  - Share not in the labor force
  - Share receiving SNAP (food stamp) benefit
- We measure the devaluation for each of these variables after controlling for Perry et al.'s 23 variables.
- **Conclusion:** In each instance we find a large devaluation based on non-race variables within tracts with ≥97.5% White census tracts. Since the residents of these tracts do not face racial animus, the large devaluations must reflect the fact that lower-SES households end up in less expensive neighborhoods.

Dependent Variable	Replacement Variable	Comparison values[1]	% Devaluation	# of Tracts
Zillow median list price of houses per square foot	Median income (as a % of AMI)	75% vs 200%	-33.8% **	465
	Average ERS	675 vs 750	-28.6% **	465
	One adult borrower share	70% vs 36%	-29.4% **	465
	Share without a bachelors degree	77% vs 32%	-34.1% **	465
	Share not in the labor force	33% vs 25%	-5.6% *	465
	Share receiving SNAP benefits	20% vs 0%	-16.4%	465

[1] Shows the values for each variable used to calculate the devaluation. For example, in the first row, we measure the devaluation of tracts with 30% of residents without a bachelors degree to tracts where all residents have a bachelors degree. The comparison values are chosen to roughly reflect the same percentiles as tracts with no and 50% Black residents.

Note: Regressions control for 23 variables and metro fixed effects in census tracts with < 1% Black residents. The 465 tracts are in 76 metros.

** denotes significance at the 1% level and * denotes significance at the 5% level.

Source: Perry et al. and AEI Housing Center, www.AEI.org/housing.

Case Study #3: Analysis of Black Home Buyers

- How can a 23% price gap exist in the marketplace between two goods that Perry et al. claim are identical?
  - Economic theory suggests that if this were really a constant-quality price gap, it should prompt Black households to buy homes almost exclusively in majority Black neighborhoods to take advantage of the discount.
    - This is not what Black buyers are doing as racial integration is increasing (next slide).
    - Are the purportedly identical homes and neighborhoods really identical?
- We find that relatively few Black borrowers choose to buy in majority Black tracts. This is especially true for Black borrowers with higher incomes.
- If constant-quality prices in majority Black tracts were really 23% lower than in <1% Black tracts, then why are Black buyers not taking advantage of the price discount in majority Black tracts?
- **Conclusion:**
  - Black buyers must understand that the non-Black neighborhoods, in fact, have more amenities and, as a result, there is no "discount" or "undervaluation" on homes in Black neighborhoods of the magnitude found by Perry et al.
  - This real world evidence is consistent with the fact that the country has been making progress in racial integration.

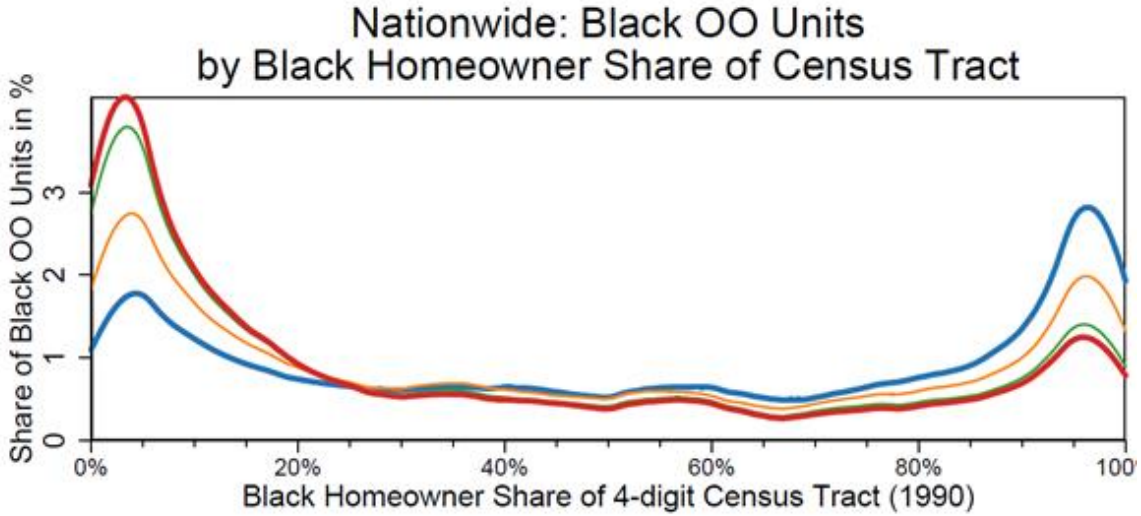
Loans to Black Borrowers (2019): by % of Area Median Income (AMI)		
By share of Black Residents	>60% & ≤120% AMI Borrowers	>120% AMI Borrowers
< 1%	4%	7%
1% - <5%	11%	18%
5% - <10%	13%	17%
10% - <20%	19%	21%
20% - <50%	30%	24%
≥50%	23%	13%
Total	100%	100%
# of Black Loans	154,000	93,000

Note: To test this we evaluated around 300,000 loans originated in 2019 to Black homebuyers. The loan level data come from the Home Mortgage Disclosure Act (HMDA), which is a near census of loans. We first assign each loan its tract's share of Black residents from the 5-year 2016 ACS data. We then focus on Black borrowers with incomes greater than 60% Area Median Income (AMI).
Source: HMDA and AEI Housing Center, www.AEI.org/housing.

Case Study #4: There Has Been Progress in Racial Integration

While the Black homeownership rate in 2019 is about the same rate as in 1990, the stock of Black homeowners has increasingly shifted to areas that were predominantly non-Black in 1990, with the same pattern for renters (not shown).

- In 1990, about 32% of housing units with a Black householder were in tracts with 80% or more Black residents; in 2019 about 17% remained in such tracts.
- **If home values in majority Black neighborhoods were undervalued all else equal, Black homeowners would not have shifted to areas predominantly non-Black.**



Note: OO denotes 'owner occupied.' Share of black OO units (y-axis) and tract-level black Homeowner share (x-axis) are from the Census. Kernel bandwidth is set to 2.5%. Numbers in legend denote the black share of homeowners (homeownership rate). Census tracts are abbreviated to 4 digits to account for changes in census tract definitions between decennial censuses.

Dissimilarity Score* (largest 100 metros):
1990: 70%
2000: 66%
2010: 61%
2019: 59%

*The dissimilarity index measures the share of Black residents (owners and renters) that would have to move to produce a distribution that matches that of the larger area.

Source: Census Bureau and AEI Housing Center, www.AEI.org/housing.

A Final Concern: Creating More Similar Treatment and Control Groups

As demonstrated below, income levels vary significantly across tracts. The greater the income differences, the harder it becomes to render tracts comparable through any combination or variety of control variables.

- For example, the median income of <1% Black tracts is 121% of Area Median Income (AMI), while the median income of 50% or higher Black tracts is 58%.

Our enhancements include:

- We bin tracts by income (in 10 ppts. intervals*), which greatly helps standardize buying power.
- We focus on the 60-110% area median income range. This captures around half of the <1% Black and about half of 50% or higher tracts (see table).

This approach generates similar comparison groups in terms of buying power.

Black population Share	Relative income percentile				
	5th	25th	50th	75th	95th
0%-1%	64%	95%	121%	156%	230%
1%-5%	61%	92%	119%	154%	225%
5%-10%	54%	84%	108%	139%	202%
10%-20%	47%	72%	94%	122%	171%
20%-50%	36%	59%	78%	101%	144%
50% or higher	28%	44%	58%	76%	114%

Note: Relative income is the ratio of tract income to median CBSA income.

* We bin income in 10 ppts. bins starting with 0% to <10% of area median income. We also use 5 ppts. and 20 ppts. bins as robustness checks. The results are robust.

Source: Perry et al. and AEI Housing Center, www.AEI.org/housing.

A Final Concern: Creating More Similar Treatment and Control Groups (cont.)

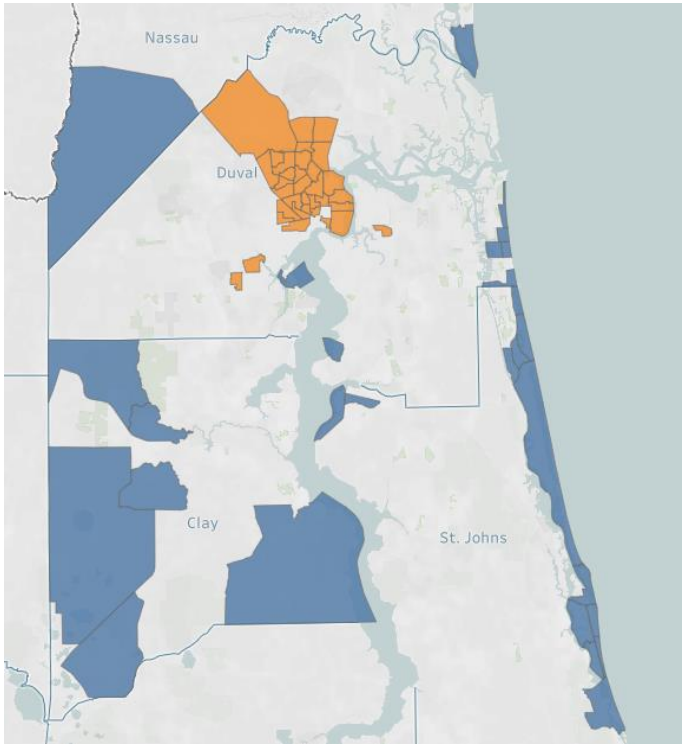
A glance at a map can quickly reveal why it is important to account for income or SES.

Jacksonville for example, which according to Perry et al. has one of the highest devaluations (-47%) of Black assets in the country, has 80% of the less than 1% Black tracts situated at or near the water. Majority Black tracts are largely found in the inner city part of the metro.

It is therefore plausible that some of the devaluation may be due to this natural amenity, for which Perry et. al.'s model does not control, rather than racial bias. Other metros in the study have similar types of natural amenity dissimilarities.

Natural amenities, to the extent reflected in the higher home prices, would be captured to some extent by higher incomes or SES of residents in a tract.

Jacksonville, FL example



Waterfront & exurban control tracts

vs.

mostly inner-city treatment tracts

Source: Perry et al. and AEI Housing Center, www.AEI.org/housing.

We Now Turn to Policy Solutions Aimed at Addressing SES

- While much work remains to be done, our study strongly suggests that the focus should be on increasing financial security, creating generational wealth, and shrinking the SES gap through sustainable home ownership. This is largely a buying power issue, not a valuation one. To do otherwise risks repeating the mistakes of the past.
- We also point out that while the country has been making progress in racial integration, stratification along income and SES has been increasing.
- Ultimately, the overarching policy goal should be to provide and support economically sound opportunities for income and wealth growth for lower income people. We propose several such policy solutions.

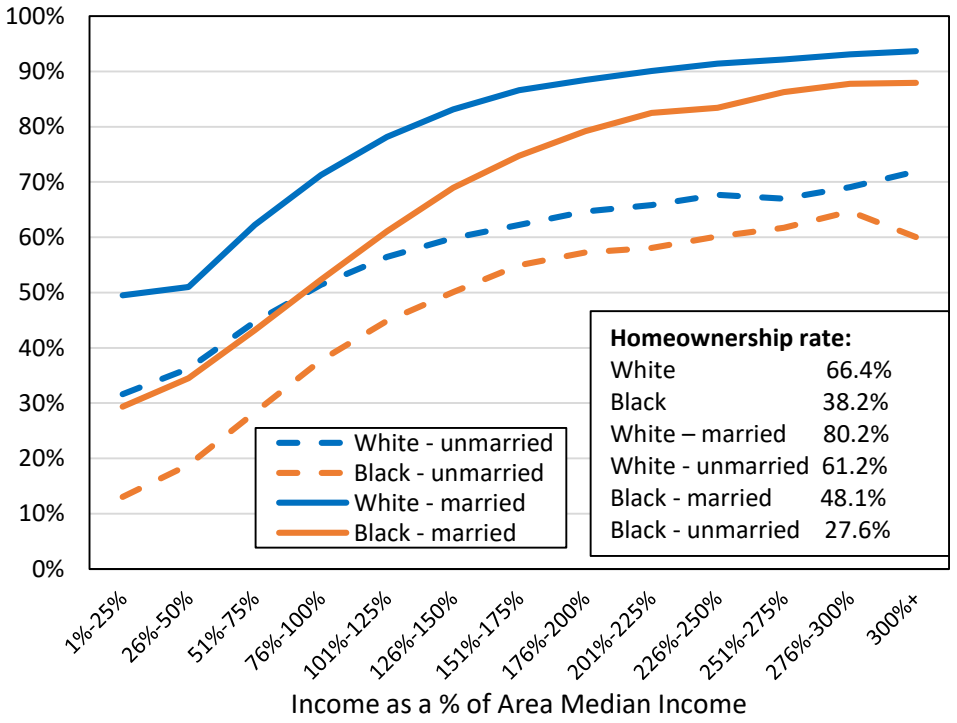
Marital Status and Income Are Key Drivers of the Homeownership Rate by Race

The Black homeownership (HO) rate is much lower than the White HO rate, but the difference gets smaller as income grows. The HO rate for White or Black married households (HH) is much higher than for unmarried White or Black HH (left panel).

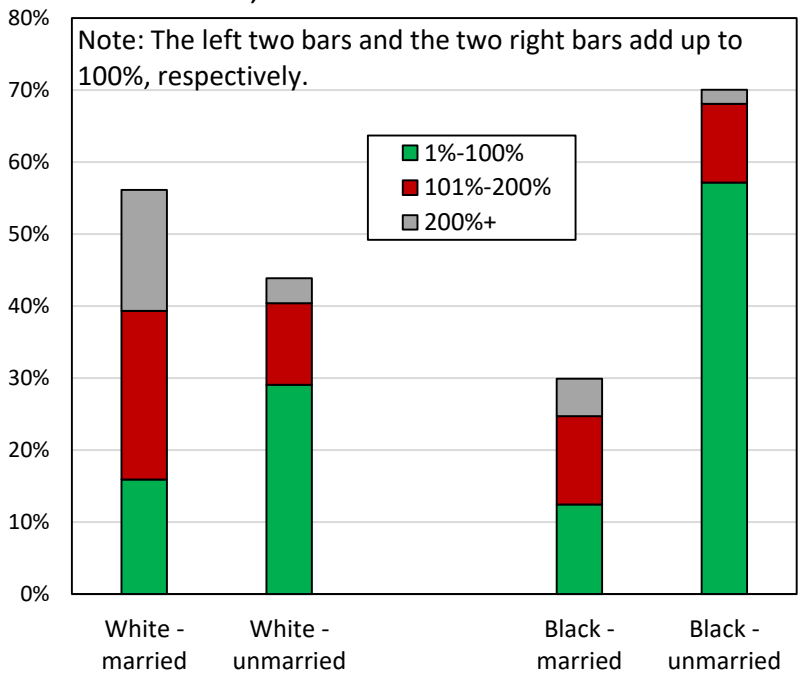
There is a big disparity by marital status between Blacks and Whites. Unmarried Black HH comprise 70% of Black HH, and the vast majority are below area median income (right panel).

Policy challenge: Reduce income and marital status disparities between Black and White HH.

Homeownership Rate by Race, Income Bin, and Marital Status



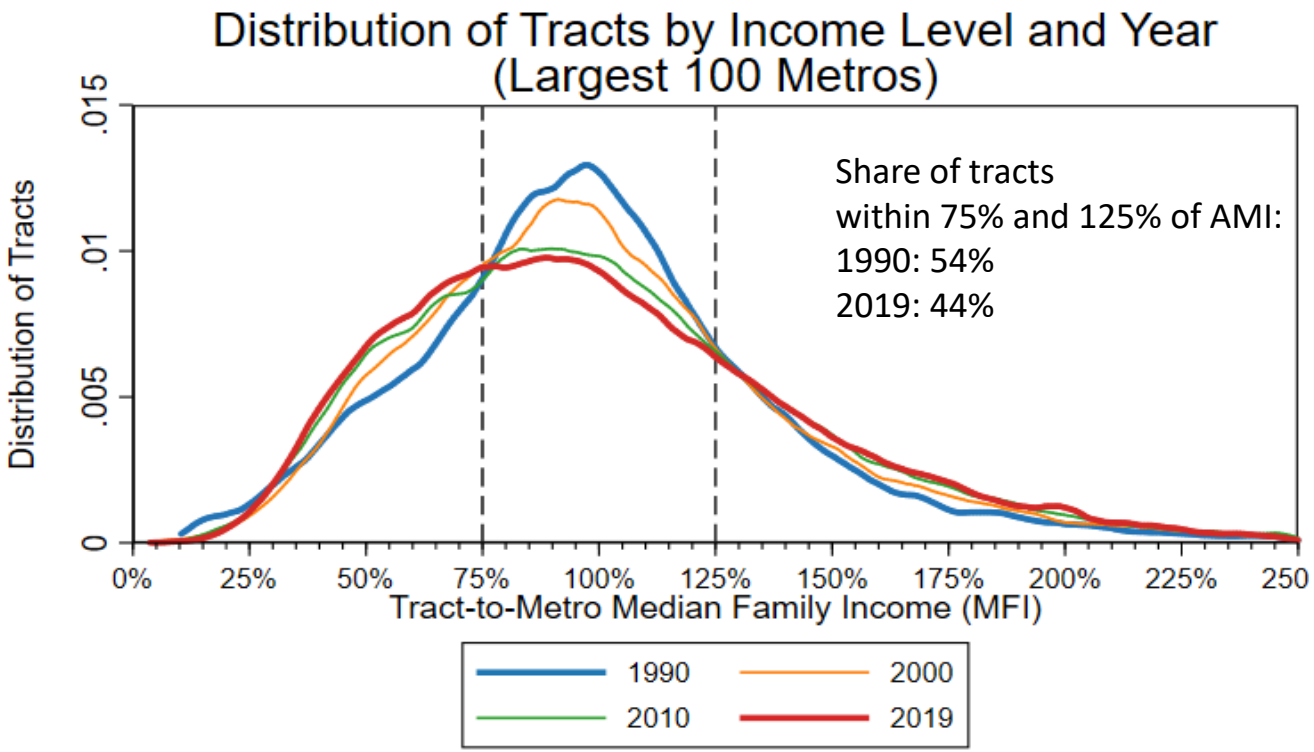
Distribution of Households by Race, Marital Status, and Income Bins as a % of AMI



Note: Data are for urban household heads aged 25-65 and exclude widowed households.
Source: Census Bureau and AEI Housing Center, www.AEI.org/housing.

There Has Been an Increase in Stratification along Income and Socio-Economic Status

The share of tracts within 75% and 125% of area median income has decreased drastically over time. By this simple measure 54% of tracts in 1990 were within this range, compared to 44% in 2019.

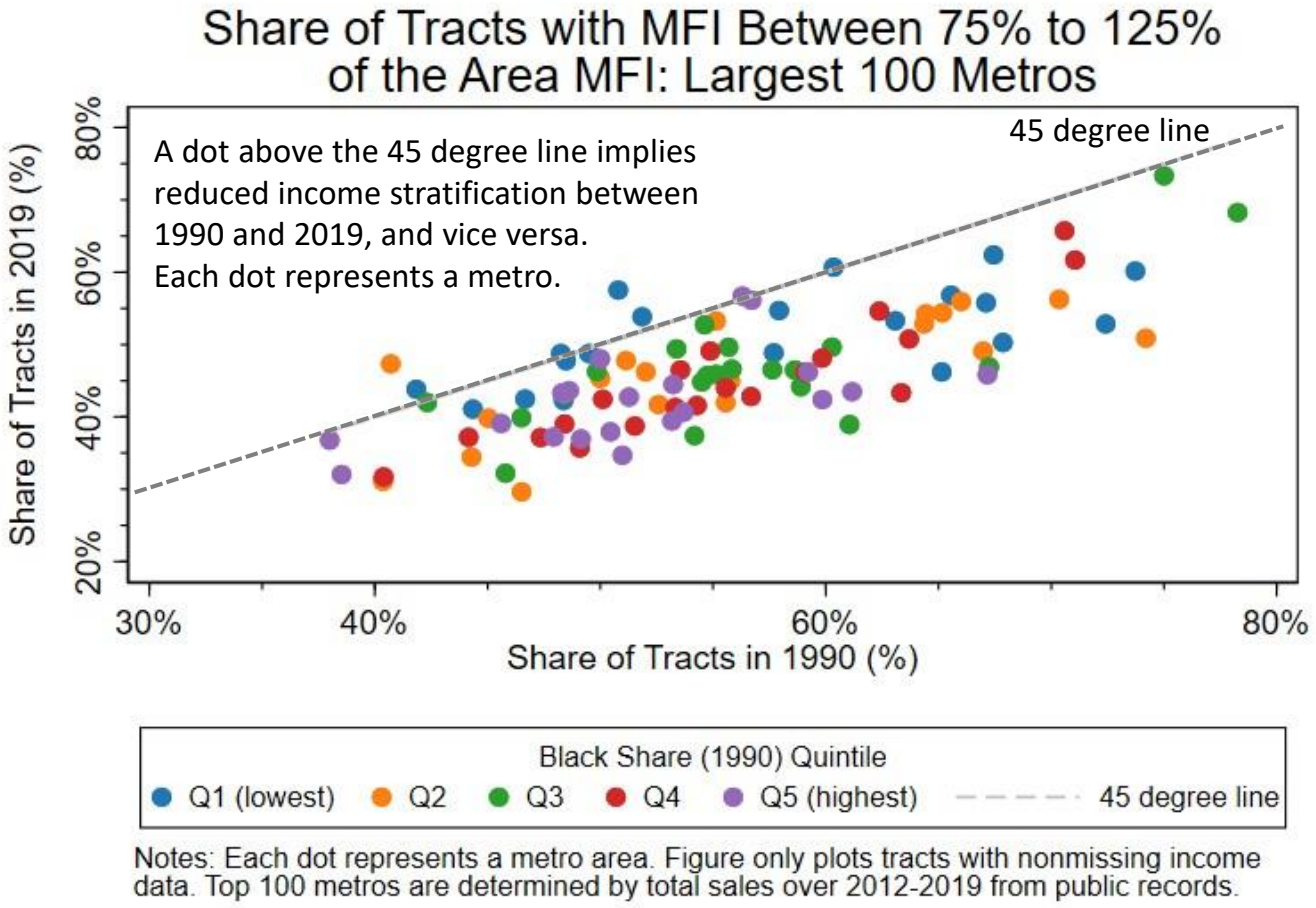


Notes: Largest 100 metros are determined by total sales over 2012-2019 from public records. Sample of tracts is limited to tracts with nonmissing income data and below 250% of the area MFI. Dashed lines indicate income levels at 75% and 125% of the area MFI. Kernel bandwidth is 2.5%.

Note: MFI stands for Median Family Income and AMI stands for Area Median Income.
Source: Census Bureau, FFIEC, and AEI Housing Center, www.AEI.org/housing.

Increasing Stratification along Income/Socio-Economic Status

Since 1990, income stratification has grown in virtually all of the largest 100 metros. This trend is not correlated with the Black share of households in the metro.



Note: MFI stands for Median Family Income.
Source: Census Bureau, FFIEC, and AEI Housing Center, www.AEI.org/housing.

Guiding Reform Principles & Past Mistakes

There is an important place for policies that assist low-income families to become homeowners, but these policies must balance the interest in low-income lending against the risks to the borrowers and the interests of the taxpayers.

- In the past, "affordable housing" policies that sought to increase homeownership turned out to escalate the risks for both borrowers and taxpayers.
- Instead such policies must promote sustainable access to housing finance and support opportunities for income and wealth growth among lower income households.
- Any efforts to subsidize low and moderate income home buyers must be on-budget, transparent and sustainable, and must meet the "do no harm" test.

Learning from the past.

- Many past and continuing housing and other policy actions to address racial discrimination have had unintended consequences that have done substantial harm to low-income households.
  - Public housing: fails to build wealth and perpetrates segregation.
  - Inclusionary zoning & transit oriented development is expensive and helps only a few.
  - LIHTC: perpetrates segregation and is incredibly expensive and crowds out unsubsidized supply.
  - Longer loan terms and looser underwriting: builds wealth much more slowly and, when combined with other forms of risk layering, leads to high defaults.
  - Low interest rates: has led to a permanent increase to prices.
    - We would be remiss if we failed to point out that the task of increasing the homeownership rate for lower-income people has been made immeasurably more difficult due to the failure of the Federal Reserve to recognize the harm its interest rate and quantitative easing policies have done by needlessly driving up home prices for current and future cohorts of aspiring low-income and minority homebuyers.

A focus on fixing the valuation process to account for race could do more harm than good.

- It is not supported by our research.
- It will likely lead to mispricing and put homeownership out of reach for low-income households.
- It would result in a wealth redistribution to owners from first-time buyers.

Housing Related Policy Solutions Based on Our Findings

Diagnosing the causes of the home value gap, along with a recognition of decreasing racial and ethnic segregation and increasing Socio-Economic Status (SES) stratification, helps in the consideration of appropriate policy solutions that will increase financial security and shrink the SES gap through sustainable home ownership. Several such policy solutions are:

- **Building generational wealth through sustainable homeownership for low SES households by reducing leverage for aspiring low-income home buyers.**
  - Lower-Income First Generation Homebuyer (LIFT Home) assistance used to buy down the interest rate on a 20-year term loan would subsidize wealth building, rather than debt.
  - Shorter terms lower default risk to sustainable levels.
    - Default propensity is a key contributor to neighborhood blight.
  - HMDA denial reasons suggest 2 main impediments for Black potential buyers*:
    - Credit score ➔ overcoming this impediment requires the safe expansion of the credit box, which is possible with a 20-yr loan term.
    - DTI ➔ overcoming this impediment requires the growth of incomes and the slowing of unsustainable home price appreciation. The latter may be done through the addition of more supply.
- **Increasing supply and reducing income stratification through Light Touch Density.**
  - Making 2, 3, and 4 unit housing legal in 1-unit neighborhoods.
  - Allow extra rooms in homes to be rented out.
- **Promote Walkable Oriented Development in existing neighborhoods with a mix of residential and commercial properties.**
  - These neighborhoods have job and education opportunities.

* Data from Ellie Mae confirm this. According to data from Feb. 2016 (the last time these data were available), closed FHA purchase loans had an average credit score of 686 and a backend DTI of 41, while denied FHA purchase loans for Black borrowers had an average credit score of 628 and a backend DTI of 50. We believe these data are still representative today.

Source: AEI Housing Center, www.AEI.org/housing.

Other Policy Solutions Based on Our Findings*

Ultimately, the overarching policy goal should be to provide and support economically sound opportunities for income and wealth growth for lower income households. Several such policy solutions which might be explored are:

- **Encouraging 2 parents in households with children**
  - Child tax credits should focus on low income households and should reward having two parents in the household.
- **Enact occupational licensing reforms and allow small businesses to be run out of one's home**
  - This would give families another path to upward mobility.
- **More economical childcare by rolling back burdensome government regulations**
  - This would allow parents to decide whom they trust with their children.
- **Real school choice for access to quality elementary and secondary education**
  - Expand charter schools and voucher programs.
  - Parents would not have to buy a more expensive home to get access to a better education.
- **Improving access to technical and apprenticeship training**
  - Public-private partnerships to promote training and skill development.
  - Provide flexible vouchers to low-income students, thereby letting them spend the money in a way to quickly and efficiently gain job skills.
- **Encouraging state and local governments to address public investment disparities relating to minority and lower income neighborhoods**

* Many thanks to our AEI colleagues Naomi Schaefer Riley and Angela Rachidi for many of these ideas. Please see their thoughtful analysis: https://reason.com/2021/02/24/fix-family-poverty-with-free-markets-for-once/

Appendix

Appendix - Redfin's "Price of Racial Bias": We Found Compelling Evidence that the Case Studies Cited Are Fatally Flawed

- The Redfin study, like Perry et al. maintains that it "rules out all the factors that are typically associated with home value" and that any residual difference is due to "bias and systemic racism", thus yielding the same formula as Perry et al.* This study defined a neighborhood as a ZIP code.

Home Value – Structural characteristics – Neighborhood amenities = Racial Bias

- Two specific case studies are provided, one in Atlanta, the other in Chicago. In each case, it was asserted that two "similar homes in similar neighborhoods" were found, the only difference being racial makeup.
- The study's two flaws are that it insufficiently controls for Socio Economic Status and ZIP code is not granular enough.
- The former becomes clear in the case of Chicago, where an examination of both zip code and Census data reveal wide pair variances in SES indicators (see green shading).
- The latter becomes clear in the case of Atlanta, where the purported majority Black neighborhood at the zip code level (used for mail delivery) has, on the census tract level, only slightly more Black residents than the White neighborhood. Census tract is the Census Bureau's proxy for neighborhood. The much large ZIP with 56,000 population compares to much finer census tracts, with around 5,000 people (see orange shading.)

	ZIP Code				Census Tract			
	Chicago	Chicago	Atlanta	Atlanta	Chicago	Chicago	Atlanta	Atlanta
	60655	60620	30329	30318	17031720400	17031700501	13089021603	13121008800
Sale price of case study home ($)	217,500	172,000	412,000	300,000	217,500	172,000	412,000	300,000
Sale date of case study home	Jul-16	Nov-17	Jun-20	May-19	Jul-16	Nov-17	Jun-20	May-19
Total population	28,741	69,299	28,383	56,109	1,957	7,645	4,943	5,430
Black %	6.5%	96.6%	17.1%	54.1%	1.7%	86.1%	18.5%	23.6%
Land Area (sq. miles)	4.4	7.1	5.4	20.4	0.3	0.6	1.5	3.7
Total housing units/square mile	2,440	4,262	2,425	1,314	2,433	4,268	1,859	671
Median Household Income - $ (ACS)	$91,102	$32,401	$58,658	$52,245	$90,721	$67,665	$66,425	$103,385
% single mothers with children under 18	3.9%	14.3%	4.7%	7.6%	2.9%	5.5%	3.0%	7.6%
Equifax Risk Score	722.0	623.0	688.1	650.0	721.7	658.6	688.8	650.0
% one borrower loans (2012-2017)	NA	NA	NA	NA	62.9%	85.7%	61.6%	61.6%
Mortgage Default Rate (2012-2020)	12.9%	23.3%	7.6%	9.8%	11.6%	21.5%	7.8%	10.7%

* Dana Anderson, "The Price of Racial Bias", Redfin, May 3, 2021, https://www.redfin.com/news/undervaluation-homes-black-versus-white-neighborhoods/

AEI Housing Center

AEI Housing Center Response to Perry and Rothwell (2021)

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December 2021[1]

The Brookings Institution and the American Enterprise Institute, two of the nation's oldest think tanks, have long engaged in a competition of ideas. That spirit has infused the discussion and commentary between scholars at both institutions with respect to *The Devaluation of Assets in Black Neighborhoods* (Perry et al. (2018)).[2] We issued a revised critique of *The Devaluation of Assets in Black Neighborhoods* on August 5, 2021 (Pinto and Peter (2021)) and Perry and Rothwell issued a rebuttal on November 17, 2021 (Perry and Rothwell (2021)). In the spirit of this competition of ideas, we welcome their engagement with us on this important topic and thank them again for providing us their data and code.

Our key takeaways are:

- In reviewing Perry and Rothwell (2021), we find that their concerns only confirm our findings.
    - In Pinto and Peter (2021) we showed that Perry et al.'s (2018) methodology has serious shortcomings, including omitted variable bias, and that their conclusion that a 23% gap in valuations of homes in majority black neighborhoods is attributable solely to racial bias is a serious overstatement.
    - Perry and Rothwell's (2021) rebuttal to our critique supports our claim of omitted variable bias, as their results in Table 1 seem to confirm that adding additional controls can significantly lower the devaluation estimate.
    - Perry and Rothwell (2021) in particular object to our two additional controls in addition to their original 23 controls in Perry et al. (2018). We show that the Equifax Risk Score (ERS) is race neutral and suitable for use as a control. We demonstrate that the one-adult borrower share on home purchase loans is no more a proxy variable for race than some of their original 23 controls are. (I.e. one-adult borrower share has the same correlation to race as the percent of households headed by single mothers with children under 18). Most importantly, both of these additional controls have significant explanatory power.
    - Finally, Perry and Rothwell (2021) also object to our case studies, where – in order to eliminate race from the equation – we examine non-Black tracts. Perry and Rothwell

[1] The views expressed are those of the authors alone and do not necessarily represent those of the American Enterprise Institute or of any individual who provided comments. The authors would like to thank Steve Oliner for his helpful comments.

[2] Andre Perry, Jonathan Rothwell, and David Harshbarger, The Brookings Institution, *The Devaluation of Assets in Black Neighborhoods*, https://www.brookings.edu/research/devaluation-of-assets-in-black-neighborhoods/, 2018

point out that these tracts could include not only White residents but also Hispanic residents, who could face racial bias just like Black residents. To address this point, we show that when we limit the sample to areas where White residents account for more than 97.5% of tract population, we find the same shortcomings in their results.

- We found and continue to assert that what Perry and Rothwell characterize as race-based differences in home values are, in large part, likely due to socio-economic status (SES) differences. Lower SES certainly reflects a legacy of past racism and lingering racial bias, leaving Blacks at a large income (and wealth) disadvantage relative to most Whites. Recognizing the importance of SES factors is key to fashioning appropriate public and private responses. For if largely SES based, the primary remedy would be policies that work to address the income and wealth gap.
- Our overarching goal in providing our critiques is to promote sustainable access to housing finance and support opportunities for income and wealth growth among lower income households. In so doing, we must be mindful that many past and continuing housing and other policy actions to address racial discrimination have had unintended consequences that have done substantial harm to low-income households generally, and minority households in particular.

Recap and what's new?

In the original paper, Perry et al. (2018) presented their key finding:

> "Homes of similar quality in neighborhoods with similar amenities are worth 23 percent less in majority black neighborhoods, compared to those with very few or no black residents…. Across all majority Black neighborhoods, owner-occupied homes are undervalued by $48,000 per home on average, amounting to $156 billion in cumulative losses….
>
> We believe **anti-black bias is the reason this undervaluation happens**, and we hope to better understand the precise beliefs and behaviors that drive this process in future research." (p. 3) (emphasis added)

As we pointed out in our critique, by this first quote along with similar ones on pages 6 and 15, Perry et al. (2018) claim to have <u>completely</u> controlled for structural characteristics and neighborhood amenities using 23 control variables (see appendix for a replication of the 23 controls in Perry et al. 2018). Therefore, the remainder in the gap has to be due to racial bias.

The second quote above states causality, namely that racial bias is the reason for the 23% devaluation of Black neighborhoods. There are many other instances where causality was implied or explicitly stated by the authors.

For example:

> "Perry testified that while overt discrimination in U.S. housing policy has been outlawed, systemic racism in the housing ecosystem still impacts Black families, both through the actions of individual appraisers as well as the broader industry's devaluation of majority-Black communities. This is evidenced by such factors as the Black homeownership rate (which

> has barely budged past its 1966 rate of 46%) and the lower valuation of homes in Black neighborhoods regardless of their quality (23% lower than homes in white neighborhoods, or $48,000 less per home on average)."[3]

In our critique of Perry et al. (2018), we demonstrated that the gaps in value that Perry et al. (2018) attribute solely to racism may be significantly reduced by adding two additional controls while keeping their 23 controls: the Equifax Risk Score (ERS) and the single-borrower share. We emphasized that we did not remove any of Perry et al.'s 23 control variables. We simply built upon their model by adding two additional controls.

Based on this result, we concluded that "their approach did not, as asserted, fully adjust for structure characteristics and neighborhood amenities" and that "their estimate of devaluation due to racial bias is, at a minimum, seriously overstated." In short, their approach suffered from omitted variable bias.

Significantly Perry and Rothwell (2021) contains a shift in the key finding of Perry et al. (2018)

In their rebuttal to our critique of their original paper, Perry and Rothwell (2021) wrote:

> "The results of our original research are robust to many alternative modeling strategies and theoretical concerns about omitted variables bias. **We cannot say if the best possible estimate is -23% or somewhat higher or lower, but we are confident that housing is valued differently in Black neighborhoods, and racial discrimination—in some form or forms—is the best explanation available given current information."** (Emphasis added)

From this response, it seems clear that their position has shifted. Perry and Rothwell (2021) are now admitting that the 23% devaluation estimate could be different, which would also change the extent of racial bias. In fact, in Table 1 (replicated in the appendix) they confirm that their estimates of racial bias could be substantially reduced when they control for additional SES factors beyond those included in their list of original 23 controls.[4]

Most importantly, Perry and Rothwell (2021) no longer claim causality for the devaluation.

> "The question is: **What explains this? We don't know with any precision.** In our paper, we reviewed literature on racial bias and pointed to its potential as an explanation, writing: "Our findings are generally consistent with the widespread presence of anti-Black bias." We left it for future work to explore some of the relevant mechanisms that link bias to valuations and quantify their importance." (Emphasis added)

However, the precise mechanism for the devaluation is of utmost importance. If neighborhood values are substantially lower as originally alleged due to racial bias based on the share of Black residents, this would call for certain policy approaches to address this bias. If neighborhood values are lower because of other reasons, such as systematic differences in SES, then the policy solutions would need to focus on

[3] See https://www.brookings.edu/testimonies/how-racial-disparities-in-home-prices-reveal-widespread-discrimination/.

[4] Perry and Rothwell (2021) state that they "created a more comprehensive measure of socio-economic status using factor analysis, with variables for median household income, the bachelor's degree or higher education attainment rate, mean capital income, and the loan-to-value ratio."

the root causes of the issue, and approaches addressing bias could do lasting harm to communities of color.

Our Responses to Perry and Rothwell's (2021) rebuttal[5]:

Rebuttal critique #1: Omitted variable bias

Perry and Rothwell's (2021) rebuttal to our critique supports our claim of omitted variable bias as shown in their Table 1 (replicated in our appendix below):

> "Table 1 reports devaluation estimates from six different models, both run using Census home values and Zillow price per square foot values. The first shows our original estimates. The second adds the loan to value ratio. The third uses the SES index from our factor analysis. The fourth omits a variable from our original model used to measure SES (single-mother households) and replaces it with our index. The fifth omits the single-mother variable from our original model, and the sixth includes our original model, the single-applicant share, and the loan-to-value ratio. The effects range from -15% to -29%."

The prior paragraph contrasts with the original statement in Perry et al. (2018) that "differences in home and neighborhood quality do not fully explain the devaluation of homes in black neighborhoods." In other words, Perry et al. (2018) claim that differences in home values have to be due to racial bias as they have completely controlled for differences in structural characteristics and neighborhood amenities using 23 control variables.

In Perry and Rothwell (2021) Table 1, they not only add an additional four SES variables in the form of an SES index, which noticeably reduces their estimates of devaluation, but they also remove the single mother with children under 18 variable, a strong SES factor. This approach is highly problematic as it directly contradicts their position in Perry et al. (2018), where they assert that the original 23 controls account for all structural and neighborhood differences. Models 4 and 5 in Table 1 each removes the "single-mother with children under 18" as a control. Therefore, judged against their own standard, they are not valid models. In our critique of their work, we start with, as a baseline, their standard, that is all of their 23 controls and then only add to this list.

Thus the key takeaway from Perry and Rothwell's (2021) results in Table 1 is a confirmation that adding additional controls can significantly lower the devaluation estimate, clearly supporting our claim of omitted variable bias.

Perry and Rothwell (2021) then inexplicably reach this conclusion:

[5] We do not respond to the first part of Perry and Rothwell's (2021) critique, which was based on our effort to independently replicate their data set. Perry and Rothwell (2021) concluded that our initial critique "fails empirically once you include rich and poor neighborhoods." Perry et al. (2018) objected to taking buying power into consideration. We attempted to overcome their objection by creating and comparing groupings of census tracts with similar buying power. We have completely replaced our first critique of their work, which was based on our effort to independently replicate their data set. We are grateful to Perry & Rothwell to have provided the complete data set and code so that we can focus on their methodology.

> "To summarize, there is no compelling evidence that bias from omitted measures of socio-economic status, purchasing power, or even non-real estate wealth have inflated our original estimate of devaluation."

As we have pointed out in our critique "the gaps in value that the Perry model attributes solely to racism may be significantly reduced by adding an additional two controls." Their analysis confirms this and furthermore leaves the option of other omitted variables that could further explain the difference they find such as the Equifax Risk Score or others.[6]

Yet, even in their original paper – albeit buried in the later pages - Perry et al. (2018) always acknowledge the potential shortcomings of their analysis:

> "It is certainly possible that our analysis has omitted variables that are correlated with both the black-population share and the value of housing and that could go further in explaining the gaps we observe in value. Yet, we believe it is unlikely that any such factors would explain the gap entirely." (p. 15)

As we pointed out in our initial critique and as Perry and Rothwell (2021) have now confirmed, there are omitted variables that lower the devaluation that Perry et al. attributed to their belief that "anti-black bias is the reason this undervaluation happens".

Thus, it was always premature and likely an overstatement to attribute all differences in value on racial bias. To simply state that "it is unlikely that any such factors would explain the gap entirely" and to make claims like the ones mentioned above is simply irresponsible in any policy debate, much less one as important as this one.

<u>Rebuttal critique #2: The inclusion of the Equifax Risk Score (ERS) and one adult borrower share as additional controls</u>

Perry and Rothwell (2021) state that we "claim that the inclusion of the ERS score lowers the devaluation estimate from 23% to 13% and it falls to 8% when including the ERS score and the individual adult borrower share."

This is correct. However, when using Perry et al.'s (2018) preferred specification, which is the Zillow list price per square foot, the devaluation falls even more and is no longer statistically significant with ERS and one adult borrower share.

Specification	**% Devaluation**	**# of Tracts**
23 controls for all tracts	-22.0% **	33,066
23 controls (limited – new baseline)	-21.8% **	33,000
23 controls & ERS	-5.1% *	33,000
23 controls & one adult borrower share	-14.6% **	33,000
23 controls & ERS & one adult borrower share	-1.9%	33,000

** denotes significance at the 1% level and * denotes significance at the 5% level.

[6] It is entirely plausible that non-SES variables on property maintenance, tax rates, nearness to natural amenities, etc. could influence home values. These factors are hard to measure and even harder to find reliable data. We think that SES to some extent incorporates these factors.

Perry and Rothwell (2021) object to using these additional two controls.

> "First, the ERS index is a proprietary model-derived measure that is methodologically opaque. Not only do scholars not know what model creates the index, we do not even know whether it includes the Black population share as a control. If so, it can hardly be used in our model."

The Equifax Risk Score (ERS) is a compilation of Vantage credit scores from 2013, representing a summary metric of the stock of all individuals of any type in a neighborhood with a score. It includes over 220 million scored individuals. In its 2007 "Report to Congress on Credit Scoring and Its Effects on the Availability and Affordability of Credit," the Board of Governors of the Federal Reserve System stated that "credit characteristics included in credit history scoring models do not serve as substitutes, or proxies, for race, ethnicity, or sex" (S-1f). Vantage credit scores are one of two industry standard scores and they are race blind as confirmed by the Fed report.

Based on the above, we don't think Perry and Rothwell's (2021) critique of ERS holds. As we have shown in our initial critique and will also show below, ERS is highly predictive. The fact that the data are propriety credit scores is not disqualifying. Indeed, credit scores are used routinely in empirical work involving mortgage and housing markets.

Perry and Rothwell (2021) also criticize our use of the one-adult borrower share.

> "Second the single-applicant share is itself a proxy variable for race. In the HMDA database, 70% of approved Black loan applicants do not have a co-applicant compared to only 50% of approved white applicants. The correlation between the Black population share and the percentage of 2016 applicants who are single-applicants is 0.50."

While this is certainly true, other variables, including ones from Perry et al.'s (2018) original 23 controls, such as the share of single mothers with children under 18, are also highly correlated with race. The following table shows some of these correlations:

Correlation with the share of Black residents	
Equifax Risk Score (ERS)	-67%
Percent households headed by single mothers with children under 18	58%
One-adult borrower share	57%
Proficiency rate of 4th-8th grade public school students	-41%
Median household income	-41%
Percent owner-occupied units	-37%
Percent with a bachelor's degree	-35%

More importantly though, the high correlations between race and the share of one-adult borrower (and other variables for that matter) is the reason why we want to include all of these control variables in the regression. In any regression analysis, explanatory variables will, to some degree, be correlated with other explanatory variables. The regression takes all of these correlations into account in order to determine the relationship between each explanatory variable and the dependent variable, all else equal. This is Econometrics 101. If ERS has little to no explanatory power beyond race, then the coefficient on ERS will be small and insignificant, while the coefficient on race will be strong and

significant. If, however, ERS has explanatory power beyond race, then the coefficient on ERS will be large and significant, while it will reduce the coefficient on race, which is exactly what we are finding.

The regression approach works well unless all explanatory variables are highly correlated with each other (multicollinearity). To say otherwise would in fact invalidate almost all regression research.

Perry and Rothwell (2021) also raise concerns about multicollinearity when we include other control variables such as the one-adult borrower share.

> "Multicollinearity occurs when variables that are highly correlated with each other are used in the same model and the result is usually that the effects are attenuated (or weakened). This is the predictable result of including the single co-applicant share."

However, the direction of the bias introduced by the multicollinearity cannot be known. In fact, the bias could go in either direction, so it is not correct to state that it would attenuate or weaken the effects since it could also enhance or strengthen them. We also do not find that multicollinearity is particularly high. The variance inflation factor (VIF) measures how much the variance of an explanatory variable is influenced, or inflated, by its correlation with the other explanatory variables. Including our two additional controls merely raises the variance inflation factor for the entire regression by 5% - from an average of 2.19 to 2.30. Furthermore, our analysis of the individual controls does not suggest a particularly high VIF for our two additional controls – and there are other controls that have higher VIFs. The VIF for both ERS (3.17) and one-adult borrower share (2.47) are far below a level of 10, which is generally considered to merit further investigation.

Perry and Rothwell (2021) then state the following:

> "Pinto and Peter justify [the inclusion of single-applicant share] by saying that it measures neighborhood socio-economic status, but they do not say why it is a better measure than school test scores, commuting times to work, access to stores, the college attainment rate, median household income, or the percentage of households headed by single mothers, all of which we already analyzed."

> "An alternative rationale for including the single-applicant share of loan applications is to measure the buying power of residents. Again, median household income would be more relevant, but one could also use the income data from the HMDA database, which has a much stronger correlation with loan value in the HMDA microdata than the number of co-applicants on the loan."

The point is not that one-adult borrower share is a better measure of SES, but that it is another possible factor that can affect property values. It is entirely plausible that one-adult borrower share captures something slightly different than income, such as a household's resiliency to withstanding a personal (i.e. medical emergency) or economic (i.e. unemployment) shock event, which may be mitigated by the presence of a second adult borrower on the note.

The same logic applies to the inclusion of the loan-to-income ratio[7], which Perry and Rothwell (2021) appear to prefer over our ERS metric. The loan-to-income ratio likely captures the leverage borrowers are taking on. The greater the ratio is, the greater the debt is and the ratio may thus proxy an inverse of a buying power. It may also capture lending risks. However in this regard, it is far less comprehensive than ERS, which may capture employment history, past hardships, etc. We are not opposed to including the loan-to-income ratio in the regression, but we think that the regression should also include other variables such as ERS and the one-borrower share, which have additional explanatory power.[8]

As discussed above, the regression methodology will tease out if the one-adult borrower variable (or any other variable) has explanatory power. In our initial critique, we pointed out that the original Perry et al. (2018) regression was already doing this: of the 23 controls used, 16 are statistically significant at the 5% level, but 7 are not.

Adding just two additional controls (ERS and one-adult borrower share), both of which are highly statistically significant, renders the Black share no longer statistically significant at the 5% level, but also leads to 2 more controls no longer being so, bringing the total to 9 of 23. This implies that our additional control variables are indeed better predictors than some of the original 23 controls. In case study 1 below, we present further evidence why the original 23 controls in Perry et al. (2018) do not work as intended and demonstrate that our additional SES control variables have explanatory power beyond the original 23 controls.

Rebuttal critique #3: Our case studies

Case study 1: Evidence that Perry et al.'s (2018) 23 controls do not work as intended

We think focusing on areas with entirely White populations provides a clear case study. Since the residents of these tracts do not face racial animus, we can test whether the 23 controls work as intended since we do not need to worry about racial bias.

Perry and Rothwell (2021) argue that:

> "It also does not follow that America's racial politics and history disappear in neighborhoods with no Black residents. Our modelling shows that these neighborhoods are over-valued relative to Black neighborhoods, and we argue that one reason is that Black people have not historically lived in these neighborhoods. Discrimination creates losses and gains when it comes to competitive markets, like housing and restaurants."

However, it is unclear why the relative valuations across all-White tracts should be affected by any estimated devaluation in majority-Black tracts especially given that Perry and Rothwell (2021) acknowledge a competitive market, in which the extra demand will not distort the relative price ratios.

[7] Perry & Rothwell (2021) also refer to the loan-to-income ratio as loan-to-value ratio. However, since HMDA 2016 does not include the LTV or the sale price, we assume that they mean loan-to-income ratio.
[8] We have included this variable in our regression next to the ERS and one-adult borrower share. We find that the loan-to-income ratio is highly statistically significant. The inclusion further reduces the devaluation for majority Black neighborhoods using the Zillow median list price of houses per square foot from 1.9% to 0.7%, which are both not significantly different than zero. Importantly, the coefficients on ERS and the one-adult borrower share are little changed implying that these variables have explanatory power beyond the loan-to-income ratio In the case of the ACS data, the inclusion reduces the devaluation from 7.6% to 5.7%.

Perry and Rothwell then use a Lasso (Least Absolute Shrinkage and Selection Operator) regression to purportedly show that this statistical tool "selected a nearly identical model to our original model and reported the same result." They then continue that "The only way to get devaluation estimates as low as those reported by Pinto and Peter is to throw away information." To reiterate the point from above, we do not discard any variables from Perry et al.'s (2018) original list. We are simply building on their model by adding two additional controls for SES. Perry and Rothwell concede that SES controls are appropriate since they themselves estimate models with added SES variables.[9]

When we tested the original 23 controls with the addition of our 2 additional SES variables (ERS and one-adult borrowers) using a Lasso regression, the Lasso ranked the model with all 25 controls as the model with the highest predictive value. Furthermore, the Lasso regression also ranked the ERS and one-adult borrower share as the most and third most predictive variables out of the full list of the 25 explanatory variables. (Out of the original 23 controls, the number of professional service businesses was ranked second highest by the Lasso model.) This suggests that SES, and in particular ERS and one-adult borrower share, are in fact highly predictive of home valuations and should therefore be included in the model as we do.

Furthermore, it's not clear that Lasso is even appropriate for the regression at hand. In contrast to the current case in which a sizable number of variables have explanatory power, Lasso is designed for situations where only a few variables out of many possible candidates actually belong in the regression. Stata, the statistical software tool used for this analysis, states as much:

> "The lasso is most useful when a few out of many potential covariates affect the outcome and it is important to include only the covariates [explanatory variables] that have an affect… Given that only a few of the many covariates affect the outcome, the problem is now that we don't know which covariates are important and which are not. The lasso produces estimates of the coefficients and solves this covariate-selection problem."[10]

Furthermore, Perry and Rothwell (2021) state that:

> "Moreover, it is unclear theoretically why the socio-economic status of residents should matter to the valuation of homes, after adjusting for things that people say they care about, such as school quality, walkability, and crime."

We would respond that SES variables are proxies for hard to quantify items such as neighborhood and structure condition, deferred maintenance, proximity to water, view, air quality, noise levels, etc. Focusing on entirely White tracts (≥97.5% White) provides further evidence of the limits of Perry et al.'s original 23 controls and the value of our additional SES variables. If the 23 controls fully account for differences in structural characteristics and neighborhood amenities, there should be little unexplained residual variation across the tracts with at least 97.5% White residents. As the table below shows, residuals from the regression for these tracts have a mean absolute error (MAE) of 12.0%, which is not near 0% and leaves unexplained about ¾ of the 16.1% within-metro variation in value.

[9] What is curious in Table 2 is that results for Perry et al.'s (2018) preferred specification (Zillow price per square foot) are not shown. It may be possible that Zillow home values refer to the preferred specification or it could refer to the Zillow median list price.

[10] See for example, https://blog.stata.com/2019/09/09/an-introduction-to-the-lasso-in-stata/.

When we then test whether the addition of two SES controls (ERS and one-adult borrower share) improves the fit of the regression by further reducing the MAE, we find that the MAE drops from 12.0% to 11.0%, which is a statistically significant drop at the 5% level. When we test whether the addition of three SES controls (ERS, one-adult borrower share, and income bins) improves the fit of the regression, we find that the MAE drops from 12.0% to 10.2%, which is a statistically significant drop at the 1% level. This tweaked case study confirms that Perry et al. omitted relevant variables and raises serious questions about their overall approach.

Mean Absolute Error (MAE) for Entirely White Tracts (≥97.5% White)	
Metro controls only	16.1%
23 controls & metro controls (baseline)	12.0%
23 controls plus 2 SES controls & metro controls	11.0%*
23 controls plus 3 SES controls & metro controls	10.2%**

Note: Additional 2 SES control variables are the Average ERS and the share of one adult borrowers. The third additional SES control are income bins based on 10ppt. increments of area median income (AMI). N-count is 465 tracts.
* and ** represents a statistically significant reduction at the 5% and 1% level from the baseline, respectively.

Case study 2: SES as an alternative explanation to value differences

As discussed above, we dismiss Perry and Rothwell's (2021) point about relative value differences between White neighborhoods due to racial bias. However, we acknowledge their point about Hispanic residents. We therefore tweak our case study 2, which previously was limited to tracts with fewer than 1% Black residents and which could include a large share of Hispanic residents.

We find a large devaluation based on non-race variables within entirely White tracts (≥97.5% White). In each instance we find a large devaluation based on non-race variables within these tracts. Since the residents of these tracts do not face racial animus, the large devaluations must reflect the fact that lower-SES households end up in less expensive neighborhoods.

Replacement variable for the Black population share	**Comparison values**[1]	**% Devaluation**
Median income (as a % of AMI)	75% vs 200%	-33.8% **
Average ERS	675 vs 750	-28.6% **
One adult borrower share	70% vs 36%	-29.4% **
Share without a bachelor's degree	77% vs 32%	-34.1% **
Share not in the labor force	33% vs 25%	-5.6% *
Share receiving SNAP benefits	20% vs 0%	-16.4%

** denotes significance at the 1% level and * denotes significance at the 5% level.
[1] Shows the values for each variable used to calculate the devaluation. For example, in the first row, we measure the devaluation of tracts with an area median income (AMI) of 75% to tracts with an AMI of 200%. The comparison values are chosen to roughly reflect the same percentiles as tracts with no and 50% Black residents.
Note: Regressions control for 23 variables and metro fixed effects in census tracts with < 1% Black residents. Dependent variable is the Zillow median list price of houses per square foot. The 465 tracts are in 76 metros.

Perry and Rothwell (2021) also state:

> "When we run our original model but include the Latino or Hispanic population share for the census tract, our devaluation estimates for majority Black neighborhoods actually increases in absolute value from -23% to -28%. The Latino or Hispanic devaluation estimate is -15%. When we include median household income and college education, the Black devaluation estimate is -23% but the Latino or Hispanic estimate falls to -3%. In other words, socio-economic status appears to be playing a much larger role in determining home prices in Latino or Hispanic neighborhoods than in Black neighborhoods. This suggests a potentially large role for anti-Black racial discrimination."

When we include Hispanic share in addition to the 23 controls and ERS and one-adult borrower, both Black and Hispanic variables are not statistically different than White. [11]

Case study 3: Progress in racial integration

Perry and Rothwell (2021) do not address our point about racial integration. There has been progress in racial integration, which runs counter to the fact of a "discount" or "undervaluation" on homes in Black neighborhoods of the magnitude found by Perry et al. (2018). This must mean that Black buyers understand that non-Black neighborhoods, in fact, have more amenities and, as a result, there is no "discount" or "undervaluation" on homes in Black neighborhoods of the magnitude found by Perry et al. (2018).

Further comments on Perry and Rothwell (2021)

Perry and Rothwell (2021) at the end of their report pivot to a Freddie Mac study claiming racial discrimination by appraisers. In a recent study, we have raised serious questions about this study. As we have pointed out, it was premature to publish a note based only on "exploratory research" limited to a single race-based correlation, with no attempt to present a rigorous analysis regarding other potential explanations. Merely stating that low appraisals resulted in "substantial appraisal valuations gaps" for minority versus White tracts provided an ominous sounding headline, but sheds little light on whether the gaps support a claim of systemic racism, which the note likely cannot substantiate.

Perry and Rothwell (2021) also state:

[11] Perry & Rothwell (2021) also state that "While this group has faced less discrimination, Latino or Hispanic Americans have similar socio-economic status as Black Americans, in that Latino or Hispanic adults have a somewhat lower rate of college education than Black adults but slightly higher median income." We would counter that it is not entirely adequate to conclude that Hispanic and Black Americans have similar SES simply based on educational attainment and income levels. Hispanic and Black Americans are quite different in terms of family structure or employment, which can all affect the demand for housing and thus home values. See for example: https://www.pewresearch.org/social-trends/2016/06/27/1-demographic-trends-and-economic-well-being/.

> "We would like to see more research along the lines of the new Freddie Mac paper. Measuring bias in appraisals is only one piece of the puzzle. Similar work needs to be done for lending and underwriting. Unfortunately, the institutions most suited to provide the data needed to conduct that analysis—Freddie Mac and Fannie Mae—do not have a culture of creating and sharing data for public research."

We would encourage them to take a look at our study on our recent work on "How Common Is Mortgage Lending Discrimination (Disparate Impact) with respect to Protected Classes? - A Critique of the Associated Press/Markup's "The Secret Bias Hidden in Mortgages." We find that on aggregate, there is no evidence of systemic bias by mortgage lenders. We cannot rule it out definitively, but we did not find any evidence of bias.

Conclusion:

In our initial critique we stated that "Lower SES certainly reflects a legacy of past racism and lingering racial bias, leaving Blacks at a large income and wealth disadvantage relative to most Whites" and that "Recognizing the importance of SES factors is key to fashioning appropriate public and private responses. We noted that "We must be mindful that many past and continuing housing and other policy actions to address racial discrimination have had unintended consequences that have done substantial harm to low-income households generally, and minority households in particular."

We thank Perry and Rothwell (2021) for their comments, cooperation, and spirit of collegiality. We find that their concerns only confirm our findings. We are not aiming to provide an alternative point estimate, but rather to show that the current approach has serious shortcomings. Therefore, we stand by our assessment that what Perry et al. (2018) characterize as race-based differences in home values are in large part, due to SES-based differences. The primary remedy should be policies that address the income and wealth gap. The focus should be on increasing financial security, creating generational wealth, and shrinking the SES gap through sustainable home ownership. This is largely a buying power issue, not a valuation one. To do otherwise risks repeating the mistakes of the past.

Appendix:

List of the Perry et al. (2018) 23 control variables:

#	Variable	Source
	Structural Characteristics	
1.	Median rooms	ACS 2012-2016
2.	Median year built	
3.	Single-family detached share of owner-occupied units	
4.	Single-family attached share of owner-occupied units	
5.	Mobile homes share of owner-occupied units	
6.	Homes with no vehicle availability	
7.	Homes with gas or electric heating	
8.	Homes with complete kitchen facilities	
	Neighborhood Amenities	
9.	Mean commute of adult workers	ACS 2012-2016
10.	Percent of working adults who carpool to work	
11.	Percent of working adults who use public transport	
12.	Percent owner-occupied units	
13.	Population (natural log)	
14.	Percent of households with children under 18	
15.	Percent households headed by single mothers with children under 18	
16.	Median age of the population	
17.	EPA Walkability Index	EPA
18.	Number of professional service businesses	County Business Patterns
19.	Number of libraries	
20.	Number of museums and historical sites	
21.	Number of food and drinking places	
22.	Number of gas stations	
23.	Proficiency rate of 4^{th}-8^{th} grade public school students	Perry et al.'s (2018) calculations

Table 1 from Perry and Rothwell (2021):

Table 1. Estimates of the devaluation of housing in majority Black neighborhoods using different modelling strategies

		Census home value			Zillow price per square foot		
		Devaluation on estimate	Number of census tracts in analysis	Adj R-squared	Devaluation on estimate	Number of census tracts in analysis	Adj R-squared
Model 1	original	−23%	38,303	0.8560	−22%	33,066	0.8350
Model 2	original + loan to value ratio	−20%	37,869	0.8660	−20%	32,866	0.8438
Model 3	original + SES index	−20%	37,851	0.8846	−21%	32,855	0.8548
Model 4	original omitting single mother variable + SES index	−23%	37,851	0.8839	−23%	32,855	0.8542
Model 5	original omitting single mother variable	−29%	38,303	0.8530	−27%	33,066	0.8324
Model 6	original + single applicants + loan to value ratio	−15%	37,869	0.8743	−16%	32,866	0.8491

Note: Original model refers to full list of controls described in Perry, Rothwell, and Harshbarger (2018), with percent of households headed by single-mothers omitted where noted (Models 4-5). SES index is first component of factor analysis using median household income, the bachelor's degree or higher attainment rate, the mean loan to value ratio and mean level of non-labor income.

Source: Perry-Rothwell-Harshbarger Housing Devaluation Data. Tract data on loan-to-income ratio and share of loans to individual applicants are from the Consumer Financial Protection Bureau (https://www.consumerfinance.gov/data-research/hmda/historic-data/). Capital income data are from the IRS, https://www.irs.gov/statistics/soi-tax-stats-individual-income-tax-statistics-2015-zip-code-data-soi

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AEI Housing Center

AEI Housing Center Critique of Freddie Mac's Note on "Racial and Ethnic Valuation Gaps in Home Purchase Appraisals"

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January 2022 (This version replaces an earlier version from November 2021.)[1]

Executive Summary

While we applaud Freddie Mac for having undertaken an effort to assemble relevant data to investigate the topic of appraisal discrimination, it was premature to publish a note based only on "exploratory research" limited to a single race-based correlation, with no attempt to present a rigorous analysis regarding other potential explanations. Merely stating that low appraisals resulted in "substantial appraisal valuations gaps" for minority versus White tracts provides an ominous sounding headline, but sheds little light on whether the gaps support a claim of systemic racism. Even worse, Freddie Mac's research note was quickly seized by policymakers and the media as evidence of systemic racism.[2]

Rather than being due to racial discrimination by appraisers, we found Freddie's claim of an "appraisal gap" is much more likely the result of would-be first-time buyer inexperience, socio-economic status (SES), or government actions (in particular a concentration of FHA lending in certain census tracts) with a disparate impact on protected classes.

Our analysis, which goes well beyond Freddie Mac's "exploratory research", can explain around 85% for Black tracts and 29% for Latino tracts of the gap through differences in socio-economic status (SES), leverage, and borrower characteristics. With the full set of controls, the Black gap disappears entirely, while the Latino gap falls by almost half.

[1] In this version, we have slightly updated our dataset to have it match Freddie Mac's cleaning process. The results are about the same as in the prior version. The views expressed are those of the authors alone and do not necessarily represent those of the American Enterprise Institute or of any individual who provided comments. The authors would like to thank Salim Furth, Mark Palim, and Steve Oliner for their helpful comments.

[2] FHFA acting director Sandra Thompson stated at the 2021 National Housing Conference that Freddie Mac found "substantial appraisal valuation gaps for minority versus White tracts." Money.com's headline stated "Freddie Mac Confirms There's a Major Racial Gap in Home Appraisals", Inman's "Landmark study confirms troubling 'appraisal gap' in minority enclaves", Bloomberg's "Freddie Mac Finds 'Pervasive' Bias in Home Appraisal Industry", CBS News' "There's a big "appraisal gap" between Black and White homeowners", and the WSJ's "Freddie Mac Finds Home Appraisals in Black, Latino Areas More Likely to Fall Short."

In a robustness test, we found a sizeable FHA effect for majority White or White-only tracts. Thus, FHA lending, but also Equifax Risk Factor (ERS) and the one adult borrower share, is not simply substituting for minority borrowers.

Finally, research ignored by Freddie Mac has found a substantial consumer benefit to low appraisals:

> Low appraisals provide enormous leverage to renegotiate the contract to a lower price. When buyers do renegotiate, subsequent to a low appraisal, they usually lower price by a significant share of the difference between contract price and appraised value. The new lower price reduces credit risk, costs to the borrower, and ultimately results in greater wealth for the buyer.[3]

If the differences found by Freddie Mac are in fact, as our research indicates, largely due to factors such as differing rates of FHA financing and SES in the grouped census tracts, then addressing wealth inequities through the use of easier lending criteria and accommodative monetary policy create a systemic barrier to sustainable homeownership and wealth creation by subjecting protected class households to risky lending, unsustainable price boosts, speculation in land, and home price volatility as other AEI Housing Center research has shown.[4] These polices are a violation of the FHFA's (and HUD's and the CFPB's) obligation to Affirmatively Further the Goal of Fair Housing. Thus, instead of Freddie Mac's correlation being the result of systemic appraiser racism, it may well have been the result of government policies and actions which have a disparate impact on protected classes.

We respectfully submit the following comments in an effort to highlight the above deficiencies and report on our research into other explanatory factors. We believe that our research could be quickly confirmed. We trust that this critique will help inform Freddie Mac, FHFA, policy makers and the public on this important topic.[5]

Replicating Freddie Mac's Data

The main data on the "appraisal gap" presented by Freddie Mac are summarized in Exhibit 1 of their note, which shows that appraisals come in below the contract price more often in census tracts (or neighborhoods as Freddie Mac refers to them) with a majority of Latino or Black residents. Per Freddie Mac, the appraisal gap increases with the share of the Latino and Black residents in the tract. From these data, Freddie Mac, while calling its note "exploratory research", states that there are "substantial appraisal valuation gaps for minority versus White tracts". As noted, publishing with only this single race-based correlation was inappropriate and premature. Given that the rest of the note is largely based on this single correlation, the entire note suffers from the same shortcoming.

[3] Fout, Hamilton, Nuno Mota, and Eric Rosenblatt. "When Appraisers Go Low, Contracts Go Lower: The Impact of Expert Opinions on Transaction Prices." The Journal of Real Estate Finance and Economics (2021): 1-41. and Fout, Hamilton, and Vincent Yao. Housing market effects of appraising below contract. Working paper, available at: http://www.fanniemae.com/resources/file/research/datanotes/pdf/fannie-mae-whitepaper-060716.pdf, 2016.
[4] See for example "The paradox of accessible lending" or "How the federal government's policies have helped to make housing outcomes separate and unequal."
[5] We also provide additional research questions in Appendix 2 and questions about the note in Appendix 3.

Freddie Mac's data set contains 13 million appraisals from 2015 to 2020. We first replicate Freddie Mac's Exhibit 1 in an effort to determine the validity of the data (Table 1). Our data set includes over 4.9 million appraisals or about 38% of Freddie Mac's data.[6] Both data sets rely on Census data at the tract level to identify the racial and ethnic composition of the tracts.[7] Neither data set includes the race or ethnicity of the individual loan applicants. Neither data set includes information as to the final disposition of the loan application (i.e. did the purchase and loan transaction proceed with the original applicant and was the purchase price adjusted based on the lower valuation provided by the appraiser).

We find that when comparing the results between Freddie Mac and AEI side by side (see Table 1), we find similar "appraisal gap" correlations for minority versus White tracts. For example, our gap for majority Black tracts is similar to Freddie Mac's gap (6.6 ppts versus 5.2 ppts), while the gap for majority Latino tracts is very close (8.3 ppts versus 8.0 ppts).

We conclude that our data are robust and representative and we will leverage them to go far beyond Freddie Mac's "exploratory research" and dive deeply into an examination of many other correlations and their explanatory power.

Table 1: Freddie Mac's Exhibit 1 and AEI's Replication of Exhibit 1
Appraisals for the purchase of single-family one-unit homes, Jan. 1, 2015-Dec. 31, 2020

Property Tract	Freddie Mac Note			AEI results		
	Count	% Lower Than Contract Price	Gap vs. White	Count	% Lower Than Contract Price	Gap vs. White
Overall	12,752,779	8.3%		4,948,772	9.1%	
White [50%-100%]	10,632,616	7.4%		3,926,787	7.9%	
Latino [50%-100%]	**553,470**	**15.4%**	**8.0 ppts**	**238,064**	**16.2%**	**8.3 ppts**
Latino [50%-80%]		15.0%	7.7 ppts	194,630	15.7%	6.8 ppts
Latino [80%-100%]		16.7%	9.4 ppts	43,434	18.7%	11.7 ppts
Black [50%-100%]	**373,747**	**12.5%**	**5.2 ppts**	**141,206**	**14.6%**	**6.6 ppts**
Black [50%-80%]		12.10%	4.8 ppts	106,577	14.00%	5.1 ppts
Black [80%-100%]		13.30%	5.9 ppts	34,632	16.40%	9.4 ppts

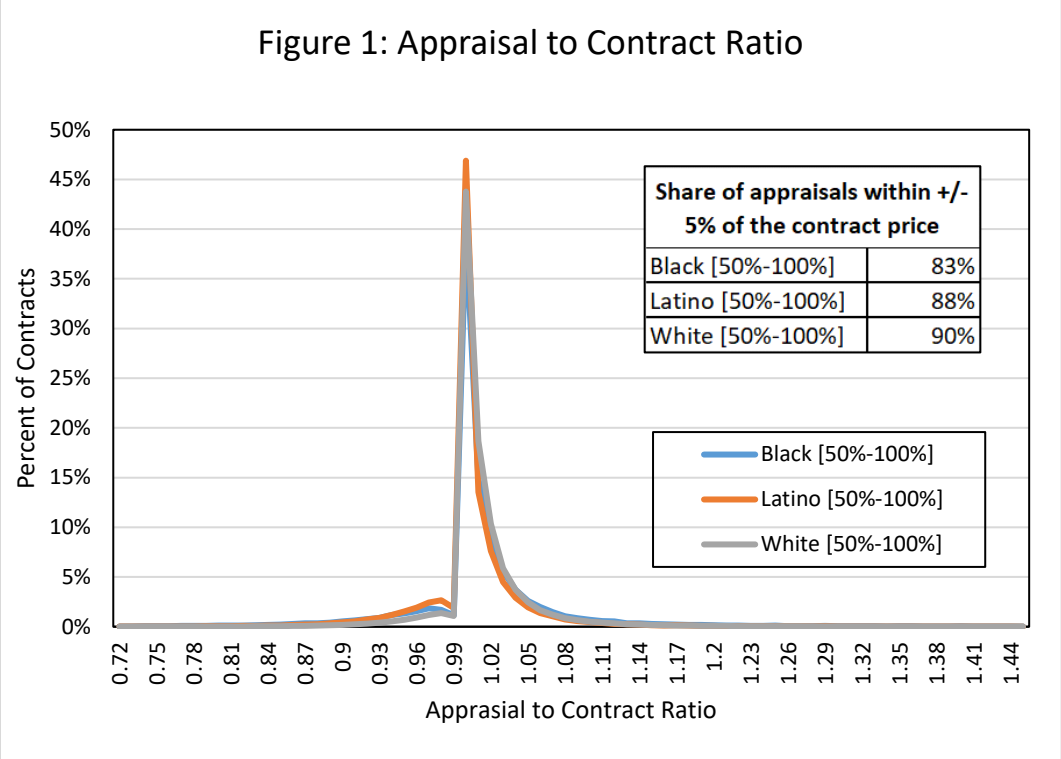
Source: Freddie Mac and AEI Housing Center.

Initial observations about Freddie Mac's "Exploratory Research"

What was omitted from the Freddie Mac note is the extent of the "appraisal gap," meaning by how much appraisers are coming in below the contract price or the severity of the gap. Figure 1 first presents the distribution of the ratios of appraisal to contract price for three groups. There is a large amount of anchoring to the contract price as shown by the large spikes at a ratio of 1. Between 83% of appraisals in

[6] Unlike in a prior version of this paper, we have now excluded appraisals where it involved a non-arm length transaction and a seller concession exceeding 3%. The new data set now uses the same cleaning steps as outlined in the Freddie Mac note.
[7] We use the 5-year 2015-2019 American Community Survey data to classify tracts while Freddie uses 2010 Census data.

Black tracts and 90% in White tracts fall within +/- 5% of the contract price. From the chart, it is hard to make out a meaningful difference between the 3 lines. Importantly research has shown that "[L]ow appraisals provide enormous leverage to renegotiate the contract to a lower price."[8] Thus, they can be an important consumer protection.



Source: AEI Housing Center.

Table 2 displays a measure of the severity of the "appraisal gap," which was not reported by Freddie Mac. Severity is, however, an important part in establishing the magnitude of appraiser bias. The table provides median gaps, which are generally around 4-6% of the contract price depending on the group for appraisals that came in below contract price. Within this narrow range, the gap in percent is negligible between Latino tracts and White ones (0.3%) and the gap between Black tracts and White ones is 1.5%. (See Figure A1 in the appendix for a distribution of the differences.)

What is interesting is that for the appraisals that came in below contract price, there appears to be no gap relative to White tracts for Latino tracts and a relatively small gap of 1-2% for Black tracts. Rather than racial bias, this seems to suggest that tracts which a higher share of appraisals below contract price have certain characteristics that make them likelier to do so. We explore this explanation in our analysis which begins following the end of this section.

[8] Fout et al. (2021)

Table 2: Insights on Freddie Mac's Omitted Results

	Median contract price	Median Difference btw. appraisal and contract price		Gap vs White	
		%	$	%	$
White [50%-100%]	$265,000	3.6%	-$10,000		
Latino [50%-100%]	$246,000	3.9%	-$10,000	0.3%	$0
Latino [50%-80%]	$243,500	3.8%	-$10,000	0.3%	$0
Latino [80%-100%]	$260,000	4.2%	-$10,000	0.7%	$0
Black [50%-100%]	$182,000	5.1%	-$10,000	1.5%	$0
Black [50%-80%]	$185,000	4.8%	-$9,950	1.3%	$50
Black [80%-100%]	$175,000	5.7%	-$10,000	2.2%	$0

Source: AEI Housing Center.

We also point to research by Fout et al. (2021), which uses home purchase loan application data, and builds on earlier research by Fout and Yao (2016). Fout studies "buyer responses to the uncommon occurrence of the appraised value coming in below the contract price (i.e. a low appraisal)."[9] The study has two significant findings:

1) "Furthermore, the study finds that "when a low appraisal occurs, … the probability of downward renegotiation rises to 55.8% and continues steadily to rise as appraised value falls further short of contract, reaching 79.9% when appraised value is short of contract by seven to 8 %" or that "higher LTV borrowers renegotiate more often, in more than 93% of cases for applications with an LTV of 97 when the appraised value's shortfall from contract is greater than 2%. Renegotiation likelihood drops much lower for LTVs of 70 or less, where the low appraisal is less likely to jeopardize the loan" and
2) a low appraisal "sharply raises the probability of downward price renegotiation"[10] and "Fig. 5 [reproduced below] shows that high LTV borrowers usually recapture the entire difference between contract and appraised value. Borrowers with lower LTV, including unconstrained borrowers, split this difference, giving up more to the seller as constraints loosen."[11]

[9] Fout et al. (2021)
[10] Ibid.
[11] Fout et al. (2021) explain that "downward renegotiation given a low appraisal is more common among borrowers that are deemed financially constrained, for whom the low appraisal, absent a renegotiation, would imply higher financing costs or difficulties in closing the loan. Nonetheless, even borrowers that are entirely unconstrained from a financing perspective, still exhibit substantial renegotiation rates when facing low appraisals. This suggests that the news or information effect of receiving an expert opinion on the property valuation (by the appraiser) has a significant implication for the renegotiation likelihood. Together, these results suggest there is both a liquidity effect and an information effect that impact the likelihood of renegotiation when facing a low appraisal, a novel finding in the literature."

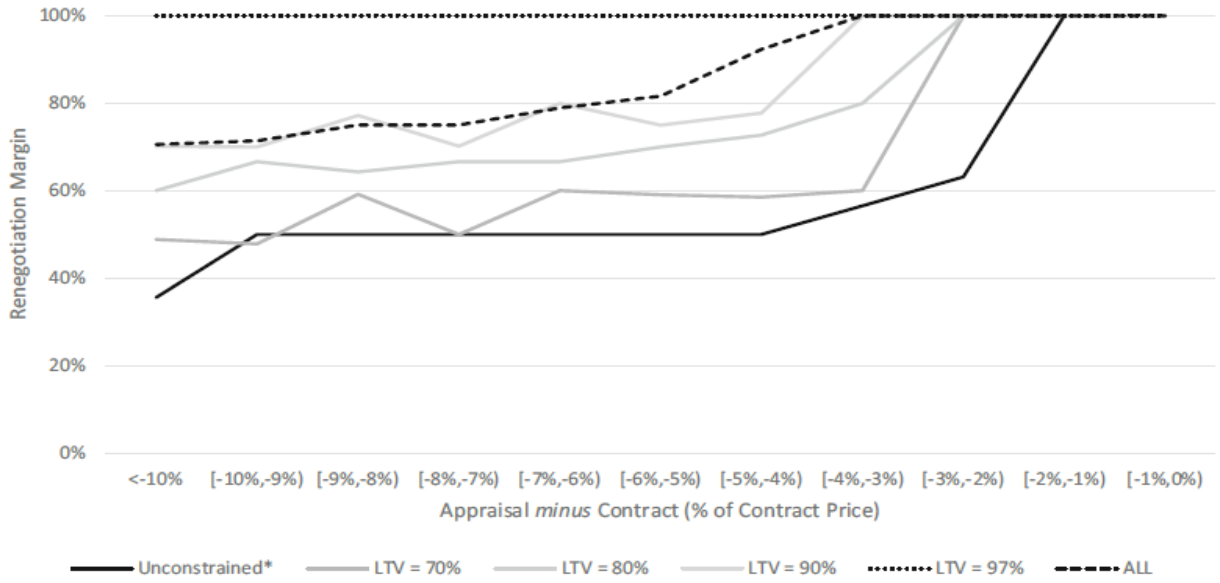


Fig. 5 Median percent of difference between contract and appraised value recaptured by buyers who renegotiate in cases where downward renegotiation occurs.* "Unconstrained" borrowers defined as those with a post-appraisal LTV below 60% and FICO of 740 or higher

Figure 5 reproduced from Fout et al. (2021)

While Fout et al. (2021) did not investigate the impact on race, the higher shares of FHA lending in Black and Latino tracts, which likely means LTVs of 96.5% or more, seem to suggest that borrowers in these tracts end up mostly benefiting from lower appraisals because the "buyer gains substantial bargaining power because the buyer can dissolve the contract by simply failing to pursue the mortgage, getting all earnest money back and avoiding most financing costs."

Thus, the slightly larger share of appraisals below contract price in Black tracts and their slightly higher differences to the appraisal price may actually provide a larger consumer benefit to these tract – quite the opposite of what Freddie Mac alleges. Crucially, this study was published on February 23, 2021, well before Freddie Mac's note was released.[12]

In footnote 8 to its note, Freddie Mac cites a paper by Calem, Lambie-Hanson, and Nakamura (2017). The footnote states:

> We acknowledge that the sale price is not always equal to market value, and we expect that in all areas some appraisals will report values lower than the contract price. However, research

[12] Fout et al. (2021) also state that "Low appraisals provide enormous leverage to renegotiate the contract to a lower price. When buyers do renegotiate, subsequent to a low appraisal, they usually lower price by a significant share of the difference between contract price and appraised value. The new lower price reduces credit risk, costs to the borrower, and ultimately results in greater wealth for the buyer" or "the ability to renegotiate sales price to more accurately reflect the value of the underlying collateral potentially puts the borrower in a better position to sustain homeownership and allow for more effective management of the associated mortgage risk. A low appraisal gives buyers an opportunity to carry out such a renegotiation. As such, more accurate appraisals in the case of evidence of buyer overbidding support better decision making and more effective assessment of mortgage credit risk and pricing."

data indicate that a high percentage of appraisals are at or above the purchase contract price (Calem, Lambie-Hanson, and Nakamura, 2017).

Interestingly, the Calem et al. paper has in the abstract the following statement: "An important benefit of appraisals reported below the contract price is that they help borrowers renegotiate prices with sellers." This sentence is based on Fout and Yao (2016).

Freddie Mac failed to mention this fact or the updated 2021 Fout study anywhere in its note on low appraisals, which noted "substantial appraisal valuation gaps for minority versus White tracts".

Methodology to Analyze Correlations: An aspect of American life is that Blacks and Latinos, on average, have a lower SES than Whites.[13] This opens up the question: Do borrowers who receive an appraisal below contract price have certain characteristics that make them more likely to do so? We are informed in this approach by having undertaken many studies on alleged racial bias in housing.[14]

Equation (1): Using our appraisal dataset and without any control variables, we first construct the following logistic regression to determine a baseline:

$$(1) \quad Below_i = a + b_1\, White_{i,x} + b_2\, Latino_{i,x} + b_3\, Black_{i,x} + Year\ FE + MSA\ FE + e_i$$

where Below is a dummy (or binary) variable for whether the appraisal came in below the contract price or not, which is indicated by the i subscript for appraisal level. White, Black, and Latino measure each group's share of the residents within a census tract, which is indicated by the x subscript for tract level. We also control for differences across metro areas through metro fixed effects and for differences across years through year fixed effects.

We report the detailed regression coefficients in the appendix. We then "translate" the regression coefficients from the logistical regression to a marginal effect for each observation, which predict the effect on outcomes (namely the share of appraisals below contract price). We then calculate average marginal effects, which is the simple average of the marginal effect across all observations for the 3

[13] However, given Whites' sizable share of the nation's population, they constitute a sizable proportion of low-SES individuals. For example, of the estimated 11 million children in poverty in 2019, 28% are Black, 39% are Hispanic or Latino, and 33% are non–Hispanic White. https://datacenter.kidscount.org/data#USA/1/0/char/5

[14] See for example: What is the Impact of Race and Socio-Economic Status on the Valuation of Homes by Neighborhood?, How Common Is Appraiser Racial Bias?, or How Common Is Disparate Impact in Mortgage Lending?

groups of interest.[15] Lastly, we calculate the gap in appraisals below contract price for minority tracts relative to White ones.[16]

Equation (2): Next, we introduce a limited set of control variables aimed at socio-economic status and buyer characteristics to test if non-race related factors may help explain the correlation found by Freddie Mac of "substantial appraisal valuation gaps for minority versus White tracts." We select these variables because of our prior research, which found them to be a significant explanatory factors in evaluating valuation differences across tracts of difference racial make-up.[17] We then repeat the steps from above.

We construct the following regression, which builds on equation (1) but adds a limited set of new control variables:

$$(2) \quad Below_i = a + b_1\, White_{i,x} + b_2\, Latino_{i,x} + b_3\, Black_{i,x} + b_4\, FHA_x + b_5\, ERS_x + \\ + b_6\, OneAdult_x + Year\ FE + MSA\ FE + e_i$$

The additional controls in equation (2) relative to equation (1) are:

- *FHA* is a continuous variable for the FHA share of purchase loans originated in each tract in 2020 per HMDA data,
- *ERS* is a set of dummy variables for the tract's 2013 Equifax Risk Score decile (ranking from low 0 to high 9), which encompasses the credit scores of all individuals in a tract with a credit score and as such it is a much broader measure of credit than the scores of individuals taking out mortgage loans,
- *OneAdult* is the share of one adult (as opposed to two adult) borrowers in 2020 per HMDA data.

Equation (3). We build on equation (1) and (2) by adding a full set of control variables:

$$(3) \quad Below_i = a + b_1\, White_{i,x} + b_2\, Latino_{i,x} + b_3\, Black_{i,x} + b_4\, FHA_x + b_5\, ERS_x + \\ + b_6\, OneAdult_x + b_7\, HPA_x + b_8\, Sales_x + b_9\, Tier_{i,x} + b_{10}\, New_{i,x} + \\ + b_{11}\, Poor_{i,x} + b_{12}\, Owner_x + b_{13}\, Income_x + Year\ FE + MSA\ FE + e_i$$

The additional controls in equation (3) relative to equation (2) are:

[15] Freddie Mac defines a majority tract as having a resident share of at least 50% for one of the three groups (White, Latino, and Black). In the regression, we include a continuous variable ranging from 0 to 100 percent for each of the three groups. When we estimate the implied appraisal gap, we assume an 80% share for each group in the marginal effects, which represents the point which Freddie Mac uses to distinguish as the share of minority people increases. At the same time, we reduce the shares for the other groups. In the case of majority Black tracts, we thus assume an 80% Black and 20% White split, in the case of majority Latino, we assume an 80% Latino and 20% White split, and for majority White, we assume an 80% White and 10% Black and Latino respectively.

[16] For the margin effects we use average predictions using SAS's Proc QLIM (Qualitative and Limited Dependent Variable Model) program.

[17] See What is the Impact of Race and Socio-Economic Status on the Valuation of Homes by Neighborhood? For details.

- *HPA* is the FHFA annual year-over-year home price appreciation. Faster HPA may introduce errors on the appraisal, including time adjustments, especially if there is a large gap to the metro median HPA, which is most likely what the appraiser is observing.
- *Sales* measures the quarterly number of appraisals (in logarithmic terms). A lower number of appraisals may make it harder to for the appraiser to find comps, which then also require a larger sale price time adjustment.
- *Tier* is a set of dummy variables for the low, middle (omitted), or high price third of the contract property's price in a given quarter relative to all other sales in the metro area. Lower priced home may be a proxy for first-time and less experienced buyers.
- *New* is a dummy variable for whether the 1004 appraisal form indicates a new home condition (Condition of C1) or not. Newer homes may be easier to appraise than older ones.
- *Poor* is dummy variable for whether the 1004 appraisal form indicates "deferred maintenance" (C5) or "substantial damage" (C6).
- *Owner* measures the owner-occupied share of homes in the tract, and
- *Income* is the ratio of the tract's income to the metro area median income, which is a component of tract SES.

Results

Equation (1): Without using any controls, we find that the gap relative to Whites for appraisals below contract price is 5.4 ppts for Black tracts and 7.8 ppts for Latino tracts. While these results are regression based, they are very similar to our results from our replication of Freddie Mac's Exhibit 1 (6.6 ppts and 8.3 ppts, respectively). They are also fairly similar to Freddie Mac's results of 5.2 ppts and 8.0 ppts, respectively.

Equation (2): After introducing the limited set of additional controls, the gap relative to White tracts for appraisals below contract price is 0.8 ppt for Black tracts (down from 5.4 ppts) and 5.5 ppts for Latino tracts (down from 7.8 ppts).

These results with the limited set of additional controls are interesting as the implied gaps in the share of appraisals below contract price are much lower than without any controls. In fact, the gap for Black tracts falls by seven-eighths and the gap for Latino tracts falls by about one-third. This presents evidence that the socio-economic factors, FHA lending, or borrower characteristics can account almost entirely (in the case of Black tracts) or for over a third (in the case of Latino tracts) of the "appraisal gap" as identified by Freddie Mac.

Equation (3): After introducing the full set of additional controls, the gap for Black tract disappears entirely (-0.3 ppt vs. 6.6 ppts) and the gap for Latino tracts falls by almost half (4.6 ppts vs 8.3 ppts). For the regression results, please refer to the appendix.

Table 3: Summary of Results	Gap vs. White				
	Freddie Mac results	Table 1 AEI results	Equation (1) no controls	Equation (2) with limited controls	Equation (3) with full controls
White					
Latino	8.0 ppts	8.3 ppts	7.8 ppts	5.5 ppts	4.6 ppts
Black	5.2 ppts	6.6 ppts	5.4 ppts	0.8 ppt	-0.3 ppt

FHA lending at the tract level is a powerful predictor: Among the controls, we particularly find that the presence of FHA lending is a powerful predictor. For a 10 ppts increase in the FHA share of lending in the tract, we find that the share of appraisals below contract price increases by 0.5 ppts. Given that Black tracts have on average an FHA share of 34%, Latino tracts of 32% and White tracts of 15% (see Table 4), this variable alone accounts for about one-quarter and about four-third of the reduction in the appraisal gap for Black and Latino tracts, respectively.[18] As we discuss below, the presence of FHA lending continues as a powerful predictor even when comparing the share of appraisals below purchase price among largely White tracts with varying levels of FHA lending.

Three hypothesis come to mind for the outsized effect of FHA lending:

1) FHA borrowers are likely more inexperienced and likely have less financial literacy. FHA purchase borrowers tend to be lower income, with 83% being first-time homebuyers (and likely often first-generation buyers) and 40% of purchasers being minority.[19] They have much lower credit scores (median of 671 over the sample period) than the average for all agency-guaranteed homebuyers (median of 733 over the sample period). This gap in credit scores may also be an indication of less financial literacy and experience, which may translate into a lower skill to negotiate on price.

   One study by FHFA researchers found that first time buyers (FTBs) have a tendency to overpay for their homes when compared to their more experienced, repeat buyer counterparts.[20] After adjusting for housing characteristics, the FHFA study found that over 2012-2016 first time home buyers overpaid on average by 1.04%. Given the $275,021 price for the average home in the study sample, this suggests that FTBs overpay by as much as $2,860. Possible explanations for this discrepancy offered are lack of buyer experience, the failure to negotiate, or haste in closing on a contract.

2) FHA borrowers could be outbidding other buyers with leverage readily provided by FHA. (FHA's median DTI is 44 percent over the sample period compared to 37 percent for all non-FHA

[18] For these estimates, we first multiply the marginal effect by the difference in FHA lending between White and Latino and Black tracts as provided in Table 4. We then compute the reduction in the gap relative to White tracts from equation 2 from equation 1, which in the case of Black tracts is 3.1 ppts. We then divide the numbers to arrive at a rough estimate of the effect of FHA lending in reducing the gap. We later repeat the procedure for ERS bin and one adult borrower share.

[19] First-time buyer and minority statistics is for FY 2018. Minority share is based on the 92% with a reported race or ethnicity. https://www.hud.gov/sites/dfiles/Housing/documents/FHAProdReport_Sep2018.pdf

[20] Shui, Jessica, and Shriya Murthy. "Under what circumstances do first-time homebuyers overpay?—An empirical analysis using mortgage and appraisal data." Journal of Real Estate Research 41, no. 1 (2019): 107-146.

agency-guaranteed homebuyers). They could be overpaying because of their inexperience in working with realtors (who are paid by the seller) or because their interests are not necessarily aligned with realtors or mortgage bankers, who get paid based on the sale price or loan amount.[21]

3) FHA loans use the same Uniform Residential Appraisal Report (Form 1004) as conventional lending. The one substantive difference in the appraisal standard for an FHA loan relative to a conventional loan is that HUD establishes Minimum Property Standards (MPS) setting certain minimum standards for buildings constructed under HUD housing programs, including FHA insured single family homes. MPS includes "durability of such items as doors, windows, gutters and downspouts, painting and wall coverings, kitchen cabinets and carpeting. The MPS includes minimum standards for these, and other items, to ensure that the value of an FHA-insured home is not reduced by the deterioration of these components." As a result, a real estate agent familiar with MPS may advise a seller, when considering an FHA insured loan applicant, to hold out for a higher contract price to offset all or part of that cost, in an attempt to shift the cost of the repairs from the seller to the buyer.[22]

Equifax Risk Score Decile: We also found Equifax Risk Score decile to be another very powerful predictor of the share of appraisals below contract price. For a tract in the lowest ERS decile, we find that the share of appraisals below contract price is about 2.4 ppts greater than in the highest ERS decile. Given that Black tracts have on average an ERS decile of 0.7, Latino tracts of 1.5, but White ones of 5.2 (see Table 4), ERS can perhaps explain about one-third of the reduction appraisal gap for Black and Latino tracts, respectively. ERS measures past payment behavior but it may also be a close proxy for financial literacy and socio-economic status. Crucially, the ERS is also color blind, meaning no race or ethnicity variables are reported to the credit bureau.

Share of One Adult Borrowers: We also found the share of purchase loans with one adult borrower to be another very powerful predictor of the share of appraisals below contract price. For a 10 ppts increase in the share of one adult borrower in the tract, we find that the share of appraisals below contract price increases by 0.7 ppt. Given that Black tracts have a median one adult borrower share of 77%, Latino tracts of 64%, and White tracts of 53% (see Table 4), this variable alone accounts for about four-tenths and about one-third of the reduction in the appraisal gap for Black and Latino tracts, respectively. Similar to the FHA share, this variable likely captures first-time, first-generation, inexperienced prospective buyers with lots of access to leverage.

When taken together, the limited set of control variables of ERS, FHA lending, and one adult borrower share – which are all highly statistically significant – reduce the "appraisal gap" for Black tracts by 85% and for Latino tracts by 29%.

With the full set of controls, the Black gap disappears entirely, while the Latino gap falls by half. The detailed regression results are summarized in the appendix.

[21] For mortgage bankers, the mechanism may work through the preapproval process based on FHA's underwriting guidelines, where the applicant is pre-approved for the maximum allowable purchase price based on income.
[22] https://www.hud.gov/program_offices/housing/ramh/mps/mhsmpsp

Robustness Test

FHA lending skews heavily to FTBs. Per FHA data, around 82.5% of its home purchase loans between Jan. 2015 and Dec. 2020 were to first-time buyers.[23] According to AEI estimates, around 16% and 22% of these FHA FTB home purchase loans were to Black and Latino borrowers, respectively. To test whether the FHA share is simply a proxy for minority borrowers and thus diminishing the size of the "appraisal gap" on the Black and Latino estimates, we limit the sample to White tracts (those with 50+% White share of residents), thus largely removing the effect from minority tracts.[24]

For these majority White tracts, we then test if the FHA purchase loan share by itself has an effect on the share of appraisals below contract price. We find that a 10 ppts increase in the FHA loan share is associated with a 1.2 ppts increase in the share of appraisals below contract price. When we control for ERS bin and the share of one adult borrowers, a 10 ppts increase in FHA lending is associated with a 0.5 ppt increase in the share of appraisals below contract price. Just like the FHA loan share, ERS decile and one adult borrower share are highly statically significant. These results also hold for tracts with even higher White resident shares.

We therefore conclude that there is a sizeable FHA effect for majority White or White-only tracts. Thus, FHA lending, but also ERS and the one adult borrower share, is not simply substituting for minority borrowers.

Discussion

The “appraisal gap” found by Freddie Mac is more likely due to SES, FHA lending, and borrower characteristics than systemic racism. From the start of 2015 to the end of 2020, we can document the following relationships to these characteristics (see table 4):

- Home price appreciation (HPA) in minority tracts has far exceeded HPA in White tracts,
- Access to looser underwriting (as measured by the mortgage default rate (MDR), a proxy for lending standards at loan origination) has been far greater in minority tracts than in White tracts,
- FHA lending has a far greater footprint in minority tracts than White ones,
- Shares of one adult borrower are much greater, and
- Credit score profiles are much lower for individual with scores in minority tracts than White ones.

[23] Supra. https://www.hud.gov/sites/dfiles/Housing/documents/FHAProdReport_Sep2018.pdf
[24] See the appendix for a detailed table on FHA shares by majority White, Latino, and Black tracts.

Table 4: Summary Statistics for Majority White, Latino, and Black Tracts	Median Cumulative HPA (2015-2020)	MDR	% FHA lending	% one adult borrower	Average ERS	Average ERS Decile
White [50%-100%]	**26.5%**	**12.4%**	**15.0%**	**52.8%**	**706**	**5.2**
Latino [50%-100%]	**33.9%**	**17.4%**	**32.3%**	**63.8%**	**665**	**1.5**
Latino [50%-80%]	37.4%	17.2%	32.0%	63.9%	667	1.6
Latino [80%-100%]	25.8%	18.1%	33.3%	63.4%	658	0.9
Black [50%-100%]	**36.6%**	**19.2%**	**34.4%**	**77.1%**	**647**	**0.7**
Black [50%-80%]	34.9%	18.5%	32.1%	74.9%	653	0.8
Black [80%-100%]	41.6%	21.2%	41.4%	83.7%	629	0.2

Note: Cells are weighted by 2020 HMDA purchase counts.

Freddie's claim of an "appraisal gap" seemingly due to systemic racism looks more to be the result of would-be first-time buyer inexperience, SES, or government actions (in particular FHA) with a disparate impact on protected classes.

FHA equips many lower income, lower SES potential homebuyers with lots of spending power in the form of leverage. Given this leverage and the "seal of a qualified mortgage underwriting approval" by a government agency, these FHA homebuyers (especially less experienced first-time/first generation buyers) have less ability to gauge what the right price is and are lulled into thinking they are able to afford the price needed to win the bidding contest.[25] For particularly inexperienced borrowers, an appraiser may be providing a consumer benefit with an appraisal below contract price by alerting the would-be buyer that he or she is overpaying on the home.

While this research cannot rule out instances of individual appraiser bias, our aggregate results either eliminate or sharply narrow the "appraisal gap" measured in Freddie Mac's research note, undercutting explanations based on systemic bias. Given these findings, we think that this framework could also explain the differences for the 934 appraisers who submitted a sufficient number of appraisals in both Black or Latino and White tracts and for which Freddie Mac presented evidence of an "appraisal gap." Freddie Mac should redo their research of these individual appraisers incorporating the additional controls that we outlined in this critique.

Conclusion

- Freddie found an "appraisal gap" between White and minorities in the share of appraisals which come in below contract price.
- We can explain around 85% for Black tracts and 29% for Latino tracts of the gap through differences in SES, leverage, and borrower characteristics. With the full set of controls, the Black gap disappears entirely, while the Latino gap falls by half.

[25] See for example, Davis, Morris A., Stephen D. Oliner, Tobias J. Peter, and Edward J. Pinto. "The impact of federal housing policy on housing demand and homeownership: evidence from a quasi-experiment." Journal of Housing Economics 48 (2020).

- The literature suggests that an appraiser may be providing some would-be buyers a consumer benefit by providing an appraised value below the contract price, thus alerting such buyer that he or she is overpaying on the home, which then triggers a renegotiation.

The United States was founded on the ideals of freedom, equality, and self-governance. While there is a legacy of past racism and lingering racial bias, progress has been made in living up to these ideals. In order to stamp out lingering racial bias, claims of systemic racism must be subjected to rigorous, fact-based research and analysis. This is fundamental to fashioning appropriate and successful public and private responses. The overarching goal must be to promote sustainable access to housing finance and support opportunities for income and wealth growth among lower income households. We must be mindful that many past and continuing housing and other policy actions to address racial discrimination have had unintended consequences that have done substantial harm to low-income households generally, and minority households in particular.

For more on this general topic by the AEI Housing Center, see:

- *What is the Impact of Race and Socio-Economic Status on the Valuation of Homes by Neighborhood?*
- *How Common Is Appraiser Racial Bias?*
- *How Common Is Disparate Impact in Mortgage Lending?*

Appendix 1:

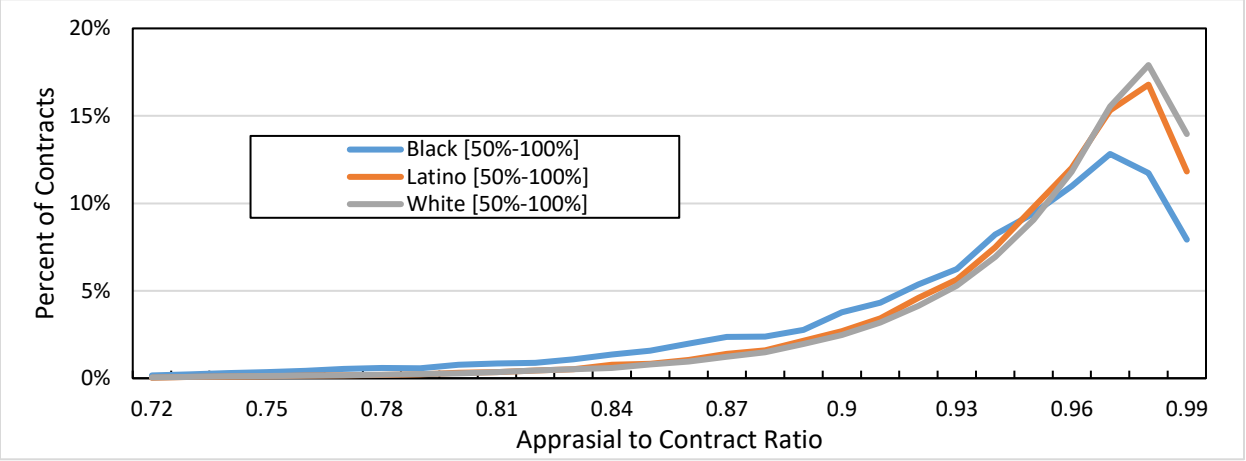
The higher the share of FHA lending is, the higher the cumulative level of HPA over 2015-2020 has been. Many majority Latino and Black tracts have very high shares of FHA lending. Thus borrowers in these areas likely have access to more leverage to bid up prices or they have certain unobservable factors that make them more likely to opt for FHA financing and to negotiate contracts that end up above the appraisal. For example, 82% of FHA home purchase loans are to first time buyers and 40% are minority respectively.[26] As a result, a disproportionate percentage of Black and Latino FHA purchasers are first-time and likely first-generation home buyers, placing them at a possible disadvantage in negotiating a home purchase.

Table A1: Distribution of tracts that are majority White, Latino, and Black by the FHA lending decile

FHA lending decile	% FHA lending	Median Cumulative HPA (2015-2020)	Distribution of tracts that are majority (columns add to 100%)		
			White	Latino	Black
1 - lowest	0%	22.8%	10%	8%	5%
2	3%	24.3%	12%	2%	2%
3	7%	24.6%	11%	3%	3%
4	10%	25.9%	12%	5%	4%
5	13%	27.0%	11%	5%	5%
6	17%	27.2%	11%	6%	5%
7	21%	28.2%	11%	7%	7%
8	25%	29.5%	10%	10%	10%
9	32%	33.1%	8%	17%	19%
10 - highest	44%	39.8%	5%	36%	41%

Note: Cells are weighted by 2020 HMDA purchase counts.
Majority tracts are defined as having at least a 50% share of the respective group of residents.

Figure A1: Appraisal to Contract Ratio for Appraisals below Contract Price



[26] Supra. https://www.hud.gov/sites/dfiles/Housing/documents/FHAProdReport_Sep2018.pdf

Detailed Regression results

	Equation 1	Equation 2	Equation 3
Intercept	-2.14 (-144.81)	-2.11 (-109.26)	-3.16 (-111.47)
White	-0.006 (-34.94) [-0.0005]	-0.009 (-53.65) [-0.0007]	-0.007 (-33.81) [-0.0006]
Latino	0.0097 (53.99) [0.0008]	0.001 (5.94) [0.0001]	0.001 (5.13) [0.0001]
Black	0.006 (33.03) [0.0005]	-0.006 (-28.41) [-0.0005]	-0.006 (-24.52) [-0.0005]
FHA		0.66 (42.47) [0.05]	0.80 (41.07) [0.06]
ERS		-0.03 (-34.88) [-0.003]	-0.05 (-45.57) [-0.004]
One Adult		0.88 (49.97) [0.07]	0.75 (33.92) [0.06]
HPA			1.56 (51.04) [0.13]
Sales			0.11 (83.29) [0.009]
Low			-0.23 (-44.24) [-0.02]
High			0.12 (27.52) [0.01]

New			-0.55 (-86.09) [-0.04]
Poor			0.78 (22.24) [0.06]
Owner			0.002 (12.5) [0.0001]
Income			-0.001 (-12.99) [-0.0001]
Year and Metro Fixed Effects	Yes	Yes	Yes

t statistics in parentheses, calculated marginal effects in brackets

Appendix 2:The AEI Housing Center respectfully requests that Freddie Mac use the suggested method below or another similar method to establish additional facts so as to determine the percentage of instances where the contract price vs. the appraised value is "correct".

The following section sets out to establish a framework for evaluating appraisals that come in below contract price. Within this framework, we then suggest various steps that Freddie Mac might undertake to test the various outcomes of the framework, in an effort to shed light on the appraiser's motivation and whether the applicant/homebuyer is a beneficiary of the gap between the sales contract price and the appraised value.

What transpired during the sales negotiation process preceding the preparation of a below contract price appraisal?

Many studies, including ones on home purchases and loans, have shown that shopping behavior can reduce price.[27] Imagine the following scenario where a buyer either negotiates or does not on the listing price:

	Buyer	
	negotiates	does not negotiate
List price	$100k	$100k
Contract price	$95k	$100k
Appraisal	$95k	$95k
Gap btw. contract price and appraisal	0%	-5%

The appraiser may assess the home at exactly the same price, but because the buyer did not negotiate, it appears as if the appraiser may be biased against the buyer, while in fact the appraiser's value may be a signal to the buyer that he may well be overpaying, thus providing a consumer benefit.

There are a number of potential outcomes, all of which require post-appraisal data:

1) Buyer renegotiates and price paid is reduced, saving the buyer some money. This implies that
    a. the appraiser was correct and actually helped the buyer.
        i. Comparison to a data set such as the public records would allow the frequency of this circumstance to be determined.
2) Buyer attempts to renegotiate but seller has market power and buyer pays the same price. This implies that
    a. the appraiser was correct, but it is difficult to know for sure.
        i. Supply/ demand data might shed light on this circumstance.
3) Buyer does nothing and pays the negotiated price. This implies that
    a. the appraiser was wrong but not necessarily biased, or
    b. the appraiser was biased, or

[27] See for example: Bhutta, N., A. Fuster and A. Hizmo. 2019. Paying Too Much? Price Dispersion in the US Mortgage Market. Working Paper, February. https://areuea.org/conferences/papers/download.phtml?id=5551, or Alexandrov, A. and S. Koulayev. 2018. No Shopping in the U.S. Mortgage Market: Direct and Strategic Effects of Providing Information. Working Paper, May. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2948491, or Malliaris, S., D. Rettl, and R. Singh. 2020. Is Competition a Cure for Confusion? Evidence From the Residential Mortgage Market. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3429267.

c. the buyer was inexperienced or was not properly advised that the price could or even should be renegotiated, or
d. the buyer chooses to forgo the hassle of renegotiating or is willing to pay the higher price and comes up with the extra cash or opts for a higher LTV.
e. In the latter two instances, an Automated Valuation Model (AVM) might be used as a "yardstick" to determine the correct (or more correct value).

4) Sale falls through because the potential buyer cannot come up with more cash or was unwilling to increase the LTV. This implies that
    a. the appraiser was correct, or
    b. the appraiser was wrong but not necessarily biased, or
    c. the appraiser was biased.
        i. In the latter two instances, an Automated Valuation Model (AVM) might be used as a "yardstick" to determine the correct (or more correct value).

We understand that Freddie Mac's current dataset is insufficient to determine the frequencies of

a. whether the buyer negotiated <u>before</u> the appraisal came in below contract price, and
b. whether the sale fell through or whether the buyer negotiated <u>after</u> the appraisal came in below contract price.

However, with what we believe would be straightforward matching against the public record data set, it would be possible to determine these frequencies and thus shed light on post-appraisal events. We say straightforward because the appraisal itself contains a number of potentially useful data fields, starting with the parcel ID, seller's name, and buyer's name. As we will demonstrate, once this matching is done, a number of other metrics become available from the public record data set, such as the presence of FHA insurance, a VA guaranty, and the recorded sales price, and is useful in determining whether the actual buyer matches the buyer name on the appraisal.

Action items for Freddie Mac:

Freddie Mac should match its appraisal data to both home listing data and the public records. The match is straightforward as the appraisal data can easily be linked to the other datasets using the property's parcel ID or address, along with seller's and buyer's names.[28] Matching to home listings data would provide the initial listing price and the negotiated price. Matching to public record would provide the sales price and whether the buyer listed on the appraisal went through with the purchase and the sales price. The appraisal also includes many other data fields that could be potentially useful once this matching is done.

<u>Listings data match to see if certain groups are better at negotiating price than others:</u>

[28] This analysis should however heavily discount post-pandemic results when a red hot housing market enticed shrewd sellers to list their homes below market to start bidding wars. Nevertheless, data from 2015-2020:Q1 will provide ample data.

While not all appraisals will match to listings, due to coverage issues in the listings data, the resulting matches should be more than ample to provide insights as to the extent that borrowers did or did not negotiate the contract price as it relates to the listing price (or prices). Days on market would also be a useful metric available from the listings data. This analysis should identify differences in the relationship of the list price to the contract price by:

a. the racial make-up of the census tract,
b. the income level of the census tract,
c. the educational attainment level of the census tract,
d. the average credit score of the census tract,
e. the homeownership rate of the census tract, etc.

Financial literacy, while hard to gauge, may be different for people of different socio-economic or racial backgrounds. First-time homebuyers may not be aware of many pitfalls and opportunities in the home buying process. Similarly, first-generation home buyers will not have access to the experience of home owning parents, who have negotiated home purchases before. Or a lower homeownership rate for minorities or in certain neighborhoods may work to their detriment as the pool of experienced home buyers in a group of friends, neighbors, or associates may smaller.

If Freddie Mac were to find systematically lower contract prices than list prices depending on the neighborhood type (particularly between higher and lower average credit score tracts), then this could be indicative of negotiating behavior (or lack thereof) by certain buyers. Thus, an appraisal below contract price may signal an appraiser trying to alert the buyer that she is overpaying. As we note below, these tentative insights might then be tested by matching to a public record data set.

Freddie Mac could also look at the same issue more directly by utilizing its smaller dataset, which already includes the borrower's race or first-time buyer status flag. It might be interesting to see whether minority or first-time buyers are less skilled home price negotiators than repeat buyers. The test should limit the sample to buyers that are White to establish a baseline without a racial context. Only as a second step should Freddie Mac then look at differences between minority and White repeat and first-time buyers.

Freddie Mac should disclose the results for each test, ideally by year, as well as the median ratios, percentages, dollar values, and confidence bands for each contract price to list price comparison.

Public records match to see how many sales fall through and if buyers use the lower appraisal to renegotiate the price:[29]

1) If no match of the appraised property to the public records data around the time of the appraisal can be found, then we can assume that the appraisal did not result in an actual sale.
2) If an actual match around the time of the appraisal is found, then Freddie Mac should ascertain that the buyer name in the public records matches with the borrower's name from the 1004 appraisal form.

[29] An FHFA paper (done jointly by FHFA's Will Larsen and AEI's Steve Oliner and Morris Davis) on land valuations has already matched appraisal data to public records data with a high success rate.

a. In this case, Freddie Mac should compare the sale price in the public records (with the exception of non-disclosure states for which the exact sale price is not publicly disclosed) to the appraised value from the 1004 form.

Knowing the frequencies for each outcome is important to understand the motivation of the appraiser. For example, an appraisal below contract price may not necessarily reflect bias if it alerts the buyer to renegotiate the contract price as this would work to the benefit of the buyer.

Freddie Mac should disclose the results for each instance, ideally by year, as well as the median ratio percentages, dollar values, and confidence bands for the comparison between appraisal amount and eventual sale price as described in 2a above.

Side note: A further advantage of matching the appraisal data to the public records would be to learn additional details about the borrower, which would allow for additional robustness checks.

1) Freddie Mac could identify VA loans and therefore VA appraisals; VA appraisers are randomly assigned. Do the Freddie Mac results hold for VA loans?
2) Freddie Mac could identify FHA loans. Over 80 percent of FHA borrowers are first time buyers (FTB). Thus it serves as an FTB proxy. Also, with FHA loans, the borrower's ability to increase the LTV is generally limited because most FHA loans are already at the statutory LTV limit.
3) Freddie Mac will learn the LTV of the loan, which should be used as an additional control variable.

Appendix 3: Additional AEI Housing Center questions and comments on Freddie Mac's note

This section provides one additional robustness check and a couple questions that Freddie Mac should explore in order to add more color to its note and also our findings from above.

Additional proposed robustness check:

For its appraisal waiver product, Freddie Mac already computes an acceptable range for a self-appraisal in lieu of a human appraisal. How do the under-appraised properties fall within the range of Freddie Mac's own Home Value Explorer (HVE) model? What about the over-appraised properties? Are there differences by a neighborhood's racial makeup or by SES?

Miscellaneous questions and comments:

- Latino tracts have a higher percentage of appraisals below contract price than Black tracts. These results also hold in our regression. What might explain this?
- What is the median time lag between comps and appraisals in majority White, Latino, and Black tract. This is an important question as longer time lags between the comp and the actual appraisal can introduce adjustment errors on the part of the appraiser. These errors can be larger if tracts experience much faster home price appreciation relative to the metro average.

How Common Is Appraiser Racial Bias?

An Analysis Using Big Data to Inform as to Whether It Is Common or Uncommon that an Appraiser's Knowledge of an Applicant's Race Results in Valuation Bias

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AEI Housing Center

Working Report – Preliminary Results

AEI.org/housing

January 19, 2021

Link to AEI HMIs:
https://www.aei.org/housing/housing-market-indicators/

Recent Reports Alleging Racial Bias by Appraisers on Mortgage Loans

- New York Times examples*
  - $135,000 or 29% difference (Jacksonville FL - appraisal 1: $330,000, appraisal 2: $465,000)
  - $40,000 (% unknown) difference (Hartford, CT suburb)
  - $160,000 or 24% difference (Los Angeles - appraisal 1: $500,000, appraisal 2: $660,000)
- Denver News Channel 7 example**
  - $145,000 or 26% (Denver, CO – appraisal 1: $405,000, appraisal 2: $550,000)
- Chicago Sun Times example***
  - $62,000 or (Chicago, IL – appraisal 1: $278,000, appraisal 2: $340,000)
- Of four examples with sufficient data, appraisal 1 came in an average of about $126,000 or 25% lower than appraisal 2.
- Claims of bias were based on an allegation that a human appraiser was aware of the applicant(s)' race either from a meeting or photos or other items in the home which indicated race, and as a result, the appraiser underestimated the property's value.
- Allegations commonly occurred in predominantly White neighborhoods.
- The implication is that intentional and perhaps unintentional appraisal bias is commonplace and the valuation gaps are large.
- While the facts alleged may well be true, any policy response must be based on whether the cases are the result of "bad apple" appraisers or systemic racial bias.
- A literature search found no statistical analysis of this type of claim.
- Using big data we conduct the first analysis into whether the alleged practices of intentional racial bias, along with unintentional bias, are common or uncommon.

* https://www.nytimes.com/2020/08/25/realestate/blacks-minorities-appraisals-discrimination.html
** https://www.thedenverchannel.com/news/local-news/an-unconscious-bias-biracial-denver-couple-says-they-faced-discrimination-on-home-appraisa
*** https://chicago.suntimes.com/2020/10/7/21493755/chicago-home-appraisal-black-race-homeowners

We Asked the Collateral Risk Network (CRN) to Survey Appraisal Management Companies and Lenders

- Why: our data consist of appraisals on transactions that actually closed, thus we need to evaluate whether our set suffers from selection bias as discrimination might occur with respect to appraisals not used in loan closings.
- The question is: how likely is that Review of Valuation (ROV) requests are received and what happens after an ROV is made? Here are relevant results:

		AMC	Lenders
Frequency of Review of Valuation (ROV) requests:		Insufficient data (only 1 response, as AMCs generally do not see ROV requests)	1st survey- 2.5% (median for 12 responses) 2nd survey- 3% (median for 8 responses)
Most common reasons for a ROV (where one is given):		1. Poor selection of comps 2. Recent Improvements not noted 3. Sq. Ft. incorrect	1. Poor selection of comps 2. Sq. Ft. incorrect 3. Recent Improvements not noted
Regarding ROVs involving racial or ethnic bias:	**Never**	58%	63%
	<10%	42%	37%
When you do get an ROV, how many get escalated to a second appraisal?	**Never**	0 (0%)	2 (25%)
	<10%	17 (89%)	4 (50%)
	10-30%	2 (11%)	2 (25%)
	>30%	0 (0%)	0 (0%)
How many contracts get renegotiated?	**Never**	3 (17%)	0 (%)
	<10%	9 (50%)	5 (71%)
	10-30%	5 (28%)	1 (14%)
	>30-60%	0 (0%)	1 (14%)
	>60%	1 (6%)	0 (0%)
Are ROVs more common on refinance or purchases?		68% refi	63% refi

- Conclusions:
  - Items noted in red are not unique to claims of racial or ethnic bias, but are common to all ROVs.
  - An ROV is rare (2.5%-3% incidence), ROVs are related to race or ethnic bias are also rare, and an ROV is a condition precedent to a second appraisal, which itself is relatively rare (about 10%-20% incidence).
  - Based on the survey, we may conclude that our data set, consisting entirely of closed loans, does not suffer from a significant level of selection bias.

Home Mortgage Disclosure Act Data for 2018-2019 (HMDA) and HUD Data for 2019-2020 Seemingly Confirm That Selection Bias Is Low

- HMDA, a virtual census of institutional loan app data, covered >8 million applicants.

		White	Black
Refi	Total Applications	4,995,603	614,394
	% of Application Denied	16%	26%
	% Denial Reason is Collateral	17%	14%
	% Denial Reason is DTI or Credit History	49%	54%
Purchase	Total Applications	6,065,075	782,255
	% of Application Denied	8%	17%
	% Denial Reason is Collateral	13%	8%
	% Denial Reason is DTI or Credit History	56%	66%

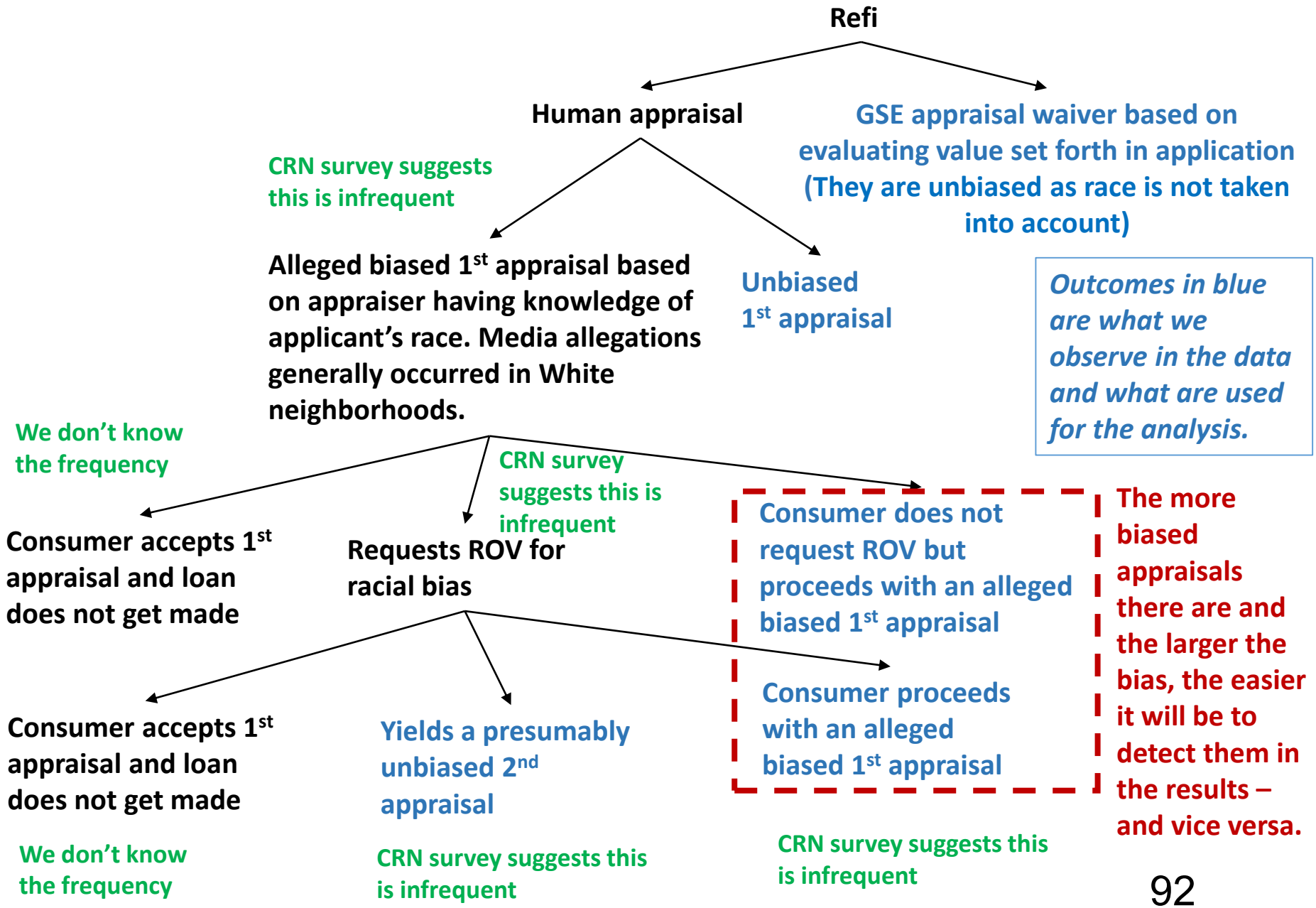
Note: Data for 1st lien, 1-unit, owner-occupied homes only. Excludes I/O, balloons, or neg. am. loans. "Denial "for principal denial reason only.

Source: HMDA 2018 & 2019

- HUD data:
  - There is no national appraisal discrimination complaint database. Given HUD's fair housing role, it does receive appraisal bias complaints. In 2019 and 2020 there were 3 and 6 respectively.
- Conclusions:
  - HMDA loan denial rate on refis is 16% for White applicants and 26% for Black applicants; denial rate on purchase loans is lower for both White and Black applicants.
    - The main reasons for Black denials are credit history and DTI.
    - Collateral is noted as a denial reason less for Black applicants than White ones and perceived or alleged bias would be one of a number of potential reasons for a collateral denial.
    - Based on HMDA data, the potential for bias by an appraiser is small, since it would be a percentage of a percentage of a percentage.
  - Since HMDA is consistent with the results of the CRN survey and since HUD receives relatively few complaints, notwithstanding media coverage of appraiser bias, we may conclude that our data set, consisting entirely of closed loans, does not suffer from a significant level of selection bias.

* https://www.washingtonpost.com/realestate/for-black-homeowners-a-common-conundrum-with-appraisals/2021/01/20/80fbfb50-5439-11eb-a817-e5e7f8a406d6_story.html

Analytical Framework



We Use Big Data to Evaluate the Likelihood of Racial Bias by an Appraiser

- The AEI Housing Center has assembled the National Housing Market Database (NHMDB), which uses and connects many different datasets.
  - Most in-depth resource for key housing data and trends.
  - Accurate, timely, and in-depth coverage of purchase trends.
  - Connects the dots for many housing indicators, yielding the most comprehensive analysis of the housing market.
  - Its integrated structure is uniquely suited to study countless questions.
  - Here we apply the NHMDB to help shed light on the question: Is there intentional or unintentional racial bias by appraisers?
    - We are able to identify whether the transaction had a human appraiser or a GSE appraisal waiver using a computer generated value.
      - The waiver value is unbiased, as neither race nor any other borrower characteristic is used that could be correlated with race is used in generating the value.
    - We use the race neutral Automated Valuation Model (AVM), where neither race nor any other borrower characteristic is used that could be correlated with race is used in generating the value.
    - The AVM controls for non-racial factors that affect home value, leaving the race dummies to pick up any racial effects.
    - AVMs allow us to statistically test bias assertions by objectively assessing previously performed human appraisals and appraisal waivers.
  - A literature search found no statistical analysis of this type.
    - This study is based on 243,000 appraisals (of which 59,000 are GSE appraisal waiver cases & 22,000 GSE human appraisals), & 2,600 group match cases originated in 2018 & 2019.
  - Unintentional bias may have a disparate impact, but it must be demonstrated that a challenged practice involving racial bias is the substantial cause of the disparate impact.
  - Using computer generated property values, we used big data to look for bias of the type alleged in the media and racial bias that might result in a disparate impact allegation.
- This Working Report presents preliminary results and we welcome comments.

Using Big Data to Evaluate the Presence of Appraiser Bias

- NHMDB data used in performing this analysis include:
  - Public records
  - Automated Valuation Models (AVM)
  - National Mortgage Risk Index using agency loan data, including use of appraisal waivers
  - Home Mortgage Disclosure Act (HMDA) data
- Our main focus is on refinance loans:
  - Refinance loans lack an arm's length transaction, potentially providing more of an opportunity to exercise racial bias.
  - Purchase loan appraisals are highly anchored to the sales price and therefore tend to not come in below the sales price.* This makes them useful as a check, since they provide less of an opportunity and potential to exercise racial bias.
  - Thus, deviations due to bias, if present, should be larger for unanchored refi valuations compared to anchored purchase valuations.
  - FHA purchase loans have a unique double anchor, which is useful for a natural experiment:
    - The 1st anchor is to sales price and the 2nd to a statutory maximum LTV of 96.5%.
    - Also, an average LTV of around 95% for groups being compared, which means even a small gap between the sales price and appraised value would require a price renegotiation with the seller.

* Contract Price Confirmation Bias: Evidence from Repeat Appraisals

Methodology

We use 2 different approaches, to see if on average there is a value difference (or a gap) between refinance loan appraisals for Blacks and Whites, in order to evaluate the existence of bias, especially as it relates to the alleged practices.

- Automated Valuation Model (AVM) approach (N-count = 243,000 loans)
  - We regress the Dec-2017 AVM, month of origination dummies, census tract fixed effects, and a dummy variable for minority status on the log property value.
    - An AVM provides a neutral control for neighborhood and home characteristics.
    - Lacks "knowledge" of applicant's race.
    - We filter out properties with extreme outliers in home characteristics.
  - Our analysis is enhanced by running it separately for loans using human generated appraisals vs. a waiver with a computer generated value (the AVM noted above is independent of this waiver value).
    - The goal is to determine whether an alleged practice (such as racial bias based on knowing whether an applicant is Black from a meeting or interior items (i.e. photos, art, or books) occurs more frequently on Black refi valuations by humans.
    - A second goal is to test for unintentional racial bias against Blacks on refi valuations by humans that has a disparate impact and is the substantial cause of the disparate impact.
  - Hedonic approach is used to check the AVM approach:
    - We replace the AVM with house characteristics (sq. footage, lot size, year built, and census tract).
- Group approach (N-count totaled 2,600 groups):
  - Identify groups of homes that are identical based on external characteristics (same census tract, home type, sq. footage, lot size, year built, # of baths, and land use code), within 1,650 ft of each other (median: 200 ft), and owned by households of different racial backgrounds.
    - Rules out challenged practices such as comp selection and neighborhood effects as an explanation.
  - We regress a set of dummies for minority status and month of origination on the log property value. The group of homes are treated as fixed effects.
- We define the following non-overlapping groups (N-counts):

	AVM/Hedonic	GSE Human	GSE Waiver	Group
White (defined as non-Hispanic White)	212,935	53,397	21,539	3,563
Black (defined as non-Hispanic Black)	30,435	5,393	1,391	2,810

Note: 2% of Hispanics identify as Black Hispanic. These loans are excluded from this analysis.

Note on Interpreting the Results

- Purchase loans are arm's length transactions between consumers. Due to anchoring to the sale price, the opportunity for racial bias from appraisers is low to non-existent.
  - The consumers establish the true price of the asset, including quantifying the impact on price of the current state of improvements, upkeep, or decoration (unobservable factors). A computer model can only approximate these items, as it is limited by data availability.
- We use a computer generated AVM as a control for home quality, thus unobservable factors will be present in both our purchase and refi analysis. Due to anchoring, purchase results can serve as benchmark on the magnitude of these unobservable factors.
- Results for both approaches found similar gaps for both refinance and purchase loans, thus we are able to attribute the refi loan gaps to unobservable factors rather than bias.
- Below we compare results for refi and purchase loans using the AVM approach. While there is a modest gap between Blacks and Whites for refis, a slightly larger gap exists for purchase loans. As noted, we compare refis to purchase loans to account for unobservable factors. It appears Blacks on average receive slightly higher appraisals than Whites.

AVM Approach	Gap between Blacks and Whites	Gap between Blacks and Whites after accounting for unobservable factors
1. For refinance loans only	-0.7%***	0.0 ppt.
2. For purchase loans only	-0.7%***	

Note: The results are differences in property value relative to Whites. ***** denotes significance at the 1% level**. Data for this approach are limited to property value $100,000-$1,000,000, Year built between 2000-2019, Lot sizes of 2,000-20,000 sq. ft., and Building area of 800-3600 sq. ft.

- The Group approach, by its design, also provides a compelling means to determine whether racial bias exists. However, it also cannot fully eliminate all unobservable factors.
  - Due to small n-sizes, we report these findings second. (By mid-2021 we expect to be able to add another year of data, growing our n-sizes. This will add to the utility of this approach.)
- Due to space concerns, the following slides do not explicitly report the gap between Blacks and Whites refinance loan appraisals after accounting for unobservable factors (red) leaving readers to do so on their own.

AVM Approach Results for Refinance Loans

- The media reports all had a common challenged practice: the human appraiser knew the applicant was Black by having met the applicant or from photos in the home and rendered a biased opinion of value that was below the property's correct value.
- The race neutral AVM approach was applied to valuations on: 1. refinance loans generally, 2. purchase loans, and 3. refinance loans with either a human appraisal or a waiver.

  #1 (refinance loans only) includes instances where biased refi valuations have been rendered.

  #2 (purchase loans only) would be much less influenced by bias due to anchoring to the sale price by human appraisers.

  #3. a. (waiver only) has lack of "knowledge" of race and interior condition, or the potential for bias in the selection of comps and should be free of racial bias due to the common practice noted above.
- Our results indicate that for #2 (purchase loans) and #3.a. (non-human valuations), Blacks had nearly identical valuation gaps as Whites (-0.8% and -0.5% respectively), as #1 (-0.7%).
- Thus we conclude allegation that knowing the race of the applicant results in racial bias by appraisers on refinance loans is uncommon and not systemic. This same analysis supports the conclusion that unintentional bias based on race is also uncommon and not systemic.

AVM Approach	Gap between Blacks and Whites
1. For refinance loans only	-0.7%***
2. For purchase loans only	-0.7%***
3. Limited to refinance loans with an Appraisal/Waiver Flag (GSE only)	-0.7%***
a. Waiver only	-0.5%
b. Appraisal only	-0.8%***

Note: The results are differences in property value relative to Whites. ****** denotes significance at the 1% level***. Data for this approach are limited to property value $100,000-$1,000,000, Year built between 2000-2019, Lot sizes of 2,000-20,000 sq. ft., and Building area of 800-3600 sq. ft.

AVM Approach: Robustness Checks

	Gap btw. Blacks and Whites
AVM Approach for refinance loans	-0.7%***
Check 1. AVM Approach for refinance loans but using quantile regression (median value)	-0.7%
Check 2. AVM Approach for refinance loans but limiting to properties with values between the 20th and 80th percentile at the census tract level	-0.4%***
Check 3. AVM Approach for refinance loans but adding controls for FICO bucket, income, CLTV bucket, and the # of borrowers	0.4%**
Check 4. Hedonic approach for refinance loans	-2.3%***
Check 5. Hedonic approach for purchase loans	-2.4%***

Note: The results are differences in property value relative to Whites. **** denotes significance at the 5% level and *** at the 1% level**. Data for these approaches are limited to property value $100,000-$1,000,000, Year built between 2000-2019, Lot sizes of 2,000-20,000 sq. ft., and Building area of 800-3,600 sq. ft.

- Checks 1 &2 focus on the impact of outliers, as the anecdotal value gaps averaged 25% and indicate that the AVM Approach results are very robust (that is, remain valid under different assumptions, parameters and initial conditions).
- Check 3, which controls for certain borrower characteristics, eliminates the small gap between Blacks to Whites (now a small positive gap).
  - Generally, higher income, higher FICO, lower CLTV, and 2 borrowers mean a slightly higher appraisal.
  - The results are also generally robust for different states, but n-counts are often too small for a systematic analysis.
- Checks 1-3: the gaps for refinance loans likely reflect unobserved property or location characteristics that are not captured in the AVM.
- Checks 4 and 5 yields a Black-White gap of -2.3% on refinance and -2.4% on purchase loans. Racial discrimination is unlikely on purchase loans due to sale price anchoring.
- Checks 1-5 support our conclusion that the common challenged practice of knowing the race of the applicant results in racial bias by appraisers on refinance loans is uncommon and not systemic. They also support the conclusion that unintentional bias based on race is also uncommon and not systemic.
- More robustness checks are provided in the appendix.

Group Approach Results

Group Approach	Gap between Blacks and Whites
1. For refinance loans only	-0.4%
2. For purchase loans only	0.0%

Note: The results are differences in property value relative to Whites. **The results are not statistically significant**. Data for this Approach are limited to homes built between 1950 and 2019 and 1-unit SF, condos, townhomes, or PUDs within 500m of each other (median is 200 ft).

- This approach looks at two or more identical homes, so as to reduce the possibility for variation between the groups.
  - This reduces the likelihood that variation in selected comparable sales, differences in racial make-up of comparable locations, & location within a neighborhood affect the result.
- The Group approach, by its design, provides the most compelling evidence regarding the existence of racial bias.
- The Group approach has results that are quite close to the AVM approach for refinance loans and there is only a small difference to purchase loans, for which biased appraisals are unlikely. It also supports our earlier conclusions that intentional and unintentional appraiser bias based on race is uncommon and not systemic.
  - We ended up with around 2,600 home groups with owners of a different race.
  - The results seem to hold for townhomes or condos only, but n-counts are fairly small.
  - There is no statistically detectable difference between Waivers and Appraisals for identical homes, but n-counts again are fairly small.

Refi Waiver-Appraisal Gap between Whites (Control Group) and Blacks

The Gap of a Human Appraisal Relative to a Waiver	Using AVM Approach to Measure Gap	N-Count (Appraisal)	N-Count (Waiver)
White (control group as presumably unbiased on race)	-0.8%***	45,155	19,987
Black	-1.4%	4,422	1,271

Note: Borrower controls are FICO and LTV buckets, the number of borrowers, and income. ***** denotes significance at the 1% level**. Data are limited to property value $100,000-$1,000,000, Year built between 2000-2019, Lot sizes of 2,000-20,000 sq. ft., and Building area of 800-3,600 sq. ft. They are also limited to GSE borrowers with CLTVs <= 80% since waivers have an eligibility criterion.

- Here we examine the gap within the each group between the Refi human appraisal and the Waiver.
  - Whites with a human appraisal get 0.8% lower value than Whites with a refi waiver and this result is highly statistically significant (at 1% level).
    - Whites serve as the control group because their appraisals should not be biased and the Waiver is in theory color blind.
  - Blacks with a Refi human appraisal get 1.4% lower value than Blacks with a refi waiver appraiser. However, this result is not statistically significant at the 5% level, with a confidence range of +0.3% to -3.2%.
  - The difference between the White and Black groups is 0.6%, basically the same as for the AVM and the Group approaches.
- This result further supports our conclusion that intentional and unintentional racial bias by appraisers on refinance loans is uncommon and not systemic.

FHA Purchase Transactions: A Unique Natural Experiment to Evaluate Bias

- FHA purchase appraisals are helpful as a check because they are prone to anchoring in two ways:
  - Sales price as usual.
  - Also prone to LTV anchoring due to the statutory LTV limit of 96.5%.
- There is another helpful characteristic: an average LTV of 95.23%, only slightly below the statutory maximum 96.5%.
- As the chart below demonstrates:
  - FHA purchase loan median LTV equals 96.5% for all listed groups.
    - Since 73% of FHA loans are at the cap, the median LTV equals the cap.
  - FHA purchase loan mean LTVs are all in a tight range relative to median LTVs (White and Black applicants have a 0.48% mean LTV difference).

	LTV of FHA Purchase Loans		
	# of obs.	Median	Mean
White	375,508	96.50	95.04
Black	92,985	96.50	95.52

Note: Data cover an estimated 99% of the agency market.
Source: AEI Housing Center National Mortgage Risk Index.

FHA Purchase Transactions: a Natural Experiment to Evaluate Bias (Cont'd)

		Gap btw. Blacks and Whites	# of observations
Purchase	AVM Approach (all loan types)	-0.7%***	299,930
	FHA only	1.0%***	35,070
Refi	AVM Approach (all loan types)	-0.7%***	243,370
	FHA only	-0.4%	30,992

Note: The results are differences in property value relative to Whites. *** **denotes significance at the 1% level**. Data for this Approach are limited to property value $100,000-$1,000,000, Year built between 2000-2019, Lot sizes of 2,000-20,000 sq. ft., and Building area of 800-3600 sq. ft.

- The results for FHA purchase loan appraisals, which involve substantial numbers of Black applicants, provide additional support for the existence of small appraisal valuation gaps, which cannot be attributed to racial bias (the positive gap for FHA purchase loans to Blacks may be due to the larger seller concessions allowed under the FHA program compared to conventional loans and which tend to be used more in low-income areas. Such concessions are absent on refis).
  - As noted earlier, there is minimal to no difference between White and Black LTV levels.
  - There are two outcomes that would result from bias, both of which are unlikely to occur.
    - A biased lower valuation for Blacks, which if present in practice, would result in the frequent renegotiation of purchase contracts to a lower price, since the value does not support the loan amount and there is little LTV room. However, this would work to the benefit of the home buyer; and the CRN survey indicates renegotiations are infrequent.
    - To display a bias, the appraiser abandons the tendency to anchor to both the purchase price and a key LTV level, yet the dollar difference here is so small that it itself would be red flag and would create a notable headache for the appraiser over the small amount.
- The results for refinance loans are fairly similar to purchase loans, and as noted above, the results for purchase loans more or less rule out significant bias.
- Therefore this experiment also supports our conclusions.

A Further Robustness Test: Refi Appraisal Gap by Neighborhood

- Under this test, we create census tract groups based on shares of Black residents and then compare gaps for tracts with <=25% and >25% Black residents.
- This is an important test as the media allegations of racial bias commonly occurred in predominantly White neighborhoods.
- The gaps for tracts with <=25% and >25% Black residents are virtually identical (-0.6% and -0.7% respectively), both of which are nearly the same gap as shown on Slide 9: -0.7%).
- This result adds further support to our conclusion that the alleged practice of knowing the applicant's race results in racial bias by appraisers on refinance loans is uncommon and not systemic.
- It also supports the conclusion that unintentional appraiser bias based on race is also uncommon and not systemic.

Black resident share of census tract	Gap btw. Blacks and Whites	# of White observations	# of Black observations
All	-0.7%***	212,935	30,435
<= 25%	-0.6%***	205,480	19,639
> 25%	-0.7%**	7,198	10,774

Note: Regression is the AVM refi approach and data are limited to property value $100,000-$1,000,000, Year built between 2000-2019, Lot sizes of 2,000-20,000 sq. ft., Building area of 800-3600 sq. ft. We only use human appraisals, waivers are excluded. Minority share of census tract is defined as the share of Black people residing in a tract. **** denotes significance at the 5% level and *** at the 1% level.**

Pro-actively Identifying or Defending against Appraiser Bias

Regulators, Appraiser Management Companies (AMCs), appraisal firms and mortgage lenders would be able to replicate our methodology and use it to pro-actively identify and root out cases of appraiser racial or ethnic bias. It could also be used to defend against claims of appraiser racial or ethnic bias.

Using our methodology one would be able to confirm the presence or lack of a statistically significant pattern of bias being experienced by the protected class, by rendering outcomes directly comparable between the protected and non-protected classes.* Should the result show no statistically significant difference in the valuation outcomes between a protected class and a non-protected class, one could conclude there was a lack of statistically significant racial bias. These results would also be usable as a valid defense to any disparate impact liability.

Regulators and individual firms may have access to even more data than was used in our analysis:

- Access to the appraiser and appraisal firm's name,
- Access to all loan applications, regardless of disposition,
- Access to all complaints and review of valuation requests and their disposition, regardless of race or ethnic origin.

* See Comment Letter on HUD's Implementation of the Fair Housing Act's Disparate Impact Standard

Conclusion

We set out to statistically examine the level of racial bias in human performed appraisals.

The CRN survey of lenders and AMCs suggest that Reconsiderations of Value (ROVs) are infrequent, as are reappraisals based on an ROV. Further, ROVs with an allegation of racial bias on 1st appraisal are also infrequent.

The CRN survey and HMDA data both support the conclusion that our data set, consisting entirely of closed loans, does not suffer from a significant level of selection bias.

Thus, statistically analyzing big data on closed loans can contribute to determining the presence and levels of racial bias by appraisers.

The more biased appraisals there are and the larger the under-valuation, the easier it would be to detect them in the results – and vice versa.

While a claim of disparate impact does not need to demonstrate intent or knowledge, any challenged practice must be shown to be the substantial cause of the disparate impact.

Our analysis looked for evidence of either intentional or unintentional racial bias.

Conclusions: (i) contrary to media allegations, racial bias by appraisers on refinance loans is uncommon and not systemic (ii) a claim of unintentional bias on refinance loans, if to be used as the basis of a disparate impact claim, was also found to be uncommon and not systemic, (iii) appraiser bias cases, such as cited by the media, may well result from "bad apple" appraisers or incompetence. Industry members with access to appraiser names should use our statistical methods to identify, investigate, and discipline as appropriate.

Appendix

Detailed Model Specification

We estimate the gap between Whites and each minority group on property value with the following regressions, which are run separately for each minority group by partitioning the sample. We also run separate regressions for refinance and purchase loans.

AVM Approach

$$ln(price) = b_0 + b_1\, Minority + b_2\, AVM + b_3\, Tract + b_4\, Month + e \quad (1)$$

where *Price* represents the property value of the refinance/purchase loan. *Minority* is a dummy variable which indicates whether the borrower is either Black, Hispanic, or Asian. It is our variable of interest and measures that gap or value difference between each respective minority group and Whites. *AVM* is a control for home quality as provided by the Dec. 2017 Automated Valuation Model (AVM), *Tract* is a set of dummy variables for census tracts, and *Month* is a set of monthly dummy variables for the period of Feb. 2018 to Dec. 2019, with Jan. 2018 being the omitted variable.

Hedonic Approach

$$ln(price) = b_0 + b_1\, Minority + b_2\, Area + b_3\, LotSize + b_4\, YearBuilt + b_5\, Tract + b_6\, Month + e \quad (2)$$

where *Area* is the building area and *LotSize* the lot size of the property, both measured in square feet. *YearBuilt* is a set of dummy variables for the year each home was built. Equation 2 is identical to equation 1 except that we use a combination of building area, lot size, and year built, instead of the Dec. 2017 AVM, to control for home quality.

Group Approach

$$ln(price) = b_0 + b_1\, Minority + b_2\, Group + b_3\, Month + e \quad (3)$$

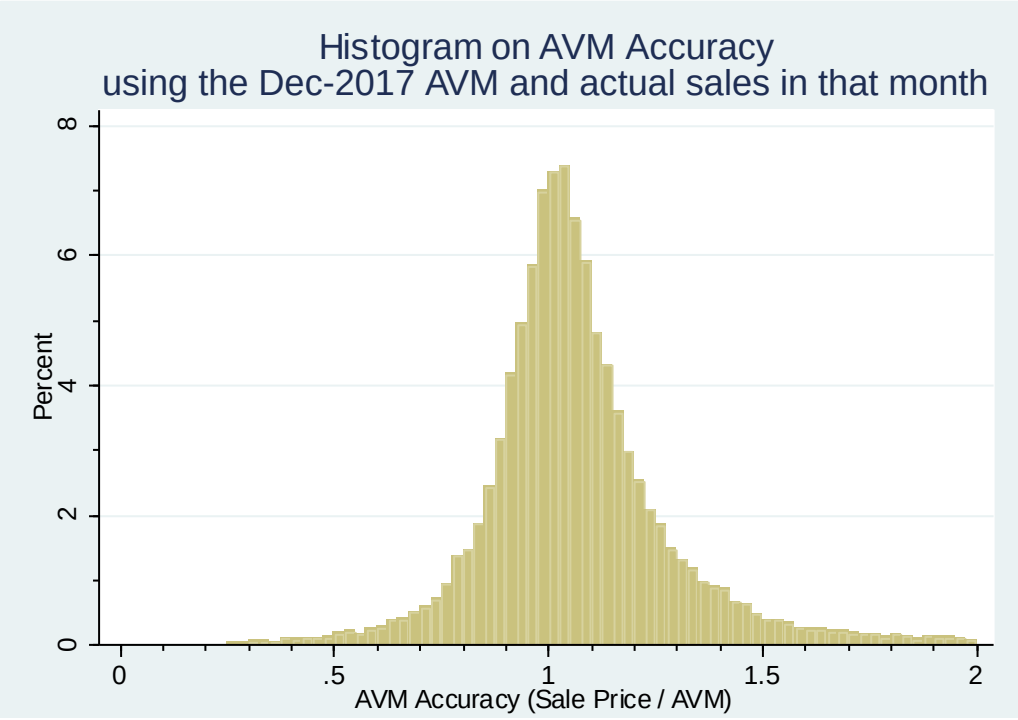
where *Group* is a set of dummy variables for identical home groups, defined as homes that have exact same building area, lot size, year built, number of bathrooms, land use code, lie in the same census tract, are no more than 500m away from each other, and are owned by at least one White and one minority individual. Home groups can consist of more than just 2 identical homes.

Appendix – Dec. 2017 AVM Evaluation

We assess the accuracy of the December 2017 AVMs by comparing AVM values to reported sale prices for properties that sold in that month. Due to data reporting and collection lags, sales in December 2017 are not known until a subsequent month. Hence, the December 2017 AVM value is calculated independently of the actual December 2017 sale price

For the roughly 37,500 homes that sold in December 2017, the histogram displays the ratio of the home's sales price to its December 2017 AVM value. The sale price was equal to 105% of the AVM, and 47% of the sale prices fell within +/-10% of the AVM (PPE 10).

As the table indicates there are differences in the AVM's accuracy by price point, we undertake several robustness checks, which are described on the next page.



Price Quintile	Median AVM Accuracy
All	105%
1 - lowest	122%
2	107%
3	104%
4	102%
5 - highest	98%

Note: AVM accuracy is defined as the ratio of actual sale price for sales in Dec. 2017 to the Dec. 2017 AVM. Price quintiles are based on the Dec. 2017 AVM and are created at the metro level and rest of state level, if outside a metro.
Data are limited to property value $100,000-$1,000,000, Year built between 2000-2019, Lot sizes of 2,000-20,000 sq. ft., and Building area of 800-3,600 sq. ft.

Appendix: Additional Robustness Checks

Gap between Blacks and Whites using …			
AVM Approach for	**Dec-2017 AVM**	**Dec-2019 AVM**	**Jun-2020 AVM**
Refinance Loans	-0.7%***	-0.9%***	-0.9%***
Purchase Loans	-0.8%***	-0.4%***	-0.6%***
PPE 10	47%	78%	81%
Median AVM Accuracy	105%	101%	101%

Gap between Blacks and Whites for loans in the lowest price quintile only		
	AVM Approach (using the Dec-2017 AVM)	**Hedonic Approach**
Refinance Loans	0.3%	-1.1%***
Purchase Loans	0.5%	-1.1%***

Note: The results are differences in property value relative to Whites. ***** denotes significance at the 1% level**. Data for these approaches are limited to property value $100,000-$1,000,000, Year built between 2000-2019, Lot sizes of 2,000-20,000 sq. ft., and Building area of 800-3,600 sq. ft. PPE 10 is the share of sale prices that fall within +/-10% of the respective AVM. AVM accuracy is defined as the ratio of actual sale price for sales in the AVM month to the respective AVM.

- The first table focuses on the impact from using different AVMs, which is fairly small. We use the December 2017 AVM as our pre-event "stake in the ground", which allows us to compare actual appraisals and sales to an unbiased estimate of home value, since the Dec. 2017 AVM predates the subject sales in our test. While the Dec. 2017 AVM scores lowest on PPE 10 and on AVM accuracy, the results are only slightly different using more recent AVMs with higher PPE 10s and greater AVM accuracy.
- The second table presents results for the lowest price quintile. Here too, the AVM results using the Dec-2017 AVM, especially when compared to purchase loans, are not materially different from our baseline results presented in the main part. Since the Dec. 2017 AVM's performance is weaker for lower priced homes, we compare the results to a hedonic approach for the same set of loans. As described in the methodology, the hedonic approach is a substitute for the AVM.
- The robustness checks on this page confirm that the results are robust for different AVM periods and also for lower priced homes.

Appendix – Results for Hispanics and Asians

The results for Hispanics and Asians are similar to the ones for Blacks.

		Gap between Whites and …		
		Blacks	**Hispanics**	**Asians**
AVM Approach	1. For refinance loans only	-0.7%***	-1.2%***	0.0%
	2. For purchase loans only	-0.7%***	-2.7%***	-0.5%***
	3. Limited to refinance loans with an Appraisal/Waiver Flag (GSE only)	-0.7%***	-1.3%***	-0.2%
	a. Waiver only	-0.3%	-0.8%**	-0.6%
	b. Appraisal only	-0.8%***	-1.3%***	-0.1%
	4. For FHA refinance loans only	-0.3%	-0.6%**	0.0%
	5. For FHA purchase loans only	1.0%***	-1.3%***	0.2%
	6. For refinance loans with $100-250k	0.0%	-0.2%	0.5%**
	7. For refinance loans with $250-500k	-0.4%***	-0.1%***	0.2%**
	8. For refinance loans with $500-1,000k	-0.4%*	-0.8%***	-0.5%***
Hedonic Approach	1. For refinance loans only	-2.3%***	-1.6%***	-1.8%***
	2. For purchase loans only	-2.4%***	-2.5%***	-1.8%***
Group Approach	1. For refinance loans only	-0.4%	0.2%	-0.2%
	2. For purchase loans only	0.0%	-0.4%***	-0.2%*

Note: The results are differences in property value relative to Whites. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level. Data for AVM Approach are limited to property value $100,000-$1,000,000, Year built between 2000-2019, Lot sizes of 2,000-20,000 sq. ft., and Building area of 800-3,600 sq. ft.
Data for Group Approach are limited to homes built between 1950 and 2019 and 1-unit SF, condos, townhomes, or PUDs within 500m of each other (median is 200 ft).

Appendix– Results for Hispanics and Asians (cont.)

The Gap of a Human Appraisal Relative to a Waiver	Using AVM Approach to Measure Gap	N-Count (Appraisal)	N-Count (Waiver)
White (control group as presumably unbiased on race)	-0.8%***	45,155	19,987
Black	-1.4%	4,422	1,271
Hispanic	-0.9%**	7,404	2,436
Asian	-0.7%	4,589	3,742

Note: Borrower controls are FICO and LTV buckets, the number of borrowers, and income. ** denotes significance at the 5% level and *** at the 1% level. Data are limited to property value $100,000-$1,000,000, Year built between 2000-2019, Lot sizes of 2,000-20,000 sq. ft., and Building area of 800-3,600 sq. ft. They are also limited to GSE borrowers with CLTVs <= 80% since waivers have an eligibility criterion.

Sample sizes:

	AVM/ Hedonic	GSE Human	GSE Waiver	Group: White-Black	Group: White-Hispanic	Group: White-Asian
White (defined as non-Hispanic White)	212,935	53,397	21,539	3,566	6,530	6,645
Black (defined as non-Hispanic Black)	30,435	5,393	1,391	2,813	\	\
Hispanic	33,323	8,699	2,608	\	5,233	\
Asian (defined as non-Hispanic Asian)	22,292	5,613	3,952	\	\	5,747

Note: 2% of Hispanics identify as Black Hispanic. These loans are excluded from this analysis.

Appendix – AVM Approach Results for Refinance Loans by State

	Refi	Purchase	Refi	Purchase
	Gap between Whites and Blacks		**N-Counts for Blacks**	
Arizona	-0.5%	-0.4%	1,580	2,027
California	-0.2%	-0.5%*	3,599	2,116
Colorado	-0.2%	0.8%	1,061	842
Florida	-0.6%**	-1.5%***	3,778	8,047
Georgia	-0.8%	-0.4%	3,823	6,578
Maryland	-0.3%	0.1%	1,544	1,900
North Carolina	-1.5%***	-0.9%**	3,154	4,059
Nevada	-0.4%	-1.4%***	1,237	1,294
South Carolina	-4.1%***	-1.8%***	1,259	2,926
Texas	-0.7%**	-0.6%**	4,741	5,857
Virginia	0.4%	-0.3%	1,915	2,571
	Gap between Whites and Hispanics		**N-Counts for Hispanics**	
Arizona	-0.6%***	-1.4%***	5,071	8,503
California	-0.5%***	-1.7%***	9,324	9,382
Colorado	-1.0%***	-1.3%***	2,285	2,569
Florida	-0.8%***	-2.6%***	4,651	13,103
Nevada	-0.9%***	-2.4%***	1,697	2,523
Texas	-1.5%***	-3.0%***	7,565	14,751
	Gap between Whites and Asians		**N-Counts for Asians**	
Arizona	-1.1%***	-1.1%***	1,112	1,968
California	-0.1%	-0.9%***	7,478	6,352
Florida	-0.9%*	-1.4%***	1,072	3,046
Nevada	-1.2%***	-1.7%***	1,679	2,202
Texas	0.7%*	0.2%	2,926	6,157
Washington	0.1%	0.0%	2,214	3,109

Note: The results are differences in property value relative to Whites. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level. Data are limited to property value $100,000-$1,000,000, Year built between 2000-2019, Lot sizes of 2,000-20,000 sq. ft., Building area of 800-3,600 sq. ft., and **states with at least 1,000 Refi loans for the minority group.**

Appendix – AVM Approach Results for Refinance Loans by Metro

	Refi	Purchase	Refi	Purchase
	Gap between Whites and Blacks		**N-Counts**	
Atlanta, GA	-1.1%*	-0.5%	3,249	5,195
Charlotte, NC	-0.5%	-1.2%**	1,305	1,583
Dallas, TX	-0.8%*	-0.6%	2,172	2,206
Houston, TX	-1.5%***	-0.7%*	1,495	2,346
Las Vegas, NV	-0.5%	-1.4%***	1,171	1,228
Phoenix, AZ	-0.6%*	-0.5%	1,430	1,836
Riverside-SB, CA	-0.4%	0.0%	1,308	704
Washington, DC	0.9%**	0.3%	1,891	1,851
	Gap between Whites and Hispanics		**N-Counts**	
Dallas, TX	-1.1%***	-2.3%***	1,630	2,485
Denver, CO	-1.3%***	-1.3%***	1,236	1,285
Houston, TX	-1.2%**	-2.8%***	1,655	4,179
Las Vegas, NV	-0.4%	-2.4%***	1,411	2,176
Orlando, FL	-0.7%	-2.8%***	1,227	2,893
Phoenix, AZ	-0.7%***	-1.3%***	3,983	6,743
Riverside_SB, CA	-0.7%***	-1.1%***	3,603	3,018
San Antonio, TX	-1.0%	-3.7%***	1,272	2,224
	Gap between Whites and Asians		**N-Counts**	
Dallas, TX	1.4%***	-0.2%	1,320	2,410
Las Vegas, NV	-1.2%***	-2.1%***	1,539	2,003
Phoenix, AZ	-1.0%***	-1.1%***	1,002	1,746
Riverside-SB, CA	-0.8%**	-0.8%*	1,301	866
Sacramento, CA	0.2%	-1.2%**	1,741	1,755
Seattle, WA	0.2%	0.0%	1,803	2,346

Note: The results are differences in property value relative to Whites. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level. Data are limited to property value $100,000-$1,000,000, Year built between 2000-2019, Lot sizes of 2,000-20,000 sq. ft., Building area of 800-3,600 sq. ft., and **metros with at least 1,000 Refi loans for the minority group.**

Appendix – AVM Approach Results for Refinance Loans by Region

	Refi	Purchase	Refi	Purchase
	Gap between Whites and Blacks		**N-Counts**	
Midwest	-0.4%	-0.6%*	2,933	4,209
Mountain West	-0.2%	-0.7%**	2,411	2,264
Northeast	-1.3%***	-0.5%	2,456	3,885
South	-1.0%***	-0.8%***	16,051	28,572
Southwest	-0.7%***	-0.5%**	6,514	8,364
West	-0.2%	-0.3%	4,603	3,209
	Gap between Whites and Hispanics		**N-Counts**	
Midwest	-1.8%***	-2.4%***	1,573	2,965
Mountain West	-1.4%***	-2.4%***	4,794	6,239
Northeast	-1.0%	-3.1%***	450	1,403
South	-1.1%***	-3.0%***	6,608	19,293
Southwest	-1.2%***	-2.5%***	13,136	24,415
West	-0.8%***	-2.0%***	10,686	11,629
	Gap between Whites and Asians		**N-Counts**	
Midwest	0.5%	-0.6%*	2,659	4,645
Mountain West	-1.0%***	-1.7%***	2,967	4,134
Northeast	1.1%*	1.1%**	1,727	3,140
South	-0.3%	-0.3%	4,031	10,399
Southwest	0.1%	-0.3%	4,137	8,716
West	0.0%	-0.6%***	10,751	10,979

Note: The results are differences in property value relative to Whites. * denotes significance at the 10% level, ** at the 5% level and *** at the 1% level. Data are limited to property value $100,000-$1,000,000, Year built between 2000-2019, Lot sizes of 2,000-20,000 sq. ft., and Building area of 800-3,600 sq. ft.