Gender Disparities in Home Appraisals

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Abstract

In a sample of 24 million refinancing appraisals over 2013–2024 we find that single women homes in the same census-tract and year-quarter are appraised for 2.4% less than those of single men. Appraisers make lower adjustments to comparable properties and give worse house ratings for single women homes. The appraisal gap is seen for new homes that require less maintenance and persists with property fixed effects. The gap is lower when borrowers have names that are difficult to categorize as female and varies with characteristics of appraisers and the appraisal process pointing to the role of stereotypic beliefs. Lower appraisals for single women households are associated with higher interest rates, lower loan amounts and lower cash-outs. Our findings indicate that appraisal disparities could contribute to sluggish refinancing by women and lead to gaps in household wealth.

Keywords: gender disparities · home appraisals · mortgage refinance

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1. Introduction

Housing is a significant portion of household wealth. Whether or when to refinance a mortgage is an important financial decision for a household. As refinancing has a significant effect on monetary policy pass-through and the real economy, understanding the frictions that prevent households from refinancing their mortgages is important.[2] Previous studies document that, despite large potential savings, many households fail to refinance in an optimal way, leading to large heterogeneity in household mortgage refinancing.[3] Further, Bajo and Barbi (2018) and Tsouderou and Tuzel (2025) document that women are significantly less likely to refinance partly due to financial illiteracy. In this paper, we examine another potential friction for the low refinancing by women homeowners - gender disparities in home appraisal values.

Lenders require a house appraisal prior to refinancing to ascertain the home's current value, which, along with the loan amount, determines the homeowner's equity and the loan-to-value ratio (LTV).[4] Low appraisal values lead to higher LTVs, which can increase the likelihood that the loan will be rejected, require the homeowner to purchase private mortgage insurance (PMI), and make the terms of the refinanced mortgage, if it happens, less attractive, such as by increasing interest rates. Gender disparities, whereby single women homeowners receive lower appraisal values, may keep these homeowners from fully exploiting the refinancing opportunities.

We use the proprietary version of the new Uniform Appraisal Dataset (UAD) available at the Federal Housing Finance Agency (FHFA), which contains standardized industry appraisal information. We use all appraisals for refinance mortgages from January 2013, the start of the data, to March 2024. The UAD contains detailed data on property characteristics, names of homeowners and details of appraisals. We use name datasets to characterize homeowners as single women, single men or couples. We focus on appraisals for refinancing as unlike house purchases they are

[2]See Bernanke and Gertler (1995), Caplin, Freeman, and Tracy (1997), Di Maggio, Kermani, and Palmer (2016), Scharfstein and Sunderam (2016), Di Maggio et al. (2017), Agarwal et al. (2018), Greenwald (2018), Beraja et al. (2019), DeFusco and Mondragon (2020), and Berger et al. (2021).

[3] See Agarwal, Rosen, and Yao (2016), Keys, Pope, and Pope (2016), Andersen et al. (2020), and Gerardi, Willen, and Zhang (2023) among others. The low refinancing rates can be partly explained by the complexity of the refinancing decision, lack of trust (Johnson, Meier, and Toubia (2019)), psychological costs (Andersen et al. (2020)), documentation and upfront costs (DeFusco and Mondragon (2020)), and other institutional features (see Gomes, Haliassos, and Ramadorai (2021) for a recent survey). We discuss this literature in more detail later.

[4] Homeowner equity is the current value of the house minus the outstanding mortgage balance.

not associated with and influenced by a negotiated contract price. This not only allows for a clean setting to examine the appraisal process but also allows us to isolate the cost for single women homeowners from lower appraisal values as opposed to buying at higher prices, that has been documented by Goldsmith-Pinkham and Shue (2023) and that will impact the value of purchase appraisals through the contracted price.

Across 24 million appraisals for single-family houses, we find that single women homeowners receive significantly lower appraisal values relative to single men homeowners. The lower appraisal values persist when we include detailed controls for property characteristics and granular year-quarter-census tract fixed effects. The coefficient from this baseline specification show that homes of single women borrowers are appraised to be 2.4% lower. For the average appraisal, this is a reduction of $11,184 in house value relative to that of single men in the same tract and in the same year-quarter. We do not find any evidence that the estimated appraisal gap for single women declines over the sample period.

The UAD data contains details of the appraisal report, and we consider how the difference in appraisal values could be attributable to parts of the report that require evaluative judgments by the appraiser. Appraisers are required to choose appropriate comparable properties and make price adjustments to these properties to account for differences with the assigned property. We find that the net adjustments to comparable properties are negative for homes of single women relative to the homes of single men. That is appraisers are more likely to reduce the value of the assigned property relative to the selected comparable houses if it belongs to a single woman rather than a single man. We also find that homes of single women receive worse ratings for the condition of the property as well as for construction quality. Homes of single women are also less likely to be marked as having had an upgrade. Overall, in all categories of evaluative judgements, homes of single women fare worse, which aligns with their overall lower appraisal values.

The worse assessment for houses of single women could reflect lower maintenance and general upkeep for their houses. Single women homeowners tend to be older, financially constrained and with responsibility for children that may limit their ability to undertake required repairs resulting in lower appraisal values. We control for updates undertaken in the last five and

fifteen years and find that it does not materially impact the estimated appraisal disparity for single women homeowners. We also identify new homes, those that are less than five years old that require little maintenance and repair. If the lower appraisal value for single women is due to lower upkeep of their houses, there should be no or a small appraisal gap in the sample of new homes. However, the estimated appraisal gap continues to be highly significant and about the same magnitude as that for the full sample.

The lower appraisal value for single women homeowners could also arise if women tend to buy disadvantaged lots. Single women have lower income and are more likely to be financial constrained resulting in them buying properties on busy streets or close to train tracks that are lower in value. As standard hedonic controls do not fully capture these features lower appraisal value may reflect these omitted property characteristics. To shed light on this we include property fixed effects. As property fixed effects require multiple refinancings for the same house over our sample period the sample size shrinks substantially. The sample consists of properties that are older, more likely to be updated and have amenities and have higher appraisal value though other house characteristics are similar to the full sample. We continue to find lower appraisal values for single women homeowners with property fixed effects.

Lastly, we examine if prior beliefs about single women' ability to buy and maintain quality homes accounts for some of the observed appraisal disparity. Our sample consists of traditional appraisals that require a visit by the appraiser to the house. Though this may lead to an interaction between the appraiser and the homeowner such a meeting is neither a surety nor observable. Can the gender of the homeowner, required for the existence of bias, be ascertained without a meeting? The appraiser is aware of the homeowner's name and from that can infer the homeowner's sex. We find that single women homeowners with names that are difficult to categorize as female, like Logan, have smaller appraisal disparity than homeowners with names that are easily identified as female, like Mary or Jane. As the ability and resources to maintain their house, as well as the propensity to buy disadvantaged properties does not vary with the ease of genderizing the first name this result suggests that negative beliefs about single women homeowners account for some of the observed lower appraisal value.

We also consider characteristics of the appraiser. Several studies provide evidence that women agents are associated with better outcomes for women because of within-group affinity or soft information that allows them to make better assessments (see Egan, Matvos, and Seru (2022), Cornaggia and Xia (2023), and Bose, Filomeni, and Tabacoo (2024)). Consistent with this view, we find that the appraisal gap is smaller when the appraiser is a woman. Additionally, we find that appraisers with greater exposure to single women homeowners, those with greater experience and diversity of experience are associated with a smaller appraisal gap. Greater knowledge and dealing with women homeowners as well as exposure to a diverse set of homeowners has the potential to change stereotypical beliefs and mitigate their impact on appraisal value.

We also examine the appraisal procedure and if it impacts the documented appraisal disparity. We first examine hybrid appraisal whereby a third party visits the property and passes on the collected data to the appraiser who then synthesizes the information to determine the appraisal value. By removing the possibility of any interaction with the homeowner and increasing the appraiser's reliance on data to determine value, hybrid appraisals have the potential to mitigate bias if it exists. In line with this we find that appraisal disparities are lower for hybrid appraisals. We also consider the role of FinTech lenders, which primarily use an online process and are known for their rapid application processing speeds and agile adjustment to changing mortgage demand volumes (Fuster et al. (2019)). While the lender is limited from influencing the appraisal directly, it can still influence the appraisal indirectly since it usually selects the appraiser. Appraisers working with FinTech lenders are more likely to rely on standardized inputs to better align with their speed and scalability. More generally, several studies suggest that demographic differences in financial outcomes can vary based on procedures and technology used (see D'Acunto, Ghosh, and Rossi (2024), and Bartlett et al. (2022)). Consistent with this hypothesis, we find that a larger fraction of FinTech lenders in a neighborhood is associated with a smaller appraisal gap. We also find that the gap is lower during busy times when there are more house transactions, which could be due to both the use of standardized process to deal with higher transaction volumes and the availability of comparable properties to benchmark appraisal values.

Overall, evidence that characteristics of the appraiser and the appraisal process result in heterogenous effects on the estimated appraisal disparity supports the role of stereotypical views and bias as one of the factors that the impact the appraisal value of single women homeowners.

Lastly, we examine the impact of a lower appraised value on the terms of the associated refinance loan. We find that lower appraised values are associated with higher LTV ratios and higher interest rates. Our estimates imply that single women pay 0.38% higher interest rates, receive loans that are 1.89% less and have cash-out amounts that are 1.71% lower due to the lower appraised values of their houses. These results suggest that the lower appraised values for single women owners adversely impact the refinancing terms they can obtain.

Our paper contributes to the literature on suboptimal mortgage refinancing. Many studies document large heterogeneity in household mortgage refinancing and have examined various frictions that prevent households from refinancing optimally. For example, Scharfstein and Sunderam (2016) and Agarwal et al. (2018) document the role of market structure, Bond et al. (2017) the role of second mortgages and DeFusco and Mondragon (2020) the role of documentation and upfront closing costs (see also Stanton (1995), Dunn and Spatt (2005), and Agarwal, Driscoll, and Laibson (2013)). Other studies show that the low refinancing rates can be partly explained by factors, such as lack of trust in banks (Johnson, Meier, and Toubia (2019)) and psychological costs (Andersen et al. (2020)). Bajo and Barbi (2018) examine the Italian market and find that financial illiteracy contributes to sluggish refinancing and further that this is more likely for women on account of their lower financial sophistication (see also Tsouderou and Tuzel (2025)).

The above studies focus on the demand side to explain the suboptimal refinancing behavior. In contrast, our paper provides a possible explanation for the refinancing gap focusing on a supply-side factor that arises from the appraisal gap. We contribute to a growing literature that documents the role of supply side factors in refinancing. Frazier and Goodstein (2023) document the presence of capacity constraints for mortgage lenders, while Fuster et al. (2019) document that a growing share of FinTech lenders has helped in easing these constraints.

Our results document that, conditional on refinancing demand, disparities in appraisal values play a role in determining refinancing outcomes, especially for single women homeowners. Not being able to refinance or obtaining worse refinancing terms is costly to single women homeowners and could hinder their ability to accumulate wealth. Our paper is related to the refinancing inequality literature. Prior literature has shown that financially sophisticated households are more likely to refinance and obtain more favorable terms from lenders (see, e.g., Agarwal, Rosen, and Yao (2016), Keys, Pope, and Pope (2016), Andersen et al. (2020), and Agarwal et al. (2024)). This inequality in refinancing can have credit allocation implications. Zhang (2022), Berger et al. (2024), and Fisher et al. (2024) show that large heterogeneity in mortgage refinancing leads to cross-subsidization from slow-to-refinance borrowers to quicker-to-refinance ones. Our paper contributes to this literature by examining the inequality implications of appraisal disparities. Low appraisal values lead to worse refinancing outcomes, which can further feedback to lower future appraisal values. Our results show that this effect is more pronounced among low-income households.

The paper is also related to the literature that documents differences in financial outcomes by sex. Goldsmith-Pinkham and Shue (2023) document that there is a 1.5% gender gap in annualized returns on housing (also see Kim et al. (2019)) and that transaction timing, house location and differences in negotiation account for the gap. Using data from Denmark, Andersen et al. (2021) also document a gender gap in real estate negotiation outcomes. There is a large and growing literature that documents gender disparities in wages (Blau and Kahn (2006)), new firm financing (Coleman and Robb (2009)), VC financing (Ewens and Townsend (2020)), financial advice (Bhattacharya et al. (2024)), promotions (Huang, Mayer, and Miller (2024)) and within-firm capital allocations (Duchin, Simutin, and Sosyura (2021)), among others. Our paper is also broadly related to a literature on demographic variation in the mortgage market. Gerardi, Willen, and Zhang (2023) and Howell and Korver-Glenn (2018) document persistent differences between Black and White borrowers in the refinancing market, while Grodzicki et al. (2024) find higher rates of low appraisals in majority Black neighborhoods.

The rest of the paper proceeds as follows. In Section 2 we describe the appraisal process and the data; in Section 3 we present our main results; in Section 4 we examine mechanisms

underlying appraisal disparities; in Section 5 we examine the impact on refinancing terms; in Section 6 we do some robustness tests and finally in Section 7 we conclude.

2. The appraisal process and data description

Home appraisals are professional assessments of a property's market value conducted by licensed appraisers that are required by lenders to determine the loan to value (LTV) that directly impacts their underwriting decisions. The appraisal industry is regulated through state licensing requirements and Dodd-Frank introduced additional safeguards to ensure appraisal independence. These regulations require appraisers to maintain independence from lenders and other parties who have a financial interest in the transaction, aiming to prevent the appraisal inflation that contributed to the housing bubble.

In a traditional appraisal, the licensed appraiser conducts an in-person physical inspection of the property and other factors such as neighborhood characteristics, proximity to schools and amenities, and lot features. Following the inspection, the appraiser prepares a detailed report using the Uniform Residential Appraisal Report (URAR) form required for single-family homes backed by Fannie Mae and Freddie Mac (the government-sponsored enterprises, or GSEs). In the form the appraiser provides detailed information on property characteristics, condition and quality of house, and updates and improvements undertaken. The appraiser also selects recently sold properties with similar characteristics, ideally from the same neighborhood as benchmarks for comparable valuation (see Appendix B for further details). The appraiser then synthesizes all the information to determine the appraised value. We access the data on the appraisal report through the Uniform Appraisal Dataset (UAD), a proprietary dataset available at the Federal Housing Finance Agency (FHFA) that captures the details in URAR.[5]

The UAD contains appraisals for both purchases of houses along with refinancing. We focus on appraisals for refinancing for two primary reasons. First, in a home-purchase transaction, the lender will order the appraisal after the buyer and seller have agreed to a contract price, which

[5] The UAD has been studied in recent work by Grodzicki et al. (2024) and Doerner and Susin (2024) to study race disparities. To our knowledge our paper is the first to examine gender disparities. The appraisals are for homes associated with mortgages backed by the GSEs. It also contains appraisals that were submitted to the GSEs but were not ultimately associated with a GSE mortgage.

is observable by the appraiser. Eriksen et al. (2018) reports that 92.1% of purchase appraisals for GSE loans between 2013 and 2017 are at or above the contract price. Unlike purchase transactions, refinance appraisals are not accompanied by a contract price that is available to the appraiser. This absence means that the appraiser must rely on their analysis of comparable sales, market trends, and property characteristics. Refinancing therefore provides a cleaner setting to examine the valuation process followed by appraisers without the influence of the contract price.

Second, as documented by Goldsmith-Pinkham and Shue (2023), single women tend to buy properties at a slightly higher price and sell at a slightly lower prices relative to single men, resulting in lower returns from home ownership. This impacts the negotiated contract price of the house and will influence appraisal value for purchase transactions for single women homeowners. However, it is unlikely to impact appraisal values for refinancing that do not involve a purchase/sale decision by the homeowner. Examining appraisals for refinancing allows us to examine and isolate the effect of the appraisal process on costs of home ownership by women that are distinct from the potential loss in buying or selling properties arising from women' negotiating ability or other factors. Due to these reasons, we focus on appraisals for refinances.

The UAD has a unique combination of features that makes it especially valuable for studying gender disparities. For one, it includes the names of the homeowner and the appraiser, which we use to infer sex. It also contains detailed house characteristics that allow for granular controls along with information about how the appraiser adjusted the selected comparable properties to value the assigned property. As seen in Table 1, single women account for 20% of our sample relative to 37% for single men. This is somewhat at odds with the Pew Report that documents a higher share of single women than single men in home ownership.[6] The lower share of single women in our sample may be due the lower propensity to refinance by women homeowners as documented by Bajo and Barbi (2019) and Tsouderou and Tuzel (2025).

[6] The Pew Report is available at https://www.pewresearch.org/short-reads/2023/06/12/single-women-own-more-homes-than-single-men-in-the-us-but-that-edge-is-narrowing/.

2.1 UAD-MLIS merged data

For parts of the analysis, we also use data from the Mortgage Loan Information System (MLIS), which is a proprietary dataset at the FHFA for loans backed by the GSEs. We link appraisals in UAD that were ultimately associated with a GSE loan to the corresponding loan in MLIS using a precise merging. We use the linked data to examine the effects of appraisals on loan terms, such as interest rates, amount of equity extracted in cash-out refinances, and loan amounts. We also use the MLIS data as an alternative source on borrower sex information, and to examine hybrid appraisals which are not available in the UAD data. We discuss these uses in detail in the corresponding sections. The merged UAD-MLIS data contains around 12 million observations, as seen in Table 2. The mean appraisal value in the merged UAD-MLIS data is somewhat lower than that in the full UAD data.

2.2 Homeowner sex classification

We infer sex from the first name of the homeowners. We identify the homeowners based on the borrowers for the associated refinance loan. We use GenderChecker to characterize homeowners as men or women (see Egan, Matvos, and Seru (2022)). GenderChecker associates a sex to a first name if the probability that the name is of the sex exceeds 99%. We supplement it with data from Namsor that provides a probability that a first name is male or female and use a cutoff of 95% to assign a first name to a sex. Homeowners whose name could not be associated with a sex or who only report last names were excluded from the analysis. This restriction reduces the sample by 9.5%. We then characterize homeowners as couples, single women or single men.[7] As Figure 1 illustrates, that the share of single women homeowners increased somewhat over the sample period from around 18% in 2013 to just above 24% in 2024.

3. Main results

In this section, we describe the baseline model and results. The dependent variable is the natural log of the appraised value and is referred to as *Log (Appraisal Value)*. The variable of

[7] Homeowners were classified as single female (male) if there was a single borrower that is a female (male). The remaining homeowners were classified as a couple.

interest is an indicator variable *Single Women*, which takes the value of one if the homeowner is a single woman. We also create an indicator variable *Couple* if the homeowners are a couple. In our first specification, we include *Single Women* and *Couple* along with year-quarter fixed effects and with the standard errors clustered at the county level. The omitted category is single men homeowners. As seen in Column 1 of Table 3, the estimated coefficient for *Single Women* is negative and highly significant while that of *Couple* is positive and significant. That is, appraisal values for *Single Women* (*Couple*) homeowners are lower (higher) than the appraisal values for single men homeowners in the same year-quarter.

In Column 2 of Table 3, we control for property characteristics. As discussed above, an advantage of the UAD is the detailed data on property characteristics. Specifically, we include an indicator for whether the house had a fireplace, a pool, a garage, and an A/C unit along with natural log of the gross living area (GLA). We also include the number of bedrooms, number of bathrooms, number of stories and the year the house was built as controls. We continue to include year-quarter fixed effects and cluster the errors at the county level. Not surprisingly, the inclusion of property characteristics increases the fit of the model significantly. The estimated coefficients for both *Single Women* and *Couple* reduce in magnitude, as some of the differences in appraisal values are on account of different house characteristics, but they continue to be highly significant.[8] The coefficient estimate suggests that, controlling for property characteristics, appraisals for homes owned by single women are 5.1% lower than that for single men owners.

In Column 3 of Table 3, we replace some property characteristics with indicator variables. For example, we replace the number of bedrooms with indicators for each unique value for the number of bedrooms. Similarly, the number of bathrooms, number of stories and year built are replaced by indicator variables for their respective unique values. Use of indicator variables is referred to as *Granular Controls* and specified at the bottom of the column. This improves the fit of the model and does not materially impact the estimated coefficients for *Single Women* or *Couple*.

[8] The property characteristics are correlated, making the interpretation of individual coefficients difficult. For example, with the inclusion of gross living area (GLA), the number of bedrooms proxies for the size of the bedrooms, resulting in a negative sign.

In Column 4 of Table 3, we keep the granular control variables and additionally include year-quarter-county fixed effects. With these fixed effects, the coefficient on *Single Women* captures the difference in the appraisal value for homes of single women and similar homes of single men in the same county and year-quarter. The estimated coefficient on *Single Women* continues to be negative and significant. Finally, in Column 5 of Table 3 we estimate the most restrictive specification where we include year-quarter-tract fixed effects to conduct a "within-census tract" test that compares properties in the same census tract and same year-quarter. As tracts are smaller than counties, this allows for a stronger control for the quality of the neighborhood and its amenities. The estimated coefficients on both *Single Women* and *Couple* are smaller, indicating that some of the differences in appraisals are due to differences in neighborhood. However, even with this granular set of fixed effects, the coefficient on *Single Women* continues to be negative and significant. As we control for neighborhood and the quarter of the appraisal, the lower appraisal values for single women owners are unlikely to be entirely explained by changes in local market conditions, or by differences in geographical factors or observable property characteristics between single women and single men borrowers.

Our baseline coefficient estimate implies that appraisals for single women are 2.4% lower than similar houses owned by single men in the same tract in the same year and quarter. As the average unconditional value of the house is about $466 thousand, this implies a $11,184 ($18,640) reduction in the appraisal value relative to similar homes of single men (couples) in the same neighborhood and the same year-quarter. The reduction in appraisal value of $11,184 is also large relative to the mean income of about $79,000 for a single women applicant for refinance.[9] Note that this model, with granular controls for property characteristics, year-quarter-tract fixed effects and standard errors clustered at the county level, is the base model for later tables unless specified otherwise. Overall, our baseline analysis reveals a significant gender gap in home appraisal values. We do not find any decline in the gender gap over time as seen in Figure 2 that plots the change in the estimated coefficient of *Single Women* over the sample period.

[9] The mean annual income of single woman applicant for refinancing is over the 2013 to 2024 period and obtained from the HMDA data. The equivalent mean income for single men and couples is $108,000 and $134,000 respectively.

3.1 Features of appraisal reports

As discussed above appraisers are required to provide details regarding their assessment of the house and comparable properties selected that are the basis of the appraisal. In this section we examine these evaluative assessments of appraisers.

Appraisers are required to use comparable properties that have recently sold to estimate the value of the property. Appraisers are responsible for determining which comparable properties are the most suitable and appropriate. After selecting comparable properties, appraisers adjust the value of these properties to account for differences with the assigned property. These adjustments potentially account for differences in house characteristics, location (e.g., on a busy road), financing (e.g., presence of concessions) and market conditions, among others. The net adjustments made by the appraiser can be positive or negative, with a negative adjustment implying that appraisers reduce the value of the assigned property relative to the available comparable houses. [10]

We examine if the net adjustments made to comparable properties to determine the appraised value of the assigned property for single women tend to be lower compared to those for single men. The dependent variable, *Net Adjustments* is the ratio of net adjustment of comparable properties scaled by the appraisal value of the assigned property.[11] As seen in Column 1 of Table 4, the coefficient estimate on *Single Women* is negative and significant, indicating that comparable properties are adjusted down for homes of single women relative to similar homes owned by single men in the same tract in the same year-quarter. In contrast, homes owned by couples are adjusted upwards compared to single men, as the coefficient on *Couple* is positive and significant. Choosing the appropriate comparable properties and net adjustments is the responsibility of the appraiser, and the results show that this judgment by the appraiser is less favorable for single women owners on average.

[10] Adjustments made to comparable properties are a function of the comparable properties selected as well as the perceived value of the house. We are not able to say whether the results are due to appraisers choosing higher valued comparable properties for single women homes or due to lower valuations of the house or both.
[11] We multiply this ratio by 100 for tractability and winsorize it at the 1% level.

The appraiser is also required to make a condition rating of the property. Condition ratings are standardized ratings that capture the overall state of the property and range from one to six with one being the best. We create the variable *Condition* which is seven minus the condition rating so that higher values of *Condition* imply better home ratings. In Column 2 of Table 4, we find that homes by single women are likely to receive a less favorable *Condition* rating than those of single men. Appraisers must also assign a quality of construction rating, which is also standardized and ranges from one to six. We create a *Quality* variable that is equal to seven minus the construction quality rating so that it is increasing in construction quality. Column 3 shows that homes of single women (couples) are likely to get a less (more) favorable construction ratings than those of single men.

Lastly, appraisers must identify whether the house has any updates and the level of updating. Whereas the condition rating takes a holistic view of the property, updating can identify specific areas of the house. We create an *Update within 5 Years* variable that takes the value of one if the appraiser indicated that the house had a kitchen and bathroom update in the last five years. As seen in Column 4 of Table 4, homes of single women (couples) are less (more) likely to show an update relative to those of single men.

Overall, the results show that, along dimensions of the appraisal report that require relatively subjective inputs, homes of single women receive less favorable assessments from appraisers, consistent with their overall lower appraisal values. On the one hand, these differences could reflect accurate judgments about the homes owned by single women homeowners. On the other hand, these relatively subjective fields could potentially be more susceptible to influence by the appraiser's beliefs about the homeowner rather than the house itself.

4. Underlying mechanisms for appraisal disparities

In this section, we consider potential channels and mechanisms that could account for the lower appraisal value for single women households.

4.1 Disparities in home maintenance

Single women homeowners are likely to be older, have children, be financially constrained, and perhaps less competent in maintaining their house. The lower upkeep of homes by single women results in their homes being in worse conditions than those of single men and this may account for the lower quality rating by appraisers and lower appraisal values. We have granular fixed effects that compare single women homes to those of single men in the same neighborhood in the same quarter year along with detailed house characteristics. However, these do not capture all the relevant lot characteristics. To shed light on this we do several analyses as follows.

First, we additionally control for whether the house was updated along with all the prior controls for house characteristics. In our baseline specification, we include the age of the house as it influence the likelihood of updates. If the disparity in the appraisal value is due to the lower likelihood of single women updating their house (as seen in the appraiser reports and documented in column 4 of Table 4), then controlling for this should reduce or eliminate the appraisal disparity. The first indicator variable, *Update within 5 Years* is the same as used in Column 4 of Table 4 and takes the value of one if there has been an update in the last 5 years. As seen in Column 1, the coefficient of *Update within 5 Years* is positive and significant as homes with updates have higher appraisal value. However, controlling for this does not impact the observed appraisal disparity for single women homeowners. We also create a second indicator, *Update within 15 Years* and find that its inclusion also does not impact the coefficient of *Single Women* which continuing to be significant and of the same magnitude. These results suggest that taking into account the lower likelihood of home updates by single women homeowners does not explain the lower appraisal value of their homes.

Along with a lower likelihood of updates single women homes are also rated as having worse house condition and construction quality by appraisers as documented in Table 4. We also examine if controlling for these attributes impact the estimated appraisal disparity. As seen in Panel C of Table 5, including *Condition* (Column 2) and *Rating* (Column 4) does not impact the estimated coefficient for *Single Women* which is similar to that estimated in the Base Model (Column 1). The interaction of these with *Single Women* is negative and significant showing that single women homes are penalized more than those of *Single Men* for the same poor *Condition* and *Quality* rating. However, the interaction of *Single Women* and *Update* is positive suggesting

that women get more of a boost in house value if their home is updated. Overall, these results show that even after controlling for poorer ratings appraisers give to homes of *Single Women* there continues to be an appraisal disparity. In other words, the negative adjustment made to homes of *Single Women* exceed what is warranted by the house condition and quality assessment by the same appraiser.[12]

Income and financial constraints impact homeowner's ability to undertake repairs and maintenance. Divringi et al. (2019) find that low-income households have more acute home repair needs. If financially constrained households are unable to adequately maintain their homes and single women homeowners are more financially constrained, then the appraisal disparity should be higher in poorer neighborhoods. We calculate the median appraisal value for houses in the tract to capture the overall wealth level of the neighborhood. We include the interaction of the natural log of the median appraisal, referred to as *Tract Median*, with *Single Women* and *Couple*. Note the median tract value is absorbed by the fixed effects. As seen in Column 3, the coefficient of *Single Women* is negative and the coefficient of its interaction with *Tract Median* is positive and significant, indicating that the appraisal disparity for *Single Women* is lower in wealthier neighborhoods. This is per se consistent with financial constraints and consequent lower house maintenance as partially accounting for the lower appraisal value for *Single Women* homeowners.

However, the coefficient of *Couple* is positive as before and its interaction with *Tract Median* is negative and significant. As couples in wealthier neighborhoods should also have better maintained houses - their lower appraisal value in wealthier neighborhoods is not consistent with financial constraints accounting for their appraisal disparities. As both the lower appraisal disparity for *Single Women* and the higher appraisal disparity for *Couples* reduces in wealthier neighborhoods the results are more consistent with a possible higher manifestation of biases in poorer neighborhoods. This is consistent with Munnell et al. (1996) and Bayer et al. (2018) that find higher racial disparities in mortgage pricing in lower income neighborhoods.

[12] The results in Panel C of Table 5 are in a random 10% sample of the full UAD data. The number of observations are less than 10% of the full sample possibly due to losing more observations due to granular fixed effects in the smaller 10% sample.

Lastly, to examine the role of differences in home maintenance between *Single Women* and *Single Men* homeowners, we examine a subset of houses that require less maintenance, that is a sample of new homes. We look at appraisals of new homes that are less than five years old, in which case the need for an update, home improvement and upkeep is likely to be low. If the lower appraisal value for single women is on account of a lower likelihood of home improvement projects, there should be no (or a smaller) appraisal gap for them in this subsample of new homes. As seen in Panel B of Table 5, the estimated coefficient on *Single Women* has the same sign and a similar, albeit slightly smaller, magnitude as our baseline results. Additionally, even in this sample of new homes *Single Women* owners are associated with lower net adjustments to comparable properties, lower ratings on quality of construction, and lower ratings for house condition ratings. The existence of appraisal disparities of about the same magnitude for *Single Women* in a sample of new homes also suggests the lower upkeep of houses does not fully explain the appraisal gap.

4.2 Selection into disadvantaged lots

Single women more likely to be financially constrained may buy disadvantaged lots, like those on a busy street or near train tracks, that tend to be cheaper properties. These lot characteristics are difficult to capture with hedonic controls and may account for lower appraisal value even if the houses are equally well maintained. Houses owned by *Single Women* in our sample have similar house characteristics though are a bit older (see Appendix Table 1).

To address the possibility that single women are more likely to own disadvantaged lots that are difficult to capture with detailed hedonic controls, we include property fixed effects in our estimation. As our sample spans 11 years, the inclusion of property fixed effects implies examining properties that are associated with multiple refinancing appraisals in this relatively short period. As some of them could be from the same (woman) owner, we further require that the property be associated with a refinancing appraisal by at least one single woman and at least one single male owner over the sample period. These restrictions substantially shrink the sample and raise the possibility that these properties may be different from the overall sample. We examine the characteristics of these properties with multiple refinancings and find that they have similar house characteristics, are more likely to have been updated and are valued slightly higher than those in the full sample. Note that as we sort on having at least one appraisal from a single woman the

fraction of single women homes is higher than that in the full sample. The properties do not differ from the overall sample in their exposure to fintech lending or the share of women homeowners though they are more likely in busier times (see Appendix Table 2 for details).

In this much smaller dataset, we include property fixed effects along with year quarter fixed effects and continue to find that the coefficient of *Single Women* is negative and significant. The results in Column 1 of Table 6 show that within a decade the same property receives lower appraisal values when owned by a single woman relative to a single man. The estimated gap at 0.7% is smaller than that estimated for the full sample. As these houses have been appraised multiple times over an eleven-year period their prior appraised value, that is likely to be relatively recent, serves as a relevant benchmark narrowing the range of justifiable appraisals and potential disparities and hence in a lower estimated appraisal gap. To increase the sample size, in Column 2 we relax the criteria to include properties that were owned by at least one single woman homeowner and one instance of any other category, whether it be a single man or a couple. With this enlarged sample, we obtain qualitatively similar results (see Column 2).

We then examine the cross-sectional variation of the gap: specifically, we include the interaction of homeowner classification with *High Value*, a dummy that takes the value of one if the property is in a tract with an average appraisal value that is greater than the sample median. In Columns 3 and 4 of Table 6, we find that the coefficient of *Single Women* in lower in poorer neighborhoods with a magnitude that is similar to that estimated in the full sample. In other words, in relatively poorer neighborhoods single women homeowners get lower appraisal value than single men homeowners for the same property.

4.3 Potential bias

The last mechanism for the appraisal disparity is a possible bias in the appraisal process against *Single Women* homeowners. Appraisers may have beliefs that single women do not or are unable to maintain their houses to the same degree as single men making their houses of lower

quality and lower value.[13] In this section, we do several analyses to shed light on the possibility of bias impacting appraisal values.

4.3.1 Do the appraiser and the homeowner need to meet?

Our sample consists of traditional appraisals where an appraiser comes to the property for a physical inspection. During the visit, the appraiser is likely to meet the homeowner and ascertain their sex. This interaction is likely to reinforce and increase reliance on preconceived beliefs about homeownership by single women and the general condition and upkeep of the property. The importance of face-to-face interactions has been shown to be important in increasing the salience of prior beliefs (see Golding and Rouse (2000) and Bartlett et al. (2022)). However, the in-person meeting between the appraiser and the homeowner is not necessarily assured, raising the concern whether the appraiser even knows the sex of the homeowner for all appraisals.

Even if the appraiser does not meet the homeowner, the homeowner's name is observable to the appraiser through the documents. While some names like Jane or Mary are unambiguously female other like Logan may not be. If the appraisal disparity is higher for names that are easier to categorize as female it suggests that a meeting is not essential and the homeowner's name may be sufficient to ascertain homeowners' sex.

As discussed earlier, we categorize names as female if the probability of the name belonging to a woman is greater than 95%. We partition our sample based on how easy it is to determine the sex from the first name. The "unambiguous'' sample consists of first names with a 98% or greater probability of being female or male. The "ambiguous'' sample consists of the remaining sample, that is, observations with first names having a probability of less than 98% but greater than 95% (our cutoff). Homeowners that are couples are included in both samples. [14] As can be seen by comparing Column 1 and Column 2 of Table 7, the estimated coefficient on *Single Women* is negative and larger in magnitude in the sample of unambiguous names (Column 1). In

[13] Along with beliefs on home maintenance, other beliefs regarding women homeowner's financial constraints, status, social preferences among others can also give rise to a bias against single women homeowners. We do not examine the nature of potential bias and focus on documenting its existence in the appraisal process.

[14] As couple borrowers are included in both the ambiguous and unambiguous samples, the sum of the number of observations across the samples exceeds that of the full sample.

other words, the more difficult it is to categorize a name as female, the lower the appraisal disparity for *Single Women*.

We also consider appraisals that were excluded from our sample due to the difficultly in determining the sex from the first name.[15] The appraiser is also likely to find it difficult to infer sex of the homeowner from these names. We match these difficult to categorize names with the MLIS data that has the sex of the homeowner to classify households. *Single Women* homeowners with these difficult-to-categorize names are less likely to be subject to biases especially if there is no meeting between the appraiser and the homeowner, though they are similar to other single women homeowners in their propensity to update and maintain their homes and to buy disadvantaged lots. As seen in Column 3 of Table 7, in this subset of the merged UAD-MLIS data where the first names were difficult to genderize and were excluded from our original data, the estimated coefficient on *Single Women* is -0.011 and notably smaller than -0.020 the coefficient estimated in full merged UAD-MLIS sample reported in Column 4.[16]

Overall, the results suggest that a meeting between the appraiser and the homeowner is not required as first names of owners convey their sex and a reliance on preconceived beliefs. As lower home maintenance and propensity to buy disadvantaged lots associated with women homeowners should not be related to the ease of genderizing their names, the results suggest that these are unlikely to explain the observed appraisal gap entirely.

4.3.2 Appraiser characteristics

In this section, we examine several appraiser characteristics to examine if some characteristics are less likely to be associated with negative beliefs about single women homeowners. Evidence of heterogenous effects of appraisal characteristics on appraisal disparity for *Single Women* not only has policy implications but also provides further support for bias as one of the significant channels for the observed appraisal gap.

[15] This was either because the first name was not available, or not on the GenderChecker or Namsor list, or was classified as unisex, that is associated with a probability of less than 95% of being male or female.
[16] As the prior baseline results reported in Table 3 were in the full UAD data we estimate the base model in the merged UAD-MLIS data as it is the appropriate benchmark to compare the coefficient of Single Women estimated in Column 3.

4.3.2.1 Sex of the appraiser

Prior studies have examined the role of women agents and intermediaries on gender disparities in various contexts. Bose, Filomeni and Tabacco (2024) document that women loan officers use their soft information about within-group members to mitigate the sex-related gaps in credit access. Cornaggia and Xia (2023) document that women with student loans are more likely to switch to economically advantageous alternatives when their service representatives are women. Egan, Matvos, and Seru (2022) document that women financial advisors receive stronger punishment for misconduct but that this gap is ameliorated when there are women managers. However, not all studies find evidence of preferences for within-group members, with Huang, Mayer, and Miller (2024) documenting that the likelihood of promotion for women in financial institutions does not vary with the sex of the decision maker. If there is within-group affinity, or if there is better soft information within groups, we expect that women appraisers would be less likely than men appraisers to assign lower values to homes of single women owners.

To examine the role of the appraiser's sex, we obtain the name of the appraiser and categorize the sex from the first name using the same methodology that we followed for homeowners. About 20.9% of the appraisals were performed by women appraisers. We create a *Women Appraiser* dummy and include it and its interaction with *Single Women* and *Couple*. As seen in Column 1 of Table 9, we find that the coefficient on the interaction of *Single Women* and *Women Appraiser* is positive and significant though small in magnitude. Women appraisers mitigate some of the gap in the appraised values of the homes of single women relative to those of single men. However, the coefficient on the interaction of *Women Appraisers* and *Couple* is also positive and significant, suggesting that women appraisers also appraise homes of *Couple* higher than similar homes of single men and amplify the positive gap for couples.

4.3.2.2 Appraiser experience

Aside from the sex of the appraiser, other characteristics of appraisers, such as prior experience with women homeowners and overall depth and breadth of experience could influence the kind of beliefs held by appraisers. If the appraisal gap is partly due to lack of knowledge about how women maintain and improve their homes, then a greater exposure to single women

homeowners or wider breadth of experience to diverse types of properties and homeowners could mitigate the gap by changing stereotypical beliefs. We therefore construct several variables to capture the appraiser's experience and exposure and examine their impact on the appraisal gap.

To measure the exposure of appraisers to single women homeowners, we construct two variables based on appraisals done by a given appraiser over the past 16 quarters in our sample. The first variable, *Single Women Fraction*, is the fraction of all appraisals by that appraiser that were for single women homeowners, which has a mean of 0.2 in our sample (see Table 8). Note that we restrict the sample to appraiser-years where there were at least 20 appraisals in the past 16 quarters. The second variable, *Log (Num Women Appraisals)*, is the natural log of the number of appraisals done for single women homeowners. As a basis for comparison, Column 2 of Table 9 reports the baseline estimation in this (smaller) sample. As seen in Column 3 of Table 9, the coefficient on the interaction of *Single Women* and *Single Women Fraction* is positive and significant, suggesting that the appraisal gap for single women homeowners is decreasing in the appraiser's exposure to single women homeowners. The results with *Log (Num Women Appraisals)* displayed in Column 4 are qualitatively similar. These results suggest that the estimated appraisal disparity for *Single Women* is lower for appraisers that have greater prior experience with single women homeowners.

We also construct three variables to capture the depth and the breadth of an appraiser's experience. The first variable is *Log (Number of Appraisals)*, which is the natural log of the number of appraisals done by the appraiser in the prior 16 quarters. The second variable is *Log (Number of Tracts)*, which is the natural log of the number of different census tracts, and the third variable is *Log(SD of Tract Median Value)*, which is the natural log of the standard deviation of the median appraisal value of all houses in the tracts that spanned the appraisals done in the past 16 quarters. The latter two variables capture the breadth of the neighborhoods and their income levels that the appraiser has worked with in the prior years. As seen in Columns 5–7, the coefficient on the interaction of *Single Women* and all the above three appraiser characteristics is positive and significant, showing that more experience as well as a greater breadth of experience mitigate the appraisal gap for single women. We find that all the above appraiser characteristics also mitigate

the positive appraisal gap for couples reinforcing that appraiser with more experience are more objective across different groups.

4.3.2.3 Appraisal procedure

As mentioned before our sample primarily has traditional appraisals whereby the appraiser visits the property and assesses the condition and quality of the house along with upgrades undertaken. These are evaluative assessments which are susceptible to biases. Appraisal processes that have greater reliance on objective data and have other features that distance the appraiser from the homeowner may mitigate the effect of prior beliefs on the appraisal value. Existing studies suggest that demographic differences in financial outcomes can be mitigated by analogous procedures in other contexts (see D'Acunto, Ghosh and Rossi (2024) and Bartlett et al. (2022)).

We focus on three aspects of the appraisal process that capture these differences. The first is the use of hybrid appraisals. In a hybrid appraisal, a third party performs the property inspection and provides the information to the licensed appraiser, who then uses this information along with other data to complete the appraisal (see Appendix B for further details on hybrid appraisals). Hybrid appraisals remove interaction between the appraiser and the homeowner and create distance that may reduce reliance on prior beliefs and increase the use of objective data.

The UAD dataset does not have information on hybrid appraisals, but it is available in the MLIS data.[17] Therefore, we implement this analysis using the MLIS data. As the MLIS data does not have any details on property characteristics we cannot control for house characteristics in these tests. We create a *Hybrid Appraisal* dummy that takes the value of one for hybrid appraisals and include it and its interaction with *Single Women* and *Couple*. As can be seen in Column 1 of Table 10, the coefficient of *Hybrid Appraisal* is positive, pointing to higher appraisal values on average relative to traditional appraisals. Its interaction with *Single Women* is positive and with *Couples* is negative. These results suggest that creating distance between the appraiser and the homeowner reduces the negative appraisal gap for *Single Women* as well as the positive appraisal gap for

[17] This is because there is no URAR appraisal form, which is the source of the UAD data, filed by the appraiser in hybrid appraisals.

Couples. However, it should be noted that this estimation only has year-quarter-tract fixed effects and no controls for house characteristics.

The second factor potentially affecting the appraisal procedure is the presence of FinTech lenders. FinTech mortgage lenders use a mostly online application process and are known for their rapid application processing speeds and agile adjustment to changing mortgage demand volumes (Fuster et al. (2019)). As mortgage lenders are independent from appraisal firms, the practices of FinTech lenders need not impact appraisal practices. However, the lender can influence the appraisal indirectly since it usually selects the appraiser. We hypothesize that appraisals associated with mortgages originated by FinTech lenders rely more on standardized inputs to better align with their advantages in speed and scalability

We construct *FinTech Share* as the fraction of FinTech-originated mortgages over total mortgages originated in a given tract in the previous year.[18] The FinTech share could be either the fraction of the number of loans (indexed as EW for "equal-weighted") or the fraction of dollar volume (indexed as VW for "value-weighted"). The classification of lenders as FinTech is based on either Fuster et al. (2019) or Buchak et al. (2018). This results in four different measures of FinTech *Share*. As can be seen from Columns 2 to 5 of Table 10, we find that a higher *FinTech Share* is associated with a smaller gap. The coefficient on the interaction of *FinTech Share* with *Single Women* is positive and significant across all four specifications, and the coefficient on the interaction of *FinTech Share* with *Couple* is negative and significant in all four specifications. These results show that greater share of FinTech lenders is associated with reducing the appraisal gap for *Single Women* as well as for *Couples*. As *FinTech Share* is likely to be associated with greater reliance on objective data in the appraisal process, the results support the role of subjective beliefs as one potential channel for the documented appraisal disparities.

Lastly, we examine the intensity of transactions in the housing market. "Hot" housing markets, characterized by a large number of home sales and refinances, produce a larger set of recently sold comparable properties that appraisers can use to determine appraisal values. This could make it easier for appraisers to find very similar comparable properties and reduce the

[18] The share of FinTech lenders and the calculation of *Female Share* and *Applications*, discussed in the next section, are based on data from the Home Mortgage Disclosure Act (HMDA).

reliance on relatively subjective adjustments. Busy periods could also increase the use of objective and scalable procedures resulting in a narrower gap. Goldsmith-Pinkham and Shue (2023) also note that hotter housing markets are associated with a lower gender gap in house transactions. We use the log of mortgage application numbers (EW) and volumes (VW) in a census tract-year-quarter, referred to as *Applications* to capture how busy the local housing market is. As seen in Columns 6 and 7 busier periods are associated with a narrower appraisal gap for *Single Women* as well as *Couples*.

Overall, the results suggest the prior negative beliefs about or bias against single women homeowners are significant in explaining the observed disparity in appraisals for single women homeowners.

5. Impact on refinancing terms

As the appraisal value is important in determining the terms of the loan, a lower appraisal value could result in less favorable refinancing opportunities for women homeowners. In this section, we examine the effect of the lower appraisal value on the terms of the refinancing obtained.

5.1 Interest rate

Lower appraisal values directly impact loan outcomes. When the appraisal for a property is low, the LTV ratio for the refinancing mortgage is higher, signaling higher risk and very likely resulting in a higher interest rate. Prior literature has documented that mortgages with higher LTV ratios have higher interest rates (see Agarwal et al. (2017) and Tzur-Ilan (2023)).[19]

In Table 11, we estimate the effect of low appraisal values on interest rates while controlling for property characteristics and year-quarter-tract fixed effects. As the UAD data does not have loan-level details, we merge the UAD data with the MLIS data. From the MLIS data, we obtain loan details and control for those variables as well. Specifically, we include the interaction of 20-

[19] As prior literature shows (see Fuster et al. (2013) and Bartlett et al. (2022)), among mortgages sponsored by the government-sponsored enterprises (GSEs), the guarantee fee (or g-fee) paid by lenders to the GSEs to cover projected borrower default and operational costs depends on LTVs and credit scores only through a course matrix. This grid regime started in March 2008 and has been adjusted several times since then.

point credit score bins, five-point LTV bins, and DTI deciles along with indicators for loan term. We also include year-quarter-seller fixed effects.

The coefficient on *Log (Appraisal Value)* is negative and highly significant, as expected. Combined with the observation that appraisals for *Single Women* are on average lower by 2.4% (the estimated coefficient from Table 3, Column 5), the economic impact in Column 1 of Table 11 implies a 0.38% higher interest rates on account of the lower appraisal value.[20] As the average loan is $247,000 and the average interest rate is 3.76% in our sample, this implies paying about $647 more in annual interest costs.[21] Figure 3 illustrates the relationship between appraisal values and the mortgage interest rate, which is consistent with our results.

5.2 Loan amount

Lower appraisal values reduce the value of the homeowner's equity and can reduce the loan amounts they receive for refinance mortgages. If a borrower is constrained by a maximum LTV limit, a lower appraised value translates directly into a lower loan amount. We estimate the impact of the appraisal value on the loan amount in Column 2 of Table 11. Note that we exclude LTV from the controls since it mechanically depends on the loan amount. The coefficient on *Log (Appraisal Value)* is positive and significant. The estimated coefficient suggests that single women homeowners receive loans that are 1.89% smaller than those obtained by men.[22]

5.3 Cash-out refinance

As a lower appraisal value reduces the value of homeowner's equity, it also reduces the cash-out amount available in the refinancing.[23] As seen in Column 3 of Table 11, a decrease in appraisal value is associated with a decrease in the cash-out amount. The estimated coefficient

[20] The estimated coefficient on *Log (Appraisal Value)* is -0.159. For single female owner this is then 0.024 × .159 = 0.0038 or 0.38%.
[21] Note that the monthly payment for a $247,000 30-year loan with an interest rate of 3.76% is $1,145.30, and the monthly payment for a similar loan but with 0.38% higher interest rate is $1,199.24. This determines a monthly difference of $53.94, or an annual difference of $647.28.
[22] A 1% increase in appraisal is associated with a 0.788 increase in the loan amount. For single females the loan amount will be lower by 2.4 × 0.788 = 1.89%.
[23] Note that we infer the cash-out amount as the loan amount on a cash-out refinance minus the balance right before the closing date of the previous loan on the same property.

implies that single women homeowners' cash-out amount is 1.85% lower than that of single men homeowners.[24]

Combining our baseline results of the gender gap in home appraisals, our results here imply that if single women owners receive a lower appraisal value, it could potentially lead to a lower cash-out amount for them, limiting their ability to leverage their home equity for consumption, investment or other financial needs. Chetty et al. (2014) document that homeowners who can access more equity in their homes are better positioned to make long-term investments, improve their property's value, or weather financial shocks, suggesting large long-term consequences for single women homeowners. Other studies have also documented positive refinancing effects on spending by exploiting exogenous variation in access to refinancing (Abel and Fuster (2021) and Agarwal et al. (2023)) or payment reductions from ARM resets (Di Maggio et al. (2017)).

6. Robustness checks

In this section, we discuss the results of some robustness tests to address concerns with the data and analysis.

6.1 Misclassification of homeowners

The classification of homeowners as single women, single men or couple is based on the first names of borrowers as reported in the UAD data. However, errors in the classification could arise if the UAD does not list all the borrowers. Errors could also arise from our method of determining sex from names.

We examine the potential impact of this on our estimates using the merged UAD and MLIS data. We compare our existing results using first names from UAD data with results if we use MLIS to classify a homeowner into single women, single men or couple. Note that the MLIS data sources its sex and borrower information from the Home Mortgage Disclosure Act (HMDA) data, which is a widely used source of demographic information about mortgages. Note that about 14% of the homeowners in the merged data of about 12 million observations have a different

[24] The estimated elasticity is 0.771. As single women get a 2.4% lower appraisal value this implies a 1.85% lower cash-out amount.

classification in MLIS. Of the homeowners that have different classifications, the largest group (80%) are homeowners that we have classified as single while the MLIS classifies as a couple. Among this group, 75% are couples that are classified as single men as UAD data reports only one name as the borrower for these cases. We examine the effect of this misclassification on our results by estimating the model in the merged data using our classification of households based on the UAD data as well as the MLIS classification of households.

The estimated coefficient on *Single Women* with the UAD classification is -0.021 (Column 1) and with the MLIS classification is -0.020 (Column 2) in the merged UAD-MLIS data. The estimated coefficient on *Couple* is also qualitatively similar, as is the fit of the model. As expected, the misclassification marginally reduces the appraisal disparity relative to *Single Men* and increases it relative to *Couples*. The results suggest that these sources of potential misclassification of homeowners in the UAD data do not materially impact the results.

6.2 Appraiser and other fixed effects

Another potential factor that could in principle contribute to the lower appraisal values for single women is that they could be more likely to be appraised by relatively conservative appraisers that tend to derive lower appraisal estimates. We estimate the model with appraiser fixed and as seen in Column 1 of Appendix Table 3 this does not substantially impact the fit of the model or the estimated coefficients of *Single Women* or *Couple*. We also include fixed effects for appraiser firm to examine if practices at the firm level rather than the individual level account for the estimated gap. As seen in Column 2, inclusion of appraiser firm fixed effects also do not materially impact the coefficients of interest.

The Dodd-Frank Act aims to make appraisers and appraiser firms independent from mortgage originators. However, the lender can influence the appraisal indirectly since it usually selects the appraiser. We therefore also estimate the base model with approximate originator fixed effects. Since the lender field in the UAD is non-standardized, we use the merged UAD-MLIS data to obtain the mortgage seller to the GSEs, which we use to approximate the originator,[25] and

[25] The originator coincides with the mortgage seller for about 72% of loans during our sample period. The remaining cases are "correspondent loans" in which the originator sells the loan to an aggregator which then sells it to the GSEs.

estimate the base model with seller fixed effects in the merged dataset. The results, displayed in Column 3, show that inclusion of seller fixed effects does not have a material impact on the estimated coefficient for *Single Women,* which continues to be negative and significant.[26]

7. Conclusion

We use a proprietary version of the UAD to examine the gender gap in home appraisals. The UAD is unique in the detail of property characteristics and other information from the appraisal report that it provides. Controlling for detailed property characteristics along with granular fixed effects that allow us to compare similar homes in the same census tract and year-quarter, we document a significant and robust lower appraisal value for homes of single women relative to those of single men. We find that homes of single women fare worse with respect to evaluative criteria that could be more subjective, such as adjustments relative to comparable properties, the condition rating of the house, the quality of the construction and whether any updates were visible.

The appraisal disparity for single women houses continues when we control for potential upgrades and is of a similar magnitude in a sample of new homes. As new homes require little maintenance and repairs, a lower upkeep of home by women is unlikely to explain the lower appraisal value for their homes. Single women are financially constrained and more likely to buy disadvantaged lots that have lower value. These omitted property characteristics could also account for the lower appraised values of single women homeowners. We included property fixed effects and find that the same property is appraised for lower when owned by a single woman.

We find that the appraisal gap is higher when names are difficult to categorize as female suggesting that appraisers priors about house value are guided by names of homeowners on documents and possibly before the visit to the house. As financial constraints, lower upkeep of houses and ownership of disadvantaged lots does not vary with the ease of genderized firm names

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The aggregator could still influence the practices of the correspondent lender and in turn the appraiser, albeit less directly.

[26] The base model with granular control variables and tract-year-quarter fixed effects in the UAD-MLIS merged dataset but without seller fixed effects is tabulated in Model 4 of Table 7 with a coefficient of -0.020 for *Single Women*. The coefficient of *Single Female* with seller fixed effects is the same magnitude as the baseline estimate.

this supports the role of bias in the documented lower appraisal value. We find that appraiser characteristics likely to reduce negative beliefs about single women homeowners, as well as appraisal procedure that increase reliance on data mitigate the documented appraisal gap. The heterogenous effects of appraiser characteristics and procedures also support the role of prior beliefs in explaining the lower appraisal value for single women homeowners.

The lower appraisal values have significant consequences for the refinancing terms obtained by the homeowner. Our results show that the lower appraisal values of single women homeowners are associated with higher interest rates, lower loan amounts, and lower cash-out amounts. The less attractive refinancing opportunities associated with the lower appraisal values are likely to account for some of the lower uptake of refinancing in low interest environments and also help explain why women homeowners exploit fewer of these apparently profitable opportunities. Our results point to supply-side factors that inhibit profitable refinancing opportunities and may reduce the pass-through of monetary policy to some segments of the population.

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Appendix A – Variable Definitions

Variable name	Definition
Panel A. UAD sample variables	
Log(Appraisal Value)	The natural log of the appraisal value (reported by the appraiser) of the property associated with the refinancing mortgage application.
Net Adjustments	The average net adjustment of comparable properties scaled by the appraisal value of the assigned property. This variable is multiplied by 100 and winsorized at 1% and 99%.
Condition	The condition rating with values from 1 to 6 with 6 being the best condition.
Quality	the quality rating with values from 1 to 6 with 6 being the best quality.
Update	An indicator that equals one if there was an upgrade of kitchen or bathroom within the last five years.
Single Women	An indicator that equals one if the homeowner is classified as single women.
Couple	An indicator that equals one if the homeowner is classified as couples.
Single Men	An indicator that equals one if the homeowner is classified as single men.
Women Appraiser	An indicator that equals one if the appraiser is classified as women.
Hybrid	An indicator that equals one if the appraisal is classified as "hybrid" in the Mortgage Loan Information System (MLIS) data.
Fintech share	The fraction of FinTech-originated mortgages over total origination in a census tract in a given year.
Women share	The fraction of women mortgage applicants over the total number (volume) of applicants in a census tract in a given year if indexed by EW (VW).
Applications	The natural log of application number (volume) in a census tract in a given year if indexed by EW (VW).
Tract Median	The natural log of the median appraisal value in the tract in a given year.
Fireplace	An indicator that equals one if the property has a fireplace.
Pool	An indicator that equals one if the property has a pool.
Garage	An indicator that equals one if the property has a garage.
A/C	An indicator that equals one if the property has air conditioning.
Log(GLA)	The natural log of gross living area (in squared feet).
Num. Bedrooms	The number of bedrooms that the property in question has.
Num. Baths	The number of bathrooms that the property in question has.
Num. Stories	The number of stories that the property in question has.
Year Built	The year the property in question was built.
Update within 15 years	An indicator that equals one if there was an upgrade of kitchen or bathroom within the last 15 years.
Update within 5 years	An indicator that equals one if there was an upgrade of kitchen or bathroom within the last five years.
Panel B. UAD-MLIS merged sample variables	
Interest rate	The mortgage contractual interest rate.
Log(Loan Amount)	The natural log of the loan amount.
Log(Cash-out Amount)	The natural log of the cash-out amount.

Appendix B: The Home Appraisal Process

The appraisal industry is regulated through state licensing requirements and professional standards. Most states mandate that appraisers complete a combination of coursework and supervised apprenticeships before obtaining licensure.[27] All licensed appraisers must adhere to the Uniform Standards of Professional Appraisal Practice (USPAP), which establishes ethical and performance standards for the profession.[28] Following the 2008 financial crisis, the Dodd-Frank Wall Street Reform and Consumer Protection Act introduced additional safeguards to ensure appraisal independence.[29] These regulations require appraisers to maintain independence from lenders and other parties who have a financial interest in the transaction, aiming to prevent the appraisal inflation that contributed to the housing bubble.

1. The Traditional Appraisal Process

In a traditional appraisal, the licensed appraiser conducts an in-person physical inspection of the property. Following the inspection, the appraiser prepares a detailed report using the Uniform Residential Appraisal Report (URAR) form with details on:

a) *Property characteristics*: Detailed information about the home's physical features, including gross living area (GLA), number of bedrooms and bathrooms, number of stories, year built, and the presence of specific amenities such as fireplaces, pools, garages, and air conditioning systems.

b) *Condition and quality ratings*: The appraiser must assign standardized ratings for both the overall condition of the property (ranging from 1 to 6, with lower numbers indicating better condition) and the quality of construction. These ratings require professional judgment about the property's maintenance, state of repair, and construction standards.

c) *Comparable sales analysis*: The appraiser must select recently sold properties with similar characteristics, ideally from the same neighborhood and typically sold within the past 12 months.[30] The appraiser then makes adjustments to the sale prices of these comparable properties to account for differences with the subject property, such as variations in square footage, number of rooms, lot characteristics and amenities. The net adjustment — which can be positive or negative—represents the appraiser's judgment about how the subject property's value compares to the selected comparables.

d) *Updates and improvements*: The appraiser must document whether the property has undergone recent updates. The form typically captures whether such updates occurred within the past 5 or 15 years.

Hybrid and Desktop Appraisals

In recent years, alternative appraisal methods have emerged that reduce or eliminate the traditional in-person property inspection. Hybrid appraisals (also called "bifurcated" or "desktop with property inspection" appraisals) involve a division of labor in the appraisal process. A third-party property

[27] The Appraiser Qualifications Board (AQB) sets minimum qualifications for licensure adopted by all states.
[28] See the Appraisal Foundation (https://appraisalfoundation.org/pages/uspap) for USPAP standards.
[29] The Dodd-Frank Wall Street Reform and Consumer Protection Act, enacted on July 21, 2010, established appraisal independence requirements under 15 U.S.C. § 1639e. In addition, the Federal Reserve Board issued interim final regulations in 2010 implementing the appraisal independence provisions, which prohibit coercion and similar actions designed to cause persons who perform property valuations to base appraised values on factors other than their independent judgment.
[30] For further details see https://selling-guide.fanniemae.com/sel/b4-1.3-08/comparable-sales.

inspector—who may not be a licensed appraiser—conducts the physical inspection of the property and documents its characteristics, condition, and features. This inspector provides detailed information, photographs, and measurements to a licensed appraiser, who then completes the appraisal report without visiting the property.

The GSEs have introduced hybrid appraisals through pilot programs, with limited adoption in specific circumstances. The key distinction of hybrid appraisals is that they reduce face-to-face interaction between the licensed appraiser making the valuation and the homeowner. This separation may affect appraisal outcomes if direct interaction with the homeowner influences appraiser judgments.

Desktop appraisals go further in reducing manual inspection, relying primarily on property records, automated valuation models (AVMs), and other data sources without any physical inspection. While not included in the traditional UAD dataset used in this study, desktop appraisals represent a broader trend toward automation and technology-driven property valuation.

Figure 1. Fraction of women appraisals over time

This figure presents the share of borrowers that are classified as single women over the years during 2013-2024. The data sample is all appraisal values associated with refinance mortgages in the Uniform Appraisal Dataset (UAD) sample, and the sample period is from 2013 through March 2024.

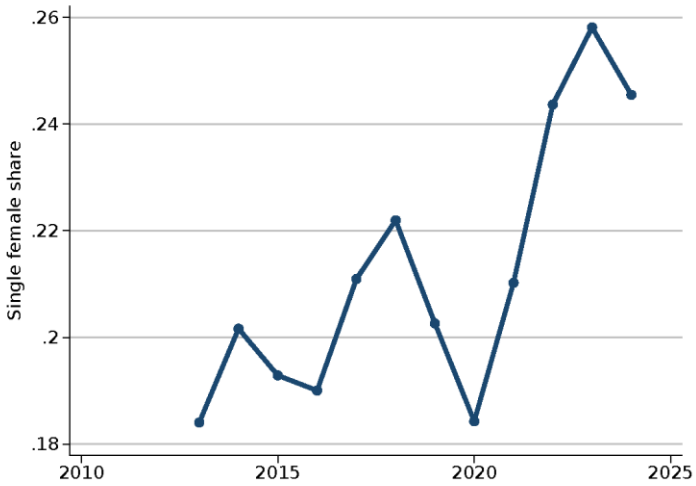

Figure 2. The Gender Appraisal Value Gap over Time

The figure presents the estimate on the Single Women indicator with a 95% confidence interval when estimating the baseline specification (with tract-by-year-quarter fixed effects) for each year separately. The data sample is all appraisal values associated with refinance mortgages in the Uniform Appraisal Dataset (UAD) sample, and the sample period is from 2013 through March 2024.

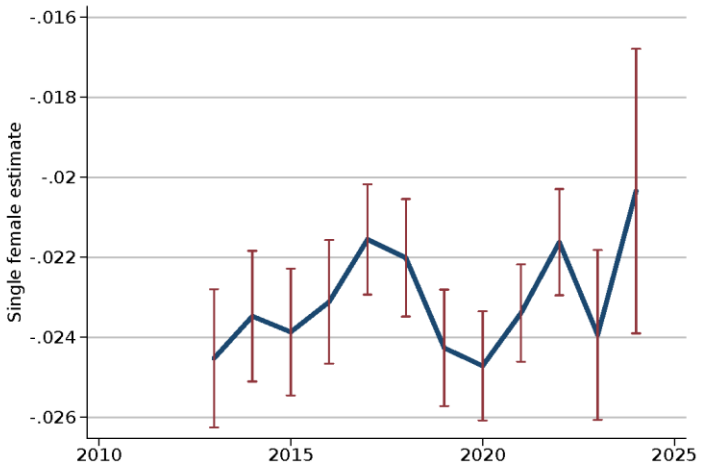

Figure 3. Appraisal values and mortgage interest rates

This binscatter figure plots the relationship between the natural log of appraisal values and the mortgage interest rate, after absorbing year-quarter fixed effects. Vertical lines of given color indicate respective mean of the group (i.e., single women, couple, and single men). The data sample contains all refinance mortgages in the MLIS-UAD merged data. The sample period is from 2013 through March 2024.

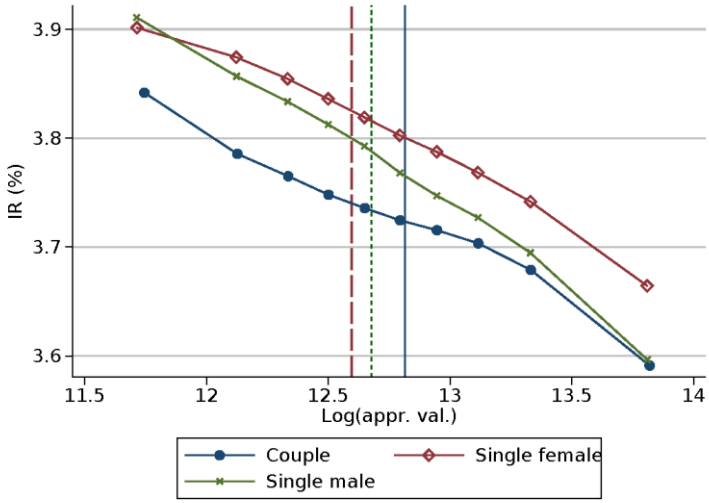

Table 1. Summary statistics for the UAD Sample

This table presents the summary statistics for the data variables from the Uniform Appraisal Dataset (UAD). The sample contains refinance mortgage applications only. The sample period is from 2013, the start of the UAD data, through March 2024. The unit of observation is an appraisal for a property. Statistics include the number of observations (N), mean (Mean), standard deviation (SD), the 25th percentile (P25), median (P50), and the 75th percentile (P75). The description of the variables is in Appendix A.

	N	Mean	SD	P25	P50	P75
Appraisal Value ($1000s)	21,966,371	465.76	481.33	221.00	340.00	530.00
Log (Appraisal Value)	21,966,371	12.77	0.71	12.31	12.74	13.18
Single Women	21,966,371	0.20	0.40	0.00	0.00	0.00
Single Men	21,966,371	0.37	0.48	0.00	0.00	1.00
Couple	21,966,371	0.43	0.50	0.00	0.00	1.00
Log (GLA)	21,966,122	7.55	0.41	7.26	7.53	7.83
Num. Bedrooms	21,966,323	3.35	0.86	3.00	3.00	4.00
Num. Bathrooms	21,965,535	2.47	1.00	2.00	2.00	3.00
Num. Stories	21,965,005	1.53	0.56	1.00	1.00	2.00
Year Built	21,962,357	1978.66	30.01	1960.00	1985.00	2002.00
Fireplace	21,966,371	0.63	0.48	0.00	1.00	1.00
Pool	21,966,371	0.13	0.34	0.00	0.00	0.00
Garage	21,966,371	0.83	0.37	1.00	1.00	1.00
A/C	21,966,371	0.82	0.38	1.00	1.00	1.00
House Age	21,962,357	39.31	30.07	16.00	33.00	58.00
Update within 15 Years	21,958,755	0.58	0.49	0.00	1.00	1.00
Update within 5 Years	21,966,371	0.36	0.48	0.00	0.00	1.00
Fintech Share (Buchak,EW)	21,462,283	0.11	0.07	0.05	0.09	0.17
Fintech Share (Buchak,VW)	21,462,283	0.11	0.07	0.05	0.09	0.16
Fintech Share (Fuster,EW)	21,462,283	0.10	0.05	0.06	0.09	0.13
Fintech Share (Fuster,VW)	21,462,283	0.10	0.05	0.06	0.09	0.13
Women Share (EW)	21,462,214	0.30	0.08	0.25	0.30	0.35
Women Share (VW)	21,462,214	0.28	0.08	0.22	0.27	0.33
Applications (number)	21,462,283	405.38	457.04	175.00	285.00	469.00
Applications ($ millions)	21,462,283	119.97	1344.87	35.59	71.31	136.60

Table 2. Summary Statistics for the MLIS and Merged UAD-MLIS Sample

This table presents the summary statistics of the regression analysis variables involving the Mortgage Loan Information System (MLIS) data. The variables *Appraisal Value ($1000s)* through *Hybrid Appraisal* are from a sample of refinances in MLIS associated with either a full/traditional or hybrid appraisal. The variables *Cash-out amount ($1000s)* through *Log (Loan amount)* are from a merger of MLIS with the Uniform Appraisal Dataset (UAD) sample. Both samples contain refinance mortgages that are backed by the GSEs. The sample period starts from 2013 and ends in March 2024. The unit of observation is an appraisal for a property. Statistics include the number of observations (N), mean (Mean), standard deviation (SD), the 25th percentile (P25), median (P50), and the 75th percentile (P75).

	N	Mean	SD	P25	P50	P75
Appraisal Value ($1000s)	17,217,985	410.69	321.26	224.00	335.00	500.00
Log (Appraisal Value)	17,217,985	12.73	0.62	12.32	12.72	13.12
Single Women	17,218,254	0.20	0.40	0.00	0.00	0.00
Single Men	17,218,254	0.29	0.45	0.00	0.00	1.00
Couple	17,218,254	0.52	0.50	0.00	1.00	1.00
Hybrid Appraisal	17,218,254	0.01	0.11	0.00	0.00	0.00
Cash-out Amount ($1000s)	3,852,633	71.85	60.48	33.15	54.41	90.38
Log (Cash-out Amount)	3,847,498	10.91	0.76	10.41	10.91	11.41
Interest Rate (%)	12,462,003	3.76	0.86	3.12	3.62	4.25
Loan Amount ($1000s)	12,462,003	247.47	134.87	145.00	220.00	325.00
Log (Loan amount)	12,462,003	12.27	0.57	11.88	12.30	12.69

Table 3. The Gender Gap in Appraisal Values

This table displays results from an OLS estimation where the dependent variables is the natural log of Appraisal Value. The sample consists of all refinance appraisals from the UAD data over the period 2013 to March 2024. Single Women (Couple) is an indicator that equals one if the homeowner is a single woman (Couple). Log(GLA) is the natural log of the gross living area. Other control variables are described in Appendix A. Granular controls refers to indicator variables for number of bedrooms, number of bathrooms, number of stories and year built. Fixed effects included are specified at the bottom of the table. T-statistics computed using county-clustered standards errors are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

	Log (Appraisal Value)				
	Model 1	Model 2	Model 3	Model 4	Model 5
Single Women	-0.144***	-0.051***	-0.048***	-0.040***	-0.024***
	(-25.21)	(-15.33)	(-15.42)	(-28.90)	(-40.64)
Couple	0.124***	0.062***	0.061***	0.031***	0.016***
	(16.74)	(11.08)	(11.66)	(19.33)	(22.90)
Fireplace		0.209***	0.201***	0.103***	0.060***
		(8.08)	(8.90)	(24.09)	(24.22)
Pool		0.153***	0.151***	0.096***	0.083***
		(7.56)	(8.12)	(14.77)	(24.13)
Garage		0.138***	0.143***	0.046***	0.059***
		(3.89)	(4.63)	(10.01)	(28.85)
A/C		0.042***	0.040***	-0.006***	-0.005***
		(8.83)	(8.88)	(-4.64)	(-10.60)
Log (GLA)		0.510***	0.565***	0.882***	0.766***
		(9.82)	(13.52)	(80.87)	(79.56)
Num. Bedrooms		-0.050***			
		(-4.07)			
Num. Baths		0.236***			
		(10.10)			
Num. Stories		-0.044			
		(-1.41)			
Year Built		-0.002**			
		(-2.33)			
Observations	21,796,426	21,790,522	21,790,517	21,783,921	21,388,347
Adj. R^2	0.065	0.428	0.459	0.822	0.921
Controls	No	Linear	Granular	Granular	Granular
Fixed Effects	Year-Qtr	Year-Qtr	Year-Qtr	Yr-Qtr-Cnty	Yr-Qtr-Tract

Table 4: Features of Appraisal Reports

This table displaces results from an OLS estimation where the dependent variable is an input in the appraisal report. The sample consists of all refinance appraisals from 2013 to March 2024. In Column 1 the dependent variable is the average net adjustment of comparable properties scaled by the appraisal value of the assigned property. This variable is multiplied by 100 and winsorized at 1% and 99%. In Column 2 (3), the dependent variable is the Condition (Quality) rating with values from 1 to 6 with 6 being the best condition. In Column 4, the dependent variable Update within 5 years is an indicator variable if there was an upgrade of kitchen or bathroom within the last five years. Single Women (Couple) is an indicator that equals one if the homeowner is a single woman (couple). Controls include Log (GLA), and indicators for fireplace, pool, garage, air conditioning (A/C), the number of bedrooms, bathrooms, stories, and the year built. Fixed effects included are listed below. T-statistics computed using county-clustered standards errors are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

	Net Adjustments	**Condition**	**Quality**	**Update within 5 Years**
	Model 1	Model 2	Model 3	Model 4
Single Women	-0.090***	-0.016***	-0.013***	-0.016***
	(-15.74)	(-14.10)	(-27.47)	(-16.79)
Couple	0.117***	0.027***	0.012***	0.011***
	(22.46)	(21.20)	(14.67)	(11.10)
Observations	21,388,053	21,387,196	21,387,786	21,388,347
Adj. R^2	0.143	0.408	0.327	0.089
Controls	Granular	Granular	Granular	Granular
Fixed Effects	Yr-Qtr-Tract	Yr-Qtr-Tract	Yr-Qtr-Tract	Yr-Qtr-Tract

Table 5. Updates and New Homes

This table displays the results of an OLS estimation. The dependent variable is displayed on the top row. Single Women (Couple) is an indicator that equals one if the homeowner is a single woman (couple). T-statistics computed using county-clustered standards errors are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

Panel A: Updates and Wealth

Update within 15 yrs (Update within 5 yrs) is an indicator that equals one if the property had an upgrade within the last 15 (five) years. Tract Median is the natural log of the median appraisal value in the tract in the year.

	Log (Appraisal Value)		
	Model 1	Model 2	Model 3
Single Women	-0.023***	-0.023***	-0.023***
	(-39.69)	(-40.24)	(-42.85)
Couple	0.015***	0.015***	0.017***
	(23.46)	(23.12)	(24.83)
Update within 5 years	0.038***		
	(45.26)		
Update within 15 years		0.045***	
		(38.68)	
Single women × Tract Median			0.004**
			(2.37)
Couple × Tract Median			-0.023***
			(-22.50)
Observations	21,388,347	21,380,917	19,359,343
Adj. R^2	0.922	0.922	0.922
Controls	Granular	Granular	Granular
Fixed Effects	Yr-Qtr-Tract	Yr-Qtr-Tract	Yr-Qtr-Tract
Additional Fixed Effects	House age	House age	

Panel B: Subsample of New Homes

The sample is restricted to properties that are less than 5 years old. The dependent variables are listed on top to the columns.

	Log (Appraisal Value)	**Net Adjustments**	**Condition**	**Quality**	**Update**
	Model 1	Model 2	Model 3	Model 4	Model 5
Single Women	-0.020***	-0.051***	-0.003*	-0.010***	-0.000
	(-17.99)	(-3.93)	(-1.93)	(-5.61)	(0.28)
Couple	0.010***	0.067***	0.019***	0.010***	-0.003***
	(14.73)	(6.82)	(16.22)	(6.32)	(-2.72)
Observations	1,503,273	1,503,273	1,503,273	1,503,273	1,503,273
Adj. R^2	0.909	0.212	0.543	0.407	0.128
Controls	Granular	Granular	Granular	Granular	Granular
Fixed Effects	Yr-Qtr-Tract	Yr-Qtr-Tract	Yr-Qtr-Tract	Yr-Qtr-Tract	Yr-Qtr-Tract

Panel C: Impact of Rating on Appraisal Value

The estimation is in a random 10% sample of the full data with the dependent variable being Log of appraisal value. Appraisal Rating is for the attribute category (listed on top of the column). Condition (Quality) rating have values from 1 to 6 with 6 being the best condition.

	Log (Appraisal Value)						
	Base Model	Condition		Quality		Update In 5 Years	
Single Women	-0.023***	-0.023***	-0.024***	-0.023***	-0.024***	-0.024***	-0.027***
	(-41.22)	(-40.16)	(-40.96)	(-40.15)	(-41.69)	(-40.64)	(-38.15)
Appraisal Rating		0.085***	0.087***	0.093***	0.097***	0.032***	0.031***
		(189.62)	(179.86)	(210.77)	(202.48)	(73.33)	(63.10)
Appraisal Rating x Single Women			-0.012***		-0.022***		0.009***
			(-12.63)		(-21.47)		(8.23)
Observations	1,353,802	1,353,693	1,353,693	1,353,753	1,353,753	1,353,802	1,353,802
Adj. R Square	0.921	0.924	0.924	0.925	0.925	0.921	0.921
Controls	Granular	Granular	Granular	Granular	Granular	Granular	Granular
Fixed Effects	Yr-Qtr-Tract	Yr-Qtr-Tract	Yr-Qtr-Tract	Yr-Qtr-Tract	Yr-Qtr-Tract	Yr-Qtr-Tract	Yr-Qtr-Tract

Table 6: With Property Fixed Effects

This table displays the results of an OLS estimation. The dependent variable is natural log of appraisal value and is displayed on the top row. The sample in Columns 1 and 3 consists of properties that had an appraisal for at least one single women and single men homeowner over the sample period from 2013 to March 2024. The sample in Columns 2 and 4 consists of properties that had at least one single woman or single men/ couple homeowner over the sample period. Single Women (Couple) is an indicator that equals one if the homeowner is a single woman (couple). High Value is an indicator variable that takes the value of one if the house is in tract with above median appraisal value. Fixed effects included are specified at the bottom of the table. T-statistics computed using county-clustered standards errors are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

	Log (Appraisal Value)			
	Model 1	Model 2	Model 3	Model 4
Single women	-0.007***	-0.006***	-0.017***	-0.023***
	(-10.67)	(-9.42)	(-9.83)	(-9.27)
Couple	0.005***	0.005***	-0.004	-0.013***
	(4.43)	(6.20)	(-1.57)	(-4.88)
Single Women × High Value			0.018***	0.031***
			(8.03)	(9.68)
Couple × High Value			0.014***	0.030***
			(4.36)	(8.79)
Observations	370,645	1,065,796	314,233	913,952
Adj. R^2	0.972	0.973	0.976	0.977
Controls	Granular	Granular	Granular	Granular
Fixed Effects	Yr-Qtr	Yr-Qtr	Yr-Qtr	Yr-Qtr
	Property	Property	Property	Property

Table 7: Impact of Names with Easily Determined Sex

This table displays results from an OLS estimation where the dependent variables is the natural log of Appraisal Value. The sample differs across the models and is specified in the last row. The UAD unambiguous (ambiguous) consists of all appraisals where the first name can be associated with a sex with a greater (less) than 98% probability, as well as all couple borrowers. The Merged UAD-MLIS sample consists of appraisals that are in both datasets, and we have used MLIS to classify the homeowner as single women, single men or couple. Excluded UAD-MLIS consist of appraisals that are in the MLIS dataset but are excluded from our baseline analysis due to not meeting our criteria for determining the sex from the first name of the homeowner. Single Women (Couple) is an indicator that equals one if the homeowner is a single woman (Couple). Granular controls refer to indicator variables for number of bedrooms, number of bathrooms, number of stories and year built. Fixed effects included are specified at the bottom of the table. T-statistics computed using county-clustered standards errors are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

	Log (Appraisal Value)			
	Model 1	Model 2	Model 3	Model 4
Single Women	-0.024***	-0.017***	-0.011***	-0.020***
	(-39.89)	(-11.59)	(-13.76)	(-32.05)
Couple	0.015***	0.019***	0.013***	0.019***
	(22.83)	(10.85)	(12.13)	(25.82)
Observations	20,931,816	9,132,311	689,344	11,283,432
Adj. R^2	0.921	0.918	0.934	0.907
Controls	Granular	Granular	Granular	Granular
Fixed Effects	Yr-Qtr-Tract	Yr-Qtr-Tract	Yr-Qtr-Tract	Yr-Qtr-Tract
Classification of Homeowners	UAD	UAD	MLIS	MLIS
Sample	UAD unambiguous	UAD ambiguous	Excluded UAD-MLIS	Merged UAD-MLIS

Table 8: Summary Statistics for Appraiser Characteristics

This table displaces summary statistics for appraisal characteristics. All refinance appraisals conducted by an appraiser in the past four years, that is from quarter -16 to quarter -1, are used to construct appraiser characteristics. We drop appraiser-years where there are less than 20 observations in the past 16 quarters. Single Women Fraction is the fraction of all houses appraised by the appraiser that belongs to single women. Log (Women Appraisals) is the natural log of the number of appraisals done in the past 16 quarters that belongs to single women. Log (Number of Appraisals) if the natural log of the total number of appraisals in the past 16 quarters. Log (Num of Tracts) is the natural log of the number of different tracts that spanned the appraisals done in the past 16 quarters. Log (SD of Tract Median Value) is the natural log of the standard deviation of the median appraisal value in tracts that span the appraisals done in the prior 16 quarters.

	N	Mean	SD	P25	P50	P75
Single Women Fraction	14,742,350	0.20	0.06	0.16	0.20	0.24
Log (Women Appraisals)	14,725,880	3.54	1.05	2.83	3.61	4.29
Log (Num of Appraisals)	14,742,350	5.19	0.96	4.52	5.27	5.89
Log (Number of Tracts)	14,742,350	4.43	0.83	3.85	4.49	5.04
Log (SD of Tract Median Value)	14,738,891	11.85	0.66	11.38	11.74	12.26

Table 9. Appraiser Characteristics

This table displaces results from an OLS estimation where the dependent variable is the natural log of appraisal value. The sample for Column 1 consists of all refinance appraisals from 2013 to March 2024 and for the remaining columns excludes appraisals for which not enough data is available to calculate appraiser characteristics. Appraiser Characteristic included in the specification is listed at the top of the column. Women Appraiser takes the value of one if the appraiser is a woman. Single Women Fraction is the fraction of all appraisals done in the prior 16 quarters that are for single women homeowners. Log (Num of Appraisals) [Log (Num of Women Appraisals)] is the natural log of the number of appraisals done in the prior 16 quarters [that are of single women homeowners]. Log (Num of Tracts) is the natural log of the number of tracts that spanned all appraisals done in the past 16 quarters. Log (SD of Tract Median Value) is the log of the standard deviation of median appraisal value for all tracts spanned by appraisals done in the prior 16 quarters. Fixed effects included are listed below. T-statistics computed using county-clustered standards errors are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

	Log (Appraisal Value)						
Appraiser Characteristics	Woman Appraiser	Base Model	Single Women Fraction	Log (Num of Women Appraisals)	Log (Num of Appraisals)	Log (Num of Tracts)	Log (SD of Tract Median Value)
Single Women	-0.024***	-0.023***	-0.035***	-0.037***	-0.040***	-0.056***	-0.106***
	(-40.48)	(-41.32)	(-31.58)	(-41.34)	(-31.25)	(-30.76)	(-9.91)
Couple	0.015***	0.015***	0.023***	0.027***	0.032***	0.053***	0.225***
	(22.57)	(19.95)	(13.11)	(21.99)	(22.26)	(26.72)	(25.98)
Appraiser Characteristic	-0.000		-0.101***	-0.002***	0.000	0.002***	0.017***
	(-0.82)		(-23.41)	(-7.53)	(0.21)	(4.63)	(19.07)
Single Women × Appraiser Char	0.001**		0.055***	0.004***	0.003***	0.007***	0.007***
	(1.98)		(11.68)	(18.24)	(14.32)	(19.36)	(7.96)
Couple × Appraiser Char	0.002***		-0.047***	-0.004***	-0.003***	-0.009***	-0.018***
	(4.17)		(-6.49)	(-13.71)	(-13.57)	(-20.24)	(-24.75)
Observations	19,036,709	12,593,864	12,334,359	12,322,791	12,334,359	12,334,359	12,334,179
Adj. R^2	0.921	0.924	0.924	0.924	0.924	0.924	0.924
Controls	Granular	Granular	Granular	Granular	Granular	Granular	Granular
Fixed Effects	Yr-Qtr-Tract	Yr-Qtr-Tract	Yr-Qtr-Tract	Yr-Qtr-Tract	Yr-Qtr-Tract	Yr-Qtr-Tract	Yr-Qtr-Tract
Sample	Full	With Available Data on Appraiser Characteristics					

Table 10. Appraisal Procedure

The dependent variable is the natural log of appraisal value. The data for Column 1 (2-7) is from MLIS (UAD) from 2013 to March 2024. Single Women (Couple) is one if the homeowner is a single woman (couple). Hybrid is one if the appraisal is classified as "hybrid" in the MLIS data. FinTech Share is the fraction of FinTech-originated mortgages over total origination in a census tract in a given year. The FinTech classification is based on Buchak et al. (2018) and Fuster et al. (2019) and based on the loan count (EW) or the loan volume (VW) as indicated at the column bottom. Applications is the natural log of mortgage application number (volume) in a census tract in a year and indexed by EW (VW) at the bottom of the table. Controls include Log (GLA), and indicators for fireplace, pool, garage, air conditioning (A/C), the number of bedrooms, bathrooms, stories, and the year built. T-statistics computed using county-clustered standards errors are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

	Log (Appraisal Value)						
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
Single Women	-0.070***	-0.029***	-0.030***	-0.030***	-0.031***	-0.040***	-0.060***
	(-29.17)	(-30.06)	(-29.57)	(-28.74)	(-28.72)	(-9.91)	(-11.73)
Couple	0.087***	0.020***	0.019***	0.022***	0.020***	0.061***	0.153***
	(32.70)	(18.77)	(17.35)	(19.55)	(17.64)	(12.97)	(29.42)
Single Women × Hybrid	0.021***						
	(10.62)						
Couple × Hybrid	-0.043***						
	(-19.33)						
Hybrid	0.010***						
	(2.73)						
Single Women × Fintech Share		0.043***	0.052***	0.064***	0.075***		
		(8.26)	(9.37)	(8.52)	(9.47)		
Couple × Fintech Share		-0.042***	-0.036***	-0.066***	-0.050***		
		(-8.33)	(-6.53)	(-9.71)	(-6.89)		
Single women × Applications						0.003***	0.003***
						(4.20)	(7.16)
Couple × Applications						-0.008***	-0.012***
						(-10.78)	(-26.93)
Observations	16,211,393	21,157,995	21,157,995	21,157,995	21,157,995	21,157,995	21,157,416
Adj. R^2	0.708	0.922	0.922	0.922	0.922	0.922	0.922
Controls	No	Granular	Granular	Granular	Granular	Granular	Granular
Fixed Effects				Yr-Qtr-Tract			
Measure		Buchak EW	Buchak VW	Fuster EW	Fuster EW	EW	VW

Table 11: Impact on Refinancing Terms

This table displays results from an OLS estimation where the dependent variable are features of the refinancing and specified at the top of the column. The sample is the UAD-MLIS merged data at the loan level and is from 2013 to March 2024. The dependent variable in Column 1 (2) [3] is the mortgage contractual interest rate (natural log of the Loan Amount) [natural log of the cash-out amount]. Log (Appraisal Value) is the natural log of the appraisal value. The estimation includes house controls like before that is Log (GLA), and indicators for fireplace, pool, garage, air conditioning (A/C), the number of bedrooms, bathrooms, stories, and the year built. Underwriting controls include the interaction of 20-point credit score bins, five-point LTV bins, and DTI deciles along with indicator for loan term when the dependent variable is Interest Rate, otherwise we exclude the interaction with the LTV bins for the other dependent variables since LTV mechanically depends on them. Fixed effects included are specified at the bottom of the table. Additionally, we include fixed effects for the loan seller (i.e., institution that sells to the GSEs, often the originator) by year-quarter fixed effects. T-statistics computed using county-clustered standards errors are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

	Interest Rate	**Log (Loan Amount)**	**Log (Cash-out Amount)**
	Model 1	Model 2	Model 3
Log (Appraisal Value)	-0.159***	0.788***	0.771***
	(-68.99)	(387.63)	(169.13)
Observations	12,075,583	12,075,583	3,240,124
Adj. R^2	0.833	0.779	0.298
House controls	Granular	Granular	Granular
Underwriter controls	Yes	Yes	Yes
Fixed Effects	Yr-Qtr-Tract	Yr-Qtr-Tract	Yr-Qtr-Tract
	Year-Qtr-Seller	Year-Qtr-Seller	Year-Qtr-Seller

Table 12: Potential Misclassification of Homeowners

This table displays the results of an OLS estimation. The dependent variable is natural log of appraisal value and is displayed on the top row. The sample consists of the merged UAD and MLIS sample over the 2013 to March 2024. Single Women (Couple) is an indicator that equals one if the homeowner is a single woman (couple). Column 1 uses UAD data on number of borrowers and GenderChecker/Namsor to determine the sex from the names and classify homeowners. Column 2 uses MLIS classification of homeowners and this information is sourced from HMDA data. Fixed effects included are specified at the bottom of the table. T-statistics computed using county-clustered standards errors are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

	Log (Appraisal Value)	
	Model 1	Model 2
Single Women	-0.021***	-0.020***
	(-32.51)	(-32.05)
Couple	0.017***	0.019***
	(27.51)	(25.82)
Observations	11,283,432	11,283,432
Adj. R^2	0.907	0.907
Controls	Granular	Granular
Fixed Effects	Yr-Qtr-Tract	Yr-Qtr-Tract
Classification of Homeowners	UAD	MLIS

Appendix Table 1. Characteristics of Houses Owned by Single Women

This table presents the summary statistics for the data variables from the Uniform Appraisal Dataset (UAD) for Single Women homeowners. The sample contains refinance mortgage applications for the 2013 to March 2024 period. The table is similar to Table 1 for Single Women homes. The unit of observation is an appraisal for a property. Statistics include the number of observations (N), mean (Mean), standard deviation (SD), the 25th percentile (P25), median (P50), and the 75th percentile (P75). The description of the variables is in Appendix A.

	N	Mean	SD	P25	P50	P75
Appraisal Value ($1000s)	4,450,650	385.79	379.56	190	290	449
Log (Appraisal Value)	4,450,650	12.6	0.68	12.15	12.58	13.01
Single Women	4,450,650	1	0	1	1	1
Single Men	4,450,650	0	0	0	0	0
Couple	4,450,650	0	0	0	0	0
Log (GLA)	4,450,601	7.45	0.38	7.18	7.42	7.69
Num. Bedrooms	4,450,644	3.2	0.82	3	3	4
Num. Bathrooms	4,450,583	2.26	0.90	2	2	3
Num. Stories	4,450,406	1.47	0.55	1	1	2
Year Built	4,450,209	1975.23	29.77	1957	1979	1999
Fireplace	4,450,650	0.58	0.49	0	1	1
Pool	4,450,650	0.11	0.31	0	0	0
Garage	4,450,650	0.79	0.41	1	1	1
A/C	4,450,650	2.53	3.15	1	1	1
House Age	4,450,209	42.89	29.84	19	38	61
Update within 15 Years	4,449,513	0.59	0.49	0	1	1
Update within 5 Years	4,450,650	0.35	0.48	0	0	1
Fintech Share (Buchak,EW)	4,345,314	0.11	0.08	0.05	0.09	0.17
Fintech Share (Buchak,VW)	4,345,314	0.11	0.08	0.05	0.09	0.17
Fintech Share (Fuster,EW)	4,345,314	0.10	0.05	0.06	0.10	0.14
Fintech Share (Fuster,VW)	4,345,314	0.10	0.05	0.06	0.09	0.13
Women Share (EW)	4,345,291	0.32	0.08	0.27	0.32	0.37
Women Share (VW)	4,345,291	0.30	0.09	0.24	0.29	0.35
Applications (number)	4,345,314	387.9	439.84	168	274	448
Applications ($ millions)	4,345,314	107.33	1028.48	31.94	64.12	122.66

Appendix Table 2. Full UAD Sample relative to Sample with Property Fixed Effects

Column 1presents summary statistics for the data variables from the Uniform Appraisal Dataset (UAD) from Table 1 for comparison. Column 2 presents summary statistics from a subsample that consists of properties that had at least one refinancing appraisal from a single woman and a single man homeowner over the sample period. Column 3 reports summary statistics in a subsample of properties that has at least one refinancing appraisal from a single woman and one from either a single man or couple over the sample period. The sample period is from 2013, the start of the UAD data, through March 2024. The unit of observation is an appraisal for a property. The description of the variables is in Appendix A.

	Full Sample	**With One Female and One Male Refinancing**	**With One Female and One Male or Couple Refinancing**
Appraisal Value ($1000s)	465.76	507.35	510.42
Log (Appraisal Value)	12.77	12.86	12.88
Single Women	0.20	0.45	0.47
Single Men	0.37	0.45	0.16
Couple	0.43	0.10	0.37
Log (GLA)	7.55	7.54	7.56
Num. Bedrooms	3.35	3.37	3.38
Num. Bathrooms	2.47	2.47	2.48
Num. Stories	1.53	1.52	1.52
Year Built	1978.66	1976.46	1976.88
Fireplace	0.63	0.66	0.67
Pool	0.13	0.16	0.16
Garage	0.83	0.84	0.85
A/C	0.82	0.82	0.82
House Age	39.31	41.42	41.04
Update within 15 Years	0.58	0.64	0.64
Update within 5 Years	0.36	0.41	0.40
Fintech Share (Buchak,EW)	0.11	0.11	0.11
Fintech Share (Buchak,VW)	0.11	0.11	0.11
Fintech Share (Fuster,EW)	0.10	0.10	0.10
Fintech Share (Fuster,VW)	0.10	0.10	0.10
Women Share (EW)	0.30	0.31	0.30
Women Share (VW)	0.28	0.28	0.28
Applications (number)	405.38	419.42	416.52
Applications ($ millions)	119.97	131.69	130.19
Number of observations	21,966,371	370,225	1,065,031

Appendix Table 3. Robustness with Appraiser, Appraiser Firms and Lenders Fixed Effects

This table displays results from an OLS estimation where the dependent variable is the natural log of appraisal value. The sample for Column 1 and 2 consists of all refinancing appraisals from the UAD and Column 3's sample is the merged UAD-MLIS data. The data are from 2013 to March 2024. Single Women (Couple) is an indicator that equals one if the homeowner is a single woman (couple). Controls include Log (GLA), and indicators for fireplace, pool, garage, air conditioning (A/C), the number of bedrooms, bathrooms, stories, and the year built. Fixed effects included are listed below. Column 1 (2) includes additional fixed effects for the appraiser (appraiser firm). Column 3 includes additional fixed effects for the institution that sells the mortgage to the GSEs. T-statistics computed using county-clustered standards errors are in parentheses. *, **, and *** indicate significance at 10%, 5%, and 1%, respectively.

	Log (Appraisal Value)		
	Model 1	Model 2	Model 3
Single Women	-0.023***	-0.023***	-0.020***
	(-40.04)	(-40.07)	(-31.69)
Couple	0.016***	0.016***	0.018***
	(23.74)	(23.79)	(28.12)
Observations	21,375,081	21,327,698	11,879,377
Adj. R^2	0.923	0.923	0.908
Controls	Granular	Granular	Granular
Fixed Effects	Yr-Qtr-Tract	Yr-Qtr-Tract	Yr-Qtr-Tract
	Appraiser	Appraiser Firm	Seller