Beyond Assessment: Racial and Gender Disparities in Property Taxation

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Abstract

Using a unique data set that identifies the race/ethnicity and gender of the homeowner, we measure group differences in key tax ratios affecting property tax bills for a large number of jurisdictions in Florida. Significant heterogeneity exists across jurisdictions, but there are important commonalties not previously documented. Consistent with prior studies, we find that initial property assessments are unfavorable to black and Hispanic homeowners relative to white homeowners. We find that assessment errors rarely explain differences in property tax bills, however. Much more consequential to measured disparities in property tax bills are group differences in benefits from tax relief programs, such as the homestead exemption and the assessment growth cap. Our analysis extends this area of research to also consider Asian homeowners, who face the most unfavorable burden of any group, and female homeowners, whose lower tax bills stem primarily from larger tax relief benefits.

Keywords: Property Tax, Racial Gap, Gender Gap, Homestead Exemption, Assessment

JEL Codes: H2, H22, H7

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I. Introduction

Recent research on the property tax suggests that errors in the administration of the tax result in minority homeowners being over assessed in comparison to white homeowners (Avenancio-León & Howard, 2022a; Berry, 2021; Amornsiripanitch, 2021). Overassessment may lead to minorities having a higher effective tax rate, defined as the ratio of taxes paid to the fair market value (FMV) of the home.[4] However, tax relief programs such as exemptions create a wedge between the assessed and taxable values of a home, and it is the latter value, in combination with the jurisdiction's millage rate, that determines the homeowner's property tax liability. How the components of the property tax system impact taxable values will vary across jurisdictions, where the relative tax burdens of a group may be comparatively high in one jurisdiction and lower in another. Ideally, national assessments of the property tax would be based on a large numbers of case studies of individual taxing jurisdictions that consider the origins of measured disparities. For example, how frequently is the effective tax rate higher for one group in comparison to another and in how many cases is the gap due to assessment error? In this paper we take an important first step in this direction. While we do not use national data, we do provide evidence on racial, ethnic and gender disparities in property taxation separately for a large number of the taxing jurisdictions within the state of Florida. Most importantly, we provide evidence on the factors that explain differences across jurisdictions.

Our contributions to the literature are fourfold. First, because the tax is administered locally, we study the property tax for a large number of separate taxing jurisdictions. In addition to our locally-focused analysis, we provide average estimates based on pooled samples, partly to facilitate comparison to prior work but also to highlight important heterogeneity concealed by national studies. Second, we focus on group differences in taxable value to FMV ratios (henceforth, taxable value ratio), because they best reflect group differences in property tax burdens. Prior studies typically focused on racial differences in the initial stage of property tax assessment (labeled the "assessment gap" by Avenancio-León & Howard, 2022a). While it is of interest to determine whether there are disparities in the initial assessment value ratio, it is the taxable value ratio that reflects the net effect of assessment practices and tax relief programs on

[4] The effective tax rate is a measure of the tax burden, assuming that house value reflects the homeowner's permanent income. The use of consumption-based measures of permanent income is defended by Poterba (1989), and housing consumption is used empirically by Plummer (2003).

property tax burdens. If groups differentially benefit from these policies, then the initial assessment gaps will not reflect actual property tax disparities. Third, where we find that disparities exist, we explore their source. Specifically, to what extent are disparities in the taxable value ratio the result of assessor error in the initial estimation of a house's value, differences in assessment growth cap-induced tax savings, or differences in the tax savings provided by various property tax exemptions? Finally, to our knowledge, previous research has only focused on disparities in property taxes among white, black, and Hispanic homeowners. Not only do we extend the list of racial/ethnic groups under consideration to include Asian homeowners, but we also add an entirely new dimension by measuring how property tax burdens vary by homeowner gender.

These contributions to the literature are made possible by our unique dataset from Florida that spans the majority of the state from years 2011 to 2020. In addition to including the race/ethnicity and gender of the homeowner and the assessor's initial estimate of the value of a home, our dataset details how policies such as homestead exemptions and caps on assessment growth affect a homeowner's property tax bill. If groups differentially benefit from these policies, then the initial assessment gaps may not reflect actual property tax disparities. Most importantly, where we find the taxable value ratio is significantly higher for a particular group, our data allows us to determine its source.

Beyond the data linking homeowner demographics, house characteristics, and tax roll information, Florida is a desirable setting to investigate group differences in property taxation for multiple reasons. First, being the fourth most populated state, it offers ample observations to make precise estimation tractable, even at the local level. Second, Florida is in the middle of the distribution when considering reliance on property taxation for state and local government revenue (Appendix Figure 1). Third, it is a diverse state which resembles the average demographics of the United States.[5] In addition to supporting claims of external validity, the state's diversity represents important variation on which our analysis is based.

[5] Florida's population is 17 percent black, 26 percent Hispanic, and 3 percent Asian. Our sample is 12 percent black, 20 percent Hispanic, and 3.0 percent Asian. The United States is 13 percent black, 19 percent Hispanic, and 6 percent Asian (Census, 2019).

Our results show that group differences in taxable value ratios vary a great deal across groups and jurisdictions. The two groups with significantly different taxable value ratios across the overwhelming majority of jurisdictions are Asian homeowners relative to white homeowners and female homeowners who are the primary owner of the property in comparison to male or joint homeowners. Taxable value ratios are higher for Asian homeowners in over 90 percent of the jurisdictions where they are a sizable minority. Women have lower taxable value ratios in all of the jurisdictions where they represent an important percentage of homeowners. Back-of-the-envelope calculations indicate that, on average, Asian homeowners pay $120 more per year than white homeowners while women pay $90 less per year than men or joint homeowners. The results are more mixed for Black and Hispanic homeowners, and for many of the jurisdictions there is not a statistically significant difference in the taxable value ratio in comparison to white homeowners. The estimates for Black (Hispanic) homeowners are about half (one-tenth) the size as those found for Asian homeowners.

Where gaps in taxable value ratios exist, we investigate their origins. Contrary to what one might expect given the attention it has received in other work, we find that assessment errors are an important contributor to taxable value ratio gaps in only a small number of jurisdictions. The tax consequences of initial assessment gaps are second-order compared to those of differential tax relief. By far the most important contributor to group differences in property tax burdens is the homestead exemption. This is partly due to differential program take-up and partly due to how the flat dollar amount of the benefit provides larger tax relief (in percentage terms) for lower-value properties. The cap on the growth in assessed value also plays a central role in generating group differences in taxable value ratios, a result we discuss in the context of both program take-up and the compounding effects of differential housing tenure.

This study has important implications for both researchers and policymakers. Not only is there is substantial heterogeneity between jurisdictions in the relative tax burdens of each group, the causes of the measured gaps are similarly varied. Policy prescriptions derived from average estimates at the national level sometimes give the impression that there is a silver bullet to addressing property tax disparities. In reality, a policy that may reduce gaps in one jurisdiction may have no effect in another. Our work demonstrates the viability and value of taking a more local approach to analyzing a local tax.

II. Literature Review

Racial and ethnic disparities in property taxation have long been a social justice issue of interest to social scientists (Hendon, 1968; Margo, 1984; Kahre, 2016; Rothstein, 2017). There has been a recent uptick in research, which stems from newly available data at the property level covering the entire United States. The fundamental question addressed is whether the property tax is an unfair tax. Avenancio-León & Howard (2022a) combine nationwide data on home sales and assessments from ATTOM with the Home Mortgage Disclosure Act (HMDA) data in order to measure assessment gaps across racial groups. Using detailed location fixed effects, they find that black homeowners, on average, receive assessment to price ratios around 10 percent higher than white homeowners in comparable homes and locations. One explanation supported by the authors for the assessment gaps is that assessors do not accurately account for positive local amenities of white homeowners. They also present evidence that property tax appeals disproportionately favor white homeowners using data from Cook County, IL.

In a second paper Avenancio-León & Howard (2022b) use a similar combination of data and methodology to show that caps on the growth in assessed values reduce racial assessment gaps. This belies conventional wisdom, the presumption being that the homes of white homeowners appreciate more rapidly than those of black homeowners, resulting in a cap causing larger reductions in the assessment ratios of whites. Avenancio-León & Howard's results suggest that the reverse is actually true. However, they argue that the more salient explanation for why caps reduce racial assessment gaps is that caps appear to discipline assessor errors by reducing the correlation between neighborhood amenities and erroneously high assessments.

Berry (2021) uses nationwide data from CoreLogic to regress the assessment ratio of individual homeowners against Census tract descriptors, including race and ethnicity. His primary finding is that property tax assessment is regressive: lower-priced houses are over-assessed relative to their sale price when compared to more expensive houses. He also finds that the percent of the Census tract that is black is positively correlated with assessment regressivity but finds no significant relationship with the percentage of Hispanics. Since blacks live in less expensive homes than whites, these assessment gaps will generate higher property tax burdens for black homeowners. Atuahene (2017) and Atuahene & Berry (2019) are two related studies which use data from Wayne County, MI, to provide evidence that areas with more black homeowners received higher

assessments than comparable white homeowners, in this case leading to higher property tax bills and significant increases in foreclosures.

As introduced above, a stylized fact from the assessment literature is that assessment rates tend be lower for higher-priced homes. Hodge et al. (2017) summarizes prior work on this subject. In addition to Berry (2021), there are numerous recent studies, which documents similar patterns using other methodologies and data (McMillen & Singh, 2020a, 2020b; Ihlanfeldt & Rodgers, 2022; Amornsiripanitch, 2021). As noted, in comparison to whites, minorities tend to live in lower-priced homes; hence, regressivity in assessment practices may result in racial disparities. The relationship between race and housing price may also play a role in differential appeal outcomes if homeowners of higher priced homes are more successful appealing their initial assessments (McMillen & Weber, 2010). A related area of research investigates the possibility that members of racial/ethnic groups pay a premium for houses, which is relevant given the ad valorem nature of the property tax (Bayer et al., 2017; Ihlanfeldt & Mayock, 2009; Myers, 2004).[6]

A major advantage of the above studies that use national data is that concerns that typically arise regarding the external validity of the results from studies relying upon sub-national data are mitigated. However, it is important to acknowledge that the property tax is not a national tax. It is a local tax. The administration of the tax, the statutory rules applicable to the tax, and problems surrounding the tax (for example, insufficient comps to obtain reliable assessments) all vary from one taxing jurisdiction to another. As a result, group disparities in the tax may vary from one jurisdiction to another and for entirely different reasons. Our interest is obtaining a better understanding of why these jurisdictional differences may exist. Hence, we view our jurisdictional level study as complimentary to the national studies, with each approach providing new evidence on property tax disparities between groups.

III. Background

An overview of Florida's property tax system is necessary before we describe the specifics of our empirical analysis. The property tax is an ad valorem tax and the first step in applying the tax

[6] Historical redlining (e.g., Aaronson, Hartley, & Mazumder, 2021) and gentrification (e.g., Hayashi, 2021) are other related areas of study.

is determining the market value of the property. Each year county property tax assessors estimate the market value as of January 1, which the Florida Department of Revenue (FDOR) labels the "just value" of the property. Assessors estimate the just value using various methods, including recent sales of comparable homes, replacement cost, and mass appraisals.[7] An assessor performs a physical inspection of the exterior of the house upon sale, after an improvement requiring a building permit, and at least once every five years thereafter. Homeowners may appeal to the assessor's office if they feel the just value is inaccurate.

Next, limitations are applied to the just value to generate a Florida property's "assessed value." The most notable limitation since its introduction in 1995 is the Save Our Homes (SOH) cap, which limits the annual growth in assessed value to 3 percent or the change in the Consumer Price Index, whichever is smaller. This benefit is similar to growth caps in other states in that it can compound over time.[8] Less common is the option for homeowners to transfer accrued benefits from one house to another, a feature labeled as "portability."[9] The definition of assessed value in Florida differs from what is commonly referred to in the literature, so it is important to focus on the just value when considering the specific impact of assessors. The SOH cap applies only to homeowners who claim the homestead exemption. In the absence of the cap, the assessed value is identical to the just value.

Lastly, exemptions are applied to the current assessed value to produce the "taxable value" of a house. A homeowner's annual property tax bill is simply the taxable value multiplied by the millage rate; the same rate applies to all property types within a jurisdiction. The most significant exemption is that of the homestead exemption, which was first introduced during the Great Depression in response to concerns that homeowners would lose their houses due to failure to pay their property taxes. To qualify for the homestead exemption, a homeowner must provide documentation that the home is their primary residence. The homestead exemption allows

[7] See Title XIV, Chapter 193 for more on assessment practices in Florida. Section 11 lists eight factors (location, size, condition, etc.) that appraisers should use in generating a just valuation, although appraisers have discretion as to how much weight they place on each of these factors. What Florida labels just value is generally referred to as assessed value in the literature.

[8] The Lincoln Institute of Land Policy (2017) lists fourteen states that impose some type of cap on assessment growth.

[9] Another state with portability is California. Homeowners are allowed to move their tax savings from Proposition 13 to a new home as long as the home is in the same county (Proposition 60) or in select counties outside the home county (Proposition 90). Besides their geographical restrictions, these propositions differ from Florida portability in that only homeowner 55 or older qualify for the portability option.

homeowners to exempt up to $50,000 from the assessed value of their house in determining the taxable value.[10] Importantly, claiming the homestead exemption automatically enrolls the homeowner in the SOH program; the two programs are effectively bundled together. Additional exemptions are granted to specific groups, most commonly homeowners who are disabled or low-income seniors, though these are much less common and are typically much smaller in size. School districts are synonymous with counties in Florida, so school-specific taxes are constant within a county. For residents living in the unincorporated portion of the county the millage rate is the county rate. For residents in cities the total millage rate is the sum of the county and the city rate, with city rates roughly 20 percent the size of the county rates on average. Roughly half of Florida's population reside in unincorporated areas.

IV. Methodology

As described below, our data include the race/ethnicity/gender of the homeowner, along with variables influential in determining the property taxes owed on the residence. We exploit these data to identify gaps between groups in the taxable value ratio based on a simple regression framework. The main OLS specification is intended to capture the relative difference in taxable value ratios for black, Hispanic, Asian, and female homeowners as compared to white or white joint homeowners:

$$TV_{i,c,t} = \beta_1 Black_{i,c,t} + \beta_2 Hispanic_{i,c,t} + \beta_3 Asian_{i,c,t} + \beta_4 Female_{i,c,t} + \tau_t + \phi_c + \epsilon_{i,c,t} \quad (1)$$

The dependent variable (*TV*) is our estimate of the taxable value ratio of the home occupied by homeowner *i* in location *c* and assessment year *t*.[11] We measure FMV (the denominator of the ratio) as the sales price of the home if it were to sell at the time of assessment (i.e., January 1 of the roll year). We use the most recent sale and the following year's assessment to form the taxable value ratio.[12] We restrict the sample to sales qualified as arms-length by the county tax assessor. Each group variable is a binary variable equal to one if the homeowner is part of the

[10] Specifically, an exemption of $25,000 is applied to the first $50,000 of a house's just value and includes all taxes and a second exemption of $25,000 is applied to the value of a house between $50,000 and $75,000 which excludes school district taxes. The most recent expansion of the program was in 2008.

[11] Exemptions and SOH savings make zero taxable values possible, hence our use of linear rather than a log-linear models.

[12] An alternative method is to adjust sales prices to the most recent assessment date using the Federal Housing Administration's Home Price Index (HPI). We focus on our fixed effects specifications because tract-level HPI data is more limited than county-level values. The results are similar using either approach.

racial/ethnic or female group, zero otherwise.[13] Because observations are drawn from the years 2011 to 2020, we include assessment year fixed effects (τ) to capture possible cyclical changes in housing markets that may be correlated with the race/ethnicity of homebuyers. We include Census tract fixed effects to account for local unobservable characteristics (ϕ). To facilitate comparison to prior work, we generate average results by pooling the locations where there are more than 100 sales for each of the groups.

As described above, there are three values that determine the taxable value ratio: the just value (JV_i) , the amount of SOH (SOH_i) that has been ported to the new home (which is the difference between just and assessed value), and exemptions (HSE_i, LSE_i, and DE_i, representing the homestead, low-income senior, and disability exemptions, respectively). The taxable ratio formula for any given property *i* is simply:

$$TV_i = JV_i - SOH_i - HSE_i - LSE_i - DE_i \quad (2),$$

where all variables are expressed as ratios with respect to FMV. It is clear that group differences in taxable value ratios may result from group differences in any of the right-hand side ratios of equation 2.

By repurposing equation 1, we can measure group differences in particular factors that affect a property's taxable value. We do so with both linear probability and conditional value models. To illustrate, assume that in county *j* we observe black homeowners having a smaller average homestead exemption value ratio than whites. That is, assume we re-estimate equation 1 using *HSE* as the dependent variable and we find that the *Black* coefficient is negative and statistically significant. This difference could be due to black homeowners having lower take-up of the exemption or from owning lower-value homes that do not benefit from the full exemption, or some combination of the two.[14] The price of the home matters because the exemption is a flat

[13] The feasibility of using interaction terms is limited by the number of homeowners in those more granular categories.

[14] The exempted amount may be less than the maximum amount depending on the assessed value of the home. The first $25,000 exemption applies to all property taxes, including school district taxes. An additional exemption up to $25,000 applies to the assessed value between $50,000 and $75,000 and only to non-school taxes. For example, if the assessed value is $45,000 the first $25,000 of value is exempt from all property tax and the remaining $20,000 of value is taxable. So, the total exemption amount is $25,000. If the assessed value is $85,000 the first $25,000 of value is exempt from all property tax, the next $25,000 of value is taxable, the third $25,000 of value is exempt from non-school taxes, and the remaining $10,000 of value is taxable. So, the total exemption amount is $50,000, the maximum amount.

amount and not a percentage of the value of the house. On the other hand, a positive coefficient on *Black* in the *HSE* model could result from that group having a higher take-up of the exemption or, on average, purchasing less expensive homes. To uncover the relative importance of these two factors, we estimate two additional models. We measure differences in program participation with a linear probability model based on the same specification in equation 1, where the dependent variable is instead a binary variable equal to 1 if the homeowner claims the homestead exemption, zero otherwise. Next, we replace the dependent variable in equation 1 with *HSE* from the right-hand side of equation 2 and condition on program participation. The combination of results will shed light on the relative importance of take-up of the homestead exemption versus the dollar amount of the exemption conditional on take-up to the measured gap in the taxable value ratio. We conduct similar analyses for *SOH*, *LSE*, and *DE*.

Lastly, we quantify the relative contribution of factors to measured gaps in taxable value ratios. To do so, we first perform unconditional regressions where the dependent variable is one of the factors on the right-hand side of equation 2 (including gaps in JV). We then divide the estimated coefficient for a group, say black homeowners, in the factor regression by the estimated coefficient for black homeowners in the taxable value ratio regression. Because all of the variables are divided by the FMV, this approach is equivalent to dividing the average difference in a particular factor by the gap in the taxable ratio, conditional on time and location fixed effects. We perform these computations for counties where there is a statistically significant group difference in the taxable value ratio and list the factors with the largest and the second largest contributions to explaining the group difference in the taxable value ratio.[15]

V. Data

Our datasets come from the Florida Department of Revenue (FDOR) and the Florida Department of State's Division of Elections (DOE). All counties are required to submit their property tax rolls annually to the FDOR. We use the rolls for the years 2011 to 2020. The DOE collects data on registered voters which includes race, gender, name, and home address. Using the name and

[15] We rank factor gaps that contribute, as opposed to weaken, a taxable value ratio gap. For example, if black homeowners are more likely to get a disability exemption but less likely to receive an old age exemption, we would consider the former as a contributor to a negative TV gap while the latter would be ranked as a contributor to a positive TV gap. We also estimated Oaxaca (1973) decompositions and found results consistent with the proposed method, the latter of which we prefer due to its relative simplicity.

address information in the 2020 voter rolls, we merge the race and gender variables to home buyers identified on the FDOR property tax rolls.[16,17] These tax rolls include extensive information about every house in the state of Florida, including specific property tax exemptions granted; the just, assessed, and taxable value; and most recent sales price.

We define separate county samples based on the number of the black, Hispanic, Asian, or female homeowners that are successfully matched. For each group the counted counties are those where there are at least 100 homeowners within the group after merging the FDOR and voter registration rolls. Florida has a total of 67 counties. The black counted counties equal 40. The corresponding counted counties for Hispanic, Asian, and female homeowners are 40, 30 and 55, respectively. To be clear, if for county *j* there are more than 100 homeowners in group A but less than 100 in group B then we only report the county-level estimate for group A.

We present descriptive statistics of the main variables used in the analysis separately for each group in Appendix Table 1. There is little difference in the taxable value ratio means for blacks and Hispanics in comparison to the reference group, although the taxable value ratio is larger (smaller) for Asian (female) homeowners. There are large differences between the taxable value and just value ratios, underscoring the importance of exemptions and SOH portability in determining the actual tax burdens of homeowners. Most notably, initial differences in the just value ratio for black and Hispanic homeowners increase when considering assessed value ratios, the result of differential SOH benefits. To that point, there appears even more variation between groups when one focuses on the value to FMV ratios of the tax relief benefits. The value of the homestead and disability exemptions are larger for the racial/ethnic groups while those groups have lower SOH benefits than the reference group.

[16] Averaging across counties, we located over 50 percent of homeowners in the voter rolls. Some buyers are not U.S. citizens and those that are do not always register to vote, both of which decreased the match rate. The U.S. Census Bureau (2019) reports that among Florida's voting age citizens 63 percent are registered to vote. Our matches resulted in a high-level of accuracy. First, we merged the tax roll and voter rolls based on the owner's name and address. Second, we performed a matching program (Matchit in Stata) to eliminate any matches where the addresses were not exactly identical.

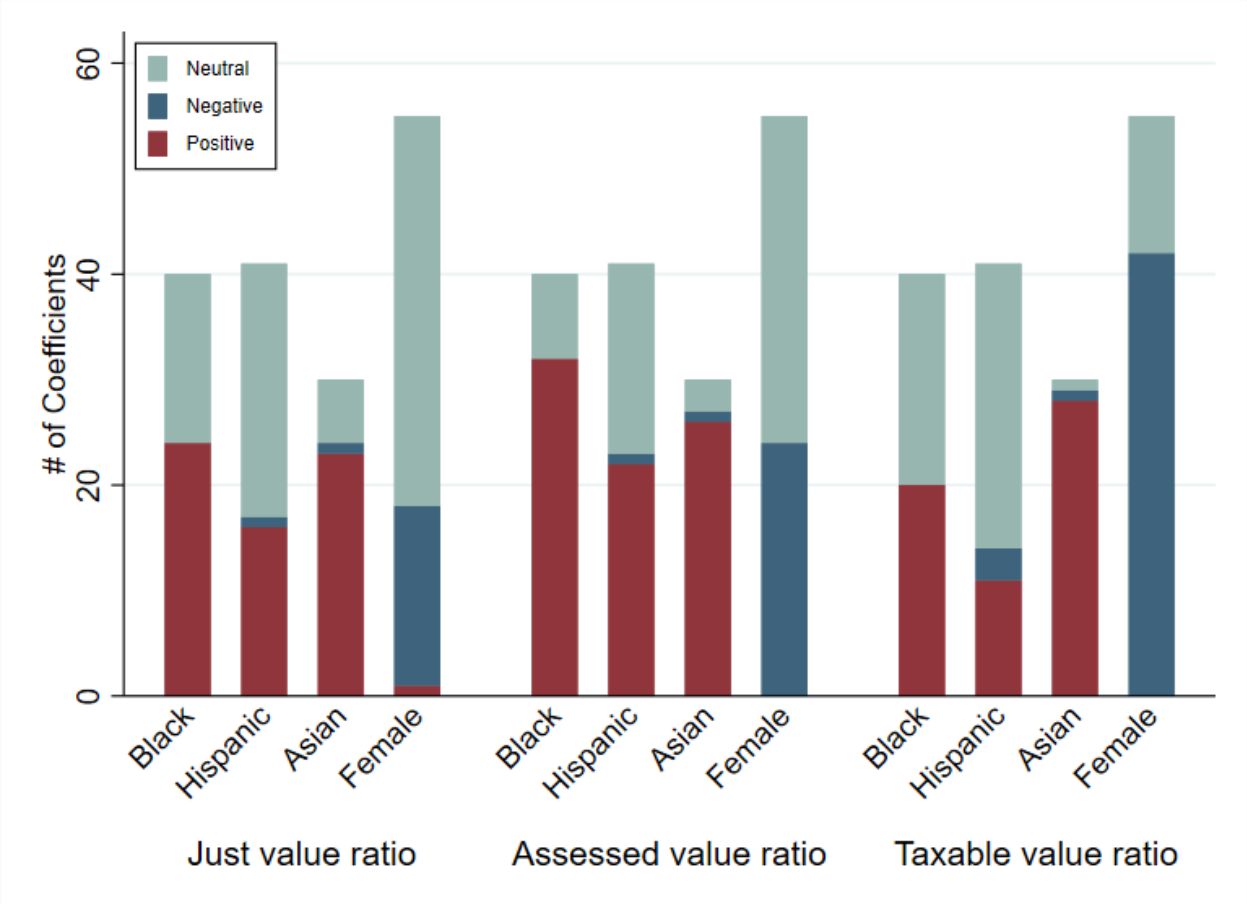
[17] An alternative and popular strategy for obtaining the race/ethnicity of homeowners is to match mortgage information contained within a homeowner record and HMDA data. There are tradeoffs of each approach related to coverage and representativeness (e.g., only recent mortgage holders can be matched with HMDA data while we rely on registered voters) that should be kept in mind when comparing studies.

Overall, the differences in the mean ratios between comparison groups reported in Appendix Table 1 suggest that gaps in taxable value ratios may be in part a consequence of tax relief benefits affecting each homeowner group differently. Uncovering the relative importance of these programs, as well as any initial gaps in just value ratios, motivates our regression analysis.

VI. Main results

The sheer number of regressions, both due to our county-level analysis and the variety of outcomes, motivates two ways of summarizing of our findings. Figure 1 shows the number of counties with statistically significant or insignificant coefficients on the group variables from our main regression equation. In order to make comparisons to previous work that use aggregate or pooled data, Table 1 shows the average coefficient on the group variables when we pool the observations from all of the counties included in our restricted sample. We also display the percent of counties with statistically significant results in Table 1. At first glance, it is clear that there is substantial variation in measured group differences across the counties in our sample. Many counties exhibit no statistically significant difference in the value ratios of minority homeowners relative to white homeowners at various stages of the property tax assessment process. It would be inaccurate to conclude that the property tax process in Florida is neutral with regards to race/ethnicity or gender, however. Consistent with previous work, our pooled analysis shows that black homeowners, on average, have just value ratios 0.9 percent higher than white homeowners. More revealing of racial disparities is that positive gaps between these two groups at the initial stage of property tax assessment exist in 60 percent of the counted counties in our sample. These differences increase in frequency and magnitude once we account for SOH benefits in the assessed value ratio results. From the pooled sample, the *Black* coefficient is over twice as large in the assessment value ratio than in the just value ratio model. From the individual county regressions, the assessment value ratio is larger for black homeowners in 80 percent of the counted counties. Once we account for the homestead and other exemptions, the pooled sample results for the taxable value ratio show the difference between black and white homeowners is around 2 percent and the number of counties where the gap is positive falls to 50 percent. The taxable value ratio stage is by far the most consequential to the taxpayer and our results illustrate that the landscape of property taxation is far more nuanced than what may be gleaned from average differences in initial assessment values.

Figure 1 – Results by group and outcome



Notes: Summary of the main regression results. The number of group coefficients that are statistically significant at the 10 percent level or not (neutral).

Table 1 – Results by value ratio

	Just value ratio		Assessed value ratio		Taxable value ratio	
	Average	% counties + [-]	Average	% counties + [-]	Average	% counties + [-]
Black	0.850***	60 [0]	2.078***	80 [0]	2.217***	50 [0]
	(0.085)		(0.093)		(0.362)	
Hispanic	0.407***	39 [2]	1.036***	54 [2]	0.444**	27 [7]
	(0.062)		(0.111)		(0.166)	
Asian	1.192***	77 [3]	2.255***	87 [3]	4.335***	93 [3]
	(0.095)		(0.088)		(0.308)	
Female	-0.168***	2 [31]	-0.394***	0 [44]	-2.970***	0 [76]
	(0.031)		(0.037)		(0.117)	

Notes: Results when pooling all counties where there are at least 100 homeowners in each category. The outcome variable is the ratio of a particular assessment value to the sales price, multiplied by 100. The coefficient represents the average benefit or penalty a group faces relative to the baseline group of homeowners (white males or white joint homeowners). We report the percentage of counted counties with statistically significant group differences (positive or [negative]) to the right of the pooled estimates. Each regression includes assessment year fixed effects and Census tract fixed effects. N = 962,830. Standard errors clustered at the county level: * p < 0.1, ** p < 0.05, *** p < 0.01.

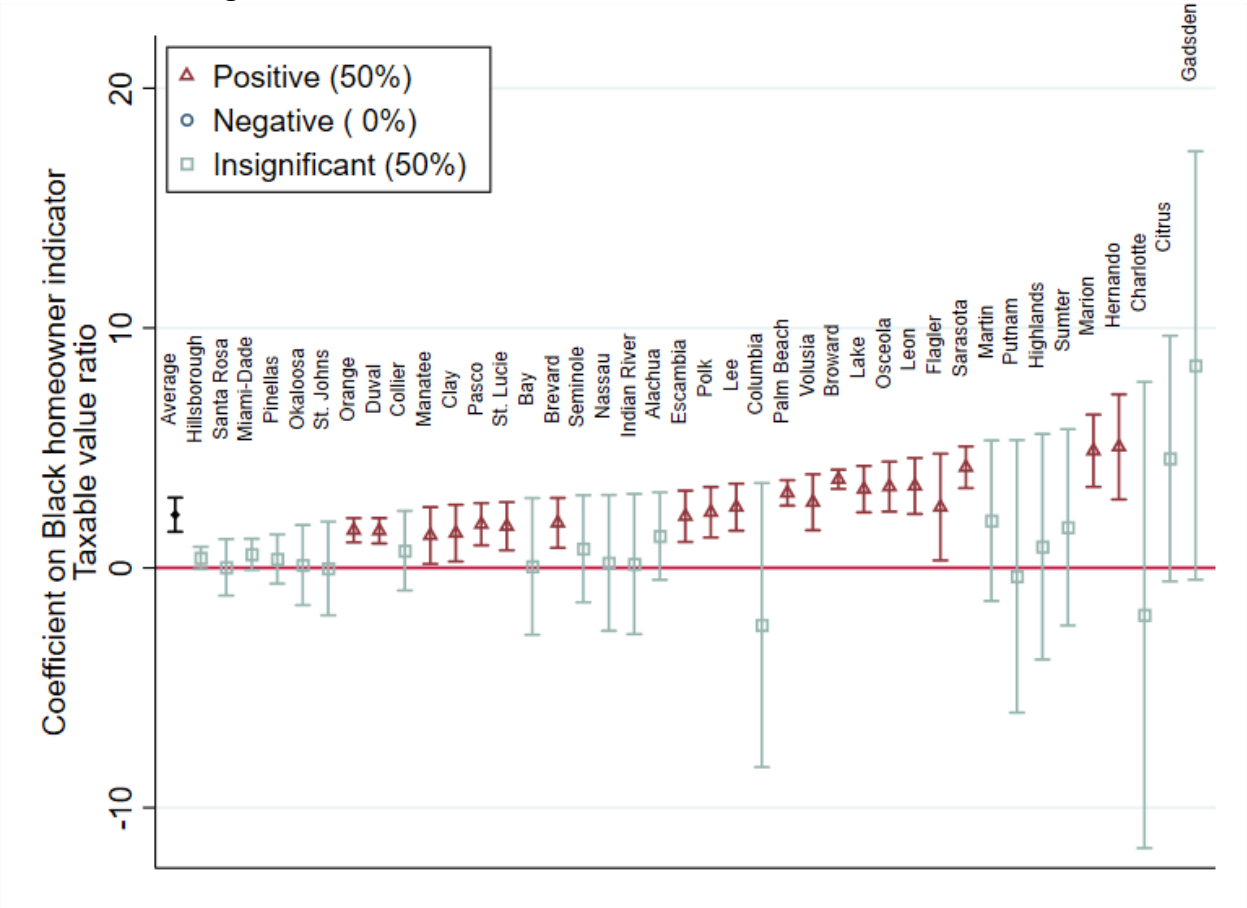
The Hispanic results are smaller than those of black homeowners although they follow a similar pattern, while the Asian results stand out for multiple reasons. First, gaps between Asian and white homeowners emerge early at the just value stage and increase in frequency and magnitude as we progress through the remaining two stages of valuation. The taxable value ratio is higher for Asian homeowners in over 90 percent of the counted counties in our sample and the size of the gap from the pooled regression is twice the size of the *Black* coefficient. A back-of-the-envelope calculation using the pooled estimate indicates that Asian homeowners pay $120 more per year on average than white homeowners.[18] This amount serves as a reasonable reference magnitude since the vast majority of estimates across groups and counties would result in tax gaps of less than $120. Although the income lost from these higher tax payments is modest on an annual basis, given that the median tenure of homeowners is 13 years, the total loss in income is around $2,200 at an interest rate of 5 percent. These non-trivial amounts relate to ongoing work on the racial wealth gap (e.g., Derenoncourt et al., 2022).

[18] We used a taxable value of $200,000 and a millage rate of 0.015 because they are close to the median of their respective distributions: $200,000 x 0.015 x 0.04 = $120.

Another novel contribution of this paper is our ability to investigate the presence of property tax gaps based on the gender of a homeowner. We find that female homeowners have, on average, lower value ratios than male or joint homeowners at every stage of the property tax process. The female homeowner results are remarkable in their consistency across counties. Small initial gaps in just value ratios grow when SOH benefits are included and increase substantially when accounting for exemptions. Female homeowners have lower taxable value ratios than the reference group in nearly 80 percent of the counted counties in our sample. Our novel findings for Asian and female homeowners should motivate future work on these groups and their property taxes.

Figure 1 and Table 1 are useful for getting a sense for the direction and significance of the effects, yet they do not convey the magnitude of the county-level effects. We present the separate county-level estimates of the coefficient on the Black homeowner indicator, as well as the result when pooling all of the counties in our sample, in Figure 2. The average gap between black and white homeowners, estimated from the pooled sample, is around 2 percent, yet the variation in estimates among counties underscores the importance of performing analysis for jurisdictions that administer the tax, which in Florida is the county government. For example, the statement that black homeowners in Florida face a higher property tax burden relative to white homeowners may be true on average, but there no discernable gaps in half of the counties in our sample. Some of the insignificant results are undoubtedly related to smaller sample sizes, and yet the confidence intervals on the positive coefficients are comparable to the confidence intervals on a number of insignificant estimates. The insignificant findings at the county level are therefore not entirely due to sample size considerations.

Figure 2 – Coefficients on Black homeowner, taxable value ratio

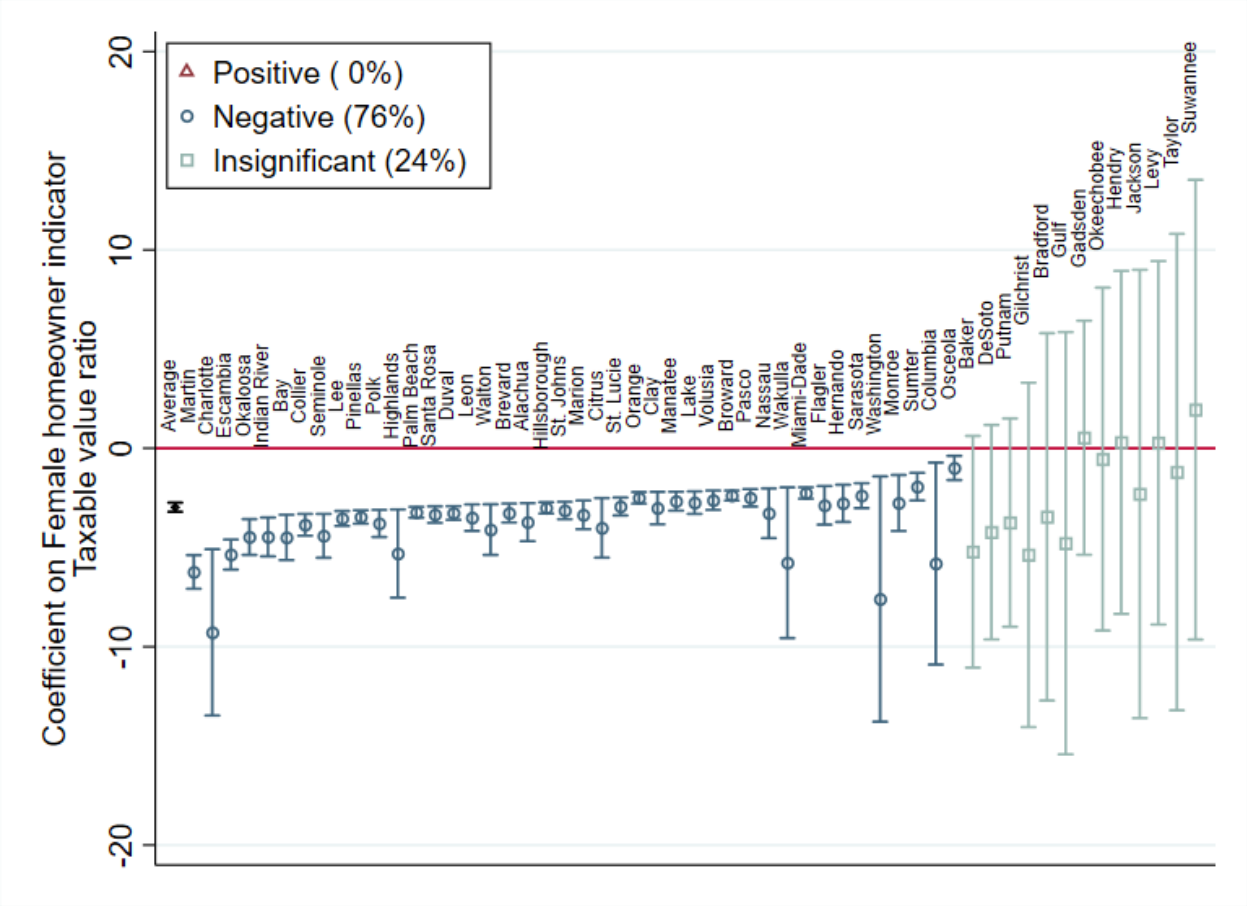


Notes: Coefficients on Black homeowner indicator and 95 percent confidence intervals for county-level and pooled (average) analyses.

Table 1 shows that, compared to male or joint homeowners, women homeowners tend to have lower value ratios in many counties regardless of the stage of the property tax process. To put the average results in context, women tend to benefit at the final stage of property taxation by a magnitude comparable to the additional burden measured for black homeowners. Using the pooled estimate from column 3 of Table 1 with the same back-of-the-envelope formula as above, we calculate that women pay $90 per year less than male or joint homeowners. We present the full set of estimated coefficients on the female homeowner variable in Figure 3. We present the Hispanic and Asian results in Appendix Figure 2 and Appendix Figure 3, respectively. Once again, the average estimates from the pooled regressions conceal important heterogeneity among taxing jurisdictions. Depending on the group under consideration, the county-level results sometimes tell a consistent story, albeit with substantial variation in magnitudes (female and

Asian), while other times indicating that the pooled results are being driven by only a few counties (Hispanic).

Figure 3 – Coefficients on Female homeowner, taxable value ratio



Notes: Coefficients on female homeowner indicator and 95 percent confidence intervals for county-level and pooled (average) analyses.

VII. Group differences in contributing factors

An important feature of our analysis is that we are able to measure gaps at various stages of the property tax process separately for individual counties. Prior work has typically focused on the initial assessment stage, not directly accounting for various tax relief programs. This is understandable given data limitations and the variety of such programs across the United States. Our primary focus, by comparison, is the taxable value ratios because they are most consequential for the homeowner. And yet it is informative to measure gaps at each stage of the process in order to better understand the origins of the gaps that exist in the taxable value ratios.

In this section we separately analyze group differences in the just value, the SOH value, and exemptions value ratios.

VII.A. Factors that may affect initial assessment (just value ratio gaps)

A cursory glance at Figure 1 and Table 1 reveals initial gaps in just value ratios, followed by larger and more frequent gaps in both assessed value ratios and taxable value ratios. The just value ratio results are consistent with previous research, suggesting that assessment errors are frequently unfavorable to black and Hispanic homeowners. Assessment errors also seem to be a problem for Asian homeowners, while the opposite is true for female homeowners. Both of these findings were not previously reported in the literature. Recent research by Avenancio-León & Howard (2022a) find that the homes of black and Hispanic owners are frequently over assessed relative to white homeowners. One explanation for these racial/ethnic gaps in assessment is that assessors are not correctly registering racial differences in neighborhood amenities. Using very granular geographic fixed effects is one way of addressing this issue, but it is not clear how sensitive such specifications are to well-known patterns of residential sorting.[19] In any case, the assessor error explanation may be applied to the Asian homeowner finding, yet it seems less applicable to the female homeowner result. We are unable to shed any light on the possibility of overt discrimination and our investigation of differential appeals behavior did not reveal meaningful differences by group.[20]

Another possible explanation for differences in just value ratios is that errors in the assessor's estimate of just value, unrelated to differences in neighborhood amenities, are correlated with the gender and race/ethnicity of homeowners. One possible explanation for the frequently lower just value ratios of females is that assessors tend to overvalue (undervalue) larger (smaller) homes (Ihlanfeldt and Rodgers, 2021) and the homes purchased by females are smaller in size. While

[19] Identification of racial/ethnic gaps is based off of areas with a mix of homeowner types. Depending on the degree of residential sorting and the level of location fixed effect, the results may be driven by a limited number of neighborhoods.

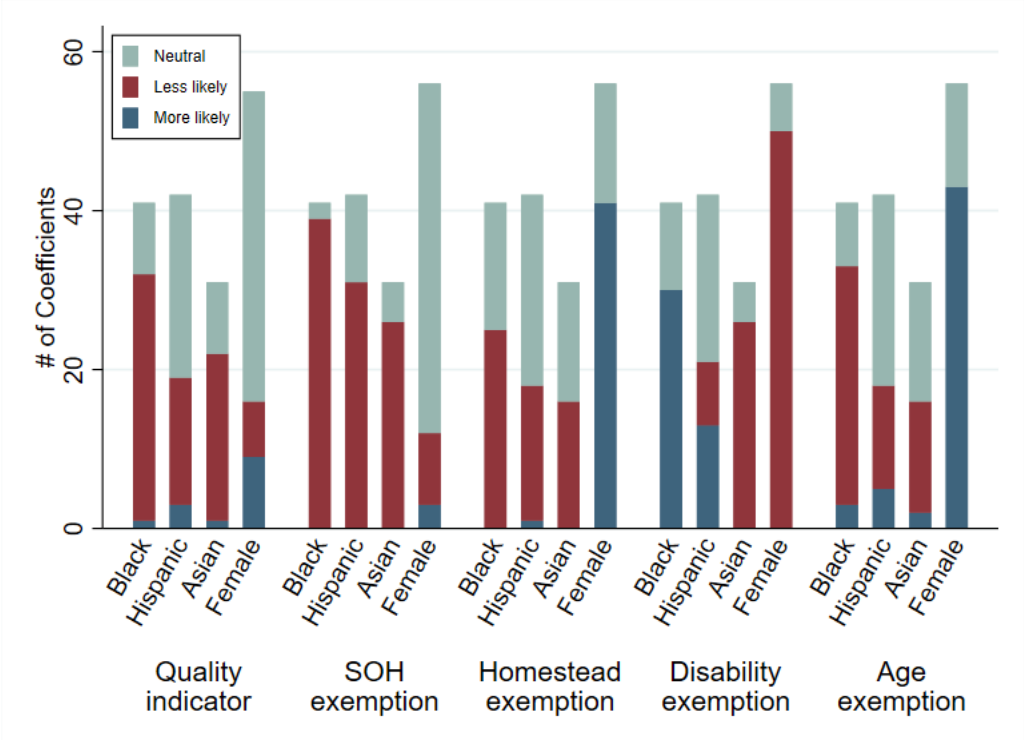
[20] After the sale of a house, a staff member from the county property appraiser's office will visit the house to gather information for estimating the just value. The inspection, which is only from the outside of the house, requires the member to announce his presence on the property to anyone who may be home at the time of the inspection. At this point, it is possible to learn the race of the homeowner, yet this information is not officially recorded, making overt discrimination extremely unlikely. Furthermore, the assessment proceeds regardless if anyone answers the door. Hispanic and female homeowners had lower appeals rates than the omitted group but the magnitudes were small (0.1 percent).

assessors may incorrectly value observable traits of a home, the potential for error is greater from those that are unobservable. Compared to prospective homebuyers, assessors have extremely limited information at their disposal when performing valuations. Where the assessor is confined largely to external indications of quality and easily quantifiable characteristics such as square footage and the year of construction, abundant property details are readily available to inform pricing bids. We make use of a variable in the tax rolls that records if a property's quality is noticeably different from what an assessor would expect for a property of that age.[21] Examples of what could trigger such an update to a property's file include the installation of a new roof or central air conditioning unit. Importantly, these exterior updates may be correlated with interior updates that are concealed from the assessor but not from the buyer (e.g., a remodeled kitchen). In the first group of bars of Figure 4 and the first column of Table 2 we present the results when we replace the outcome variable in equation 1 with an indicator variable equal to one if there is a quality-related update to the property's tax roll file, zero otherwise. We find that, on average, homeowners in each racial/ethnic group are significantly less likely to live in a house which has been flagged for quality differences and that this pattern exists across many counties.[22] There are a non-trivial number of counties where female homeowners have significantly different quality differences although the average effects are indistinguishable from zero. If remodeled interiors raise the sale price of a home but are not reflected in just value estimations, this could partially explain the initial just value ratio gaps. An important consequence for future work is that that even the use of very granular location fixed effects will not eliminate this problem.

[21] This variable is the "effective year." During out interactions with county assessor offices, we discovered that each county had slightly different ways measuring the effective year variable. Because of this ambiguity we view the results of this analysis as suggestive.

[22] Due to their volume, county-level results are available by request for both Table 2 and Table 3.

Figure 4 – Differences in possible contributors to TV gaps (binary)



Notes: Summary of the county-level regression results where the dependent variable in equation 1 is replaced by a binary indicator for quality differences or participation in one of the listed tax relief programs. The number of group coefficients that are statistically significant at the 10 percent level or not (neutral).

Table 2 – Possible contributors to measured gaps (binary)

	Quality Indicator	SOH Status	Homestead Exemption Status	Disability Exemption Status	Senior Exemption Status
	(1)	(2)	(3)	(4)	(5)
Black	-0.038***	-0.077***	-0.039***	0.040***	-0.009***
	(0.009)	(0.004)	(0.004)	(0.007)	(0.001)
	2.4 [75.6]	0 [95.1]	0 [61]	73.2 [0]	7.3 [73.2]
Hispanic	-0.011***	-0.043***	-0.021***	0.006**	-0.001
	(0.003)	(0.005)	(0.004)	(0.002)	(0.001)
	7.1 [38.1]	0 [73.8]	2.4 [405]	31 [19]	11.9 [31]
Asian	-0.046***	-0.055***	-0.030***	-0.022***	-0.004***
	(0.008)	(0.004)	(0.005)	(0.002)	(0.001)
	3.2 [67.7]	0 [83.9]	0 [51.6]	0 [83.9]	6.5 [45.2]
Female	-0.003	-0.003	0.028***	-0.029***	0.010***
	(0.005)	(0.002)	(0.003)	(0.003)	(0.001)
	16.4 [12.7]	5.4 [16.1]	73.2 [0]	0 [89.3]	76.8 [0]

Notes: Results when pooling all counties where there are at least 100 homeowners in each category. The outcome variable is a binary indicator equal to one if the homeowner is receiving certain tax benefits (Columns 2–5) or if the effective year on the property differs from the actual year built (proxy for quality). The coefficient represents the average difference of a particular group relative to the baseline group of homeowners (white males or white joint homeowners). We report the percentage of individual counties with statistically significant group differences (positive or [negative]) underneath the pooled estimates. Each regression includes assessment year fixed effects and Census tract fixed effects. N = 962,932. Standard errors clustered at the county level: * p < 0.1, ** p < 0.05, *** p < 0.01.

VII.B. SOH's contribution to assessed value ratio gaps

Moving on from gaps in just value ratios that reflect differences in the initial assessment stage, we next consider differences in the SOH program and how these contribute to differences in assessed value ratios. Column 2 of Table 2 show that each racial/ethnic group is less likely to take advantage of the cap on assessment growth, which is not surprising given the lower participation in the homestead exemption program shown in Column 3: homeowners automatically receive SOH benefits once they've been granted the homestead exemption.[23] The estimated racial/ethnic group averages from the pooled samples are supported by the county-level results in Figure 4 that show lower take-up of SOH benefits in 70 to 95 percent of the

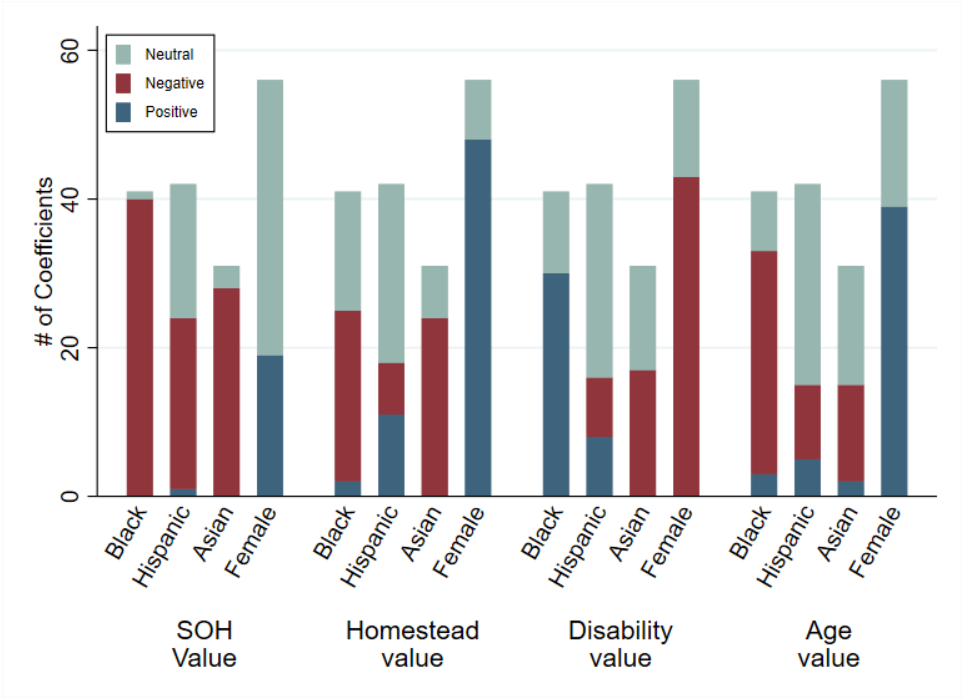
[23] The receipt of the homestead exemption requires that homeowners make their new home their primary residence. Our matching algorithm between the registered voter and tax rolls is based on the home address. This suggests that the homeowners in our groups should all be eligible to receive the exemption.

counties in our sample. Lower SOH porting by minorities may stem from factors related to racial/ethnic gaps in prior home ownership. Moreover, minorities may port a lower amount to the new home if lower price appreciation of their prior home resulted in the SOH cap providing less tax relief than it would in other areas with higher price appreciation. Discrimination against minorities in mortgage and housing markets is a factor in their lower homeownership rate and their lower neighborhood house price appreciation.[24] Hence, the losses that minorities experience from past discrimination may be exacerbated by Florida's SOH program.

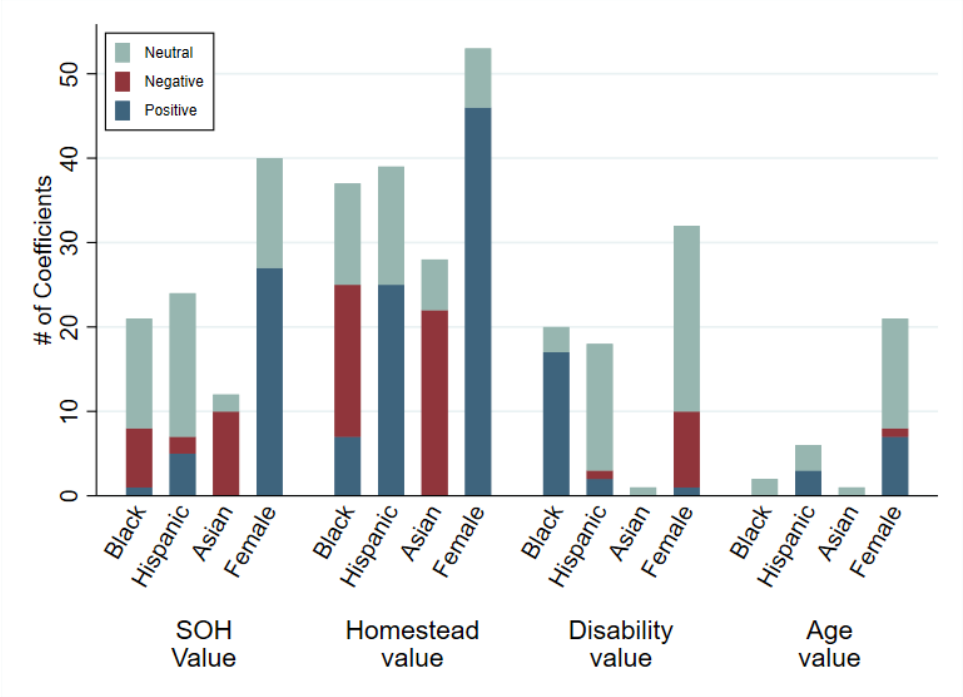
We continue our empirical exploration of the SOH program by replacing the outcome of equation 1 with the ratio of SOH benefits to FMV and then estimating unconditional differences and differences conditional on program participation. Panel A of Figure 5 and column 1 of Table 3 show the unconditional differences in SOH values, estimates that are influenced by the lower participation of the racial/ethnic groups documented in Table 2. Lower participation results in lower SOH values for everyone but female homeowners in a vast majority of the counties in our sample. Panel B of Figure 5 and column 2 of Table 3 show the differences in SOH values conditional on program participation. The black and Hispanic gaps are no longer significant on average, while the Asian and female differences remain statistically significant on average and for around half of the counties. These results could be due to female (Asian) owners having a higher (lower) prior participation rate in the homestead program or higher (lower) probability of transferring previous SOH benefits. Overall, differential SOH benefits explain why gaps in assessed value ratios are typically larger and more frequent than the gaps in just value ratios.

[24] The vast literature documenting discrimination against minorities in housing and mortgage markets has recently been reviewed by Zonta (2019).

Figure 5 – Group differences in the value of tax relief programs



A: Unconditional differences



B: Conditional differences

Notes: Summary of the county-level regression results where the dependent variable in equation 1 is replaced by the ratio of the tax relief provided by a particular program to FMV. Panel A is unconditional while Panel B is conditional on program participation. The number of group coefficients that are statistically significant at the 10 percent level or not (neutral).

Table 3 – Group differences in tax benefit ratios

	SOH Ratio		Homestead Exemption Ratio		Disability Exemption Ratio		Senior Exemption Ratio	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Black	-1.228***	-0.448	-1.258***	-0.514**	1.359***	7.253***	-0.312***	0.513
	(0.098)	(0.312)	(0.164)	(0.210)	(0.231)	(0.692)	(0.077)	(0.401)
	0 [97.6]	2.5 [25]	4.9 [56.1]	17.1 [43.9]	73.1 [0]	52.5 [0]	7.3 [73.2]	12.9 [3.2]
Hispanic	-0.629***	0.061	0.370**	1.169***	0.241**	2.009*	-0.007	1.887**
	(0.117)	(0.371)	(0.152)	(0.159)	(0.100)	(1.084)	(0.021)	(0.710)
	2.4 [54.8]	12.2 [4.9]	26.2 [16.7]	59.5 [0]	19 [19]	4.9 [9.8]	11.9 [23.8]	26.7 [0]
Asian	-1.063***	-1.871***	-1.611***	-1.201***	-0.379***	-0.362	-0.135***	0.078
	(0.082)	(0.171)	(0.246)	(0.221)	(0.045)	(0.760)	(0.030)	(1.537)
	0 [90.3]	0 [48.4]	0 [77.4]	0 [77.4]	0 [54.8]	0 [6.5]	6.5 [41.9]	16 [16]
Female	0.226***	1.361***	2.956***	2.784***	-0.616***	-1.046**	0.332***	0.896**
	(0.030)	(0.088)	(0.149)	(0.162)	(0.065)	(0.504)	(0.048)	(0.402)
	33.9 [0]	57.1 [0]	85.7 [0]	82.1 [0]	0 [76.8]	2.2 [24.4]	69.6 [0]	35.5 [3.2]
Obs.	962,932	184,605	962,932	745,807	962,932	49,952	962,932	13,074

Notes: Results when pooling all counties where there are at least 100 homeowners in each category. The outcome variable is the ratio of the tax benefit amount and the FMV multiplied by 100, unconditional (odd columns) or conditional on program participation (even columns). The coefficient represents the average difference of a particular group relative to the baseline group of homeowners (white males or joint homeowners). We report the percentage of counted counties with statistically significant group differences (positive or [negative]) underneath the pooled estimates. Each regression includes assessment year fixed effects and Census tract fixed effects. Standard errors clustered at the county level: * p < 0.1, ** p < 0.05, *** p < 0.01.

VII.C. Homestead exemption differences and the taxable value ratio

Differential take-up of the homestead exemption, shown in column 3 of Table 2 and Figure 4, can affect the taxable value ratios of the homeowners in each group. Indeed, the homestead exemption provides substantial tax savings to homeowners, so these differences in take-up rates are important.[25] The exemption's fixed dollar amount means that the benefit is larger in percentage terms for lower-value properties. If black and Hispanic homeowners own lower-value homes then this could contribute to the smaller (and sometimes negative) gaps in taxable value

[25] The differences in take-up of the homestead exemption among groups merits additional research. One recent study by Ihlanfeldt (2021) suggest that differences in internet access help explain the gap in homestead take-up between black and white homeowners. In Florida, with the exception of a hand full of rural counties, the homestead exemption can be applied online, which substantially reduces application transactions costs. Future research may help determine if differential access to the internet explains the lower homestead exemption take-up of Hispanic and Asian homeowners, too.

ratios. This explanation is further supported by the results in Column 4, which shows less (more) negative (positive) coefficients for black and Hispanic homeowners when we condition on homestead participation. Asian homeowners are less likely to use the homestead exemption while the opposite is true for female homeowners.[26] It does not matter if we condition on receipt of the homestead exemption or not, the value of the homestead exemption is lower (higher) for Asian (female) homeowners. These patterns are prevalent across a majority of counties, as displayed in Figure 5. Once again, these findings may be at least partly related to the value of properties typically owned by members of these groups.

A number of possible explanations may account for our finding that female homeowners are more likely to receive the homestead exemption than male or joint homeowners in nearly half of the counted counties. Are female homebuyers savvier financially, more able to navigate the online application process, or do gender differences in income make women more motivated to file an application? Like the homestead exemption, a SOH portability transfer does not come automatically, as homeowners must submit an application to the county tax assessor's office.

VII.D. Disability and age-related exemptions

Column 4 of Table 2 shows differences in disability exemptions applied before arriving at a property's taxable value. Relative to the omitted group, black and Hispanic homeowners are more likely to receive a disability exemption while Asian and female homeowners are less likely to receive such an exemption. This result conforms to data that shows, at the national level, and in most places, blacks have markedly higher disability rates than whites, up to 2.5 times greater (Ross and Bateman, 2018). Columns 5 and 6 of Table 3 show that the disability exemption is more valuable to black and Hispanic homeowners regardless of whether or not we condition on participation. The larger take-up of disability benefits by black and Hispanic homeowners may partially explain why positive gaps in the assessed value ratio decrease or reverse sign when we consider the taxable value ratio. Participation in these programs is relatively limited, however, so the overall estimates are unlikely to be driven primarily by disability exemptions. For example, many of Florida's disability exemptions are restricted to veterans, which may help explain the

[26] Note that the Asians in our sample are registered voters; hence, their lower take-up of the homestead exemption is not due to the homestead exemption being available in Florida only to U.S. citizens. Differences in first languages between Asians and whites may be a factor given that applications must be made in English.

gender gaps. The lower rates of disability status for Asian and female homeowners does reduce the average value of the disability exemption for those groups, but there is limited evidence of meaningful differences once we condition on receiving the exemption. Figure 5 shows that, conditional on receipt, gaps at the county-level are infrequent for all groups except black homeowners who tend to benefit more from the disability exemption.

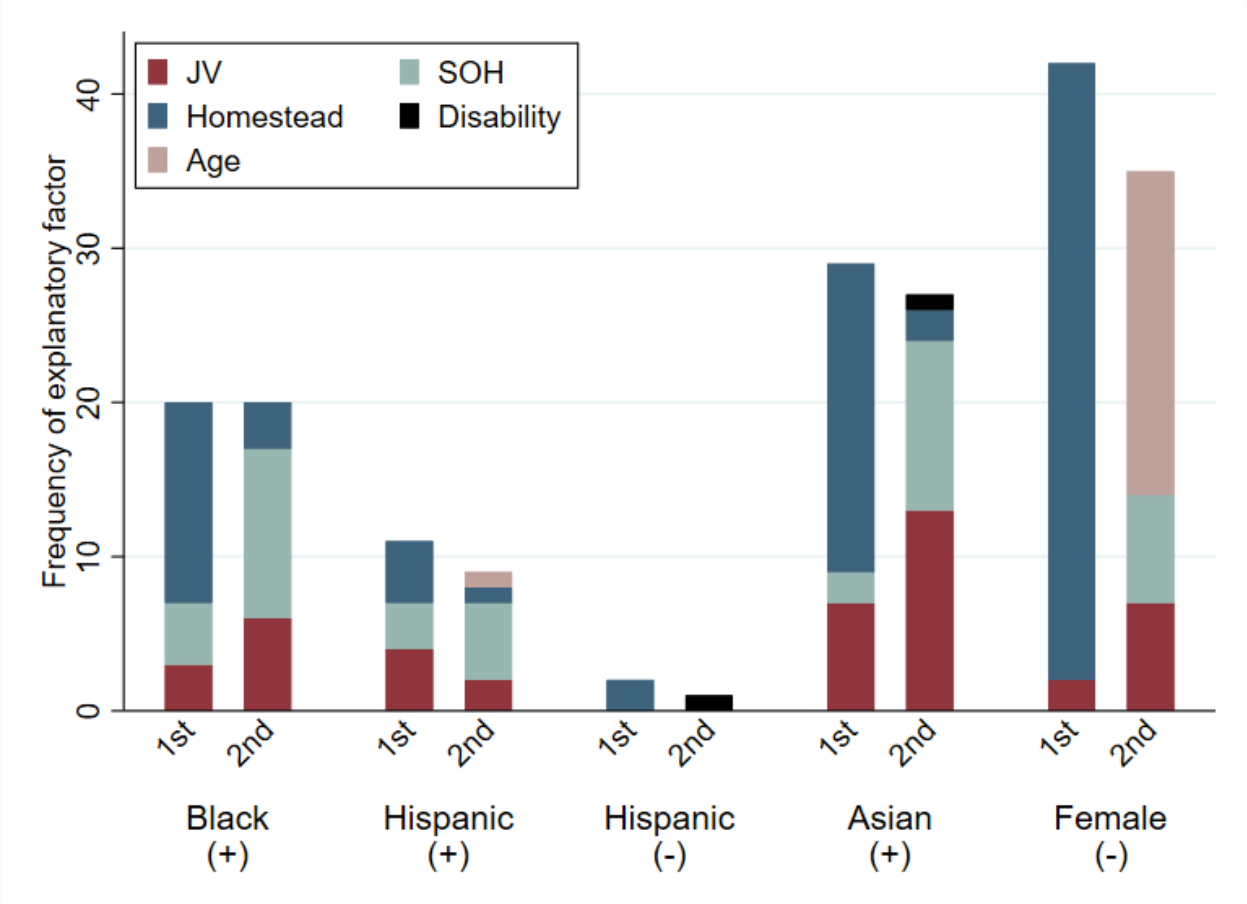
The final column of Table 2 shows that black and Asian homeowners are less likely to receive a low-income senior exemption while female homeowners are more likely to receive this exemption. It is possible that these differences, as well as the disability differences, are related to underlying patterns of health and longevity. For example, women tend to live longer than men and therefore would be more likely to qualify for the senior exemption. Figure 5 shows that the racial/ethnic groups have lower age-related benefits while female homeowners have higher age-related benefits in many counties, all of which can partially explain the sign of the gaps in taxable value ratios. Conditional on receipt, there are relatively few counties with statistically significant differences in age-related benefits between groups, though it is worth noting that these results are likely affected by the lower sample size that is a consequence of the targeted nature of these programs.

VIII. What factors are most consequential for taxable value ratio gaps?

We now turn to addressing our central question: where there is a significant gap in the taxable value ratio, what accounts for this difference? As we outlined in Section IV in reference to equation 2, group differences in any of the value ratios will contribute to differences in the taxable value ratio. The unconditional results in Table 3 show the direction and statistical significance of each tax relief program, both of which provide a rough indication of a program's impact on gaps in taxable value. To better understand the relative importance of these contributing factors, we show the number of times that a specific factor explains the largest proportion of the taxable value ratio gap (1st contributor) as well as the number of times that a factor explains the second largest proportion of the gap (2nd contributor) in Figure 6. As a reminder, we divide the group coefficient in an (unconditional) factor regression by the group coefficient in the taxable value ratio regression to quantify the relative contribution of that factor to the taxable value ratio gap. We allow factors to separately explain positive and negative gaps,

indicated by the sign in parentheses beneath the group label, and we only consider statistically significant coefficients. We also present this information in Appendix Table 2.[27]

Figure 6 – Frequency of contributors to measured gaps



Notes: Summary of the first and second largest contributors to statistically significant gaps in taxable value ratios measured at the county-level. The ranking of contributors is based on the ratio of the group coefficient in the factor regression and the group coefficient in the taxable value ratio regression. We rank factors separately for positively and negatively signed gaps in TV, as indicated by the symbols in the parentheses.

Among all racial/ethnic and gender groups the ratio most frequently ranked as the largest contributor to a gap in the taxable value ratio is the homestead exemption value ratio. This is true whether the taxable value ratio is higher or lower for the group. For example, in the 20 counties

[27] The decomposition method described in Gelbach (2016) yields similar conclusions. Because some factors have offsetting effects (e.g., black homeowners are less likely to claim the homestead exemption but more likely to claim disability exemptions), we focused on factors that contributed to positive taxable value gaps. Taking a ratio of the JV gap over the next largest contributing factor captures the relative importance of initial assessment gaps. The median ratio for each racial/ethnic group was around 0.66. These findings are consistent with the analysis presented below.

where the taxable value ratio is higher for black homeowners, the homestead exemption ratio is the dominant contributor in 13 counties. The explanatory power of the homestead exemption ratio is especially apparent in the higher taxable value ratios for Asians and the lower taxable value ratios for primary female homeowners. In the 28 counties where the taxable value ratio is higher for Asian homeowners, a lower homestead exemption value ratio is the dominant factor in 20 counties. Even more striking is that a higher exemption value ratio explains the lower taxable value ratio of females in 40 of the 42 counted counties. The SOH value ratio is also a frequent contributor to gaps in the taxable value ratio, but generally as a second rather than a first contributor. In particular, the lower value of SOH benefits is consistently in the top two contributors to higher taxable value ratios for the racial/ethnic groups.

Of key interest is the extent to which taxable value gaps are attributable to differences in the just value ratio. That is, are assessment errors a root cause of the taxable value gaps? Differences in the just value ratio are a top-two contributor to taxable value gaps, but they are not nearly as important as the various tax relief programs considered.[28] For black and Hispanic homeowners, the focus of previous work detailing gaps in initial assessment values (i.e., the just value gap) is less consequential to taxable value gaps than both the homestead exemption and SOH benefits. If anything, assessment errors are more important for Asian and female homeowners, both of whom have more frequent taxable value gaps (positive for the former and negative for the latter) and significant just value ratio gaps. These findings indicate that while assessment errors tend to be unfavorable for black, Hispanic, and Asian homeowners in a large percentage of counties (60, 39, and 77 percent, respectively; see Table 1), they do not explain the bulk of the downstream gaps in taxable value ratios.

IX. Conclusion

In this paper we contribute to the recent literature at the intersection of property taxation and race/ethnicity by expanding the group analysis to include not only black and Hispanic homeowners, but also Asian and female homeowners. A central point of emphasis is that the property tax is administered locally and research should be conducted accordingly. National averages can be informative, but the intricacies and nuances of each jurisdiction's property tax

[28] We divide the group coefficient in the JV ratio regressions by the group coefficients in the TV ratio regressions in order to make this comparison.

system necessitate analysis at a more local level. In Florida, counties are responsible for administering the property tax. Hence, we estimated racial/ethnic and gender gaps for each county (where samples sizes permitted) in all of the key value to FMV ratios that affect property tax bills. The most important gaps to consider are those for taxable value ratios, since it is the taxable value that determines homeowners' property tax liabilities. Our ability to observe gaps at this and other stages of the property tax process is another feature of our work that distinguishes it from prior work that focuses primarily on the initial stage of property assessment. We find substantial variation in these gaps across counties, heterogeneity that is concealed by pooled regression analysis. Group differences in tax relief programs, which has hitherto received little attention, are equally if not more important than initial assessment gaps to overall property tax disparities. In fact, some of the measured initial gaps for Black and Hispanic homeowners disappear once we account for programs like the homestead exemption. Additionally, the number of counties that tend to favor female homeowners compared to white male or joint homeowners more than doubles between the initial and final assessment values. A much more concerning result that warrants further study is that Asian homeowners face the most unfavorable gaps in property taxation at every stage of the process.

Our findings have many policy implications related to fairness and equity in property taxation. Most importantly, diagnosing measured gaps in taxable value ratios should be performed at the level of tax administration. Reducing assessment errors may be a valid goal in counties where this is a documented problem, but in other counties the priority may be increasing take-up of the homestead exemption.[29] Gaps stemming from initial income and wealth gaps that compound via the SOH program present a more difficult problem, as the original motivations for capping assessment growth and offering portability have not changed and homeowners would undoubtedly resist changes to this program if it raises their property tax bills. The strong portability advantage enjoyed by white homeowners, presumably due to prior ownership, might be somewhat offset by allowing first-time homeowners an automatic reduction in their assessed

[29] Where an assessment gap problem exists, it may make sense to supplement comps with professional appraisals, especially if Avenancio-León & Howard (2022a) are correct that the problem with traditional mass appraisal models is that they do not accurately account for neighborhood amenity differences. In those jurisdictions where gaps exist in the take-up of the SOH transfer or the homestead exemption more advertising of these opportunities by the county tax assessor may make a difference.

value, a proposal that would face less resistance by homeowners even if it would lower the property tax revenue collected by the jurisdiction.

Our findings reveal many fertile areas for future research, such as exploring why tax relief program participation vary across population groups and how growth assessment programs might have unintended consequences. Although we have made the case that Florida provides an appropriate setting for studying disparities in the property tax, future research is necessary to better understand how gaps vary across the United States and how particular aspects of other property tax systems contribute to or ameliorate such gaps. We reiterate our recommendation to perform jurisdictional level analyses, perhaps following our methodological approach of merging registered voter and property tax rolls for other states, where again the emphasis would be on achieving a better understanding of racial/ethnicity and gender gaps across jurisdictions. Such work is necessary in order for policymakers to identify the most effective way of achieving progress towards horizontal equity in property taxation.

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Appendix Material

Appendix Table 1 – Descriptive statistics

	Black	Hispanic	Asian	Female	Reference group
	(1)	(2)	(3)	(4)	(5)
Taxable value ratio	62.3 (20.8)	62.5 (19.0)	68.3 (16.5)	58.0 (20.8)	62.9 (19.3)
Assessed value ratio	83.4 (9.74)	81.2 (10.7)	83.4 (9.56)	79.9 (12.0)	80.6 (11.2)
Just value ratio	84.9 (8.31)	83.6 (8.47)	85.2 (8.22)	83.3 (9.00)	83.4 (8.96)
SOH value ratio	1.51 (5.60)	2.45 (7.05)	1.80 (5.47)	3.36 (8.44)	2.87 (7.29)
Homestead value ratio	18.3 (14.6)	17.3 (13.8)	14.7 (12.6)	20.9 (15.9)	16.4 (13.8)
Disability value ratio	2.69 (13.9)	1.01 (8.52)	0.38 (5.18)	0.53 (5.97)	1.11 (8.69)
Age value ratio	0.19 (2.98)	0.48 (4.79)	0.16 (2.48)	0.80 (5.82)	0.29 (3.49)
# of counted counties	40	41	30	55	65
Obs.	48,124	87,627	16,140	209,190	508,297

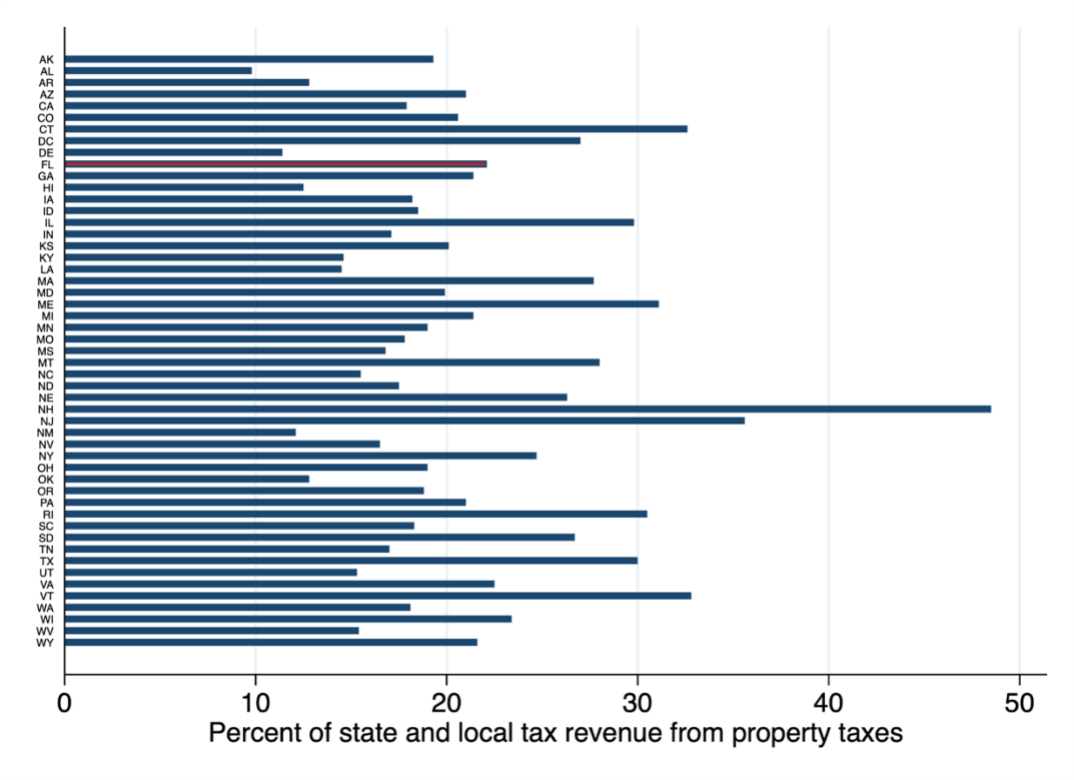
Notes: Means and (standard deviations) when pooling all counties where there are at least 100 homeowners in each category. Each variable is the ratio of the property value or tax relief benefit divided by the fair market value of the property, multiplied by 100.

Appendix Table 2 – Frequency of contributors to measured gaps

	Positive TV ratio gap		Negative TV ratio gap	
	1st Contributor	2nd Contributor	1st Contributor	2nd Contributor
Black	Homestead [13] SOH [4] JV [3]	SOH [11] JV [6] Homestead [3]		
Hispanic	Homestead [4] SOH [3] JV [4]	SOH [5] JV [2] Homestead [1] Age [1]	Homestead [2]	Disability [1]
Asian	Homestead [20] JV [6] SOH [2]	JV [13] SOH [11] Homestead [2] Disability [1]		
Female			Homestead [40] JV [2]	Age [21] JV [7] SOH [7]

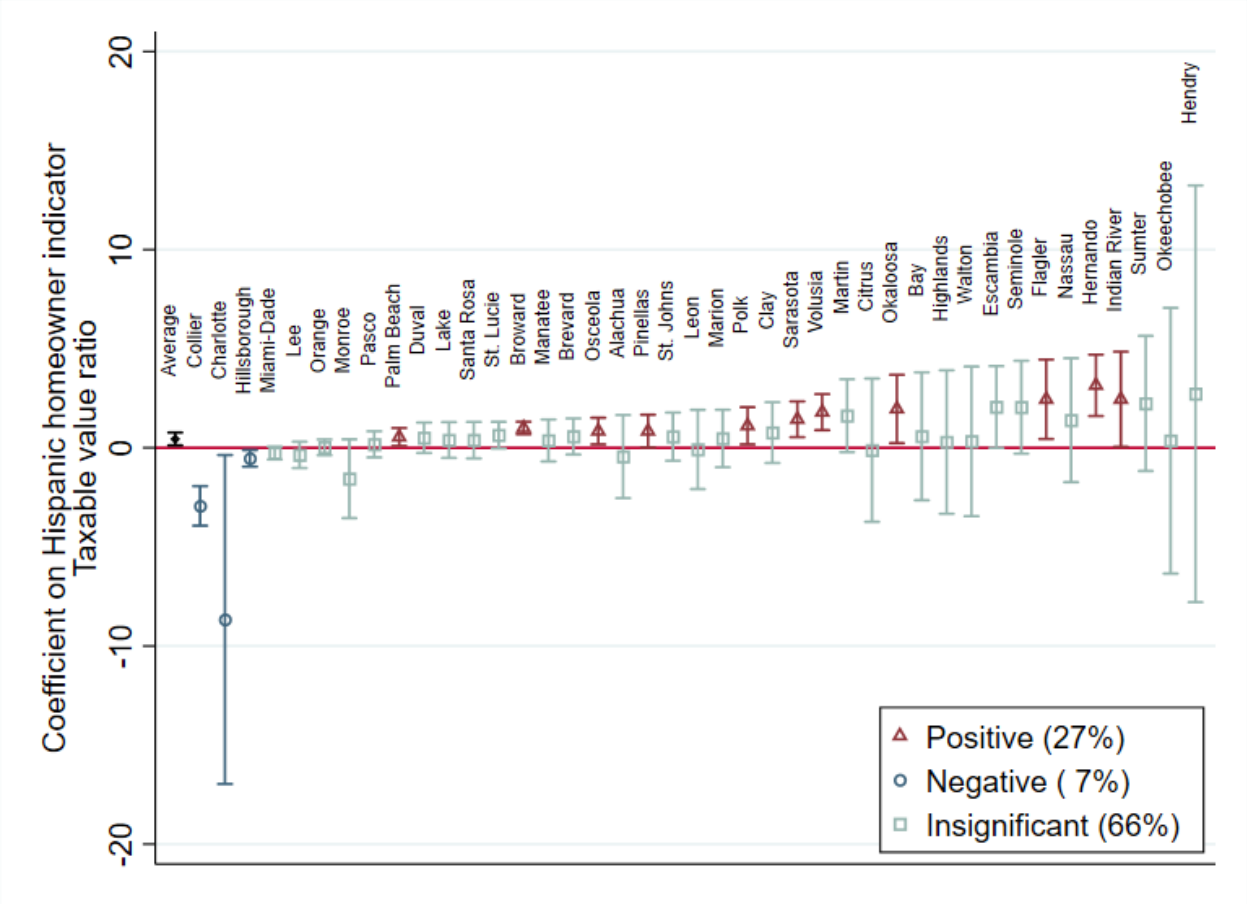
Notes: Summary of the first and second largest contributors to statistically significant gaps in taxable ratio values measured at the county-level. The ranking of contributors is based on the ratio of the group coefficient in the factor regression and the group coefficient in the taxable value ratio regression. We rank factors separately for positively and negatively signed gaps in TV. The number of contributors depends on how many counties registered statistically significant gaps in TV ratios as well as the number of factors that were significantly different between groups.

Appendix Figure 1 – Property tax revenue percentage by state



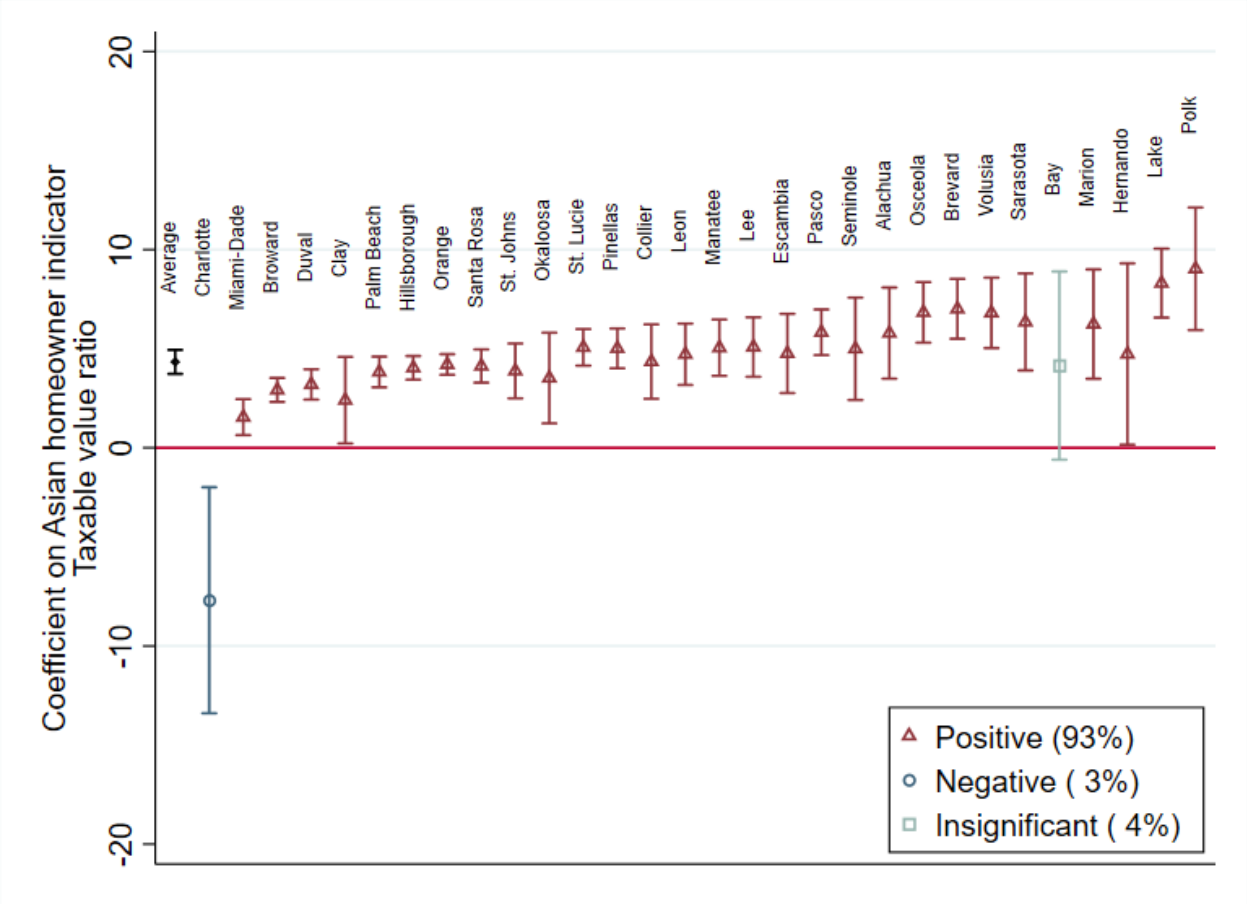
Notes: The mean is 21.2 and the median is 19.3. The percent of state and local tax revenue from property taxes in Florida is 22.1. Data from the 2017 Survey of State and Local Government Finances (Census, 2017).

Appendix Figure 2 – Coefficients on Hispanic homeowner, taxable value ratio



Notes: Coefficients on female homeowner indicator and 95 percent confidence intervals for county-level and pooled (average) analyses.

Appendix Figure 3 – Coefficients on Asian homeowner, taxable value ratio



Notes: Coefficients on female homeowner indicator and 95 percent confidence intervals for county-level and pooled (average) analyses.