Assessment Caps and the Racial Assessment Gap*

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Abstract

We show that legislative caps on assessment growth are associated with reduced racial inequality in property taxation. These reductions increase in treatment intensity and are largest in highly-minority neighborhoods and low-income neighborhoods, which prior work shows are more susceptible to assessment misvaluations. We provide support for two channels explaining this finding. First, conditional on a binding cap, Black and Hispanic homeowners are exposed to slightly higher home price growth within jurisdiction, which leads to a small mechanical reduction of existing inequality. Second, caps appear to discipline assessor errors by reducing the correlation between neighborhood amenities and erroneously high assessments.

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1 Introduction

The property tax is a notoriously unpopular tax (Cabral and Hoxby 2012), and most states in the U.S. have adopted policies in response to public concerns about property tax burdens perceived to be excessive (Paquin 2015; Anderson 2006). In a recent study, Avenancio-León and Howard (2021) document large, widespread racial inequality in local property tax administration. Within regions where every homeowner theoretically faces the same rate of taxation, we find that erroneously high property assessments lead the average Black or Hispanic homeowner to pay a 10–13 percent higher effective tax rate than white homeowners. One common response to a broad range of concerns about excessively high assessed valuations has been to enact caps explicitly restricting the growth on assessments. Assessment caps have inherently strong distributional implications for homeowners paying taxes to the same governments: a lower tax burden is placed upon homeowners for whom the cap binds, but other homeowners see an increase in tax burden.[1,2] This paper explores how overall racial inequalities in property assessments are affected by this widespread and salient feature of property tax policy.

It is unclear whether property assessment caps should be expected to promote or inhibit racial equity. Because of a long-lasting Black-white homeownership gap (Choi et al. 2019) that still reflects discriminatory policies of not long ago (Rothstein 2017), if cap policies confer benefits to older homeowners over younger homeowners – as researchers have shown for California's Proposition 13 (Myers 2009; Chu and Uhler 2016) – caps may place a disproportionate tax burden on Black homeownership. The same prediction would hold if home price growth for Black homeowners and/or predominantly Black communities tends to fall below cap limits, while home price growth for white homeowners tends to exceed the limit. Alternatively, cap policies may intersect with existing sources of assessment error in ways that mitigate over-assessment of Black homeowners.

We find that, in general, legislative caps on assessment growth are associated with reduced inequality for Black homeowners. Our measure of inequality is the racial assessment gap: the difference between average assessment ratios – the ratio of assessed to market value – for Black and white homeowners within the same tax jurisdiction. The central analyses of this paper contrast this racial assessment gap between various tax cap regimes characterized by the existence (or lack) of an assessment

1. This has been explored both theoretically and empirically by, for example, Dye, McMillen, and Merriman (2006) and Dye and McMillen (2007).

2. This relationship holds directly in regions where the aggregate levy is the relevant policy lever. In regions where the tax rate is the policy lever, this relationship holds for a fixed level of tax revenue.

cap, as well as the extent to which that cap binds.

First, we document that the assessment gap is smaller in areas where a cap on assessment growth exists and binds. We show that caps do have the anticipated direct effect: the longer the binding spell of a cap, the lower the assessment ratio for a homeowner. In addition, this same pattern also holds for the racial assessment gap: racial inequality is nearly monotonically lower for each additional year a cap binds within the decade prior to an observed assessment ratio. To further explore the distributional impact of cap policies, we decompose the cross-sectional reductions in inequality along several demographic characteristics. We show reductions are largest for Black and Hispanic homeowners within highly-minority neighborhoods and low-income neighborhoods – precisely those communities which prior work shows are more affected by assessment misvaluations (Avenancio-León and Howard 2021; Berry 2021; McMillen and Singh 2020; Black 1977). Related to other common concerns about the distributional effects of caps by age-cohort, we show that longer homeowner tenure is strongly associated with larger reductions in racial inequality.

We provide support for two channels that may drive the relationship between caps on assessment growth and racial assessment gaps. First, within neighborhoods where growth exceeds the statutory cap, the average Black or Hispanic homeowner is exposed to higher home price growth than the average white homeowner. Conditional on a binding cap within a taxing jurisdiction, realized home price growth is 36 basis points higher for Black homeowners than it is for white homeowners within the same jurisdiction. Thus, when the cap binds, the denominator of the assessment ratio (market prices) will increase more for Black homeowners, while the cap constrains the numerator (assessments) to grow equally across races. As a result, assessment ratios, and thereby tax burden, will decrease for Black homeowners. A similar pattern holds with the inclusion of Hispanic homeowners. We show this channel explains a relatively small portion of the total reduction in inequality. The second channel relates to misvaluation of home characteristics, especially spatial attributes. We show that caps appear to discipline assessor errors, resulting in lower correlation between neighborhood amenities and erroneously high assessments. While caps introduce a distortion in property taxation by generating under-assessment with respect to accurate and uncapped assessments, the fact that these under-assessments actually work to correct other over-assessement generated by errors in tax administration constitutes an example of the theory of second best at play (Lipsey and Lancaster 1956) and should caution against evaluating the efficiency impacts of cap policies without fully comprehending

their redistributive effects.

Our results are robust to several alternative specifications. For example, one concern may be that the inclusion of California and Proposition 13 in our estimates might be driving our results. While Proposition 13 is one of the most-widely known policies that implement a cap on property assessment growth, a cap is by no means the only policy lever contained in Proposition 13. Nevertheless, excluding California from our analysis does not change our findings. Likewise, our results are robust to the inclusion of racial time trends, as well as a battery of alternative specifications that use granular fixed effects to absorb potential confounders.

Our paper contributes to a relatively under-explored area within the intersection of research on racial inequalities in property taxation and research on the real effects of capping property tax revenue. Historians and social scientists have documented the prevalence of practices that led to the over-assessment of Black property at multiple different times since Reconstruction. Kahrl (2016) describes how property tax rates played a central role in the political mobilization of Black communities during the Reconstruction era. Margo (1984) presents evidence consistent with over-assessment of Black property for the period prior to World War I. Additional evidence supporting discriminatory assessments is present for different time periods since, including examples of homeowners suing local governments for relief from discriminatory assessments during the 1920s and 1930s (Kahrl 2016), over-assessments extending from the end of the 1950s through the 1960s (Hendon 1968), and practices that perpetuated discriminatory assessments during the 1960s and 1970s (Rothstein 2017). In recent times, Atuahene and Berry (2019) showed there is a relationship between inflated assessments and tax foreclosures within one county in Michigan between 2009 and 2015; while Avenancio-León and Howard (2021) document the widespread and contemporaneous presence of assessment gaps using comprehensive national data and show the role of assessment misvaluations in generating this assessment gap. We build on this literature by focusing on the role of property tax caps in shaping unequal property taxation.

Several papers within the broader literature on property taxation evaluate how property tax caps affect local government financing, spending, and various downstream outcomes. Dye and McGuire (1997) and Dye, McGuire, and McMillen (2005) show that an aggregate property tax cap enacted in 1991 in Illinois subsequently constrains the growth of property tax revenues across multiple types of local government units in both the short- and long-run; and also reduces operating and instructional

expenditures on K-12 education. McCombs and Carroll (2005) show California's Proposition 13 lowered K-12 spending. Downes and Figlio (1998) find that property tax caps can lower student test scores. And there is concern that revenue lost to property tax caps can lead to increases in potentially regressive non-tax fees and charges (Galles and Sexton 1998). On the other hand, proponents of property tax caps underscore it can benefit older homeowners or homeowners in rapidly gentrifying areas by isolating them from property tax increases they cannot afford.Using self-reported survey data from the PSID, Martin and Beck (2017) argue that property tax caps exacerbate racial inequalities. We contribute to this literature by documenting the association between property assessment caps and lower racial inequality in property taxation, which is critical to understanding the distributional implications of tax caps as a policy tool.

2 Data

The core dataset for this paper is constructed as described extensively in Avenancio-León and Howard (2021). We briefly summarize here for convenience. We combine data from three key sources: 1) annual property-level records of assessments, transactions, home characteristics and geolocation from ATTOM, 2) Geographic Information System (GIS) detail on local government boundaries in the form of 75,000 shapefiles from Atlas Muni Data, 3) mortgage-holder race from Home Mortgage Disclosure Act records. These three sources are merged to create a panel of observations at the property-year level. For each home, four pieces of information are observed: (i) the network of taxing entities touching that property, (ii) the annual assessment, (iii) whether any transaction occurs, along with the transacted price if so, and (iv) the race of the home seller. We form property-level assessment ratios: the tax assessment for year t divided by the sale price in an arms-length transaction also occurring in year t.[3] We restrict attention to homes which transact in an arms-length sale with an observed market price, and we focus on the race and ethnicity of the home seller (the homeowner at the time when the assessment was done). We merge this assembled dataset with standard tract-level measures from the American Community Survey, including median income, median age, and racial demographic shares.

We then obtain a record of assessment cap policies by year along with the cap rate of growth from

3. Assessments applying to tax year t must be, in general, produced in advance of tax year t due to the time required to estimate, validate, and disseminate notice of new assessments. As a consequence, the numerator of the assessment ratio (the assessment) is unlikely to be mechanically affected by the denominator (the sale price).

the Lincoln Institute of Land Policy. The Lincoln Institute database covers state policies from 2006 onward, including those targeting specific subset counties. Fourteen states impose some type of cap on assessment growth during 2006–2016. Table (1) lists each, along with the associated assessment cap. Appendix A presents further detail on classification, including discussion of several judgment calls in classification. Two states change the cap limit during the sample. Three states limit assessment growth to the lesser of a specific target or inflation. There is little variation on the extensive margin of assessment caps during the sample: Minnesota is the only state where we observe a transition from a capped regime to a no-cap regime, however the cap limit in Minnesota is fairly high, and the limit was removed during the Great Recession. As a result, the cap seldom bound in the period prior to being lifted.

We use ZIP code level Home Price Indices (HPIs) from Zillow and the Federal Housing Finance Agency to determine whether the cap constraint binds within each year. For the minority of states which link assessment caps to inflation, we use regional CPI measures from the Bureau of Labor Statistics to determine the relevant limit. We use these HPIs along with the ZIP code of each home to partition observations into three different tax-cap regimes: (i) there is no known cap policy, (ii) a cap exists but has not recently bound, (iii) a cap exists and has been binding over some past period of time. Our final dataset covers 7.4M properties in all 50 states, and spans 2006–2016.[4]

Taxing jurisdictions. We hold intended taxation fixed by conducting our analysis within regions where every home faces the same set of overlapping governments. We call these taxing jurisdictions. Assessment practices, local targets for assessment ratios, and aggregate policy rates can all vary depending on the set of governments a home is exposed to. Estimating inequality within taxing jurisdictions ensures that we are holding fixed all these relevant factors. Just as importantly, by estimating inequality within taxing jurisdictions, we also ensure homeowners are receiving public goods and services from the same set of public entities, which would imply that our measures of inequality are not entangled with any differing choices about the level of public goods provision.

Taxing jurisdictions are constructed using the shapefiles for government boundaries from Atlas Investment Research's Atlas Muni Data together with GIS techniques to associate each home with its encompassing network of overlapping governments. Shapefiles span the universe of local governments

4. We have less than 500 observations in each of 7 so-called "non-disclosure" states which do not mandate reporting of transaction prices.

in the U.S., including counties, cities, towns, schools, and special districts as defined by the U.S. Census. We refer the interested reader to the online appendix of Avenancio-León and Howard (2021) for additional detail on these taxing jurisdictions.

3 Research Design & Results

3.1 Average Inequality by Cap Regime

We begin with a descriptive analysis of overall racial inequality, along with cross-sectional differences by cap regime. All else equal, a higher assessment ratio implies a higher effective tax burden. Thus, all homeowners facing the same legally established rate of taxation should, in theory, have identical assessment ratios (regardless of what the local target ratio is). We characterize any difference in assessment ratios between racial groups as a racial "assessment gap." To test for racial differences in average assessment ratios, we pool all cap regimes and establish the baseline racial assessment gap by evaluating the following specification:

$$ar_{ijt} = \gamma_{jt} + \beta_1 race_{ijt} + \epsilon_{ijt} \tag{1}$$

where ar is the log assessment ratio for property i in taxing jurisdiction j during year t and $race_{ijt}$ is a dummy variable indicating the race of the homeowner.[5] The vector of jurisdiction-year fixed effects, γ_{jt}, absorbs variation arising from different local choices of target assessment ratio.[6] A positive assessment gap means that, relative to market value, assessed values are higher for Black or Hispanic homeowners than they are for white homeowners.

This basic specification can be expanded to directly incorporate an interaction term that accounts for cap regime:

$$ar_{ijt} = \gamma_{jt} + \beta_2 race_{ijt} \times Cap_{jt} + \beta_1 race_{ijt} + \epsilon_{ijt} \tag{2}$$

where Cap_{jt} denotes a cap regime for region j at time t. The main coefficient of interest is β_2, while β_1 maps to our analysis of the assessment gap. Please note the omitted single order term Cap_{jt} is

5. Our analysis focuses on Black or Hispanic minority homeowners and uses non-Hispanic white homeowners as the comparison group in all results. To avoid dropping observations, we group all non-Black or non-Hispanic minority homeowners together. We do not report estimates for this grouping.

6. By itself, the local choice of target has no meaning: a ratio of 50 percent and a policy rate of 4 percent is equivalent to a ratio of 100 percent and a policy rate of 2 percent.

absorbed by fixed effects; however, variation on $race_{ijt} \times Cap_{jt}$ varies at the individual level and hence it is not collinear with our baseline set of fixed effects.

Table (2) shows the results. In Panel A, column (1) presents a baseline estimate of the racial assessment gap in the data: assessment ratios for Black homeowners are on average 12.7 percent higher than for white homeowners in the same jurisdiction. Column (2) estimates Equation (2) when Cap_{jt} denotes cap-exists regime. The racial assessment gap is 15.8 percent in regions with no cap. In regions with a cap, inequality is reduced by 7.2 percent. For transparency, columns (3)–(5) estimate inequality separately within each of three cap regimes using Equation (1). Column (3) shows again 15.8 percent inequality for no-cap regions. Column (4) shows that inequality is 8.6 percent in regions with caps. Column (5) considers regions where a cap not only exists, but has also bound over the prior year; inequality in these regions is 5.9 percent.

Column (6) shows estimates with California removed from the baseline data set. In California, since the passing of Proposition 13 in 1978, assessment growth is capped at 2 percent annually during a homeowner's tenure. Upon sale, the assessment is supposed to reset to market value, although there are also provisions which allow some homeowners to transfer their artificially low assessment ratios to a new property or to their heirs (Danforth 2021). Over this same period of time, many regions of California have experienced yearly growth far in excess of 2 percent. Accordingly, California likely has the largest cap-induced variation in assessment ratios of any state. Reflecting its large population, California also accounts for approximately 15 percent of our core sample. Column (6) shows that despite its prevalence in the data and the stringency of its cap policy, California does not drive our findings of reduced racial inequality in cap regions. Cap regimes within the ex-California sample have 6.1 percent lower inequality, 1.1 percentage points less than the estimate in column (2). So, although Proposition 13 has created outlier variation in assessment ratios, column (6) suggests that the differential impact by race is broadly similar between California and other states with cap policies.

Table (2) Panel B shows results for homeowners who are either Black or Hispanic. Overall inequality across all cap regimes, shown in column (1), is lower at 10.8 percent. The difference between cap and no-cap regimes is also smaller, at 2.53 percent. Columns (3)–(5) again estimate inequality within each regime. Column (5) shows that in regions where the cap has bound over the prior year, Black or Hispanic homeowners face inequality of 6.3 percent; a reduction of 4.5 percent relative to no-cap regimes. Here, the inclusion of California does meaningfully affect the estimate in column (2).

Inequality for Black or Hispanic homeowners in California (a cap regime) is larger than it is for Black homeowners alone, and also larger than the national average. Column (6) shows results for the ex-CA sample: the difference between no-cap and cap regimes is 3.8 percent.

3.2 Who Is Affected and By How Much?

Any tax policy lowering rates for some subset of homeowners is a deliberate choice to increase and accept inequality on some margin. As a consequence, discussion of the distributional and equity implications of tax cap legislation often seeks to understand how institutional features of a given policy translate to impact on certain groups. In California, for instance, analysis of Proposition 13 often focuses on intergenational implications: older homeowners often face much lower tax burden than younger homeowners (Chu and Uhler 2016; Myers 2009). In this section, we decompose the average differences between no-cap regime and binding-cap regimes along several socioeconomic and demographic lines in an attempt to illuminate which homeowners appear to be most affected by cap-related reductions in racial inequality.

For any given demographic characteristic, we sort minority homeowners into quantiles based on that characteristic. For each quantile, Q, we compare racial inequality faced by minority homeowners in that characteristic-quantile, between no-cap and binding-cap regimes:

$$[\bar{ar}_{black,\, Q,\, no\_cap} - \bar{ar}_{white,\, no\_cap}] - [\bar{ar}_{black,\, Q,\, binding\_cap} - \bar{ar}_{white,\, binding\_cap}] \tag{3}$$

As before, a binding-cap region is one where the assessment cap bound over the prior year. Formally, to ensure that we absorb local variation in target assessment ratios correctly, we implement the comparison of Equation (3) by regressing assessment ratios on a jurisdiction-year fixed effect and a categorical variable of quantile assignment that groups all white homeowners together in a single reference group. We estimate inequality within no-cap regions and cap regions separately, because no-cap status (determined at the state-year level) is collinear with the set of jurisdiction-year fixed effects for those regions, preventing us from recovering estimates across all regimes in a pooled specification.[7] We produce bootstrap standard errors for the difference in inequality by resampling the entire dataset and estimating across regimes over 1,000 iterations.

7. For cap-regions, we estimate inequality for both binding and non-binding regions in the same specification, ensuring the jurisdiction-year fixed effect retains its interpretation as the jurisdiction-wide average assessment ratio.

We first examine racial demographics and geographies by median income. Prior work shows that racial inequality in property taxes is highest within regions with the largest share of minority residents and in regions with lowest median income (Avenancio-León and Howard 2021). We sort minority homeowners into quintiles based on the racial demographics of the tract they live in. To illustrate: a Black homeowner living in a neighborhood with less than 0.5 percent Black share would be in the lowest quintile; a Black homeowner living in a tract with more than 21 percent Black share would be in the highest quintile.[8] We then estimate over-assessment for Black homeowners in each quintile and compare between binding-cap and no-cap regimes. Panel A of Figure (1) shows the results. Each bar is the reduction in inequality under a binding-cap regime faced by Black homeowners in that quintile. The cap effect appears to be highly concentrated upon those most affected by the racial assessment gap overall. Inequality is reduced for Black homeowners living in regions with the highest Black population share by 14.2 percent. This does not mean that inequality disappears: under no-cap regimes, Black homeowners in high Black share regions face an average assessment gap of 21.5 percent. So even in binding cap regions, Black homeowners in this quintile still face an average inequality of more than 7 percent.

Panel B of Figure (1) shows a very similar pattern holds for Black or Hispanic homeowners. Reductions in inequality are again highly concentrated on residents living within tracts with the highest share of Black or Hispanic residents. As before, the large reductions in the highest quintile does not signify an overall lack of inequality: the remaining inequality in binding cap regimes for the highest Black/Hispanic share tracts is 7.2 percent.

Panel A of Figure (2) conducts the same analysis when splitting Black homeowners into quintiles by median tract-level income. The lowest quintile contains Black homeowners in areas with the smallest median income, and the highest quintile captures Black homeowners in regions with the largest median income. Again, each bar represents a reduction in inequality between a binding-cap regime and a no-cap regime. Caps have the largest effects on the lowest income neighborhoods: again the areas experiencing the highest racial inequality. Panel B shows qualitatively similar results when considering Hispanic homeowners as well.

As noted, age-related differences are a common concern with cap policies. If prices generally increase over time in excess of the cap limit, this will generate an increasing wedge between assessment

8. The results we present are qualitatively similar using equal percentage splits of 20 percent, 40 percent, etc.

and market values over time. This means that long-tenured homeowners will have lower tax burdens on average. Life-cycle factors also mean that long-tenured homeowners are often older homeowners as well. Age-cohort impact is particularly relevant within the setting of racial inequality, due to racial imbalances in homeownership (Choi et al. 2019) driven significantly by discriminatory housing practices that persisted well into the 20th century and therefore disproportionately affected older Black homeowners.[9]

Figures (3) and (4) explore tenure and age respectively. Panel A of Figure (3) splits Black homeowners into quintiles by the length of tenure observed from the data. The reduction in racial inequality comparing between binding-cap and no-cap regimes generally increases in tenure, with a difference of 15.7 percent in the highest-tenured subset which spans 12–16 years.[10] Results for Black or Hispanic homeowners, shown in Panel B, reflect no reduction for the lowest-tenure quintile, reductions between 5–7 percent for the middle quintiles, and again the largest reduction for longest tenured homeowners. Within no-cap regions, inequality varies little over tenure quintile.[11] Thus, the reductions shown in Figure (3) are driven primarily by differences across quintile within binding-cap regions. In cap regions, assessments are often (though not always) constrained to reset to market value upon sale. As a consequence, longer-tenured homeowners accumulate a larger number of years in which the cap may drive a wedge between assessed values and market prices. Therefore, Figure (3) suggests that the effects of an assessment cap may intensify over time. We explore this directly in the next section.

Figure (4) shows the result of splitting Black homeowners into quintiles by tract-level median age. Here, for both groupings of minority homeowners, we observe the largest cap-related reductions in inequality for homeowners in the youngest regions. For Black homeowners, there is no evidence of age-related heterogeneity across the remaining bins. With the inclusion of Hispanic homeowners, inequality reduction is slightly smaller for the quintile of highest-median age tracts. It seems plausible that larger differences for younger homeowners may arise from age-related location choices: for instance, life-

9. Some examples include: redlining until the 1960s, "white flight" patterns, restrictive zoning policies, persistent public disinvestment in "underserved communities," and the design and siting of public housing. See, e.g., Rothstein (2017).

10. Because the sample construction requires observing an initial transaction to pin down the race of the home seller at a subsequent sale, we observe only a shorter-end subset of the population tenure distribution. Results are qualitatively quite similar if we split on median neighborhood tenure instead.

11. For Black homeowners, estimated inequality falls between 18 and 21 percent for all quintiles. For Black or Hispanic homeowners the range is 12.5 to 16.5 percent.

cycle dynamics would suggest that younger homeowners may be more likely to live in lower-income neighborhoods. Concerns about the distributional implications of cap policies often focus on inter-generational transfers, and so it is noteworthy that changes in racial equity associated with cap policies appear to asymmetrically benefit the youngest homeowners.

We conclude this section with an important note on this heterogeneity analysis. As reflected in Equation (3), the benchmark comparison in each regime is the jurisdiction-wide average assessment ratio for all white homeowners. So, for Black homeowners, each analysis decomposes the average Black-white gap to answer the question: with respect to a particular characteristic, which Black homeowners are further from, or closer to, the overall white homeowner average? A different, and potentially interesting comparison, would explore how the racial assessment gap shifts *within* quantile bin between the two regimes. In the racial demographic setting, for instance, such an analysis would yield the estimate of racial assessment gaps (Black minus white) compared between regime (no-cap minus binding-cap), *only* for homeowners living in tracts with the highest demographic share. In this setting, estimates of zero would mean that the Black-white gap is not different within bin between a no-cap and binding-cap regime. We produce this analysis in the online appendix to this paper, for each of the characteristics discussed above. Across each analysis, we find similar qualitative patterns. This means that even conditioning on a given attribute quantile, Black homeowners are more affected by caps.

3.3 Evidence on Direct Impact

As the outcome of a political process, the existence of a cap is potentially endogenous to a myriad of state-level differences. Accordingly, lower inequality within assessment cap regimes might reflect latent geographical differences in local conditions that affect assessment practices or housing values. In this section, we exploit heterogeneity in how stringently caps bind over time within cap regimes, to assess whether caps directly drive reductions in racial inequality. If caps have a direct effect, we should see these effects increase as caps bind more frequently and for longer periods of time.

Our sample contains very little variation on the extensive margin of cap policies. There is little evidence that supports any high-frequency adjustment of cap policies with respect to either local house prices or local inequality in property tax burden. Policies in 2006 remain in place, largely unchanged through 2016. Minnesota removes its cap after 2009, however the cap limit is fairly high (15 percent),

and given that the transition occurs during the Great Recession, the cap binds infrequently in the years immediately preceding removal. Arizona and Oklahoma shift the cap limit once each during these 10 years. Limits in California, Florida, and Michigan are linked to inflation in a pre-determined manner.

Accordingly, we view realized home price growth within local areas as largely exogenous with respect to cap policies. For a given taxing jurisdiction subject to a cap, some homes are in ZIP codes that experience frequent growth in excess of the cap limit, and therefore are subject to the binding cap over multiple periods. Within the same taxing jurisdiction, other homes will be in ZIP codes that fall below the cap limit more consistently, and therefore are subject to fewer binding periods. We estimate the direct impact of an assessment cap by exploiting this variation in treatment intensity.

We first show that caps do, in fact, have the anticipated mechanical impact: assessment ratios are decreasing in the number of years a cap binds. For each property subject to a cap, we use ZIP code HPI indices to determine how many years the cap binds in the decade prior to the observed assessment ratio. We then estimate:

$$ar_{ijt} = \gamma_{jt} + \beta years\_binding_{z(it)} + \epsilon_{ijt} \tag{4}$$

The subscript on *years_binding* emphasizes that the ZIP code of property i determines the number of binding years in the decade prior to year t. Figure (5) shows the results. An estimate of zero would denote that assessment ratios for capped properties are exactly in line with the jurisdiction-year average for unconstrained properties. We find that assessment ratios monotonically decline as the cap binds more frequently. Within regions where the cap binds for 1–3 years, we find assessment ratios are very similar to the jurisdiction-wide target: statistically the estimates are indistinguishable from zero. Once a cap binds 40 percent of the time (4 years in prior decade), assessment ratios are approximately 3 percent lower, and this difference is marginally statistically significant. As the number of binding years increases from four to seven-plus, we see increasingly lower assessment ratios. This finding empirically confirms the simple mechanical prediction of an assessment cap: a restriction on the numerator along with an increasing denominator theoretically should result in lower assessment ratios relative to unconstrained properties.

We next use this same empirical approach to estimate changes in racial inequality. We augment Equation (4) by interacting *years_binding* with the race and ethnicity of the home seller. Figure (6) Panel A shows the racial assessment gap within each binding year bin for Black homeowners.

Inequality is virtually flat across four years of treatment. Beginning with five years of treatment, inequality shrinks. For properties where the cap binds seven or more years over the prior decade, the Black-white assessment gap is no longer distinguishable from zero. Panel B shows the results for Black or Hispanic homeowners. For this grouping of minority homeowners, inequality is monotonically decreasing in treatment intensity. Again, the estimated racial assessment gap for properties treated for seven or more years is a statistical zero.

Because the existence of a cap is predetermined, and because levels are set statewide (and also largely predetermined, as discussed), the variation in binding intensity driven by ZIP code level growth is plausibly exogenous with respect to the cap policy itself. Accordingly, the results of Figure (6) are strongly consistent with assessment caps causally reducing racial inequality, rather than being a political outcome which is correlated with other drivers of racial variation in tax burden. We elaborate further on this point in the next subsection.

3.4 How Robust is the Relationship between Caps and the Assessment Gap?

The central challenge we face in establishing a causal link between cap policies and assessment gaps is the lack of significant variation in assessment cap policies. Nevertheless, to fully understand the policy implications of imposing a cap, it would be useful to know how robust is the link between cap policies and reductions in assessment gaps. In this section, we extend our analysis to reject several key ways in which unobservable factors could drive the negative relationship between caps and assessment gaps that we find in the cross-sectional analysis.

Our baseline specification includes jurisdiction-year fixed effects; this controls for differences in taxation, amenities and provision of public goods, assessment practices, and local changes in economic conditions. It does not control, however, for time-varying heterogeneity in assessment trends across race, or any racial heterogeneities in factors that vary by state or county (e.g., racial heterogeneity in assessment practices). The latter represents a particularly strong threat to any causal interpretation: perhaps the selection of states into cap policies is related to assessment inequalities in ways that correlate with race. While our data is sufficiently detailed to allow us to control for factors that vary at the year-race level, a significant challenge in this context is that the imposition of caps varies at the state level, and thus controlling for state-race factors would absorb any constant features of state policy. Nevertheless, we can exploit within-state variation in whether limits on assessment growth

are binding or not. While exploiting within-state variation in cap-binding status would not erase all threats to identification, it does allow us to include more stringent fixed effects to control for potential unobservable confounders that could drive the relationship between assessment gaps and binding caps. We can thus extend Equation (2) to impose a more stringent specification that controls for yearly racial trends and state/county-level racial factors by including year $\times$ race, γ_{rt}, and/or state/county $\times$ race, γ_{rs}, fixed effects:

$$ar_{ijt} = \beta_2 race_{ijt} \times regime_{jt} + \gamma_{jt} + \gamma_{rj} + \gamma_{rs} + \epsilon_{ijt} \tag{5}$$

where $regime_{jt}$ denotes a particular cap regime for region j at time t. Here, the estimate on *race* alone is absorbed by year $\times$ race or state/county $\times$ race fixed effects. Also, note that when $regime_{jt} =$ Cap Exists, $race_{icjt} \times regime_{jt}$ will also be absorbed by state/county $\times$ race fixed effects.

We show these results for Black homeowners in columns (1)–(6) of Table (3) Panel A. In column (1), we introduce year $\times$ race fixed effects when $regime_{jt}$ denotes a cap-exists regime. In this specification, the existence of a cap reduces racial inequality by 7.6 percent for Black homeowners, which is in line with our baseline estimate of 7.2 percent (see Table (2), column (2)).

From column (2) onward, we let $regime_{jt}$ denote binding cap regions, so that we are able to absorb geography by race variation (which otherwise would be collinear with cap existence). Motivated by the evidence in Figure (6) that suggests effects arise after several years of exposure to a binding cap, we focus on regions where the cap binds for 5 or more years over the prior decade. For comparison, column (2) repeats the year $\times$ race specification of column (1). The results suggest that a binding cap regime is associated with a reduction in racial inequality of 6.9 percent, again not far off from our baseline estimate. Columns (1) and (2) suggest that time-varying racial heterogeneity do not seem to be driving the relationship between caps and assessment gaps. As previously stated, all our specifications include jurisdiction-year fixed effects which makes our estimates robust to unobserved jurisdiction-level shocks that occur over time; however, these do not control geographic factors that generate persistent differences across race.

In column (3), we present estimates of Equation (5) where we introduce state $\times$ race fixed effects. Controlling for state $\times$ race fixed effects reduces the magnitude of our estimates on the margin, down to 5.5 percent. Similarly, in column (5), we introduce county $\times$ race fixed effects; the estimates we retrieve are virtually indistinguishable from those with state $\times$ race fixed effects, which, importantly,

suggests that factors that typically vary at the county level (such as assessment practices), are not driving the relationship between caps and the assessment gap. Columns (4) and (6) add year × race fixed effects to columns (3) and (5), respectively, and again show an economically and statistically significant negative relationship between binding-caps and the assessment gap. Time-varying and state/county heterogeneity by race do not seem to explain the negative relationship between caps and assessment gaps. These results are qualitatively similar when we consider Hispanic homeowners as well (columns (1)–(6) of Table (3) Panel B).

While time-varying and state/county heterogeneity by race do not explain the results we have presented, it might still be the case that factors precisely varying with cap-binding status × race could be driving our results. Cap-binding status is a function of local home price growth, itself presumably a high-dimensional function of local economic variables which we can neither completely observe nor control for. To address this limitation, we refine our analysis by matching ZIP codes on home price growth across the entire time-dimension of the sample. For each ZIP code, we find a match-pair set of ZIP codes where home-price growth falls within a predetermined threshold percentage point distance ρ for each year from 2005 to 2016. The choice of ρ is not trivial: Having a small distance threshold would presumably yield more precise matches; however, this would also decrease the number of match-pairs. We thus perform this exercise for $\rho \in \{1, 1.5, 2\}$. We then include match-pair × race fixed effects, $\gamma^{\rho}_{r,\, match-pair}$, in an attempt to absorb potential confounders that could vary at the cap-binding status × race level. Our match-pair specification takes the following form:

$$ar_{ijt} = \beta_2 race_{ijt} \times regime_{jt} + \gamma_{jt} + \gamma^{\rho}_{r,\, match-pair} + \epsilon_{ijt}. \tag{6}$$

We show results for this estimation in columns (7)–(9) of Table (3), where ρ takes on values of 1, 1.5, or 2 percentage points, respectively. For Black homeowners, estimates of the reduction in the assessment gap using this procedure range from 3.4 percentage points to 11.6 percentage points. For Black/Hispanic homeowners, the estimates range from 1.8 to 4.5 percentage points. In the most conservative case, the lower end of the estimate range is no smaller than 47 percent of our baseline results. We thus interpret these estimates as evidence that the relationship between caps and assessment gaps is not an artifact of selection into cap-binding status.

4 What Mechanisms Explain Reductions in Racial Assessment Gaps?

It is unsurprising that assessment caps reduce assessment ratios overall – this is the mechanical result of a binding cap. But it is less clear why caps have a disproportionate effect on Black homeowners and Black communities. In this section, we explore two different mechanisms that are triggered by binding caps and contribute to reduce the assessment gap.

Exposure to home price growth. A simple reason why property tax caps might help reduce property tax inequality is that the cap binds more often or more tightly for Black homeowners. However, such a hypothesis is neither obvious nor immediately intuitive given historical and contemporaneous evidence suggesting that Black homeowners face lower levels of home price growth than whites. Evaluating pre-WW II housing patterns, Akbar et al. (2021) show that Black households paid 28 percent more for their homes only to see a drop in the value of their homes once their neighborhoods transitioned from majority-white to majority-Black. Flippen (2004) and Perry, Rothwell, and Harshbarger (2018) present evidence that devaluation of homes in Black neighborhoods persists today. Kermani and Wong (2021) present further evidence that housing returns are lower for Black homeowners; however, importantly they find that a modern racial gap in housing returns is driven mostly by foreclosures and short sales, and that Black homeowners who sell under non-distressed conditions yield housing returns similar to those of whites.

Table (4) explores racial exposure to caps, binding intensity conditional on being subject to a cap, and exposure to home price growth. Columns (1) and (2) of Panel A estimate the average difference in exposure to a cap policy. In a linear probability specification that regresses a dummy for cap region on homeowner race, Black homeowners are 2.6 percent more likely to live in a state with a cap policy. This estimate is not statistically different from zero. Racial demographics also do not strongly predict cap exposure. The 80th percentile of tract-level Black share is 21 percent; the estimate in column (2) implies this is associated with a 1.9 percent reduction in probability of living in a cap regime. This estimate is also statistically insignificant. For Black homeowners, the magnitude of both point estimates is sufficiently small that racial selection into cap regime is unlikely to be a major channel that generates any of the patterns we document.

We cannot rule out the role of selection once Hispanic homeowners are included. Grouped together, Panel B shows that Black or Hispanic homeowners are 18 percent more likely to live under a cap regime.

Tract-level demographics are also a predictor. The 80th percentile of Black or Hispanic population share is 54 percent. Column (2) suggests that regions this would be associated with a 25.7 percent increased likelihood of living in a state with a cap policy. This analysis, therefore, does not rule out the possibility that Hispanic homeowners select into regions where an assessment cap binds, but also assessment ratios are lower relative to white residents for reasons unrelated to cap policies. However, the results of Figure (3) still show that inequality reduces with homeowner tenure for Black and Hispanic residents, suggesting that selection alone cannot explain all cross-sectional differences.

Conditional on living within a region having an assessment cap, columns (3) and (4) assess the likelihood of a minority resident having that cap bind. We regress a dummy signifying a binding cap over the prior year on a jurisdiction-year fixed effect and homeowner race. Panel A shows that Black homeowners are 14 basis points more likely to live within a binding-cap regime. Tract demographics are not a strong predictor. Here, the results for Black or Hispanic homeowners are similar: 15 basis points more likely to live within a binding-cap regime. Racial demographics, while statistically significant, are a minimal economic predictor of a binding-cap regime: a shift from zero to the 80th percentile of Black or Hispanic population share would be associated with an 80 basis point increase in binding propensity.

Columns (5)–(7) in each panel test exposure to home price growth. Consistent with the findings in the literature, we also find that unconditional home price growth is not higher for Black or Hispanic homeowners than it is for whites in our sample. Column (5) shows that the average Black homeowner in our data, regardless of cap regime, is exposed to 19 basis points lower growth. This figure does not change with the inclusion of Hispanic homeowners. Conditional on a cap existing, but regardless of whether it binds, column (6) shows essentially no difference in exposure to home price growth for Black homeowners, and 10 basis points higher growth for Black or Hispanic homeowners. However, column (7) shows that conditional on a cap binding within a jurisdiction, both groups of minority homeowners are exposed to slightly higher growth. Black homeowners face an additional 36 basis points per year, and Black or Hispanic homeowners face 24 basis points higher growth.

So, conditional on living in a state with a cap, Black and Hispanic homeowners are both slightly more likely to live in a ZIP code where caps bind, and conditional on a binding cap, experience slightly higher growth. Both facts mechanically imply that assessment caps will drive down assessment ratios *more* for minority homeowners than for white homeowners: the greater likelihood of a

binding cap pushes the numerator down for Black or Hispanic homeowners relative to (uncapped) white homeowners; and when the cap binds equally, these minority homeowners see larger increases in the denominator.

We can quantify how much of the reduction in racial inequality between no-cap and capped regimes would be generated by this purely mechanical effect. To quantify the effect of repeatedly binding caps, we consider regions where the cap has bound consecutively for n years, with $n \in \{1:5\}$. We compute the reduction implied by differential exposure to home price growth by assuming every homeowner starts with equal assessment ratios at $t-n$. Then, we construct counterfactual uncapped assessment growth by cumulating ZIP code growth from $t-n$ to t. We construct capped assessment growth measures by assuming the assessment grows at exactly the capped rate over the same period. We regress the log of each measure on race, absorbing jurisdiction-year fixed effects, as always. This yields two estimates: $\beta_{Black}^{uncapped}$ and β_{Black}^{capped}. The difference between the two represents the change in racial inequality that arises solely from differential exposure to home price growth within jurisdiction.

Figure (7) shows the results. Two facts are most salient. First, the reduction in inequality that arises through this mechanical exposure to different home price growth is small across all horizons. For Black homeowners subject to a binding cap five years in a row, the total reduction in racial inequality is 1.4 percent. For Black or Hispanic homeowners – a group facing smaller average differences – the maximum reduction, also realized after 5 years, is 78 basis points. Second, the mechanical reduction does appear to be increasing the longer the cap binds. This latter finding is not a direct implication of racial differences averaged across the time-series. Indeed, we find that within the small number of ZIP codes in the sample exposed to 6 or more consecutive years of binding caps, the mechanical shift in racial inequality is less than a percent. Since the data span 2006–2016, a consecutive 6 or 7 year period necessarily includes the Great Recession. As a consequence, ZIP codes seeing very long and consecutive exposure to binding caps are potentially a highly selected sample. We consider the main takeaway from Figure (7) to be that racial differences in exposure to home price growth does explain some of the reduction in inequality engendered by caps, but a relatively small proportion overall.

Caps Mitigate Neighborhood Misvaluation. Because the mechanical explanation cannot explain the large reductions in the Black-white gap associated with an assessment cap, we explore how the correlates of assessor error shift between the two regimes. In a hedonic modeling framework, we treat home values as the inner product of two vectors: home attributes and the price of each attribute.

For equitable tax administration, assessments should perfectly track market prices. Therefore, the implied prices of each home-attribute should also be the same between the two valuations. We extract implied prices for market values and assessed values by estimating two hedonic regressions. For each, the independent variables remain exactly the same: a vector of home attributes and a vector of neighborhood-level attributes. The dependent variable is either market price (M) or assessment (A). Our estimating equations take the following form:

$$\ln(y_{injt}) = \gamma_{jt} + \beta_1^y X_{injt} + \beta_2^y W_{njt} + \epsilon_{injt} \tag{7}$$

where $y \in \{A, M\}$, and i indexes home, j taxing jurisdiction, n census tract, and t year. X_{injt} is a vector of home characteristics including square feet, bedrooms, total rooms, and flags for various amenities, and W_{njt} is a vector of tract-level characteristics. Our goal is the comparison of $\hat{\beta_1}^M$ with $\hat{\beta_1}^A$, and $\hat{\beta_2}^M$ with $\hat{\beta_2}^A$. That is, we need to determine whether hedonic characteristics appear to be *differently* capitalized into market valuations and assessed valuations.[12] We perform this exercise for areas where there is no cap, and for areas with a persistently binding cap.

Figure (8) shows the results. In each panel, for a given attribute we plot the absolute difference between coefficients from the market regression and the assessment regression: $|\beta^M| - |\beta^A|$. This shows the percentage change in assessment ratio induced by a 1-standard deviation shift in the underlying attribute. A bar of zero length denotes that assessments capitalize features in the same way as market prices – the assessment goal. Negative bars mean that assessments react *more* to that attribute than market prices do, and a positive bar means that assessments are under-responsive to a given attribute.

Panel A shows results for areas without assessment caps. The central pattern is much larger disagreement on neighborhood-level attributes than on housing-stock attributes. A standard-deviation shift in property-level attributes induces a 1 percent or smaller mismatch in the assessment ratio. Assessors appear to slightly over-react to square footage and the presence of a porch/patio; for all other traits, market prices are more responsive. It is neighborhood attributes that generate the largest mismatch between assessed values and market values. The impact of these mismatches is also evidently racially correlated. A standard deviation shift in tract-level Black population share induces 3 percent misalignment in assessment ratios. This mismatch will tend to increase assessment ratios for Black

12. This analysis closely parallels the analysis used in Avenancio-León and Howard (2021).

homeowners.[13] However, as a consequence of residential segregation, racial differences in exposure to other neighborhood-level factors, like unemployment or median income, will also generate higher average assessment ratios for Black homeowners.

Panels B–D shows the same analysis for homes in ZIP codes where an assessment cap binds with increasing frequency over the prior decade: 1–2 years in Panel B, 3–4 years in Panel C, and 5 or more years in Panel D. The disagreement between market-implied attribute prices and assessment-implied prices steadily decreases in cap binding intensity. Once a cap has bound for 5 years within the prior decade, only two attributes induce more than half a percentage point of disagreement in assessment ratios. Assessments are still more responsive to square footage than market prices are. Black share is also still associated with misalignment, but the magnitude is substantially reduced. The previously evident and large misalignment on other neighborhood attributes almost entirely disappears.

With more than 3,000 assessing districts nationwide, we are not able to ascertain what particular modeling choices or changes generate this closer alignment within binding-cap regimes. Our sense, however, which is consistent with the evidence in Figure (8), is that caps reduce the scope for model-based error. The valuation process is simple for a binding-cap region: the assessment is simply increased by the growth limit. The existence of a cap, in effect, appears to discipline assessors from making large mistakes, potentially by removing the necessity of relying on a complicated valuation model. While this does not necessarily translate to a direct policy implication, it suggests that transparent and rules-based approaches to assessments – relying on 3rd party-produced HPI indices, for instance – may help improve assessment equity on both racial and potentially other margins.

5 Conclusion

Assessment caps are one of a wide range of policies that move property tax schedules away from a perfectly proportional tax applying identically to all residents. Exemptions are another extremely common policy: primary homeowners or senior homeowners are often eligible for a (usually flat) reduction in taxable basis. By definition, any policy that shifts tax burden for a subset of residents will induce inequality within that taxing jurisdiction. A longstanding and stringently binding assessment

13. It is a stylized fact of racial segregation in the U.S. that the average Black homeowner lives in a tract with higher Black share (43.5 percent) than the average white homeowner (7.2 percent); a similar patterns holds for Black or Hispanic demographics.

cap, for instance, tends to place a higher tax burden on those who buy homes recently, and a lower one on long-time residents.

In a world where assessors did not make mistakes, policy evaluation would straightfowardly weigh the benefits of policy-driven inequality (reduction of tax burden on senior citizens with liquidity constraints, for instance) with its costs (perhaps increased difficulty for young families to buy homes or for middle-aged people to move). However, assessors do make systematic mistakes. This paper shows that tax policy can have an important secondary effect through intersection with existing flaws in property tax administration. In the context of racial inequality, we show that caps have a strong impact on tax equity for Black and Hispanic homeowners, particularly those in low-income neighborhoods and high-minority neighborhoods, which as prior work has shown, are exactly the neighborhoods where assessors are making the largest mistakes. The hedonic evidence we present suggests that a large portion of this reduction may operate through mitigating model-driven misvaluation.

This paper does not explore how caps affect inequality on margins other than race. In addition to the primary, age-related distributional margins discussed briefly above, one would also expect caps to have an impact on the provision of public goods or in the use of alternative sources of funding for local governments. McCombs and Carroll (2005) show that policy limiting tax revenue can lower K-12 spending; Downes and Figlio (1998) find that tax limits can lower student test scores. And there is concern that revenue lost to property tax caps can lead to increases in potentially regressive non-tax fees and charges (Galles and Sexton 1998). The impact of adjustment along these margins will also potentially have differing interpretation by race, income-level, rural-urban divide, or many other characteristics. Our focus on how assessment caps affect one group of homeowners is not, of course, intended to suggest that other margins are less relevant for policy evaluation.

Caps appear to discipline assessor errors, which presumably arise from model misspecification. Our results suggest that more attention should be given to caps on property tax assessments as a potential tool for addressing existing administrative inequality in property taxation. Recognizing that cap-induced under-assessment may ameliorate over-assessment generated by misvaluation, we caution against evaluating the efficiency impacts of caps without fully understanding their redistributive effects. Likewise, we caution that inequality along alternative dimensions most be studied to determine whether caps on property tax assessments are an effective tool against racial inequalities more broadly.

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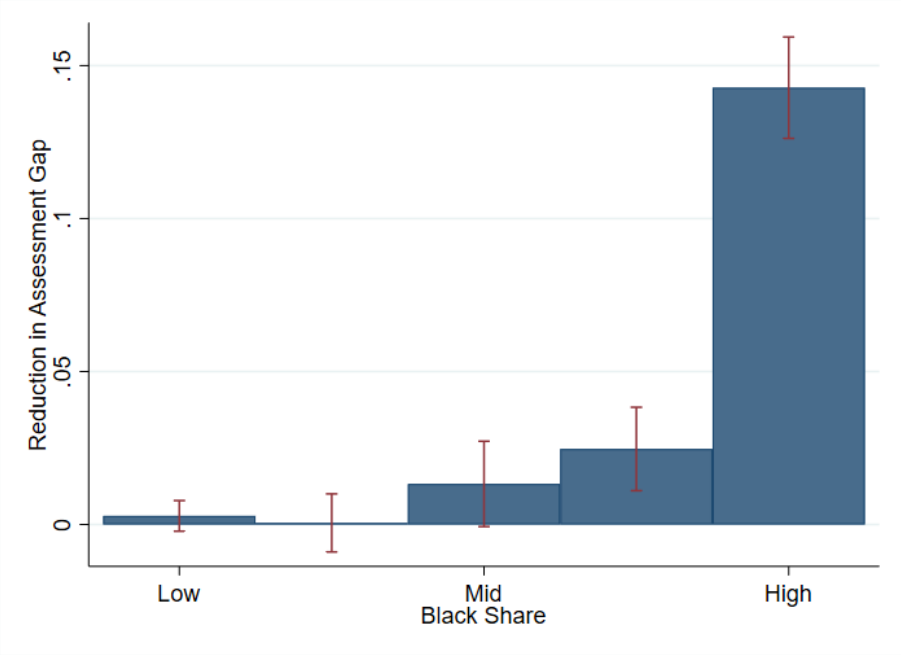
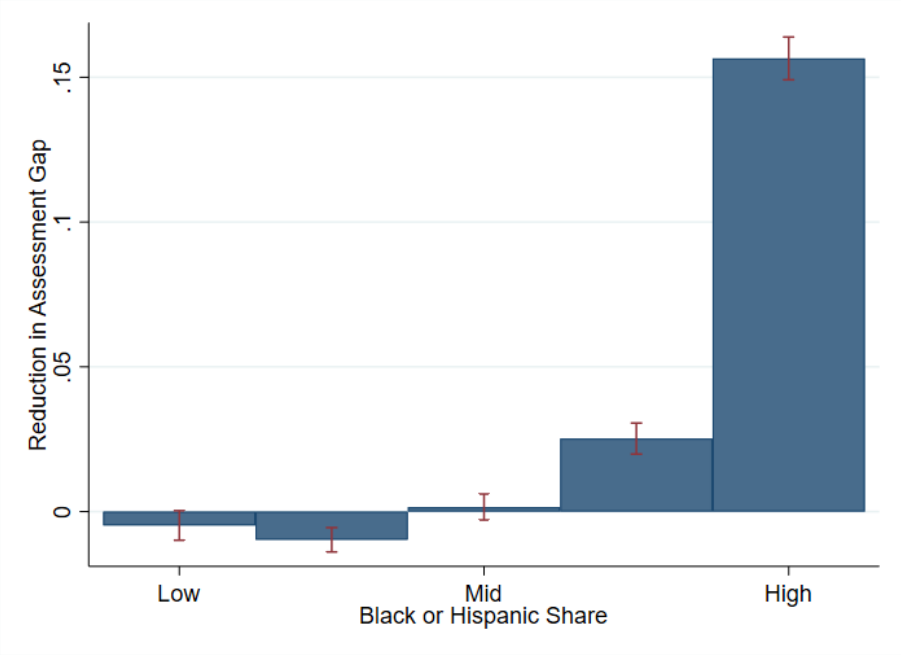
Figure 1: Cap-Related Reduction in Inequality By Minority Share

Panel A: Black Homeowners Only



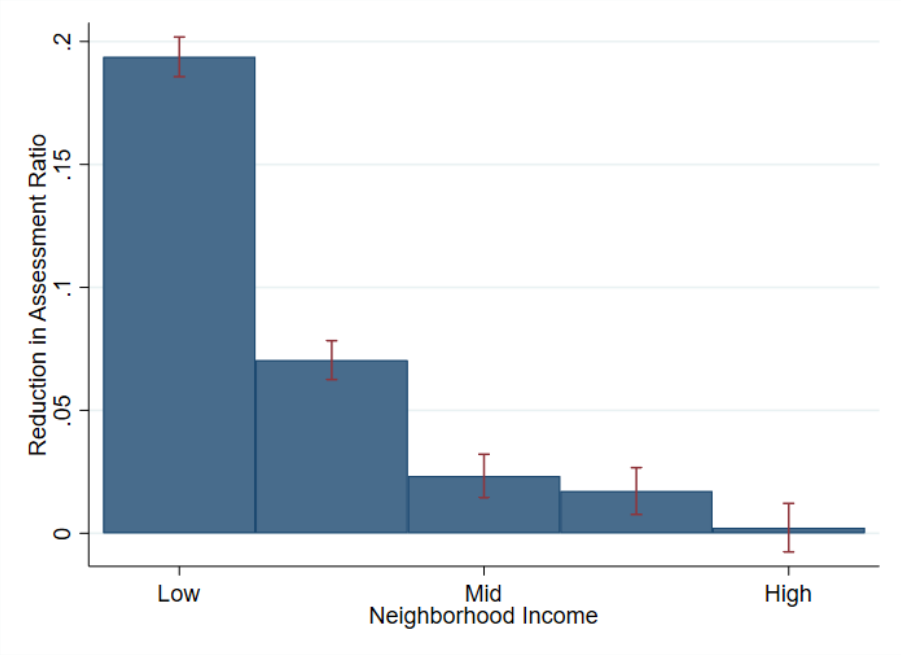
Panel B: Black and Hispanic Homeowners



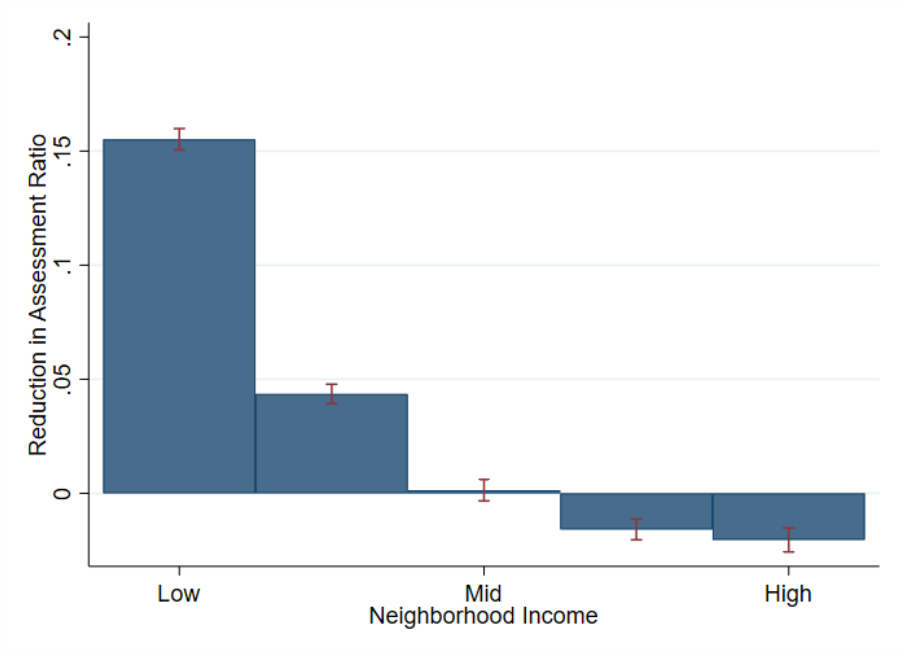
NOTES: This figure depicts the difference in assessment gap between jurisdictions with a binding cap on assessment growth and jurisdictions with no legislative caps, by Black/Hispanic share bins. Bins are constructed by sorting census tracts by their share of Black residents and then assigning tracts to quintiles. The assessment gap for each jurisdiction-bin is constructed by taking the difference in assessment ratios between the average Black homeowner in a given jurisdiction-bin and the jurisdiction-wide average for white homeowners. For each bin, we plot the difference between the assessment gap for homeowners in no-cap regimes and for homeowners in binding-cap regimes. A positive difference is then indicative of a *reduction* in inequality when a cap binds. Panel A presents results for Black homeowners only. Panel B shows results for Black and Hispanic homeowners together. Bootstrapped confidence intervals are presented at the 95 percent level.

Figure 2: Cap-Related Reduction in Inequality By Neighborhood Income

Panel A: Black Homeowners Only



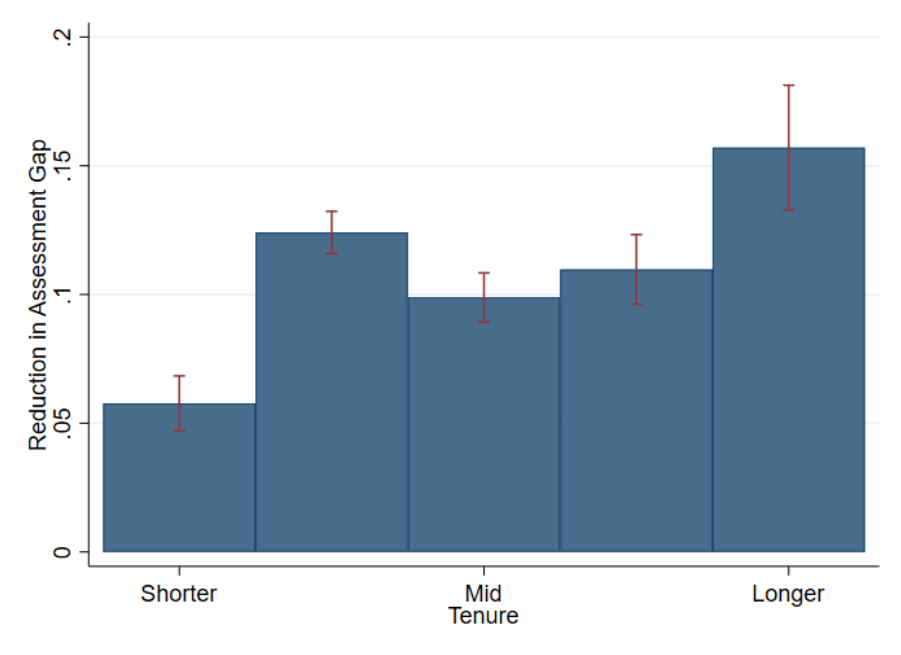
Panel B: Black and Hispanic Homeowners



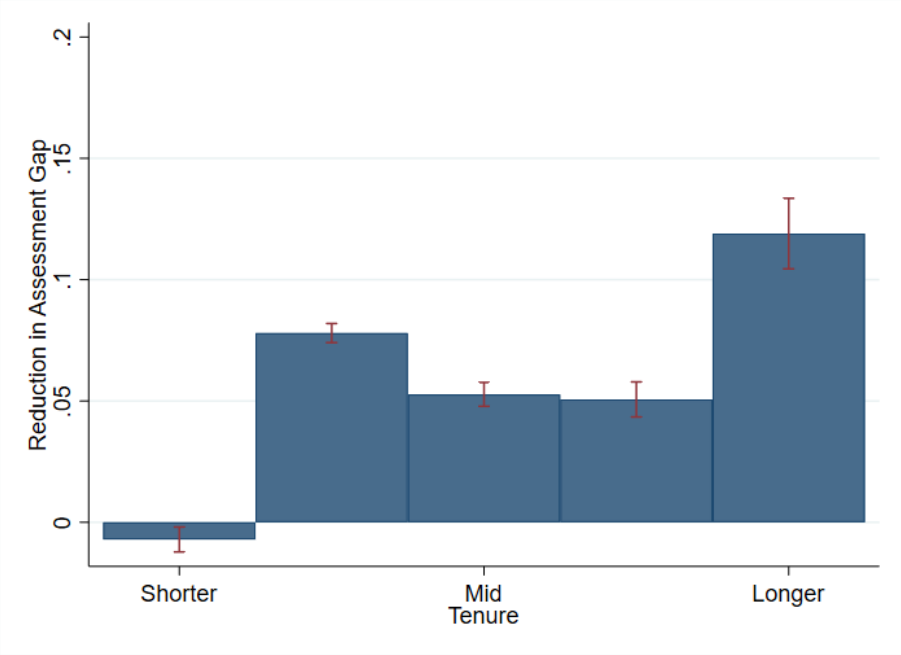
NOTES: This figure depicts the difference in assessment gap between jurisdictions with a binding cap on assessment growth and jurisdictions with no legislative caps, by neighborhood income bins. Bins are constructed by sorting census tracts by their average neighborhood income and then assigning tracts into quintiles. The assessment gap for each jurisdiction-bin is constructed by taking the difference in assessment ratios between the average Black homeowner in a given jurisdiction-bin and the jurisdiction-wide average for white homeowners. For each bin, we plot the difference between the assessment gap for homeowners in no-cap regimes and for homeowners in binding-cap regimes. A positive difference is then indicative of a *reduction* in inequality when a cap binds. Panel A presents results for Black homeowners only. Panel B shows results for Black and Hispanic homeowners together. Bootstrapped confidence intervals are presented at the 95 percent level.

Figure 3: Cap-Related Reduction in Inequality By Homeowner Tenure

Panel A: Black Homeowners Only



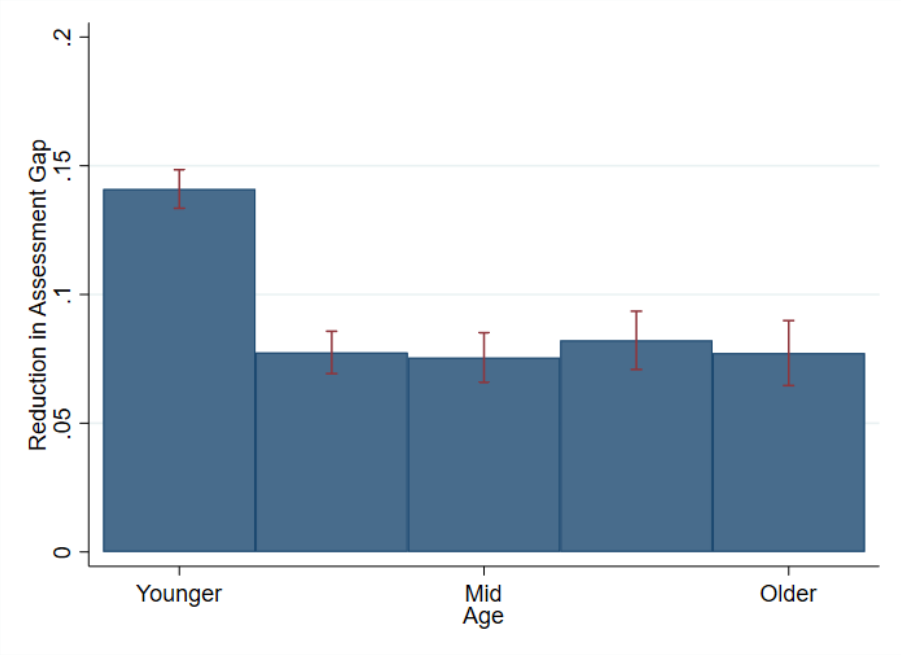
Panel B: Black and Hispanic Homeowners



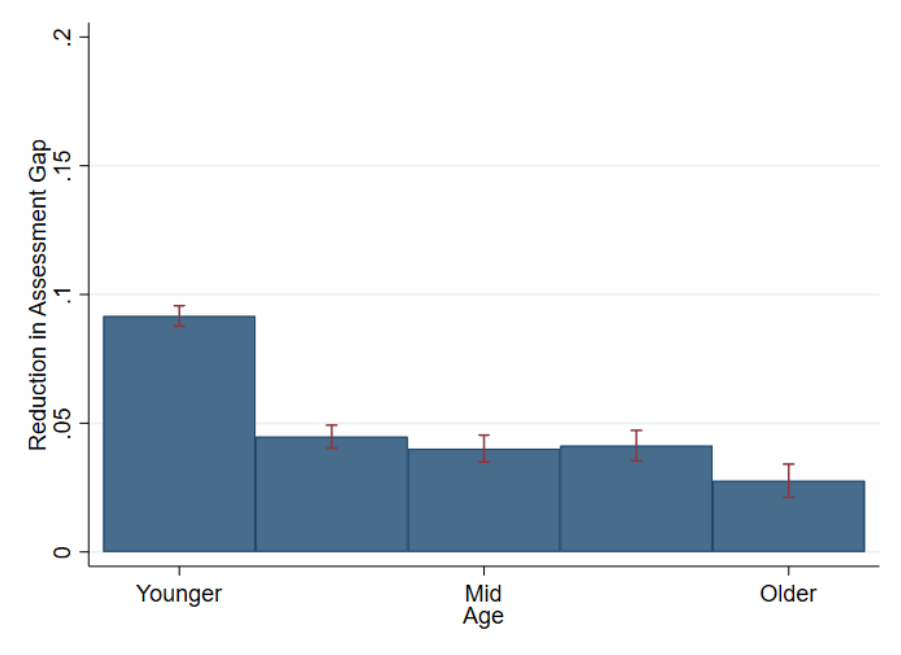
NOTES: This figure depicts the difference in assessment gap between jurisdictions with a binding cap on assessment growth and jurisdictions with no legislative caps, by homeowner tenure bins. Bins are constructed by sorting homeowners by their tenure and then assigning homeowners into quintiles. The assessment gap for each jurisdiction-bin is constructed by taking the difference in assessment ratios between the average Black homeowner in a given jurisdiction-bin and the jurisdiction-wide average for white homeowners. For each bin, we plot the difference between the assessment gap for homeowners in no-cap regimes and for homeowners in binding-cap regimes. A positive difference is then indicative of a *reduction* in inequality when a cap binds. Panel A presents results for Black homeowners only. Panel B shows results for Black and Hispanic homeowners together. Bootstrapped confidence intervals are presented at the 95 percent level.

Figure 4: Cap-Related Reduction in Inequality By Median Neighborhood Age

Panel A: Black Homeowners Only

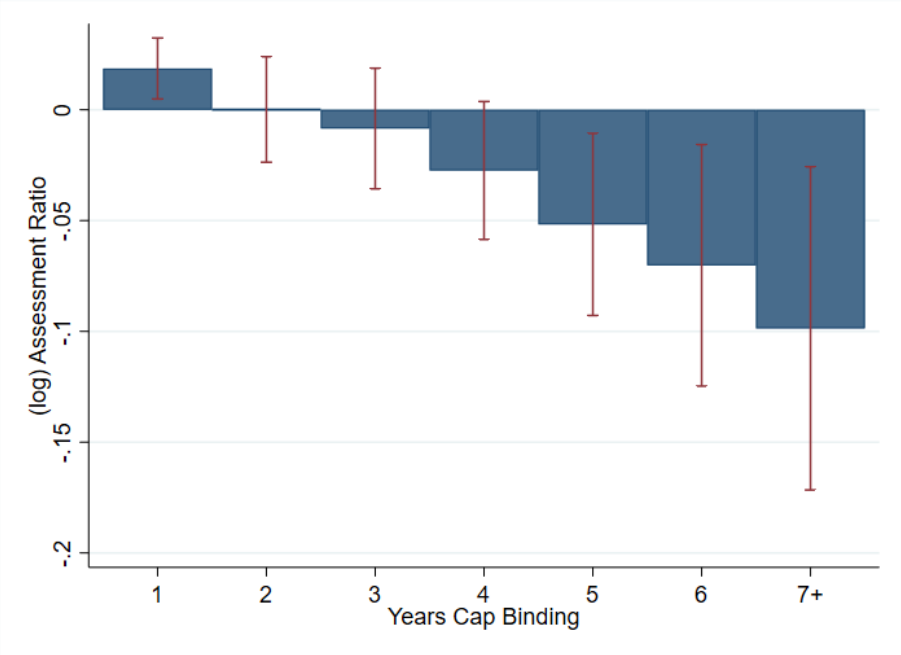


Panel B: Black and Hispanic Homeowners



NOTES: This figure depicts the difference in assessment gap between jurisdictions with a binding cap on assessment growth and jurisdictions with no legislative caps, by median neighborhood age bins. Bins are constructed by sorting census tracts by their median neighborhood age and then assigning tracts into quintiles. The assessment gap for each jurisdiction-bin is constructed by taking the difference in assessment ratios between the average Black homeowner in a given jurisdiction-bin and the jurisdiction-wide average for white homeowners. For each bin, we plot the difference between the assessment gap for homeowners in no-cap regimes and for homeowners in binding-cap regimes. A positive difference is then indicative of a *reduction* in inequality when a cap binds. Panel A presents results for Black homeowners only. Panel B shows results for Black and Hispanic homeowners together. Bootstrapped confidence intervals are presented at the 95 percent level.

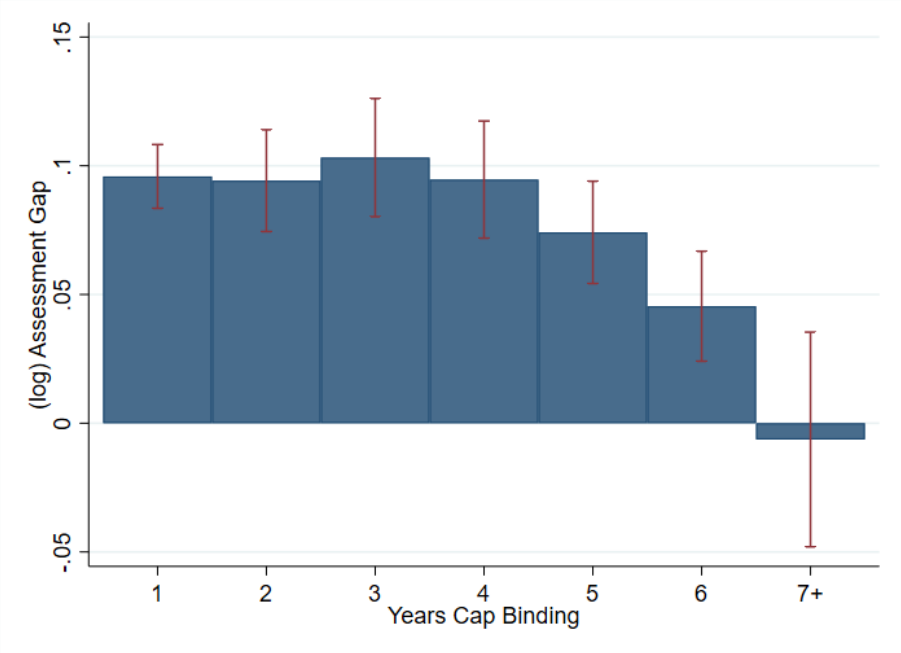
Figure 5: Heterogeneity in Assessment Ratios By Years of Cap Binding



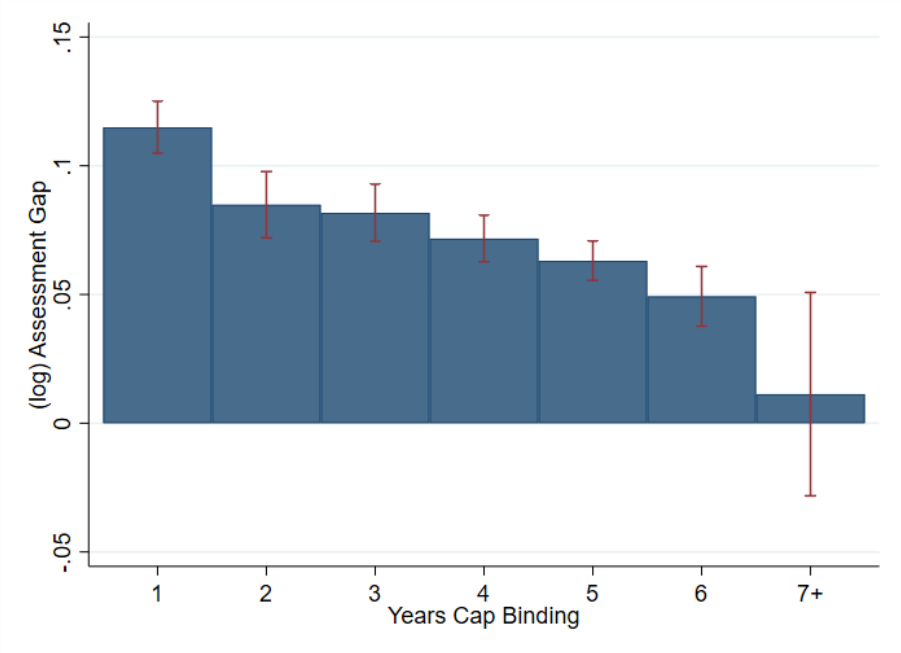
NOTES: This figure depicts the difference in assessment ratio between homeowners in a given bin and the jurisdiction-wide average for each jurisdiction-year. Each bin represents the number of years home price growth has met or exceeded the statutory cap on assessment growth. Each bar presents the difference in assessment ratios between the average homeowner in a given bin, regardless of race, and the jurisdiction-wide average. Confidence intervals presented at the 95 percent level.

Figure 6: Heterogeneity in the Racial Assessment Gap by Years of Cap Binding

Panel A: Black Homeowners Only



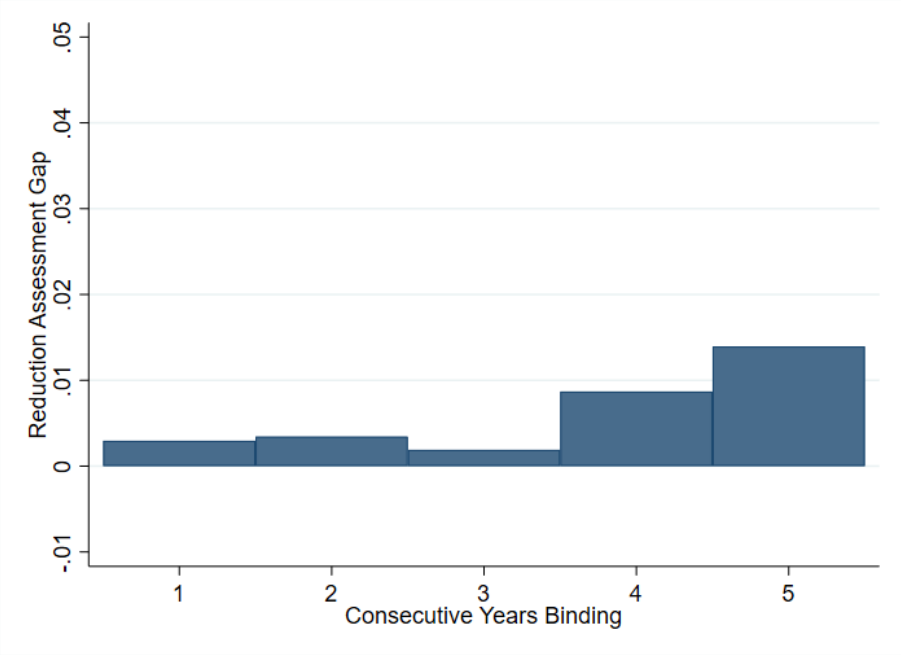
Panel B: Black and Hispanic Homeowners



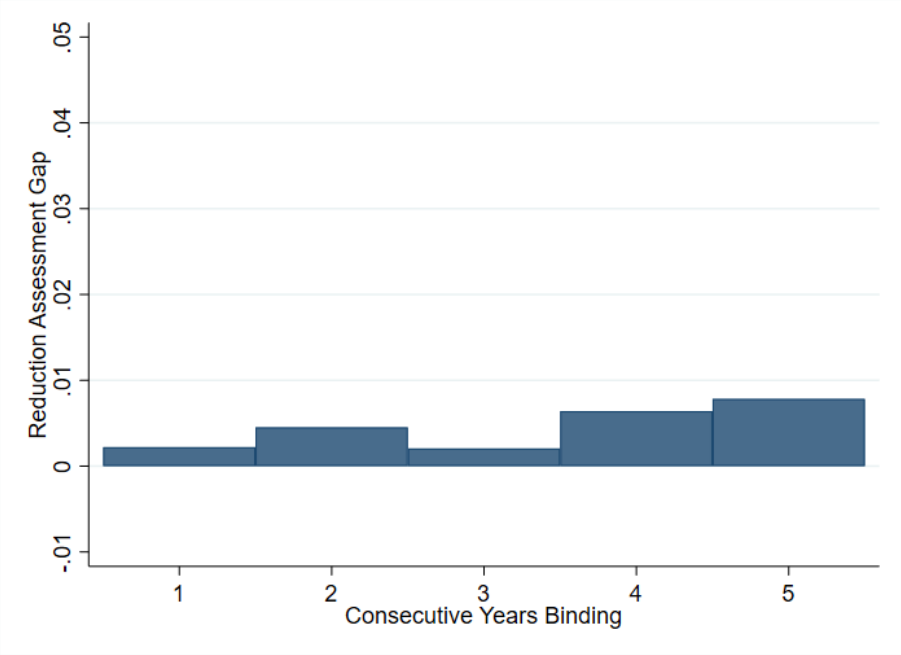
Notes: This figure depicts the difference in assessment ratio between the average Black or Hispanic homeowner in a given bin and the jurisdiction-wide average for each jurisdiction-year. Each bin represents the number of years home price growth has met or exceeded the statutory cap on assessment growth. Panel A presents results for Black homeowners only. Panel B shows results for Black and Hispanic homeowners together. Confidence intervals presented at the 95 percent level.

Figure 7: Reduction in Inequality Implied by Differential Exposure to Cap

Panel A: Black Homeowners Only

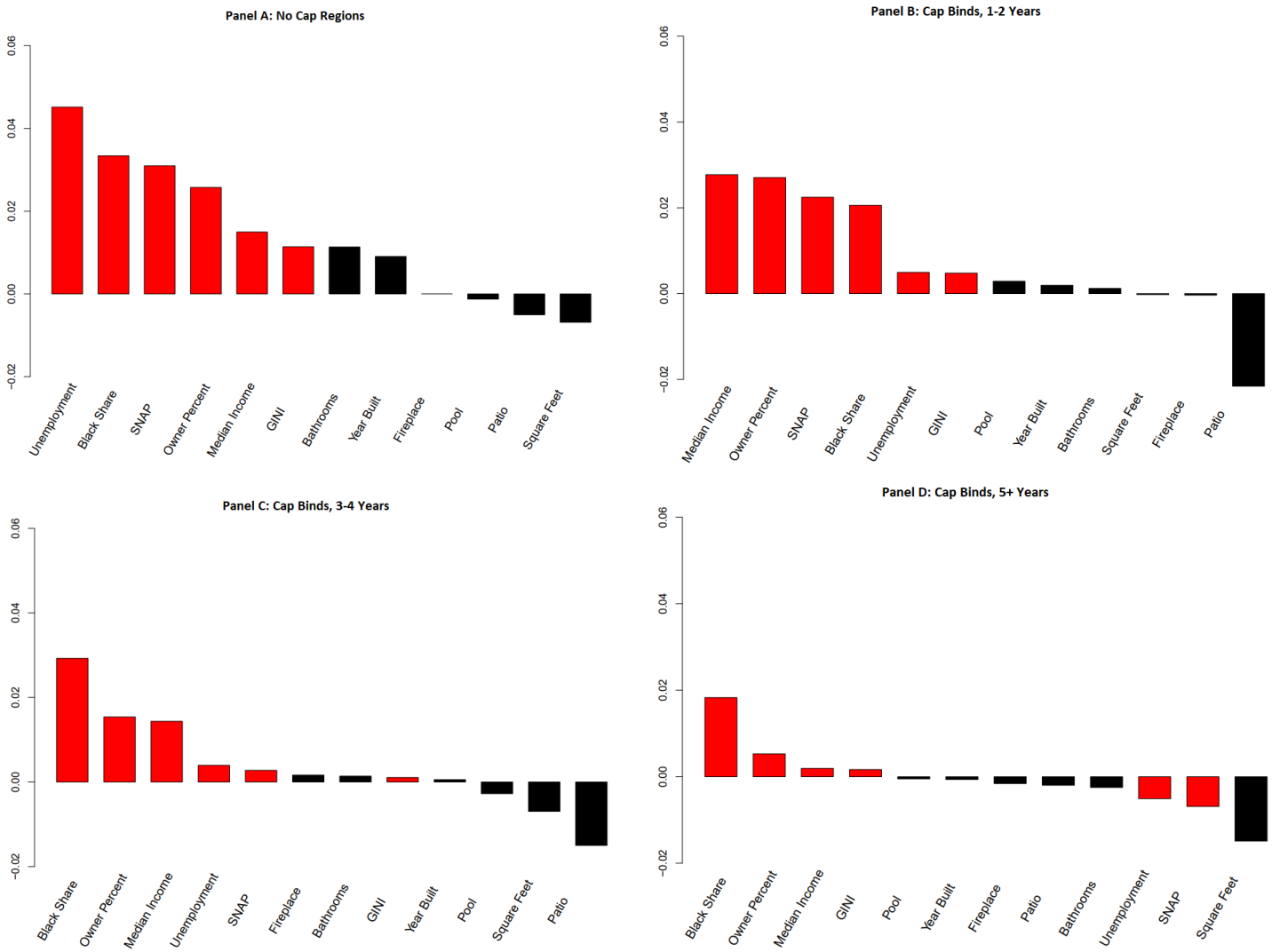


Panel B: Black and Hispanic Homeowners



NOTES: This figure depicts the mechanical reduction in assessment gap that arises under binding-cap regimes due to Black/Hispanic homeowners being exposed to higher home price growth, conditional on that binding cap. Each bar computes the effect within a region where the cap binds consecutively for a given number of years. We construct counterfactual no-cap assessment ratios by cumulating the growth in home prices for a given property's ZIP code, assuming assessments accurately reflect this growth. We construct cap-regime assessment ratios by assuming assessments grow at exactly the policy limit. We then estimate the racial assessment gap under each regime, and plot the difference. A positive bar represents a reduction in inequality under the binding cap regime. Panel A presents results for Black homeowners only. Panel B shows results for Black and Hispanic homeowners together.

Figure 8: Hedonic Models: Mismatch – Black Homeowners



NOTES: Each bar in this figure plots the difference between two estimated hedonic prices: one estimated from a model with market values as the dependent variable, and one from a model with assessment values as the dependent variable. Otherwise, the two hedonic models are identical: all regressors are the same. Both market values and assessed values are logged in the underlying models, so the difference between the two estimated hedonic prices represents a proportional shift in the assessment ratio that arises from a one standard-deviation shift in the underlying variable. Bars in red are tract-level characteristics. Bars in black are property-level characteristics. A bar at zero would denote that the market-hedonic is the same as the assessment hedonic price. Larger bars signify a greater disconnect between market-hedonics and assessment-hedonics. Finally, bars above zero denote that estimated market hedonic prices are greater in (absolute) magnitude than assessed hedonic prices. Bars below zero denote that the assessment hedonic price is larger. Panel A shows estimates for regions with no legislative cap on assessment growth in place. Panel B shows estimates for regions where a cap has bound for 1–2 years. Panel C shows estimates for regions where a cap has bound for 3–4 years. Panel D shows estimates for regions where a cap has bound for 5+ years. Appendix Figure (B.5) presents results for Black and Hispanic homeowners together.

Table 1: Summary of Assessment Cap Policies, 2006-2016

State	Assessment Growth Limit	Notes
Arkansas	5%	
Arizona	5% or 10%	Increase in limit in 2014
California	2%	Lesser of 2% or inflation
Florida	3% or less	Lesser of 3% or inflation
Maryland	10%	
Michigan	5% or less	Lesser of 5% or inflation
Minnesota	15%	Cap removed in 2011
Montana	-	Assessment increases phased in over 6 years
New Mexico	3%	Also 6.1% max over two years
New York	6%	Policy covers the five boroughs of NYC plus Nassau County. In addition to annual limit, policy provides for 20% limit over a 5 year period.
Oklahoma	3% or 5%	Decrease in limit in 2013
Oregon	3%	
South Carolina	15% over 5 years	
Texas	10%	

NOTES: This table reports legislative limits on assessment growth at the state level for the 2006–2016 time period. Source: Lincoln Institute of Land Policy Significant Features of the Property Tax database.

Table 2: Relationship Between Property Tax Caps and the Assessment Gap

	log(Assessment Ratio)					
	Overall Inequality	Full Sample	Cap = No	Cap = Yes	Cap/Binding Year	Ex-CA
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Black Homeowners						
Black Mortgage Holder	0.1273***	0.1579***	0.1579***	0.0858***	0.0579***	0.1579***
	(0.0147)	(0.0231)	(0.0231)	(0.0057)	(0.0085)	(0.0231)
Black × Cap Exists		−0.0721***				−0.0615**
		(0.0238)				(0.0239)
Panel B: Black or Hispanic Homeowners						
Black or Hispanic Mortgage Holder	0.1076***	0.1216***	0.1216***	0.0963***	0.0633***	0.1216***
	(0.0087)	(0.0175)	(0.0175)	(0.0034)	(0.0028)	(0.0175)
Black/Hispanic × Cap Exists		−0.0253				−0.0379**
		(0.0179)				(0.0181)
Fixed Effects	Jurisd-Year	Jurisd-Year	Jurisd-Year	Jurisd-Year	Jurisd-Year	Jurisd-Year
No. Clusters	42729	42729	28874	14354	10797	37249
Observations	7,400,150	7,400,150	4,164,342	3,235,808	1,428,168	6,303,226
Note:						*p<0.1; **p<0.05; ***p<0.01

NOTES: This table shows our findings of a racial assessment gap in areas with different policies regarding a cap rate of growth. In all specifications, we regress the log assessment ratio on jurisdiction-year fixed effects and a categorical variable equal to one if the homeowner is Black. Column (1) presents the racial assessment gap using the full sample. Column (2) estimates Equation (2) to assess the relationship between a cap policy and the assessment gap. Columns (3)–(5) reestimate the assessment gap for areas with no legislative cap in place, areas where a cap exists, and areas where a cap exists and bind, respectively. Column (6) repeats the estimation of Equation (2) from column (2) but excluding California from the sample. Panel A presents results for Black homeowners only. Panel B shows results for Black and Hispanic homeowners together. In all columns, the reference group is non-Hispanic white residents, and for clarity coefficients for other groups not being considered are not reported. ***,**, and * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Standard errors are clustered at the jurisdiction level.

Table 3: Relationship Between Property Tax Caps and the Assessment Gap – Robustness

	log(Assessment Ratio)								
							Match-Pair Comparison		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: Black Homeowners									
Black × Cap Exists	−0.0762***								
	(0.0251)								
Black × Cap Binds		−0.0693***	−0.0547***	−0.0429***	−0.0558***	−0.0474***	−0.1155**	−0.0342	−0.0391***
		(0.0142)	(0.0119)	(0.0141)	(0.0132)	(0.0146)	(0.0526)	(0.0228)	(0.0121)
Panel B: Black or Hispanic Homeowners									
Black/Hispanic × Cap Exists	−0.0204								
	(0.0166)								
Black/Hispanic × Cap Binds		−0.0402***	−0.0548***	−0.0417***	−0.0547***	−0.0429***	−0.0184	−0.0454***	−0.0450***
		(0.0097)	(0.0070)	(0.0077)	(0.0073)	(0.0079)	(0.0340)	(0.0114)	(0.0073)
Added FE	Race:Year	Race:Year	Race:State	Both (ST)	Race:FIPS	Both (FIPS)	Pair(1pp)	Pair(1.5pp)	Pair(2pp)
No. Clusters	42729	42729	42729	42729	42729	42729	1296	7373	16488
Observations	7,400,150	7,400,150	7,400,150	7,400,150	7,400,150	7,400,150	124,959	853,706	2,211,954
Note:									*p<0.1; **p<0.05; ***p<0.01

NOTES: This table shows our findings of a racial assessment gap and policies regarding a cap rate of growth using alternative specifications to Equation (5). In all specifications, we regress the log assessment ratio on jurisdiction-year fixed effects and a categorical variable equal to one if the homeowner is Black/Hispanic. Columns (1) estimates the relationship between the assessment gap and the existence of a cap policy after the inclusion of race × year. Columns (2)–(6) estimate the relationship between the assessment gap and the binding status of a property tax cap policy after adding additional fixed effects: race × year for column (2); race × state for column (3); race × year and race × state for column (4); race × county for column (5); and race × year and race × county for column (6). Columns (7)–(9) present results using a match-pair design matching on ZIP code level home price growth, as detailed in Subsection 3.4. Panel A presents results for Black homeowners only. Panel B shows results for Black and Hispanic homeowners together. In all columns, the reference group is non-Hispanic white residents, and for clarity coefficients for other groups not being considered are not reported. ***,**, and * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Standard errors are clustered at the jurisdiction level.

Table 4: Relationship Between Race and Property Tax Caps

	log(Assessment Ratio)						
						Home Price Growth	
	Cap Exists		Cap Binds		All	Cap Exists	Cap Binds
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Black Homeowners							
Black Mortgage Holder	0.0269		0.0015**		−0.0019***	−0.0003	0.0036***
	(0.0215)		(0.0006)		(0.0003)	(0.0004)	(0.0006)
Tract Share Black		−0.0880		0.0065*			
		(0.0590)		(0.0034)			
Panel B: Black or Hispanic Homeowners							
Black or Hispanic Mortgage Holder	0.1863***		0.0015***		−0.0019***	−0.0010**	0.0024***
	(0.0149)		(0.0005)		(0.0003)	(0.0004)	(0.0004)
Tract Share Black/Hispanic		0.4691***		0.0152***			
		(0.0444)		(0.0044)			
Fixed Effects	-	-	Jurisd-Year	Jurisd-Year	Jurisd-Year	Jurisd-Year	
No. Clusters	42729	42729	28874	14354	10797	37249	
Observations	7,400,150	7,400,150	7,400,150	7,400,150	7,400,150	3,235,808	1,428,168
Note:							*p<0.1; **p<0.05; ***p<0.01

NOTES: This table shows estimates of regressions of legislative cap status, cap binding status, and home price growth on homeowner race or neighborhood share of Black/Hispanic residents. Columns (1) and (2) estimate the relationship between existence of a cap and homeowner race or neighborhood share of Black/Hispanic residents, respectively. Columns (3) and (4) estimate the relationship between a cap binding and homeowner race or neighborhood share of Black residents, respectively. Columns (5)–(7) regress home price growth on homeowner race in areas with different policies regarding a cap rate of growth. Specifications (1) and (2) do not include jurisdiction-year fixed effects, as these absorb legislative cap status. All other specifications include jurisdiction-year fixed effects. Panel A presents results for Black homeowners only. Panel B shows results for Black and Hispanic homeowners together. In columns (1), (3), (5)–(7) the reference group is non-Hispanic white residents, and for clarity coefficients for groups not being considered in a given column are not reported. ***,**, and * denote statistical significance at the 1, 5, and 10 percent levels, respectively. Standard errors are clustered at the jurisdiction level.