City of Pittsburgh Property Tax Regressivity and Racial Inequality: 2012-2020

Independent Report
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Abstract

Recent nationwide studies of effective property tax rates reveal the majority of U.S. municipalities chronically overtax non-White homeowners and low-value homes. However, no comprehensive explorations of these dynamic exists for Pittsburgh at the municipal scale. We analyze Allegheny County assessment and real estate data from 2012-2021 to reveal that during these years, the county assessed Pittsburgh's lowest value homes at around twice their same-year market value, while the highest value homes were assessed at just over half their market value, on average. We additionally find that Pittsburgh's Black homes were assessed at 7.5% more, on average, than comparable White homes.

Keywords

Millage rates represent the total dollar amount taxed for each $1,000 of assessed property value. For all properties receiving the same local and county government services, millage rates are uniform.
Example: for a property assessment value at $100,000 in a taxing region with an aggregate millage rate of 22.74, taxes on that property will total $100,000 x 0.02274, or $2,274.00.

Assessment values are calculated by county officials to approximate the taxable, fair market value of a property. It is important to note that assessment values can be calculated as a percent of fair market value. In these cases, millage rates are adjusted accordingly to ensure the government raises all necessary tax revenue. According to our independent study, Allegheny County assessments in 2020 averaged around 55% of same-year, fair market sale values.

Effective tax rate represents the percentage of a property's actual fair market value (determined through sale records) that is collected in property taxes each year. Comparing the assessment to sale ratio on two properties in the same year and taxing region will reveal differences in their effective tax rates (*fig. 1*).

Introduction

Property owners in the U.S. are responsible to pay a certain percentage of their home's value in taxes each year. Historically, these taxes have represented the vast majority of local government revenue in the United

States — in 1927, 97.3% of the country's local taxes were collected on real property (Carlson, 2004). Though this percentage has decreased over that last century as sales and income taxes grew, property taxes still represented 71.8% of United States local tax collections in 2019 (U.S. Census Bureau, 2021).

Governments calculate each property tax by multiplying the county's assessed value of a property by the annual millage rate for each tax-collecting body in the area.[1] Because millage rates are uniformly applied, variability within property tax systems arises when ratios of assessment to fair market value differ among homes. Property with an assessment to sale ratio greater than the taxing region's average are overtaxed. Properties with assessment to sale ratios less than the average are undertaxed. Such variation is unavoidable at the municipal scale. When this variation correlates with home and homeowner characteristics (such as sale value, owner race and owner income), property tax systems become inequitable.

An effective tax rate is the percentage of a property's actual fair market value (determined through sale records) that is collected in property taxes each year. Comparing the assessment to sale ratio on two properties in the same year and taxing region will reveal differences in their effective tax rates (*fig. 1*).

In 2020, economists at the University of California Berkeley found that, on average, non-White homeowners were charged significantly higher property tax rates across the United States (Avenancio-León and Howard, working paper). The following year, researchers at the University of Chicago revealed that the owners of America's lowest-value properties tended to face tax rates two times greater than those applied to the highest-valued properties of their neighbors (Berry).

Hypothetical Allegheny County Property	2021 Fair Market Value* (Determined by transfer value in an arm's-length sale)	2021 Assessment Value** (Determined by the County)	**2021 Assessment to Sale Ratio** (Assessment Value / Sale Value)	2021 County Property Taxes (Assessment Value *x* 2021 Allegheny County millage rate factor 0.00473)	**Effective County Property Tax Rate** (Property Taxes / Sale Value)
Home A	$350,000	$200,000	**0.57**	$946.00	**0.2703%**
Home X	$100,000	$70,000	**0.70**	$331.10	**0.3311%**
Home Y	$100,000	$100,000	**1.00**	$473.00	**0.4730%**
Home Z	$100,000	$130,000	**1.30**	$614.90	**0.6149%**

Figure 1. Hypothetical Property Tax Variation Chart. *Assessment values tend to vary, even between properties with the same sale value. Disparities in these assessments lead to disparities in the effective property tax rate levied on each home. *Note, comparisons of fair market value are only valid for properties sold in the same year.*

[1] In the City of Pittsburgh, homeowners pay annual property taxes to Allegheny County (2021 millage rate: 4.73), the City of Pittsburgh (8.06), the Pittsburgh Public School District (9.95), the Carnegie Library system (0.25), and the City of Pittsburgh Parks (0.50).

Most counties regularly perform reassessments, during which the market value of each property is recalculated to ensure taxes are distributed proportionally. However, in Pennsylvania, regular reassessment is not required by law.[2] Allegheny County (home to the City of Pittsburgh) takes advantage of this loophole by relying on a base-year system in which the taxable value of property is held constant, despite dramatic local market fluctuations among neighborhoods. The county's most recent reassessment took place in 2012. In the wake of this reassessment, no comprehensive study of home-value and racial disparity within Pittsburgh's property tax system has been published.[3]

Borrowing from the methodological framework of existing studies, we aim to build on previous research and quantify the extent of local inequality. We construct a property-level dataset containing assessed value, transaction price, and demographic information for a representative sample of properties located in the City of Pittsburgh. We limit our sample to residential properties of four or fewer units that have been assessed and sold at arms-length in the same year between 2012 and 2020.

As is standard in the literature, we measure over-taxation as a ratio of assessment to sales value. However, our approach differs from most in that we are able to directly observe race for each property, rather than as a census tract-level correlate. In doing so, we are able to examine racial disparity in property tax assessment at a granular level. We find that on average, Black property owners face a 7.5% higher property tax burden than their White counterparts. Likewise, we find evidence that what is purportedly a proportional tax is sharply regressive. The lowest-valued decile of properties is assessed at a ratio nearly three times that of the highest-value decile, almost double their market value. Finally, we demonstrate that the majority of this disparity stems not from systemic bias in assessment, but rather from a lack of sensitivity to census tract-level attributes that may affect market value. We provide evidence that simply calculating and including adjustments for more localized assessments could almost entirely reduce the racial disparity we have observed.

Data

We construct our dataset using Allegheny County's recorder and assessment data from 2012-2020, as collected and hosted by ATTOM Data Services, a proprietary firm that specializes in aggregating real estate data. We then merge these data with mortgage lending data from the federal government as mandated by the HMDA. Combining these datasets allows us to track demographic information at the level of individual

[2] This is only one of the ways in which Pennsylvania's property tax systems are anomalous. A 2007 report found that Pennsylvania was the only state in which: there was no state mandate for regular reassessment; the duties of property fell entirely on local government; the state failed to regularly audit local assessment departments; and neither state nor local government verified real estate sales data used to inform taxation rates. (Montarti and Weaver, 2007).

[3] A 2021 study of economic property tax disparities by The University of Chicago's Center for Municipal Finance included findings on Allegheny County and the City of Pittsburgh. Their data, however, spanned 2008-2017, straddling Allegheny County's 2012 reassessment and therefore provided limited insight into the recent impact of the county's value freeze. See University of Chicago Center for Municipal Finance, "Property Tax Fairness" March 9, 2021.

property owner, and thus, directly measure racial bias in property tax assessments in a way the city and county do not.

To preserve only the highest quality matches between the previously mentioned datasets, we require an exact match on transaction year, sale value rounded to the nearest multiple of $5,000, mortgage lending entity, and census tract. Because there exists considerable inconsistency in how the data are reported between sources, we employ a relatively standard text matching algorithm that serves to clean observations and standardize spellings, capitalizations, and abbreviations. We are confident in the accuracy of the recorded matches, having manually verified more than 10% of the dataset without finding a single example of improper match. Finally, we verify that matches are a representative sample of all properties in the city using a Kolmogorov-Smirnov test.

We restrict our final dataset to residential properties of less than four units, as commercial property is often assessed differently and cannot be directly compared. We likewise include only properties that have been bought and sold at arms-length in the same year between 2012 and 2020. Doing so ensures that we record an accurate fair market value and corresponding assessed value for a given property. Limiting our analysis to the City of Pittsburgh–a single tax jurisdiction–allows us to directly compare assessment ratios of Black and White homeowners.

In Allegheny County, there are several exemptions that can be applied to reduce the taxable property value. The most significant reductions are achieved through the homestead exclusion, which allows homeowner occupied units to withhold up to $29,944 from the taxable value of their property. We use the county's assessed property values before any exemptions are applied in order to observe the baseline assessments provided by the county's subcontractor.

Methods

After ensuring our dataset exclusively contains eligible properties, we calculate our primary variable of focus, assessment ratio, as defined in equation 1.1 where φ, α, and τ represent assessment ratio, assessed value, transaction dollar amount, and year, for a given property *i* in jurisdiction *j* observed in year *t*. We choose to analyze by ratio, rather than raw dollar amount, as it allows us to standardize the measurement of over-taxation across disparate property values.

Equation 1.1:

$$\varphi_{ijt} = \frac{\alpha_{ijt}}{\tau_{ijt}}$$

We likewise observe race of each individual property owner for comparison within demographic groups m, whether they be sorted by race, property value, or income. Group means are defined by equation 1.2 and are to measure intra-group disparities. Theoretically, assessment ratios should be consistent across demographic groups, thus group means should likewise be equal.

Equation 1.2:

$$\mu_{m_1} = \frac{1}{n}\sum_{i \in m}^{n} \varphi_{ijtm} = \mu_{m_2}$$

We use regression analysis with fixed effects for year and jurisdiction to control for natural variation over time and place. Our regression models are defined by equations 1.3 and 1.4 where Y represents estimated assessment ratio; *i,j,t*, are once again property, jurisdiction, and year, respectively; β, the coefficient for Race; X, observed race (0 if Black, 1 if White); ϒ, the fixed effects of census tract; δ, the fixed effects for time; and ε the error term. Equation 1.3 includes fixed effects only for year, while 1.4 includes fixed effects for both year and census tract.

Equation 1.3:

$$\widehat{Y_{ijt}} = \beta_0 + \beta_1 X_{1,it} + \delta_{it} + \varepsilon_{it}$$

Equation 1.4:

$$\widehat{Y_{ijt}} = \beta_0 + \beta_1 X_{1,it} + \gamma_{it} + \delta_{it} + \varepsilon_{it}$$

Equations 1.3 and 1.4 are subject to null hypothesis that:

$$H_0: \beta_1 = 0$$

Results

We begin by establishing a baseline calculation of the entire city's assessment ratio, which we find to be 0.725. This may be interpreted more intuitively as, on average, between 2012 and 2020, a property located in the City of Pittsburgh will be assessed at 72.5% of its fair market value. However, we fear that this figure is not consistent across income, race, or property value. Breaking each variable into deciles, we find convincing evidence of sharp regressivity in relation to both income and property value.

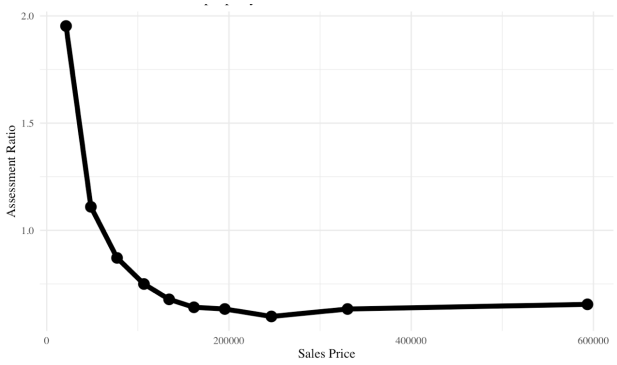

Figure 1.2 Assessment Ratio by Property Value Decile

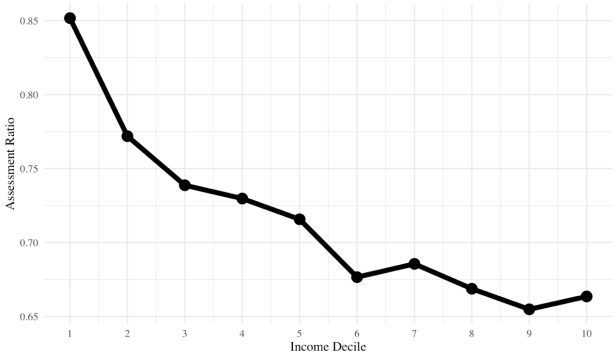

Figure 1.3 Assessment Ratio by Income Decile

As demonstrated by Figure 1.2, the lowest valued decile — or bottom 10% — of properties are taxed nearly three times as highly as the top 10%, nearly double their fair market value. Meanwhile, the top decile is

assessed at an average of 65% of sales price. This means that low-income homeowners are disproportionately burdened with high effective tax rates. Figure 1.3 demonstrates a similar trend: the lowest earning decile of property owners is taxed at an average rate 1.28 times higher than their highest earning counterparts. Thus, in Pittsburgh, the property tax is dually regressive in the sense that lowest valued properties are taxed at the highest rate relative to the mean and are most likely to be owned by the lowest income homeowners.

It is through this channel that our analysis finds evidence of racial bias. While Black property homeowners represent only 4% of originated mortgage loans, they own 15% of the bottom third lowest valued properties but only 2% of the upper third. Likewise, within our sample, they compose 15% of the lowest income decile, but only 3% of the highest. We propose that disproportionate clustering of low-value property in majority Black neighborhoods, compounded with over-assessment of that property results in Black homeowners paying on average 7.5% more in property taxes relative to their average White counterparts.

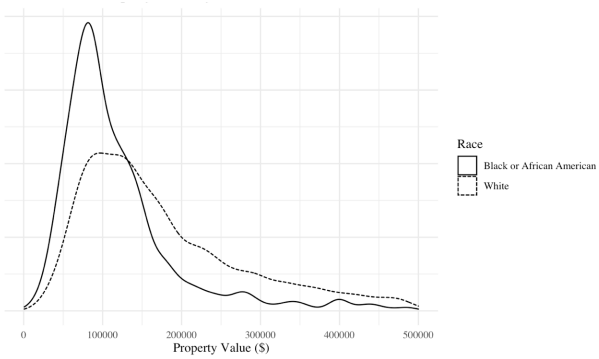

Figure 1.4 Distribution of Property Value by Race

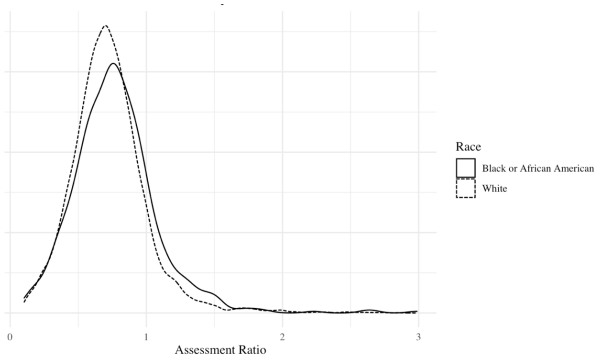

Figure 1.5 Distribution of Assessment Ratio by Race

Figures 1.4 and 1.5 jointly support this claim. There is a stark difference in the distribution of property values by race; Black property owners disproportionately claim housing valued under $100,000. This results in disproportionate over-assessment, as demonstrated by Figure 1.5.

We confirm the existence of racial divide in property assessment using the regression models found in Equations 1.3 and 1.4.

Figure 1.6 Regression Model including fixed effects only for time

Variable	Estimate	Std. Error
Assessment Ratio (Black-White)	0.07031***[4]	0.01134

Figure 1.7 Regression model including fixed effects for both time and census tract

Variable	Estimate	Std. Error
Assessment Ratio (Black-White)	0.0136	0.01175

[4] *** p < 0.001, ** p < 0.01, * p < .05

Curiously, when we introduce statistical controls for census tract into the model, the racial gap is no longer statistically significant. This confirms our suspicion that racial bias enters property assessment through location. That is to say, there is clear evidence that Black property is over-assessed relative to the average White property. However, because the magnitude of that bias appears to be dramatically less significant after adjusting for differences between census tracts, we presume that the racial disparities we observe are due to variation between census tracts. The county's assessment methodology abjectly fails to take this unfortunate fact into account, in part leading to the disproportionate burden placed upon Black homeowners that we have plainly observed throughout this study.

With this knowledge, we must consider the legacy of historical redlining in the City of Pittsburgh; we can plainly see the lingering effects of decades of inequitable policy. It is no accident that low-value homes are densely clustered and should come as no surprise that this history of discriminatory policy continues to breed inequality to this day. While the current assessment system may not have been designed with malicious intentions, a failure to analyze, assess, and adapt it to the City's reality has fostered the same end result: that Black homeowners face a disproportionate property tax burden. To rectify an explicitly race-blind system that nevertheless perpetuates racial disparities, we must consider further policy intervention. When the county completes its next reassessment, we urge it to take this stark regressivity and census tract-level disparity into account. As it stands, the County Assessor's level of analysis is simply too broad, we estimate that accounting for local differences could almost entirely reduce the disparities in tax burden we have observed. If racial biases all but disappear when we correct for local differences, why should this not be a call to action?

Sources Cited:

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