

Can More Regular Reassessment Help Improve Property Tax Equity in Philadelphia?

Lei Ding and Alaina Barca

Key Findings

- The Actual Value Initiative (AVI) improved assessment quality and equity in general, but the property tax system remains relatively regressive.
- For lower-value properties and properties in more vulnerable neighborhoods (lower-income or minority), the AVI reduced property owners' tax burdens on average but led to an increase in assessment variability.
- More frequent, short-cycle reassessments could help improve both the quality and equity of property taxation.

This report summarizes findings from a longer working paper¹ released in 2021 by the Federal Reserve Bank of Philadelphia on whether reassessments of market value at short intervals and taxing by such values improved equity in the city of Philadelphia. Unless otherwise noted, the analysis was based on parcel-level assessment data matched with sales transactions for single-family residential properties in Philadelphia and 15 comparable cities across the nation. Sales with extremely low or high prices and observations with extreme assessment ratios (based on the industry standard) were dropped from the analysis. See the Appendix for more details about the data and methodology.

¹ For more details on the data, methodology, and regression results, see Yilin Hou, Lei Ding, David J. Schwegman, and Alaina G. Barca, "Assessment Frequency and Equity of the Real Property Tax: Latest Evidence from Philadelphia," Federal Reserve Bank of Philadelphia working paper 21-43 (2021). Available at www.philadelphiafed.org/community-development/housing-and-neighborhoods/assessment-frequency-and-equity-of-the-real-property-tax-latest-evidence-from-philadelphia/.

Introduction

Property taxes are sometimes referred to as the “least fair” tax by the average American, reflected in lower-value properties often facing higher assessments and tax burdens relative to their actual market values than higher-value properties. Despite this, and despite decades of property tax revolts, local governments continue to rely heavily on property taxes as a source of revenue.² The negative reputation of the property tax is partly derived from issues and challenges in its administration, and this brief focuses on one key aspect of that administration: whether assessing property values more regularly can improve the equity of the real property tax and how that would affect property owners in vulnerable neighborhoods.

In practice, many U.S. states, including Pennsylvania, do not mandate regular revaluation cycles — at least not short, regular cycles. During long intervals between assessments, property values in urban centers diverge widely: Those in gentrifying neighborhoods and prime locations often appreciate quickly, whereas those in poor neighborhoods and less desirable locations rise very little, if at all. Recessions could also exacerbate the quality of overall property assessment when assessments do not keep up with sharper declines in property

values in harder-hit areas. In jurisdictions where regular reassessment is not mandated by the state, fairness in taxation thus could become a serious concern, as house appreciation or depreciation are less likely to be included in the assessed value when lags in reassessment are long. In Philadelphia, historical lags in property assessment had resulted in systematic inequities in the city’s property tax system. Between the 1980s and 2013, Philadelphia did not conduct any comprehensive reassessment. As a result, the assessed value listed on most property tax bills was significantly lower than the true market value and properties with similar market values were often assessed and taxed with dramatically different values.³

Using data from Philadelphia, this research evaluates the impact of the Actual Value Initiative (AVI), which was adopted in 2013 and required the city to conduct more regular comprehensive revaluations of all properties, on tax equity for property owners in Philadelphia and for owners in minority and otherwise vulnerable neighborhoods. A minority neighborhood is defined in this study as a census tract with a (racial or ethnic) minority population of at least 50 percent, while a majority-Black neighborhood is one with a Black population of 50 percent or greater.

² Christopher Berry, “Reassessing the Property Tax,” The University of Chicago Harris School of Public Policy (2021), available at cpb-us-w2.wpmucdn.com/voices.uchicago.edu/dist/6/2330/files/2019/04/Berry-Reassessing-the-Property-Tax-3121.pdf.

³ Kevin C. Gillen, *Updated Results on Property Assessment Accuracy, Uniformity and Equity in Philadelphia*, Philadelphia: Econsult Corporation. Available at media.philly.com/documents/taxproj07gillen08.pdf.

The Actual Value Initiative and Relevant Tax Relief Programs

Before the adoption of the Actual Value Initiative (AVI) in 2013, the assessed value listed on most property tax bills in Philadelphia was significantly lower than the true market value, and properties with similar market values often had dramatically different assessed values. As assessments were increasingly out of line with actual property values, Philadelphia, based on the AVI, initiated in 2014 the first comprehensive reassessment of all properties in the city and then conducted another revaluation of all properties in 2019. The next comprehensive reassessment, initially scheduled for 2021, was postponed to 2023 because of the COVID-19 pandemic. Two major policy initiatives were enacted along with the AVI to mitigate tax increases: the Homestead Exemption reduces property taxes for all owner-occupied primary residences, and the Longtime Owner Occupants Program (LOOP) provides targeted relief for eligible long-term homeowners.

Measures of Property Tax Equity

Property tax equity can be measured by both horizontal equity and vertical equity. Horizontal equity measures the level of assessment uniformity, i.e., whether parcels with the same attributes are assessed and taxed at equal amounts. Vertical equity is concerned with the inequality in assessments and whether less expensive properties are systematically assessed at higher ratios relative to their market values and thus could bear more than their fair share of property taxes than more expensive properties. A system in which more expensive homes are assessed and taxed at higher ratios than less expensive homes is considered *progressive*.

Horizontal equity is primarily evaluated by the following two measures in this study:

- **The assessment ratio (AR)** is the ratio of a property's assessment value to its market value, proxied by its sales price. An AR equal to 1 indicates a perfectly accurate assessment, an AR above 1 indicates overassessment, and an AR below 1 indicates underassessment.
- **The coefficient of dispersion (COD)** measures the percent deviation of a property's AR from 1. A reasonable COD for single-family homes, as industry standards suggest, in "older, heterogeneous areas" such as Philadelphia should be 15 percent or less.

Vertical equity is primarily measured by the *price-related differential (PRD)*, which is defined as the mean AR for all parcels divided by the weighted mean AR, where the weight is the sale price. A perfectly equitable PRD is 1, a PRD above 1 denotes regressive assessments, and a PRD below 1 denotes progressive assessments. Industry standards say a PRD between 0.98 and 1.03 is acceptable.

Has More Regular Reassessment Improved Property Tax Equity in Philadelphia?

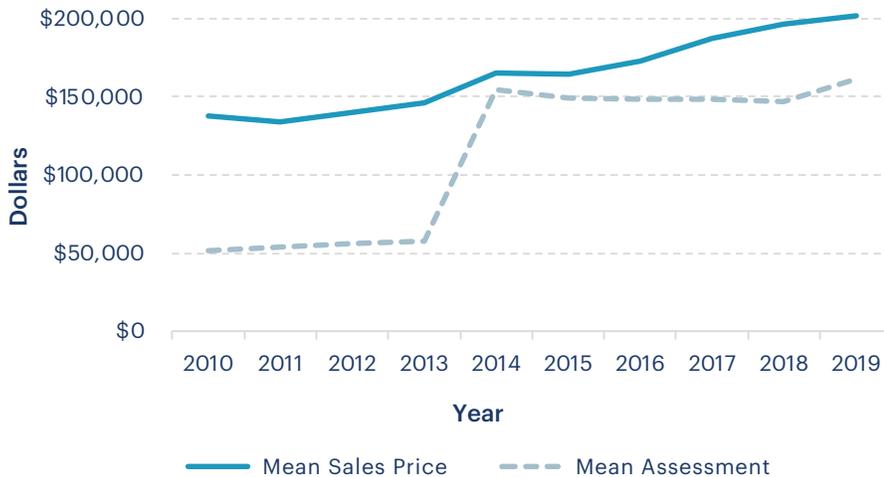
The answer is yes: Assessment quality and equity have improved at the aggregate level, although assessments remain regressive. The implementation of the AVI dramatically changed the citywide relationship between assessments and market values (measured by sale transaction prices) for single-family properties, as demonstrated in **Figure 1**. Before the AVI, the average assessed value of single-family housing did not experience much change over time and was drastically lower than the average market value. For single-family property sales in 2013, the average assessed value was about \$57,369, much lower than the mean sales price of \$145,997. Following the implementation of the AVI, the gap between the assessed value and the market value closed considerably, with the average assessed value (\$154,299) much closer to the average sales price (\$165,434) in 2014. Of course, as the average sales value continued to increase after 2014, the gap between the average sales price and the assessed value widened again until it was mitigated by the 2019 reassessment.

Aggregate city trends suggest that the shifts initiated by revaluation had a positive impact on horizontal equity. Assessments jumped from extremely underassessed in 2013, with an average AR of 0.55, to a significantly higher average AR of 1.19⁴ in 2014. Meanwhile, the average COD was extremely high (about 57 percent) in 2010 (Appendix Table A1), almost four times the acceptable level of 15 percent recommended by the industry standard from the International Association of Assessing Officers (IAAO), indicating significant inequity across assessments of similar properties. Although there was not much change in the magnitude of the COD before the AVI,

⁴ An average AR of greater than one does not necessarily suggest an overall overassessment because the distribution of ARs is not symmetric about one. Actually, the average assessed value (\$154,299) of single-family sales was still lower than the average sales price (\$165,434) in 2014.

Figure 1

Change in Mean Sales Prices and Mean Assessments for Single-Family Homes in Philadelphia Before and After the AVI (2014)



Notes: Single-family properties matched with sales transactions only. Sales with extremely low or extremely high prices and observations with extreme assessment ratios (based on the industry standard) were dropped from the analysis (see Appendix); authors' calculations using data on property assessments and sales transactions from the City of Philadelphia's Department of Revenue, Department of Records, and Office of Property Assessment.

assessment quality improved post-AVI, as the average COD declined from 55 percent in 2013 to 41 percent in 2014 and continued to improve after that. The average COD further decreased to 32 percent in 2019. Although this suggests that horizontal equity had improved after the AVI, in 2019, the horizontal inequity of assessments was still higher than the IAAO-recommended 15 percent.

When we compare Philadelphia's trends with other major cities in [Figure 2](#), we see that the quality of Philadelphia property assessments was the poorest before the implementation of the AVI, with an average COD almost double that of most other major cities. Between 2013 and 2014, the assessment quality in most cities remained relatively consistent, but Philadelphia experienced a relatively larger improvement in its assessment quality, measured by the average COD of single-family property sales in the city.

Changes in citywide PRD show promising improvements in the regressivity of the city's tax assessments, too. The city's PRD of 1.42 in 2010 indicates that assessments

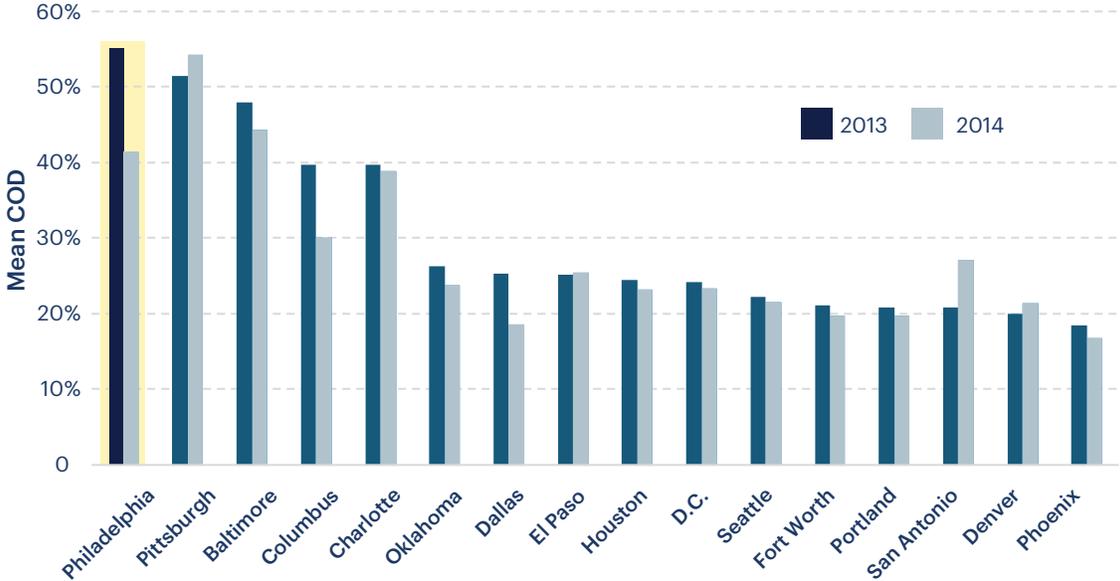
of single-family homes were extremely regressive in Philadelphia ([Figure 3](#)). In other words, lower-priced single-family homes were on average assessed at a greater percent of their dwelling's value than higher-priced ones. The long period with no reassessments and disparities in Great Recession-induced price crashes across submarkets could help explain such high levels of regressivity. The PRD decreased from 1.39 in 2013 to 1.28 in 2014, and by 2019, it decreased further to 1.14. This indicates that assessment inequity had been improved by the AVI, but it was still significantly above 1 and thus remained regressive in 2019.

To put vertical equity into context, Philadelphia, with a PRD of 1.39 in 2013, was the most regressive among these 16 cities (as shown in [Figure 4](#), the PRD of the peer cities ranged from 0.97 in Phoenix to 1.30 in Pittsburgh in the same year). Pittsburgh's PRD was only slightly lower than Philadelphia's, likely because both cities are in the same state — one that does not require regular revaluation. All cities in the control group saw smaller changes in their PRDs from 2013 to 2014 than did Philadelphia, with a control group average change of -0.01, compared with a decline of 0.081 in Philadelphia. Philadelphia's improvement in its PRD obviously outstripped any other city in the control group, most likely because of the adoption of the AVI, although it still remained one of the most regressive cities as of 2014.

Overall, assessment accuracy improved after the first full market reassessment in 2014 and after the second full market reassessment in 2019, although there was still significant variation in assessment from sales prices. Tax assessments also became less regressive after the citywide reassessments in 2014 and 2019. Regression results from the corresponding longer working paper are consistent with the results from this descriptive analysis.

Figure 2

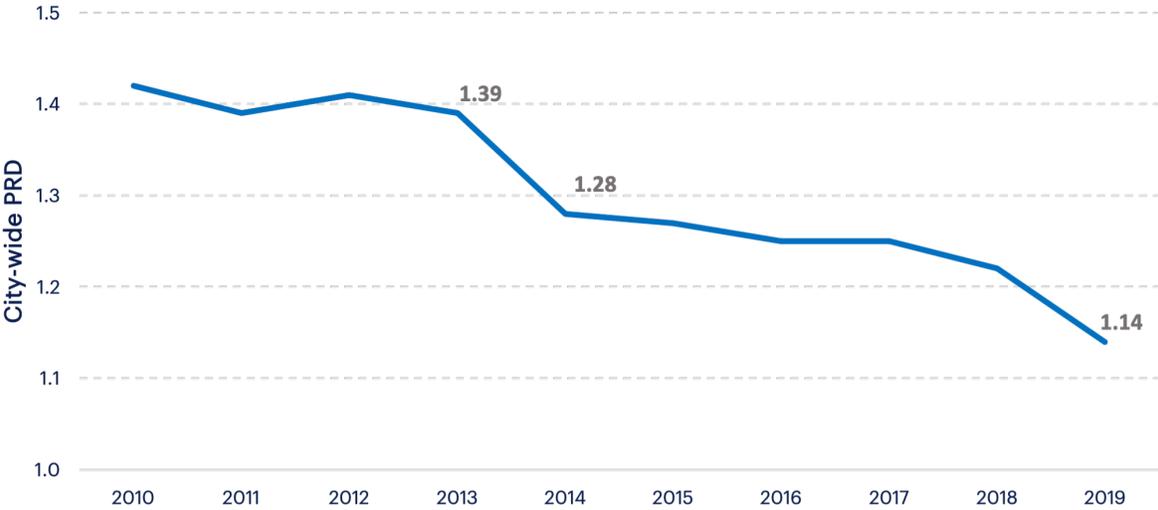
Mean Coefficient of Dispersion (COD) of Single-Family Properties in Philadelphia and Peer Cities, 2013–2014



Source: Authors' calculations using data on property assessments and sales transactions from the City of Philadelphia's Department of Revenue, Department of Records, and Office of Property Assessment, and national control city data from CoreLogic Solutions.

Figure 3

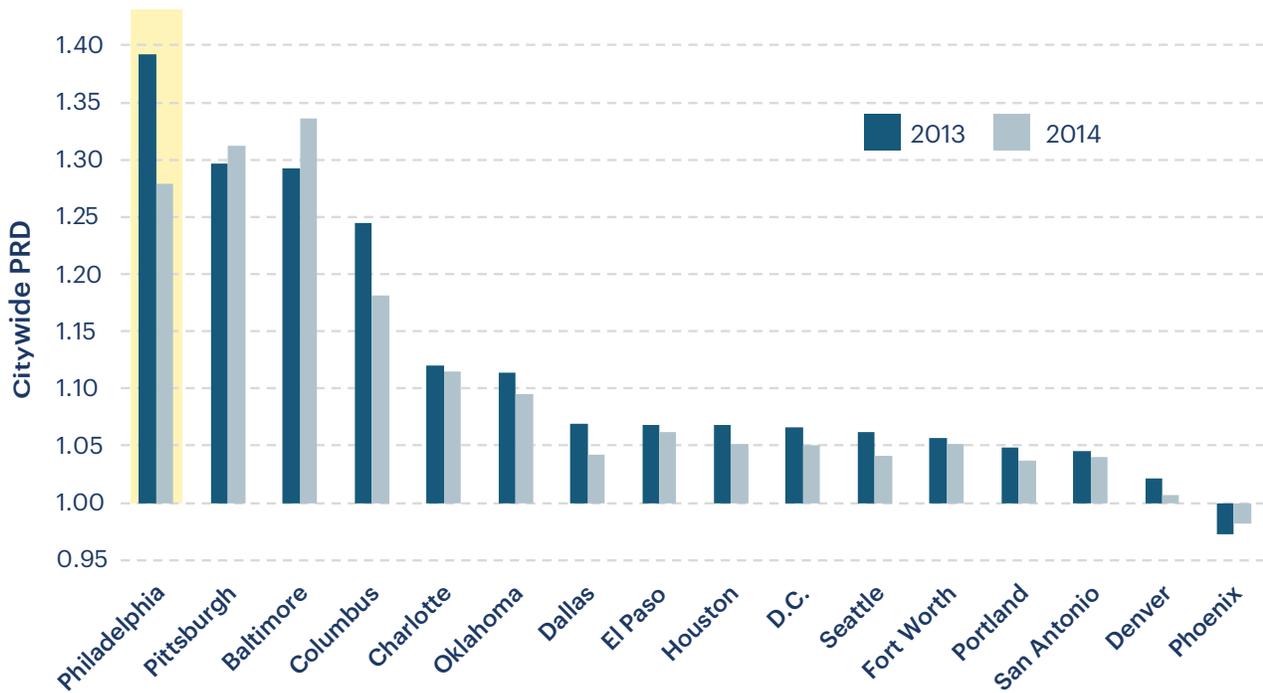
Price-Related Differential (PRD) of Single-Family Properties in Philadelphia, 2010–2019



Source: Authors' calculations using data on property assessments and sales transactions from the City of Philadelphia's Department of Revenue, Department of Records, and Office of Property Assessment.

Figure 4

Price-Related Differential (PRD) of Single-Family Properties in Philadelphia and Peer Cities, 2013–2014



Source: Authors’ calculations using data on property assessments and sales transactions from the City of Philadelphia’s Department of Revenue, Department of Records, and Office of Property Assessment, and national control city data from CoreLogic Solutions.

Has More Regular Reassessment Improved Property Tax Equity in Minority and Vulnerable Communities?

While citywide results are helpful, it is worth demonstrating how these impacts vary across properties and neighborhoods. We disaggregate results by neighborhood characteristics and by property values, and the findings suggest that the adoption of the AVI, along with newly adopted tax exemption programs, helped improve tax equity but not necessarily assessment quality for properties in vulnerable neighborhoods.

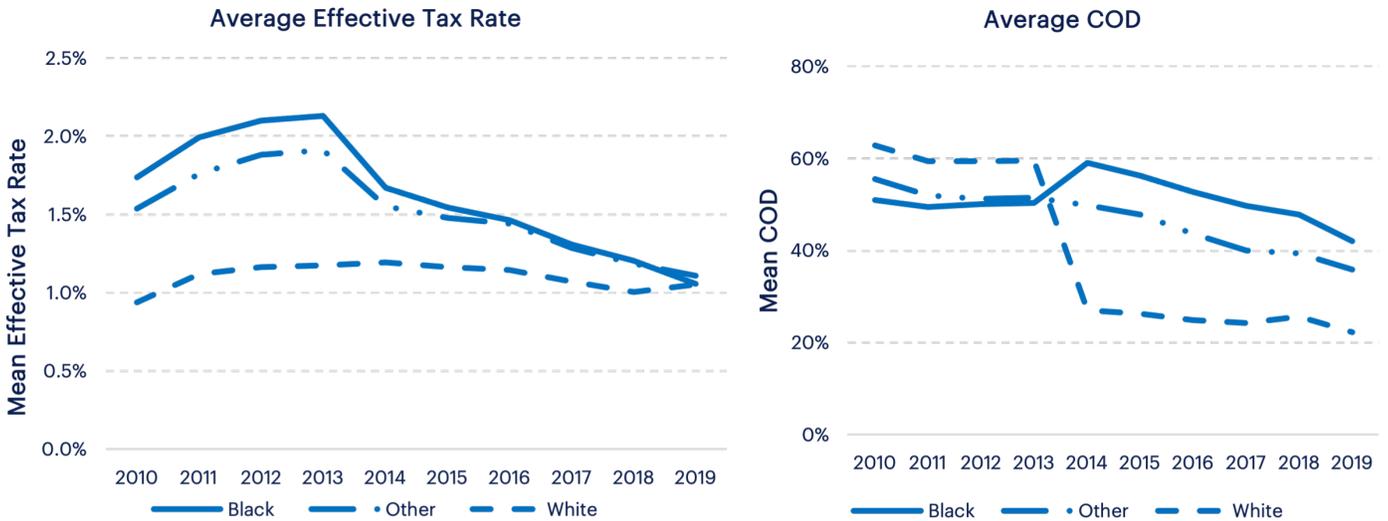
Reduced Tax Burden and Worsened Assessment Quality for Minority Neighborhoods

Figure 5 shows trends in average effective tax rates, which are defined as the tax amount divided by the sales price,

and average CODs across neighborhoods’ majority race of residents. The results show that pre-AVI, single-family property sales in minority neighborhoods generally had a much higher effective tax rate than those in majority-White neighborhoods. On average, taxes for properties in majority-Black tracts were about 2.13 percent of sales prices in 2013, while the rate was about 1.17 percent in majority-White tracts. This suggests property owners in majority-Black tracts on average had tax burdens higher than their fair share before the AVI. After the AVI, sales in minority tracts still had higher effective rates, although they experienced a larger decrease. Effective rates in those tracts dropped from about 2.13 percent in 2013 to 1.67 percent in 2014, but the 2014 rate remained higher than that in majority-White tracts, where it was 1.19 percent. However, by 2019, the effective rates for sales in neighborhoods with different racial compositions had largely converged. The reassessments, together with tax relief programs, help explain the reduced tax rates

Figure 5

Effective Tax Rate (Left) and Coefficient of Dispersion (Right) Trends by Neighborhood Majority Race/Ethnicity



Source: Authors' calculations using data on property assessments, tax payment history, and sales transactions from the City of Philadelphia's Department of Revenue, Department of Records, and Office of Property Assessment, and 2009-2013 American Community Survey data.

in minority neighborhoods.⁵ In other words, the results suggest property taxes became more equitable for property owners in minority neighborhoods after the AVI.

The results also show that before the AVI, majority-White tracts were more likely to have higher CODs, suggesting that those tracts were more likely to have less accurate value assessments. After the AVI, however, sales in majority-Black tracts had higher CODs than those in other neighborhoods; that is, majority-Black tracts were more likely to have less accurate assessed values after the AVI. In other words, after 2013, the assessed values of properties in majority-Black neighborhoods became less accurate, at least in the first few years after the adoption of the AVI. But the assessment quality improved for all groups after 2014, and by 2019, the average COD was lower than the pre-AVI period for property owners in all three types of neighborhoods.

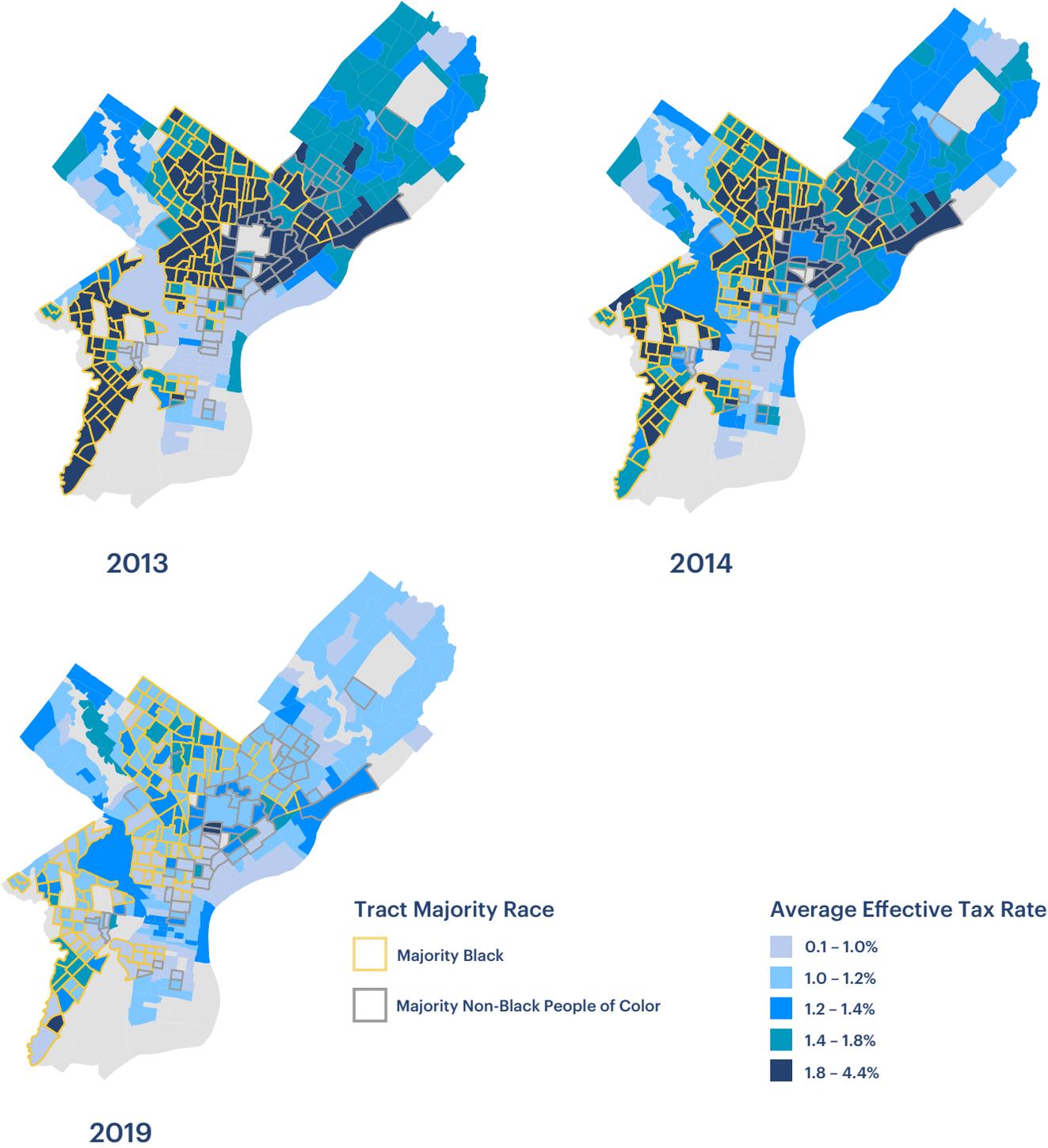
⁵ The regression analysis in our longer paper confirms the 2014 reassessments contributed at least partly to the decreased tax burden for property owners in majority-Black neighborhoods.

Figure 6 shows maps of the average effective tax rate by neighborhood majority race in Philadelphia for 2013, 2014, and 2019, with the prominence of darker colors indicating higher tax rates. It is obvious that neighborhoods in West, Southwest, and North Philadelphia had higher tax rates than other neighborhoods either pre-AVI (2013) or shortly after the AVI (2014). These trends visibly correlate effective property tax rates with the share of minority residents. There was some reduction in the tax rates in these neighborhoods from 2013 to 2014, but it was not until 2019 that the tax rates in these neighborhoods became similar to majority-White neighborhoods.

Figure 7 shows maps of average COD by census tract in Philadelphia, with darker colors indicating higher average CODs and poorer assessment quality. The results confirm that assessment quality improved for most tracts post-AVI, but minority neighborhoods lagged behind. In 2013, most tracts in the city had high CODs, indicating an overall poor assessment quality for the city. The 2014 panel shows substantive improvements from the 2014 reassessment, but geographic differences of assessment

Figure 6

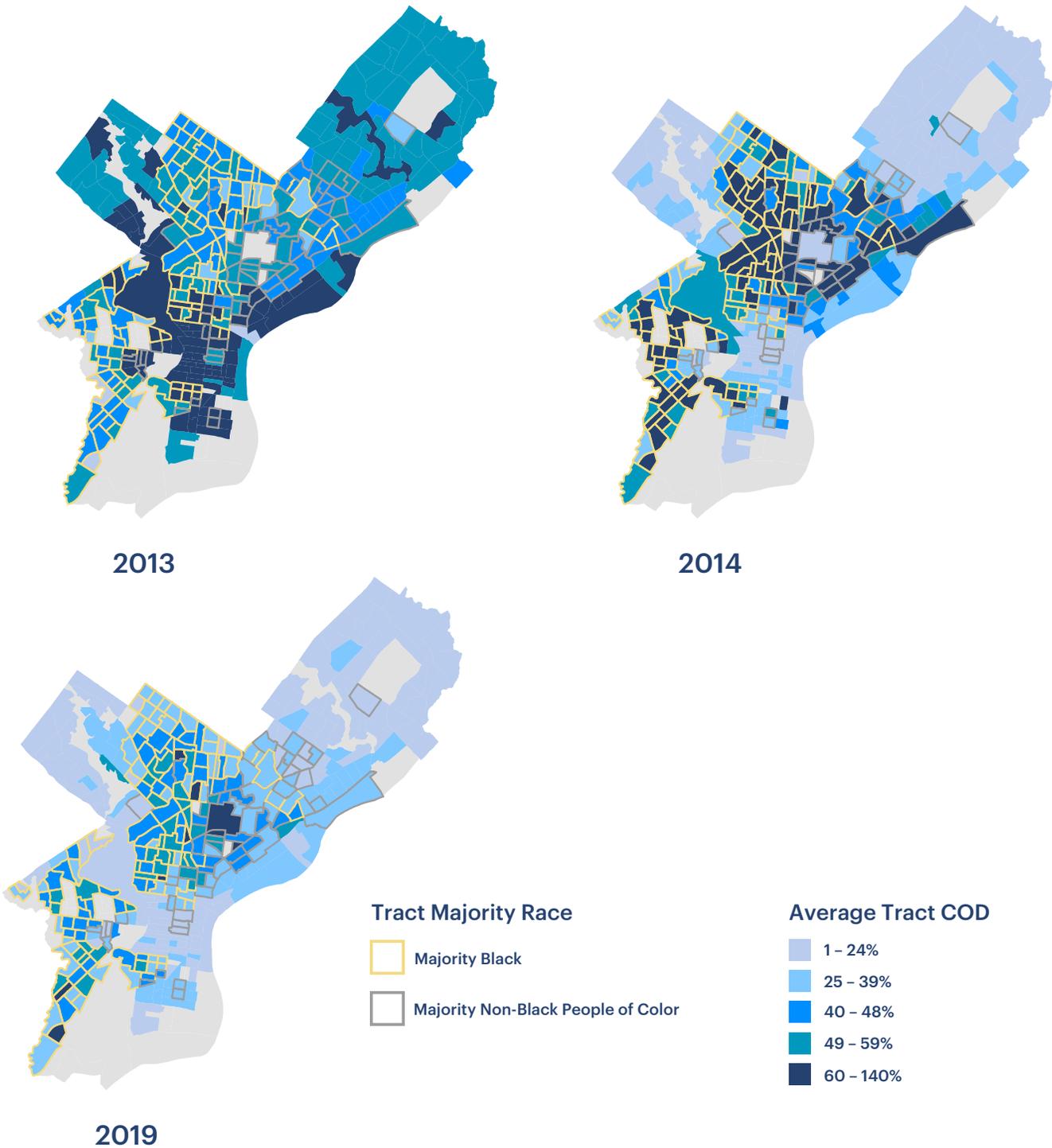
Average Effective Tax Rate in Philadelphia by Neighborhood Majority Race/Ethnicity in 2013, 2014, and 2019



Source: Authors' calculations using data on property assessments, tax payment history, and sales transactions from the City of Philadelphia's Department of Revenue, Department of Records, and Office of Property Assessment, and U.S. Census TIGER/Line Shapefiles.

Figure 7

Average Coefficient of Dispersion (COD) in Philadelphia by Neighborhood Majority Race/Ethnicity in 2013, 2014, and 2019



Source: Authors' calculations using data on property assessments, tax payment history, and sales transactions from the City of Philadelphia's Department of Revenue, Department of Records, and Office of Property Assessment, and U.S. Census TIGER/Line Shapefiles.

quality visibly intensified. The quality drastically improved in many higher-income nonminority areas, while many minority neighborhoods continued to see relatively poor assessment quality or even saw quality worsen. In 2019, the city saw improvements across most neighborhoods; however, clustering patterns were still persistent, where areas with the worst assessment quality were largely concentrated in minority neighborhoods.

Property Tax Equity and Assessment Quality for Lower-Value Properties and Properties in Lower-Income Tracts

Similar trends — reduced tax burdens and worsened assessment quality in the first few years post-AVI — can also be found for lower-value properties and properties in lower-income neighborhoods. **Figures 8 and 9** show the average effective tax rates and average CODs for sales in different subgroups based on property value quartiles and tract median income quartiles over time.

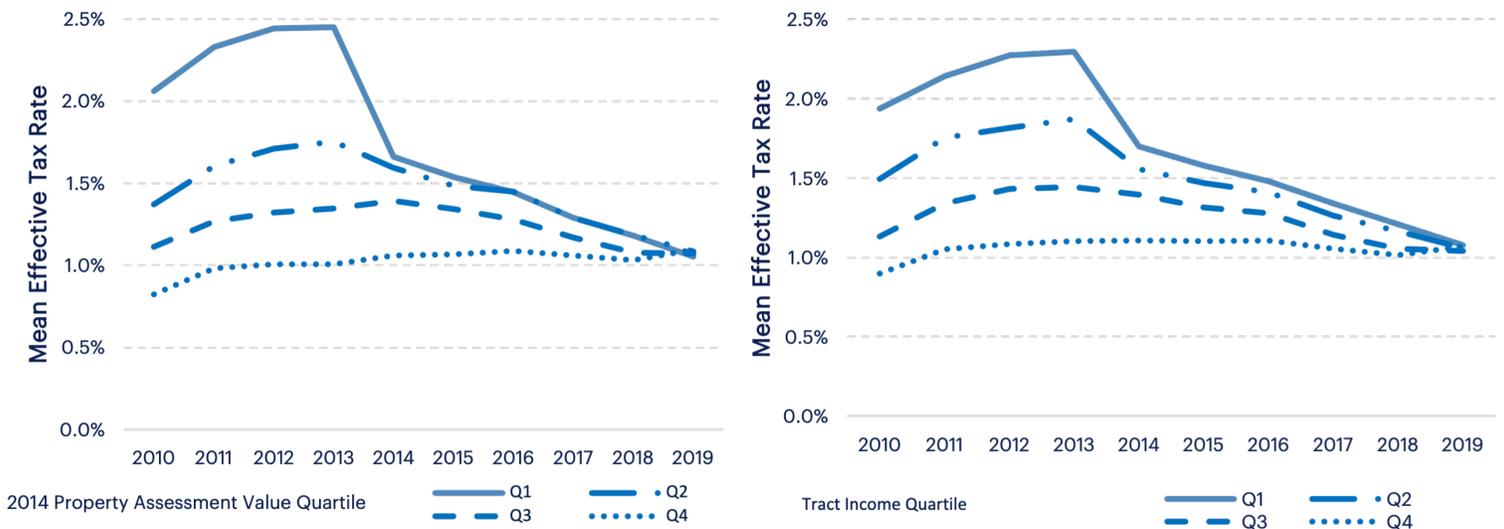
Lower-value properties and properties in lower-income neighborhoods saw a larger decrease in their effective tax

rate relative to other properties (**Figure 8**). However, in the first few years post-AVI, the effective rates for lower-value properties and properties in lower-income neighborhoods were still much higher than those for other properties. But between 2014 and 2019, the effective tax rates of properties in different subgroups generally converged, and by 2019, the differences among groups became marginal. Put differently, property taxes became more equitable for both owners of lower-value properties and property owners in lower-income neighborhoods.

Figure 9 shows trends in average CODs across neighborhoods, suggesting that before the AVI was implemented, higher-value properties, as well as properties in higher-income tracts, were more likely to have slightly higher CODs and thus were more likely to have less accurate value assessments. After the AVI, however, these trends reversed. Sales of lower-value properties and properties in lower-income tracts had higher CODs than other properties. In other words, immediately after 2013, the assessed values of lower-value properties or properties in lower-income neighborhoods had a larger variation in sales prices.

Figure 8

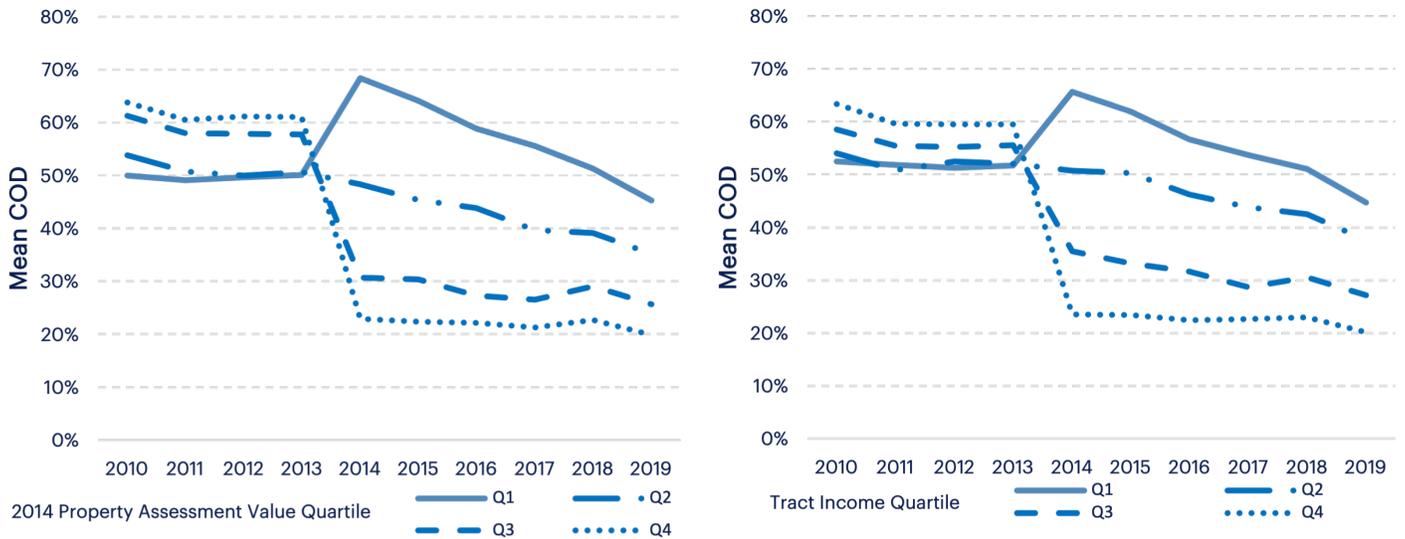
Average Effective Tax Rate by Property Value (Left) and Tract Income Quartiles (Right)



Source: Authors’ calculations using data on property assessments, tax payment history, and sales transactions from the City of Philadelphia’s Department of Revenue, Department of Records, and Office of Property Assessment, and 2009–2013 American Community Survey data.

Figure 9

Coefficient of Dispersion (COD) Trends by Property Value (Left) and Tract Income Quartiles (Right)



Source: Authors' calculations using data on property assessments, tax payment history, and sales transactions from the City of Philadelphia's Department of Revenue, Department of Records, and Office of Property Assessment, and 2009–2013 American Community Survey data.

Overall, the AVI, together with tax relief programs adopted along with it, made property taxes more equitable in Philadelphia: Sales of lower-value properties and properties in more vulnerable neighborhoods had lower effective tax rates after the AVI. As owners of properties that experienced larger appreciations in value pre-AVI started to pay their fair share of taxes, the burden for owners of lower-value properties or properties in more vulnerable neighborhoods was reduced. Results also suggest property taxes became more equitable over time during the period after the first reassessment, likely because of improved assessment quality and the adoption of exemption programs that helped more vulnerable owners. The results also suggest properties in more vulnerable neighborhoods still faced higher tax rates and less accurate assessment values in the first few years after the AVI, although the gap appeared to be converging in more recent years. We suspect that even with the AVI, a single comprehensive assessment cannot solve long-accumulated issues all at once; regular reassessments at short intervals likely provide greater incentive to further improve the quality of assessments.

Summary and Implications

This descriptive study evaluates whether reassessments to true market value at short intervals and taxing by those values can improve equity in Philadelphia. The results suggest that the city's quality and equity of property assessment improved substantially after the comprehensive reassessments in both 2014 and 2019. The results highlight the importance of regular reassessments and make the case that, with regular reassessments, the real property tax can be an effective tax instrument. It must be noted, however, that previous reassessments were either designed to be revenue-neutral (2014) or coincided with a moderate level of housing price appreciation (2019). The equity implications may be different if the pattern of house price inflation changed radically — for example, if housing appreciation is more substantial or if the appreciation is significantly larger for residential properties (versus commercial properties) and/or for properties in lower-income or minority neighborhoods.

Of course, more regular reassessment itself does not address all the challenges of property assessment or

property tax administration. The quality of assessment of single-family properties in Philadelphia, measured by the variation of assessments from sales prices, was still outside the acceptable threshold in 2019. Furthermore, results suggest special attention needs to be paid toward vulnerable populations and neighborhoods. The overall positive impact of the AVI on tax equity was found to vary across communities, and the impact on minority and

other vulnerable communities is nuanced: It reduced the overall tax burden but may have worsened assessment quality, or at best, only improved quality slightly relative to more advantaged neighborhoods. Better administration of tax assessments in vulnerable neighborhoods, as well as well-targeted tax relief programs, should help ensure and maintain an equitable impact.



Appendix

Tax Equity Measures and Data

Technical Details of Measures of Property Tax Equity

The assessment ratio is the ratio of assessed value of a property to the actual sale price of the property (assessed value [AV_{*i*}] divided by market value [MV_{*i*}] in the year when the property was sold). It is calculated as:

$$R_i = \frac{AV_i}{MV_i}$$

The coefficient of dispersion (COD) is a measure of the average percent deviation of an individual parcel *i*'s assessment ratio from the target assessment ratio, and it can be expressed as:

$$COD_i = \frac{|R_0 - R_i|}{R_0} = |1 - R_i|$$

where R_0 is the target assessment ratio in the taxing jurisdiction. In an ideal world, every property would be assessed exactly at its market value, and thus each property would have an R_i of 1. So, we use a value of 1 for R_0 , and then the mean COD is computed as the average COD across all properties. Higher COD values indicate less uniformity in assessments. According to the IAAO, a reasonable COD for single-family homes is between 5 percent and 15 percent, conditional on the age of the property and neighborhood type; the target COD for residential properties in "older, heterogeneous areas" such as Philadelphia should be 15 percent or less.⁶

The effective tax rate is defined as the actual tax amount paid divided by the market value, which is proxied by the sales price.

$$EFFECTIVE_Rate_i = \frac{Tax_i}{MV_i}$$

We use the price-related differential (PRD) as the primary measure of vertical equity, which is calculated by taking the mean AV-to-MV ratio for all parcels in the sample and dividing it by the weighted mean ratio, where the weight is the sale price. This calculation can be expressed as:

$$PRD = \frac{\frac{1}{N} \sum_1^N \frac{AV_i}{MV_i}}{\frac{\sum_1^N AV_i}{\sum_1^N MV_i}}$$

⁶ International Association of Assessing Officers, *Standard on Ratio Studies*. Kansas City, MO: IAAO (2013). Available at www.iaao.org/media/standards/Standard_on_Ratio_Studies.pdf.

Appendix

Data

Administrative data for Philadelphia: We use parcel-level data from the City of Philadelphia’s Department of Revenue (DOR), Department of Records, and Office of Property Assessment (OPA). Using ArcGIS, we conducted a spatial join to link property-level data to Philadelphia’s census tracts. We then merged the real estate transfer data to their respective property parcels, so we have information on assessments and taxes for properties that were transferred during the study period.

CoreLogic Solutions data: CoreLogic data were used to comprise a control group of 15 major cities: Baltimore; Charlotte, NC; Columbus, OH; Dallas; Denver; El Paso, TX; Fort Worth, TX; Houston; Oklahoma City; Phoenix; Pittsburgh; Portland, OR; San Antonio; Seattle; and Washington, D.C. A few other major cities, such as New York, Chicago, and Los Angeles, were not included primarily because of limited coverage or poor data quality in their assessment or sales data during the study period.

Data cleaning decisions: We construct a property-level data set of single-family properties. Data were cleaned to keep only arms-length transactions for single-family residential properties. Duplicate property-month records were removed, only keeping the transaction with the highest price. Sales with extremely low or high prices were excluded. About 10 percent of observations with extreme assessment ratios were dropped, following IAAO Standards, which state that it is appropriate to set a maximum trimming limit of no more than 10 percent (20 percent in extreme circumstances).⁷ Finally, we exclude data for tracts or cities with sparse populations or inconsistent transaction data across years.

⁷ International Association of Assessing Officers, *Standard on Ratio Studies*.

Appendix

Descriptive Statistics for Single-Family Home Sales in Philadelphia, 2010–2019

Year	Total Sales	Mean Sale price	Mean Assessment Value	Mean Tax Amount	Mean AR	Mean COD	Percent COD Below 15%	PRD	Mean Effective Tax Rate
2010	12,596	\$137,884	\$51,640	\$1,179	0.53	0.57	0.07	1.42	1.34%
2011	11,363	\$133,575	\$53,694	\$1,329	0.56	0.54	0.09	1.39	1.55%
2012	12,029	\$140,307	\$55,774	\$1,413	0.56	0.55	0.07	1.41	1.61%
2013	13,381	\$145,997	\$57,369	\$1,492	0.55	0.55	0.08	1.39	1.62%
2014	13,517	\$165,434	\$154,299	\$1,655	1.19	0.41	0.33	1.28	1.41%
2015	15,756	\$164,414	\$149,106	\$1,622	1.15	0.40	0.33	1.27	1.35%
2016	18,455	\$172,862	\$148,670	\$1,679	1.08	0.38	0.34	1.25	1.31%
2017	20,040	\$187,057	\$148,588	\$1,694	0.99	0.36	0.31	1.25	1.19%
2018	20,102	\$196,348	\$147,089	\$1,700	0.91	0.36	0.25	1.22	1.11%
2019	18,932	\$202,013	\$161,284	\$1,855	0.91	0.32	0.29	1.14	1.06%

Note: Single-family properties matched with sales transactions only. Sales with extremely low or extremely high prices and observations with extreme assessment ratios (based on the industry standard) were dropped from the analysis (see Appendix); authors' calculations using data on property assessments and sales transactions from the City of Philadelphia's Department of Revenue, Department of Records, and Office of Property Assessment.