New York City Independent Budget Office Fiscal Brief

August 2022

Does NYC's Method for Assessing Commercial Property Values Result in Inequities?

Summary

Commercial properties are a critical part New York City's property tax base—with their revenue making up nearly 40 percent of property taxes. Like many cities, New York City values commercial properties for tax purposes differently than single-family homes. Single-family homes are valued by estimating how much they are worth on the sales market. Properties in the city's Tax Class 4—which include offices, factories, hotels, and stores—are assessed using a capitalized income approach. Under this method, the city estimates a commercial building's net operating income and then applies a capitalization rate—a rate to measure return on investment—to it to calculate property values. The Department of Finance produces a set of guideline capitalization rates to use in this process each year, based on parameters set by state law. In this paper, IBO examines the city's method for assessing commercial property values with a focus on these capitalization rates. We describe the limitations of the current guideline rates and compare them to capitalization rates that would occur in the market. We then investigate how the rates used by the city lead to inequitable property assessment. Among our findings:

- The capitalization rates used by the Department of Finance are, on average, higher than the capitalization rates IBO estimated based on market sales. Adopting artificially high capitalization rates can lead to the underassessment of property values, compared with those that would have been generated based on market information.
- New York State requires the city value properties in Tax Class 4 according to their current use, rather than their highest and best use. While this method of calculation is intended to avoid speculative valuation, it also can lead to lower assessed values than what the market implies.
- Within the confines New York City's property tax system, the implications of these differences are largely in terms of equity among properties in Tax Class 4: if properties have a lower assessed value compared with sale price, it means their property tax is a smaller share of the sales value—or a smaller burden—and that the tax system works to their advantage compared with properties with lower sales values.
- Using established metrics, IBO found evidence of both horizontal and vertical inequity of assessments under the current system. This means that properties of similar market sale prices have different assessed values (horizontal inequity) and higher-value properties are under-assessed (and hence under-taxed) relative to their lower-value counterparts (vertical inequity).

New York City's property tax structure is bound by state law. Almost any changes require state intervention and the city's options to remedy these equity issues are limited. However, there may be some adjustments the city could make to its guideline capitalization rates to help narrow the gap between the values it assesses and the market sales values.

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Introduction

Commercial property tax makes up about 40 percent of the total property tax revenue in New York City each year. Despite being fewer in number, commercial buildings generate more tax revenue annually than all single-family properties combined. This is due to features of the state's property tax law that governs the city's property tax system, as well as some characteristics inherent to commercial buildings. New York City assesses commercial buildings at a higher rate than single-family residences, meaning that a larger proportion of their value is subject to taxation. Commercial buildings are also typically larger and have higher values than other building types, which partly explains why their tax liabilities are higher. New York City is also bound by legal provisions that require the share of aggregate tax levy borne by each tax class to remain virtually constant from year to year, referred to as the "class share system." This system plays a key role in determining tax rates for each of the city's four property tax classes each year. New York City assesses commercial properties based on their income, which is different from how single-family homes are assessed—based on potential sale values.

Like many other jurisdictions, New York City uses a dual methodology for assessing property values. It values single family homes using the "comparable sales" approach by estimating how much they are worth on the sales market, and values commercial properties using the "capitalized income" approach. To do so, the city estimates commercial buildings' net income and then divides them by capitalization rates. A capitalization rate is a tool to measure potential profits from an investment property. The New York City Department of Finance (DOF) produces a set of guidelines each year to be used in determining appropriate capitalization rates. The reason for the difference in assessment methodology between the commercial and single-family properties is because commercial properties are not sold as frequently as single-family homes making it difficult to assemble enough transactions to use the comparable sales approach.

In this paper, IBO examines the city's approach to commercial property assessment, and in particular the critical role played by capitalization rates. We explore how the capitalization rates employed by New York City for assessing property values may overlook the capacities that buyers and sellers in the market possess in terms of absorbing buildings' income potentials. We describe the legal provisions that restrict the city's discretion in determining capitalization rate guidelines and can lead to higher capitalization rates than would be generated based on market transactions and discuss how these concerns about capitalization rates can lead to undesirable equity outcomes in terms of distribution of assessed values and tax burdens.

There are two main principles of tax equity: horizontal equity and vertical equity. First, if properties with similar values face different tax burdens they are said to suffer from horizontal inequity. Second, when high-value properties are under-assessed (and hence under-taxed) relative to their lower-value counterparts, this results in vertical inequity. In this paper, we examine whether New York City's current assessment method for commercial properties—based on their net income—leads to horizontal and vertical inequity in assessments.

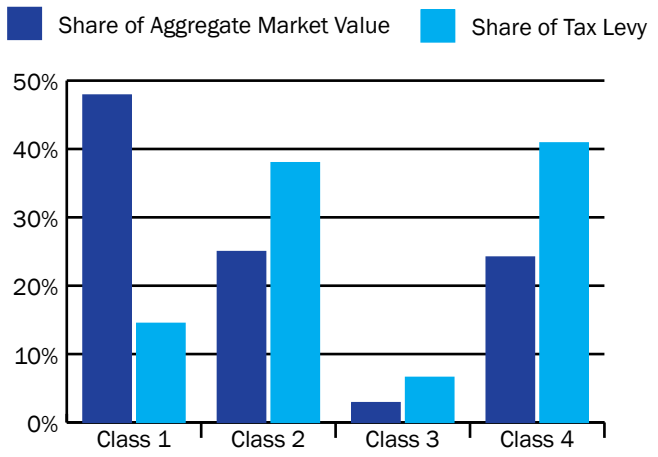
To answer that question, we use commonly known measures of horizontal and vertical equity. To measure whether or not comparable properties are assessed similarly (horizontal equity), we use the Coefficient of Dispersion (COD) and compare it across different property types to document existing variations. Vertical equity—the divergence between higher- and lower-value properties' tax burden is usually measured by the price-related differential (PRD). In addition to PRD, we use the price-related bias (PRB), which is capable of not just indicating inequalities but quantifying them as well. The study also attempts to estimate the extent of the divergence between guideline capitalization rates and those generated from market sales. IBO finds non-uniformities between the guideline and market rates, which can be an important driver of inequitable assessment outcomes.

This brief proceeds as follows: it first provides a description of New York City's assessment method for commercial properties. This is followed by an analysis of capitalization rates by comparing the guideline rates against the market ones and an examination of how the capitalization rates used by the city contribute to horizontal and vertical inequity using the various measures.

Current Method of Assessing Commercial Properties

Like most local governments, New York City depends heavily on property tax as its largest source of tax revenue. In 2020 (all years refer to city fiscal year unless otherwise noted), property tax collections made up 47 percent of the city's total tax revenue. To comply with New York State's property tax law of 1981, also known as S7000A, New York City classifies real property into four classes with distinct methods for determining assessed value. Commercial

Share of Aggregate Market Value in Each Tax Class Compared to Tax Levy, Fiscal Year 2020



NOTE: Aggregate market values (blue bars) are calculated using DOF's Fair Market Values (FMV), which usually are noticeably below market sales for properties in Tax Classes 2 (including condominiums & cooperatives) and 4 (commercial properties).

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properties are classified as Tax Class 4, which includes offices, factories, stores, hotels, theatres, and most vacant land.[1] Tax Class 1 comprises 1-, 2-, and 3-unit homes; Tax Class 2 includes rental residential buildings, and condominiums and cooperative residences; and Tax Class 3 is utility properties.

Commercial properties in Tax Class 4 accounted for 41 percent ($13 billion) of the total property tax levy in 2020, while comprising only 24 percent of the aggregate fair market value of all city properties (fair market values refer to the values determined by the city's current assessment system).[2] To provide some context, in the same year residential properties in Class 1 accounted for 14 percent of the city's total property tax levy, while making up 48 percent of the aggregate fair market value.

While the number of commercial properties in the five boroughs is far fewer those in Class 1, their assessed value for tax purposes—the portion of the fair market value that is being taxed—are much higher (In 2020, there were 98,000 Class 4 properties in the city, compared to 700,000 Class 1 properties). By comparison, aggregate assessed value for Class 4 properties was $136 billion in 2020, compared to $21 billion for Class 1 properties. In addition to commercial properties being typically larger and having higher values than 1-to 3-unit homes, this class difference is also rooted in the fact that Class 4 properties are assessed at a much higher rate (45 percent) compared with Class 1 properties (a maximum of 6 percent, with many below that target due to limits on annual assessment increases).

For tax purposes, DOF values commercial properties by applying a capitalization rate to their net operating income (gross income net of expenses other than taxes), which results in what the city calls a fair market value (FMV). This method of value assessment differs from what DOF uses for residential properties in Class 1, which is a price estimation method using property and locational characteristics.[3] DOF has adopted the capitalized income assessment approach because the sale of commercial properties occurs less frequently than the sale of single-family ones, and the small number of sales each year does not allow for accurate assessment of commercial properties.

In order to calculate the property tax liability for each commercial property the DOF uses the following method (also illustrated in Equation 1).

First, the city multiplies each FMV by an assessment ratio (we will discuss more about how FMV is calculated at length later in this section). Assessment ratios vary by tax class and are set at the discretion of the city's finance commissioner.[4] The ratio is currently 0.45 for all Class 4 properties. The product of the FMV and the assessment ratio is the property's assessed value, with the caveat that any increases in assessed value are phased in over a five-year period in order to protect property owners from sudden escalation of their tax.[5] This assessed value is then decreased by any applicable property tax exemptions and the resulting value is multiplied by the tax rate. The tax rate for Class 4 properties is set each year at the level that yields sufficient property tax income from each of the four tax classes according to the class share system.[6] The tax rate for Class 4 was 10.537 percent in 2020. Finally, any abatements for which the property are eligible are subtracted, resulting in the property's tax liability. Therefore, at the base of this calculation is the property's FMV, which for commercial property is determined by two components: net operating income and capitalization rate.

Equation 1: DOF's Calculation of Commercial Property Tax for Property *i* in year *t*, where:

FMV = Fair Market Value assessed by the assessor, AR = Assessment Ratio, and TR = Tax Rate.

$$Tax_{i,t} = [(FMV_{i,t} \times AR) - Exemptions_{i,t}] \times TR_t - Abatements_{i,t}$$

Equation 2: DOF's Calculation of Fair Market Value for Property *i* in year *t*, where:

NOI = Net Operating Income (after DOF's adjustments), and CR = Capitalization Rate.

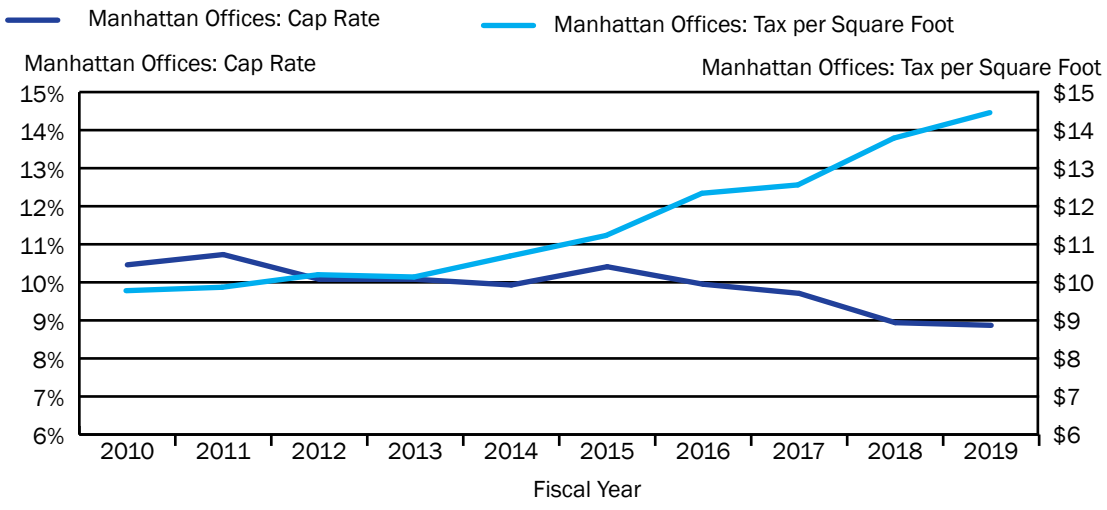
$$FMV_{i,t} = \frac{NOI_{i,t}}{CR_{i,t}}$$

The capitalized income approach depends partly on having reliable data on income and expenses to calculate net operating income. To ensure access to this information the city requires the owners of most Class 4 properties to report their income and expenses every year. DOF reviews the data, reported in the Real Property Income and Expense (RPIE) statements, and makes adjustments to them using a modeling process. The process also calculates net income for properties that fail to file RPIEs (for detailed description of these processes see Quintos, 2015). After net operating income is calculated for all properties, DOF calculates their FMV for the upcoming assessment roll by dividing the net operating income by the DOF's capitalization rate (see Equation 2). (Details on how the DOF capitalization rate is chosen are in the next section).

This formula means the capitalization rates are inversely related with FMV (the higher the capitalization rate the lower the FMV). This may seem counterintuitive because in the market higher capitalization rates are synonymous with higher sale prices. When buyers and sellers think of capitalization rates, they estimate a revenue stream a given property would potentially generate relative to the property's sale price. From that standpoint, higher income streams would generate higher capitalization rates. In DOF's approach, income is known and the goal is to estimate the value of a given property with known income by using estimated capitalization rates. To do so, income must be divided by estimated capitalization rates, which inverses the relationship between those rates and property values. This also means there is an inverse relationship between capitalization rates and property tax (which is an outcome of FMV), as demonstrated in the accompanying charts for Manhattan office properties and Manhattan retail properties.

Calculating the Capitalization Rate. DOF provides assessors with guidelines containing ranges of appropriate capitalization rates for categories of use for commercial buildings, e.g. midtown offices, trophy buildings, etc. Assessors are to choose an appropriate capitalization rate taking into account factors for the building such as rents, upcoming vacancies and location.[7] One critical factor in the city's use of capitalization rates in property assessment is that New York State's Department of Taxation and Finance (DTF) requires the city to assess properties based on their current use. The DTF asserts that "in establishing assessments, the assessor must value property in accordance with its current use, rather than its highest and best use."[8] The justification for considering the current use as the basis for assessment is to avoid speculative valuation, and/or overtaxing properties because the parcel is not being used at its highest speculated potential. While protecting property owners from excessive taxation, this

Inverse Relationship between Capitalization Rates and Property Tax, Manhattan Offices



NOTE: Capitalization rates are the ones used by the Departmnet of Finance for assessment purposes, which exclude property tax from the rate calculations.

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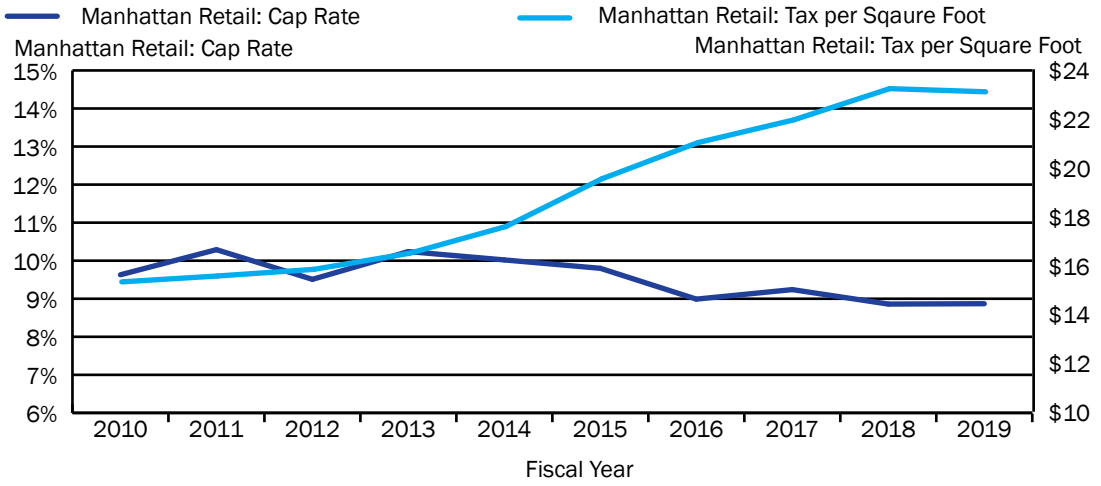
Inverse Relationship between Capitalization Rates and Property Tax, Manhattan Retail



NOTE: Capitalization rates are the ones used by the Departmnet of Finance for assessment purposes, which exclude property tax from the rate calculations.

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interpretation of the law has an important implication for New York City's property tax structure. It means that guideline capitalization rates are prohibited from taking into account any projections about future property value appreciations (or depreciations), and must only consider the stream of income generated by the property in its current use.[9]

This policy diverges from what happens in market transactions, where property values are determined after taking into account potential uses and future value increases (for example, an old factory in a neighborhood with high potential for value growth is most likely priced not solely based on its current factory function, but also on its potential income if converted to a store or office building). Adopting artificially high (or low) capitalization rates leads to underassessment (or overassessment) of property values, compared with the values that would have been generated based on market information.

Elsewhere, this divergence could lead to implications on the total tax revenue collected, resulting in less (or more) tax revenue than if the assessments were based on market transactions. However, because of New York City's tax share system—where each tax class's share of the aggregate levy can adjust only gradually to market value changes —whether such a change would have revenue implications would depend on whether it were accompanied by more comprehensive reform of the city's property tax system. Absent such an overhaul, the implications of any divergence for the city is largely in terms of tax equity among properties in Tax Class 4: if higher-value properties have lower assessed value-to-sale price ratios, it means their property tax is a smaller share of the investment—or a smaller burden—for them, or that the tax system works to their advantage relative to lower-value properties.

Capitalization Rates and Overestimation Risk

Before addressing equity concerns, we first examine the differences between two sets of capitalization rates: those utilized by the DOF to estimate FMVs, and those that can be inferred from market sales, or the "fallout rates." This exercise means to provide a quantitative measure of the extent to which the guideline cap rates may be overestimated, and what kind of outcomes can be expected in terms of assessed values and property tax. Overall, we find that the DOF's capitalization rates are on average higher than the fallout rates we calculated based on sales.

In order to estimate these fallout rates, we use several data sets that provide different components of the city's property value assessment. These components include net operating income, DOF capitalization rates, sale prices, FMVs as calculated by the DOF, and tax liabilities. The study sample is limited to a subset of Class 4 properties that sold from 2010 through 2019 and excludes non-arms-length sales and properties with no income or $0 taxable values. The sample also only includes the four property types most relevant to the research: warehouses, factories, retail, and offices (several other property types, like hospitals, hotels, or theatres, are excluded for various reasons).[10] This selection process resulted in a sample of 11,702 sales over the course of 10 years. Appendix A provides descriptive statistics of the study sample.

Equation 3: Calculation of the "crude" fallout rate for Property *i* in year *t*, where:

NOI = net operating income, and SP = sale price.

$$CR\ (crude)_{\ i,t} = \frac{NOI_{i,t}}{SP_{\ i,t-2}}$$

DOF Capitalization Rates vs. Market. As noted in the previous section, the DOF provides a range of capitalization rates specific to each building type, location, and income range. These rates act as guidelines for local assessors and for the DOF in calculating FMVs. After the capitalization rate is selected for each property, it is recorded in DOF data—the rates we use in this analysis as the guideline rates. For that same property—if sold on the market—a fallout capitalization rate can be generated by dividing net operating income by sales price (see Equation 3).

Average Department of Finance Guideline Rates are Higher Than Estimated Market Rates for All Property Types

Building Class	Mean Guideline	Mean Crude	Mean Market
Warehouse	10.269	4.706	8.883
Factory	10.323	3.925	8.775
Retail	10.543	4.979	9.246
Office	10.489	5.763	9.411
Pooled	10.458	4.816	9.181

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This fallout rate could then be compared against the guideline rate.[11] However, this fallout capitalization rate can be considered "crude" because it captures only one aspect of an investment's profitability as viewed in the market: return on investment, or the annual stream of income generated by the property. There is, however, a second aspect of profitability, which is return of capital. This aspect measures the rate at which the original investment (buying a building) is recouped, as reflected in changes in property value as a result of market dynamics or upgrading to higher-value functions. A comprehensive market-driven capitalization rate includes both these components. To account for them in calculating market fallout capitalization rate, the 10-year average change in price per square foot is added to the equation (see Equation 4). We call this rate the market capitalization rate. (It is important to note our calculation of the fallout rates uses NOI as calculated by the DOF, but sales prices from market transactions; ideally, both values should come from the same source, since net income could vary based on who calculates it and for what purpose, however we are limited by available data.)

This strategy, while somewhat constrained by available data, allows us to approximate the capitalization rates used in market transactions. We then compared the capitalization rates used by DOF, with the market rates computed from sales for properties in our sample (sold between 2010 and 2019). While the average capitalization rate used for value assessment is 10.46 percent, the market rate is 9.18 percent, or about 1.3 percentage points lower. This difference, while not seemingly large in percentage terms, can mean large dollar amounts. As a hypothetical example, the value of a property with an annual income of $100,000 would be assessed at $950,000 using the average guideline rate, and $1.1 million using the market fallout rate. This is roughly a 14 percent difference in assessed value. We also compared the DOF guideline and our market capitalization rates separately based on property type (warehouse, factory, retail, and office). When viewed by property types, the guideline-market difference in capitalization rates is most pronounced for factories, where the average market rate is 1.5 percentage points lower, and least pronounced for offices, where the average market rate is 1.1 percentage points lower than the guideline.

These results show that the rates used by the DOF are higher than what the market generates after accounting for value appreciation. In other words, the DOF capitalization rates seem to be overestimated relative to what market sales imply, which leads to under-assessment of commercial properties overall. The magnitude of the difference between the two rates is consistent across building types in different locations: for Manhattan offices in isolation, the guideline capitalization rates are 1.1

Equation 4: Calculation of the "market" cap rate for Property *i* in year *t*, where:

NOI = net operating income; SP = sale price; and Avg(Δ median sale psf) = average change in the median property's price per square foot over the course of the study period (the change is calculated separately for each property type).

$$CR\ (market)_{\ i,t} = \frac{NOI_{\ i,t}}{SP_{\ i,t-2}} + Avg_{(\Delta\ median\ sale\ psf\ \rho\ (t_1:t_{10}))}$$

percentage points higher than the market fallout rates; offices in other boroughs show a 1.2 percentage point difference between the guideline rates and the market fallouts. Similar differences are observed for retail properties in Manhattan versus other boroughs as well.

Assessment Equity

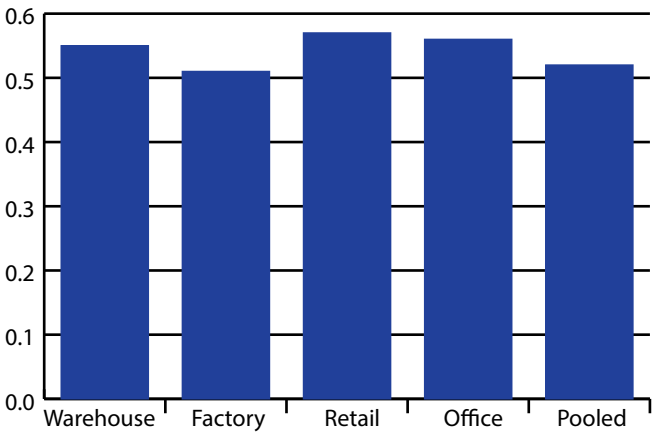
Overestimated capitalization rates can potentially lead to inequity in assessments. As discussed, capitalization rate is inversely related with assessed value, which means higher capitalization rates generate lower assessed values in general. Therefore, properties with market values over and above their current use would benefit more than others from the underestimation of their values, because their tax levies would likely be a smaller proportion of their market sale prices. Another equity concern is that when the FMV, as calculated by DOF, and market sale prices (SP) diverge, properties with higher sales prices would have a smaller FMV-to-SP ratio, and most likely a smaller tax-to-SP ratio, relative to lower-value properties. We explore the existence of such inequities in the distribution of tax burdens using the general framework of horizontal and vertical equity.

Horizontal Equity. Horizontal equity is an economic principle that asserts tax burdens should be fairly distributed among individuals that are economically similar. In the context of property tax, horizontal equity translates to equality of tax burdens across properties with similar values. This does not mean to disregard the differences among property values. Rather, it focuses on whether or not property tax varies fairly, relative to variations in property assessed values. In a horizontally equitable tax regime, properties with similar values are assessed similarly.

A common metric for measuring horizontal equity is the Coefficient of Dispersion (COD). In this study the COD, measures how "sale ratios" are distributed in a given sample of properties. Sales ratio is simply the ratio between a property's fair market value and sale price (FMV / SP). The COD considers the sale ratio of the median property in the sample, and reports the average deviation of the sample from that median (as shown in Equation 5.)

To simplify the concept, consider a sample of two properties with identical sale prices (SP1 = SP2). If those properties also have identical fair market values (FMV1 = FMV2), the

Coefficient of Dispersion Shows Horizontal Inequity Across All Property Types



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COD would be zero because both properties would have the same sales ratio. But if the two properties are assessed at different values (FMV1 ≠ FMV2), then the COD would be greater than zero. In a larger sample, the COD is the average of absolute differences between each individual property and the sample's median in terms of sale ratios. Therefore, the more properties there are in the sample with similar sales prices but varying FMVs, the larger the COD will be, hence an indication of horizontal inequity.[12]

IBO calculated the COD values for each property type in the sample, as well as for all property types pooled. The sample's average COD is 0.52, with variations among property types: factories have the lowest COD values (0.51 or the least horizontal inequity in the sample) and retail properties the highest (0.57 or greatest horizontal inequity). Using results from a wide range of studies and samples, the International Association of Assessing Officers (IAAO) provides standards for specific ranges that are acceptable for the COD by property type. According to those standards "income producing properties in larger areas represented by large samples" are expected to have CODs between 0.05 and 0.15 (IAAO, 2013). COD values above 0.15 are considered cause for concern regarding horizontal equity or indicate a sizable deviation in sale ratios from the sample's median. Considering the IAAO standards, the COD values calculated from our sample of sales provide evidence of horizontal inequity in assessing commercial properties.

Equation 5: Calculation of the study sample's Coefficient of Dispersion, where:

FMV = fair market value, and SP = sale price.

$$COD = Avg\left|\frac{FMV_i}{SP_i} - Median\left(\frac{FMV}{SP}\right)\right|$$

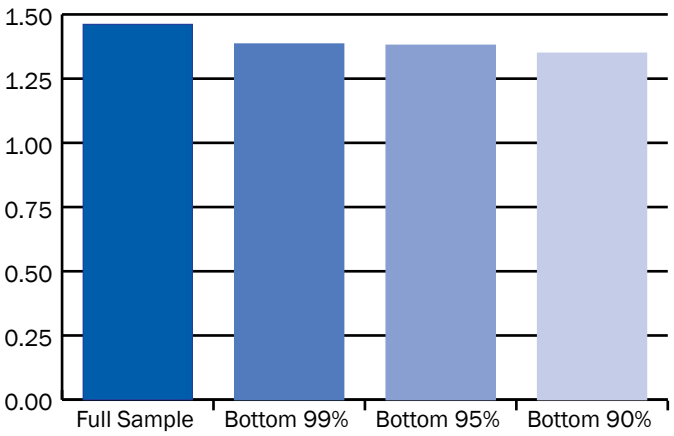
Vertical Equity. Rather than examining similar tax burdens for properties with similar values, vertical equity concerns the proportionality of FMV to market price between the highest and lowest value properties. In an equitable regime, the assessed values grow proportionate to market prices, and therefore the sale ratio is comparable at the top and the bottom of sale price distribution.

Economists have developed a range of methods to measure vertical equity. While having technical differences, these measures are all rooted in the correlation between assessed values and market prices— (see Carter 2016 for a comprehensive review). IBO used two metrics to examine vertical equity: one metric that is commonly used, Price-Related Differential (PRD); and a second metric that is newer and technically more sophisticated, called the Price-Related Bias (PRB)—scholarly literature advises using multiple measures, given the difficulties and limitations inherent to each of the metrics. Before discussing our results, it is worth noting that some level of inequity is usually expected in measuring vertical assessment equity. This is because the distribution of property values, especially commercial properties, is usually not even, but rather skewed towards the high-price end. This, in turn, skews the vertical equity measure because more expensive properties are generally assessed at much lower values relative to their market price, and therefore, have lower sales ratios.[13] Appendix B presents a discussion of such skewedness among different property types.

Price-Related Differential. Price-Related Differential measures the level of uniformity in sale ratios between low- and high-sale price properties. It is an expression of the average sales ratio of a given sample, normalized by the weighted mean of that sample—or the ratio of the arithmetic mean to the value-weighted mean sales ratio (McMillen & Singh, 2020). For any sample of properties, PRD is calculated by dividing the mean sales ratio by the sample's aggregate sales ratio, which is the sum of all FMVs divided by sum of all sale prices (as shown in Equation 6).

The same example of a sample of two properties helps understanding what PRD measures. Assuming the two properties in the hypothetical sample have different sale prices (e.g. SP1 < SP2), the expected equitable outcome is for their assessed values to differ proportionately to their sale prices (FMV1 < FMV2), and therefore for their sale ratios to be comparable (FMV1 / SP1 ≈ FMV2 / SP2). This means that a perfectly equitable outcome will have a PRD equal to 1, because the average of the two sale ratios will be the same as the sample's aggregate sales ratio. In a real-world sample, more properties with higher sale prices and lower assessed values (or more properties with small sales ratios) would generate a larger PRD score—as the denominator of Equation 6 becomes smaller—which indicates vertical inequity in favor of higher value properties (meaning higher value properties have a disproportionately lower tax burden than lower value properties). This applies in the other direction too: when a sample has an over-presence of properties with lower sale prices but higher FMVs (larger sale ratios), the PRD score would be lower than 1 because the denominator inflates. In general, PRD scores that noticeably deviate from 1 in either direction are an indication of vertical inequity.

Price-Related Differential Indicates Vertical Inequity



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IBO calculated the PRD scores for the full study sample. As a test for robustness against the inherent upward price bias, IBO also calculated the PRD score excluding the highest value properties, i.e. those in the top 1, 5, and 10 percentiles. The full sample had a PRD score of 1.46. As expected, the PRD was closer to 1 without those outliers, with the 90 percent sample having a PRD score of 1.35.

Equation 6: Calculation of Price-Related Differential for the study sample, where:

FMV = fair market value, and SP = sale price.

$$PRD = \frac{\frac{\sum_i^n \frac{FMV_i}{SP_i}}{n}}{\frac{\sum_i^n FMV}{\sum_i^n SP}}$$

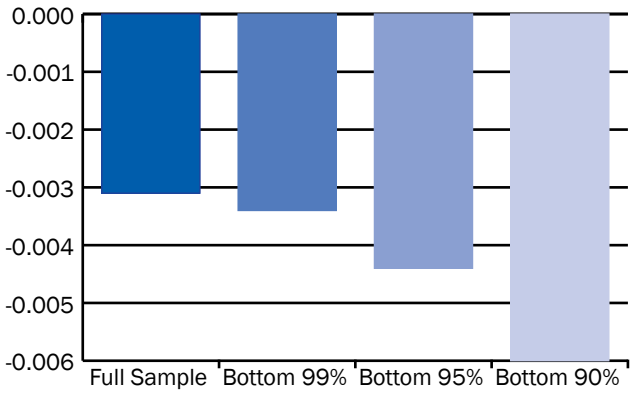
The PRD standards recommended by the IAAO assert that PRD scores below 0.98 or above 1.03 are cause for concern about vertical equity (IAAO, 2013). These bounds have been scrutinized in the scholarly literature, and some scholars believe they should be broadened to 0.95 and 1.10 (e.g. see Almy, Gloudemans, and Denne, 1978). Considering either range, the study sample's PRD score is above the acceptable maximum, which indicates vertical inequity in assessing commercial properties in the city in favor of higher value properties.

Price-Related Bias. Price-Related Bias (PRB) is a newer measure of vertical equity with an important advantage: while PRD is mainly interpreted as an indication of vertical inequity, PRB provides a way to quantify the extent of it. In its simplest expression, PRB is the coefficient in a regression model with sale ratio as the dependent variable and sale price as the independent variable. The coefficient explains changes in sale ratio as a result of changes in sale price. Therefore, if sales ratios and property values increase together, the resulting PRB (regression coefficient) will be positive, and it will be negative if sale ratios and sale prices go in opposite directions. Besides the coefficient sign, which points at the direction of potential inequity, its magnitude provides a measure for the extent of vertical inequity. The expanded form of the regression equation used in the study is shown in Equation 7.

In Equation 7, PRB is the B_1 coefficient. The dependent variable captures the percent difference between individual property sales ratios and the sample's median ratio. The explanatory variable, rather than simply using sale price, captures the weighted average of sale price and FMV in order to control for the inherent upward bias.[14]

Again, IBO calculated PRB results for the full sample, as well excluding the highest value properties (those in the top 1, 5, and 10 percentiles). The full sample generates a PRB of -0.0031, or -0.31 percent (Since the independent variable is in logged form, the PRB is interpreted as the expected percent change in sales ratio if sale price doubles). Therefore, the coefficient of -0.0031 means that as the property value doubles (e.g. going from a $1 million to a $2 million property), the sales ratio declines by 0.31 percent (about a third of a percent). In order to define

Price-Related Bias Confirms Existence of Vertical Inequity, Albeit Within Acceptable Range



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how large of a coefficient is cause for concern, the IAAO advises that any PRB coefficient beyond the ±5 percent mark is a sign of inequity (IAAO, 2013). According to those standards, the study sample's PRB score remains within the acceptable range, even after the top highest value properties are excluded from the analysis (the PRD ranges from -0.0034 when the top 1 percentile are excluded to -0.006 when the top 10th percentile is excluded). Appendix C presents complete regression results for the PRB analysis, including sample sizes and model statistics.

The PRB results offer a few takeaways. The negative coefficients confirm vertical inequity, consistent with the results from the PRD analysis. The PRB magnitude, however, is within the reasonable range of 5 percent, implying that the amount of vertical inequity is not concerning. This can be interpreted as a deviation from the PRD findings, which showed scores well beyond the acceptable range. However, it should be noted that the PRD does not measure the size of inequity, so it cannot be directly compared with PRB beyond the direction of inequity and both measures indicate inequities in favor of higher value properties.

Conclusion

The capitalization rate is a critical component in assessing the property tax for commercial properties in New York City. Comparing the guideline rates used by the city with the market fallout capitalization rates suggests the former

Equation 7: Calculation of Price-Related Bias for the study sample, where:

Sales Ratio = FMV / SP.

$$\frac{(Sales\ Ratio - Median\ Sales\ Ratio)}{Median\ Sales\ Ratio} = \beta_0 + \beta_1 \frac{\ln(\frac{\frac{Assessed\ Value}{median\ sales\ ratio}}{2} + \frac{Sale\ Price}{2})}{\ln(2)}$$

is exposed to overestimation, which has consequences with regard to equity. We examined the resulting equity outcomes using different metrics, and document both horizontal and vertical inequities that can be connected to high capitalization rates used in the assessment process.

An inequitable tax regime produces outcomes that are generous to some and burdensome to others. According to our findings, the assessment regime used in New York City does not always treat properties with similar values similarly, and that higher value properties are in general assessed at lower rates than their lower-value counterparts, and in many instances have a smaller tax levy relative to their actual market values. These outcomes are undesirable in two ways: inequitable property tax has a negative impact on the value of (at least some) commercial properties by reducing the profitability of investing in them. Secondly, certain types of businesses may find the city less attractive as a result of inequitable distribution of tax burdens, which is at least partially transferred to them by property owners.

It is important to acknowledge that New York City's tax structure is for the most part bound by state law, including the S7000A regime that has remained fundamentally unchanged since 1981. This means that almost any changes to the property tax systems would require some form of state intervention and New York City is limited in what it can do itself to remedy these inequities. If this were not the case, and a certain type of commercial building were over-assessed relative to other building types within the class, tax rates could be adjusted for those building types to make the property tax more equitable (to achieve the same aggregate levy for the tax class, the tax rate could be lowered for the over-assessed type and raised for other types). However, tax rates are required to be uniform in New York City within each tax class and modifying them requires making changes to the property tax law, which is determined at the state level.

However, even with the limited set of tools the city has at its disposal, there are ways to achieve more equitable assessment outcomes. One such way is to adjust the guideline capitalization rates towards the median property—that is to lower the capitalization rates for properties with highest sale prices and raise them for lowest-value ones. Because capitalization rates are published by the DOF and are allowed to vary for different property types, this adjustment would narrow the somewhat wide divergences between fair market values and market sale prices. As discussed in the paper, narrowing that gap remedies inequities both horizontally and vertically.

Reforming the assessment regime towards equity can lead to raising more revenue from higher-value properties, and at the same time alleviating the burden for lower-value properties to incentivize business activity in the city. These reforms are all the more important in the current times. Aside from the shock of the Covid-19 pandemic, which left many commercial properties with no income for an extended period of time, the need for commercial space is going through seemingly permanent changes: new technologies have enabled workers in several industries to work from remote locations, not necessarily from a specific physical spot, and consumers to do their shopping without need to visit physical stores. These changes highlight the importance of assessment equity as a tool to create a more level playing field, rather than an additional obstacle, for business activities.

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Appendix A: Descriptive Statistics of Study Sample

This study takes advantage of a few separate datasets provided by the Department of Finance. The Real Property Assessment Database (RPAD) provides detailed information about all parcels in New York City, including physical attributes, property type, and assessed and fair market values as calculated by DOF. Commercial properties' income, expenses, and capitalization rates are taken from the Notice of Property Value (NOPV) forms after being adjusted by DOF. Information on final tax liabilities and abatements are provided in the Open Balance data. Finally, data on all commercial sales transactions were also available to us. These data were combined in a parcel-level panel using unique parcel identifiers over the period of 2010 through 2019. As noted in the Introduction section, the sample selection process included eliminating several property types that were irrelevant to the study.

Summary Statistics for Select Numeric Variables

Variable	N	Mean	Median	Standard Deviation	Minimum	Maximum
Gross Area (sqft)	11,215	22,379	4,935	101,993	21	2,548,000
Floors	11,215	4	2	7	0	90
Year Built	11215	1943	1931	452	1800	2016
Net Operating Income ($ per sqft)	8,106	31.27	23.04	8.16	9.89	390
Effective Tax Rate (per $100 of fair market value)	11,161	3.97	3.79	2.14	0.77	19.99
Sales Price ($ per sqft)	11,224	619.44	371.33	160.84	47.62	7,489
Assessed Value ($ per sqft)	11,161	98.67	59.19	25.01	12.43	2,750
Fair Market Value ($ per sqft)	11,161	219.28	126.42	77.98	27.62	6,110
Fair Market Value ($ per sqft)	11,161	219.28	126.42	77.98	27.62	6,110

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Summary Statistics for Select Categorical Variables

Variable	N	Percent
Corner	1,346	11.84
Landmark	65	0.58
Historical District	374	3.29
Alteration	3,241	28.51
Warehouse	1,732	15.43
Factory	1,292	11.51
Retail	5,204	46.36
Office	2,996	26.69
Manhattan	2,667	23.76
Bronx	1,158	10.32
Brooklyn	3,578	31.88
Queens	3,064	27.3
Staten Island	757	6.74

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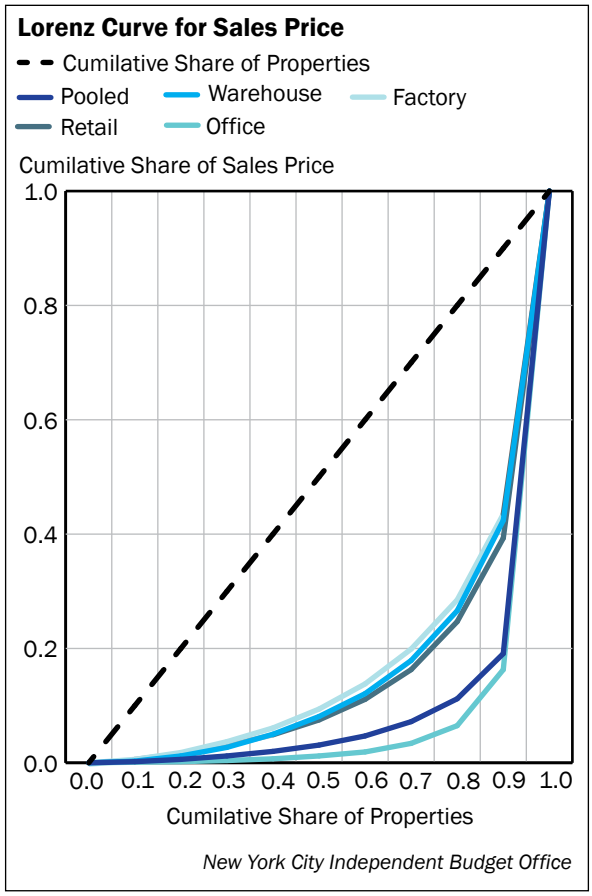
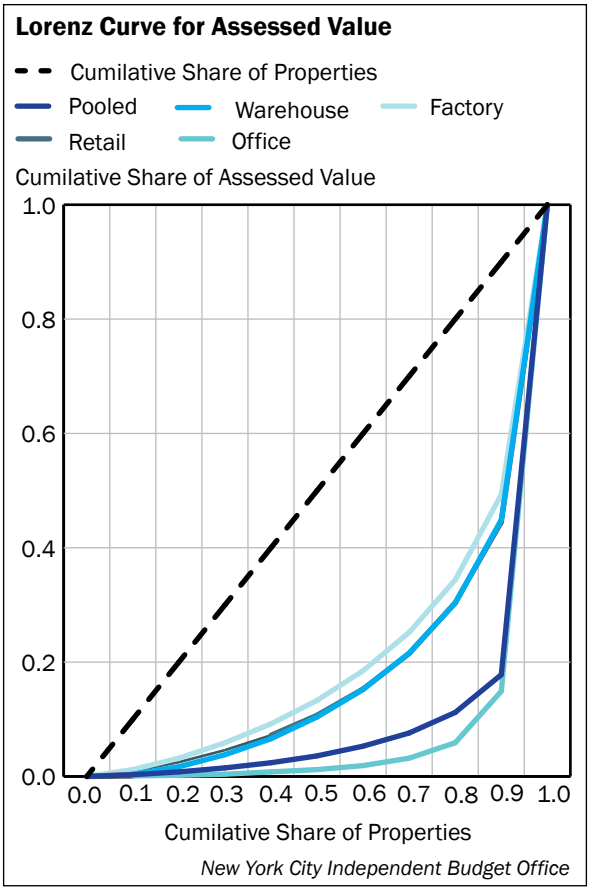
Appendix B: Lorenz Curve and Upward Skewedness

This appendix presents the Lorenz curve for both sales price and assessed value. The curve visualizes the cumulative share of value against cumulative value deciles, with the goal of demonstrating the scale of skewedness. Perfect equality is achieved when each decile contributes proportionately to the cumulative value, i.e. the 45-degree line. As both figures show for most property types, the top 10 percent of the value distribution accounts for about 60 percent of the cumulative value. This applies to both sales prices and assessed values.





Appendix C: Price-Related Bias (PRB) Regression Results

Price-Related Bias Scores for Full Sample and Robustness Sub-Samples				
	Full Sample (I)	Bottom 99% (II)	Bottom 95% (III)	Bottom 90% (IV)
	All Properties			
prb	-0.0031*	-0.0034*	-0.0044*	-0.0060*
	(0.0013)	(0.0024)	(0.0028)	(0.0030)
_const	0.478	0.4776	0.4759	0.4726
	(0.1592)	(0.1584)	(0.1556)	(0.1512)
N	10,954	10,844	10,406	9,859
R2	0.0153	0.0154	0.0200	0.2064
F	10.17	10.21	10.37	11.72
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Endnotes

[1]Tax Class 4 encompasses a diverse range of property types; warehouses (Building Class E); factories (F); garages and gas stations (G); hotels (H); hospitals (I); theatres (J); retail (K); lofts (L); religious buildings (M); asylums (N); offices (O); cultural buildings (P); parks (Q); commercial use within condo buildings (R); stores or offices within small residential buildings (S); airports (T); bridges and railroads (U); academic buildings (W); municipal services (Y); and other miscellaneous usages (Z).

[2]Because of the restrictions dictated by state law (Real Property Tax Law, Section 581), condominiums and cooperative buildings in class 2 are assessed approximately 75-80 percent lower than their market prices. Should those values be used, the class 4 share of the aggregate fair market value would be closer to 20, rather than 24 percent. For more details on the state law on assessing condos and coops, see https://www.tax.ny.gov/pubs_and_bulls/orpts/legal_opinions/v7/81.htm

[3]Properties in Class 2, which includes rental residential buildings, condominiums, and cooperatives are also valued based on income, or imputed income in the case of coops and condos.

[3]While there have been variations in assessment ratios, they are rather infrequent. For instance, the assessment ratio for class 1 properties was reduced from 18 percent to 8 percent in 1991, and further to 6 percent in 2006. The rates have remained unchanged since then. For more information see https://www1.nyc.gov/assets/omb/downloads/pdf/methodology-2022-06.pdf

[5]The "transitional assessed value" is determined using 20 percent of the current year assessed value change and the 20 percent changes from the prior four years. The assessed value used for determining the tax levy is the lower of the actual assessed value minus actual exempt value and transitional assessed values minus transitional exempt value and is called the billable taxable assessed value.

[6]Under the New York City Charter, an overall tax rate is set by determining the amount of property tax revenue needed to balance the city's budget. In reality, the overall rate has changed infrequently since the early 1990s. Since 2009 it has remained "frozen" at 12.283 percent. With the levy determined, each class's share of the levy is calculated using the class share process. With a class' share of the levy known, the rate for each class is computed by dividing the class levy by the total billable taxable assessed value in the class.

[7]For the most recent list of capitalization rates and other guidelines see https://www1.nyc.gov/assets/finance/downloads/pdf/19pdf/fy2020_assessment_roll_guidelines_final.pdf

[8]Obtained from https://www.tax.ny.gov/pubs_and_bulls/orpts/legal_opinions/v10/45.htm

[9]For more information of the DOF methodology for calculating capitalization rates see https://www1.nyc.gov/assets/finance/downloads/pdf/21pdf/fy2021-additional-statistical-distributions-and-capitalization-rate-methodology.pdf.

[10]For example, hotels were eliminated because their sales and net income are hardly comparable with any other commercial property type. Theatres were eliminated due to their very small sample size. Properties such as religious buildings are usually tax-exempt or have no income to report, and therefore do not belong in this study. Vacnant land was also excluded.

[11]Property values, as assessed by the DOF using its own capitalization rates, are released with a 2-year lag, and therefore are reflective of market sales on a lagged basis. That is why Equation 3 compares capitalization rates in year t against sale prices in year t-2.

[12]Because the FMV is determined based on net income and IBO's equity measures use market sale prices, one might argue that differences between FMV and SP are naturally expected, or that FMV should not be viewed relative to market sales. While these two "value" measures are seemingly different, net income is always implied in market sales, as properties with higher net income also have higher market prices. Therefore, while it is not surprising for the FMV to be generally lower than SP, the difference between the two are expected to be consistent and not vary across the sample. Any such variance can be validly considered a sign of inequity, without explicitly incorporating net income in the analsyis.

[13]In the sales sample used in this study, the sales ratio (FMV/SP) for the bottom quartile of sale price distribution is 0.197, which is higher than the 0.156 rate for the top quartile.

[14]For a detailed discussion of why the dependent and independent variables are structured this way see the Minnesota Department of Revenue Tutorial at https://www.revenue.state.mn.us/sites/default/files/2018-11/crv_18_srcriteria.pdf.