

Economic Effects of Revenue Provisions of Bring Chicago Home

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1 Executive Summary

An increase in the Real Estate Transaction Tax (RETT) was recently proposed by the City of Chicago as a means to provide a dedicated funding stream to prevent homelessness. The proposal was approved by the Chicago City Council on November 7, 2023, and will be put before city voters as a ballot measure in March 2024.¹ This memo analyses the proposed changes to the RETT. We find that the increased RETT could be expected to raise revenue by approximately \$160M per year on average, using the 2013 - 2022 period as a baseline. Over the course of the real estate market cycle, the tax would have brought in additional revenue with a lower bound of \$106M (2020) and an upper bound of \$324M (2016). Of this revenue, past projections show an increase of roughly \$40M from residential properties and an increase of \$120M from non-residential properties.

We also adjust our revenue estimates to reflect the fact that some buyers and sellers may negotiate different sales prices to offset the increase (or decrease) in taxes paid by the buyer. Although we find this to have a very modest impact on revenues, some other important economic costs may remain that are not captured by our analysis. Finally, we look at the potential impact of the RETT change on the rent paid for different types of units. Our analysis suggests that the impact on rents will be less than 0.1% for all but the most expensive units. Put otherwise, a unit that currently rents for \$1,000 per month would be likely to see an average rent increase of less than \$1.

2 Introduction

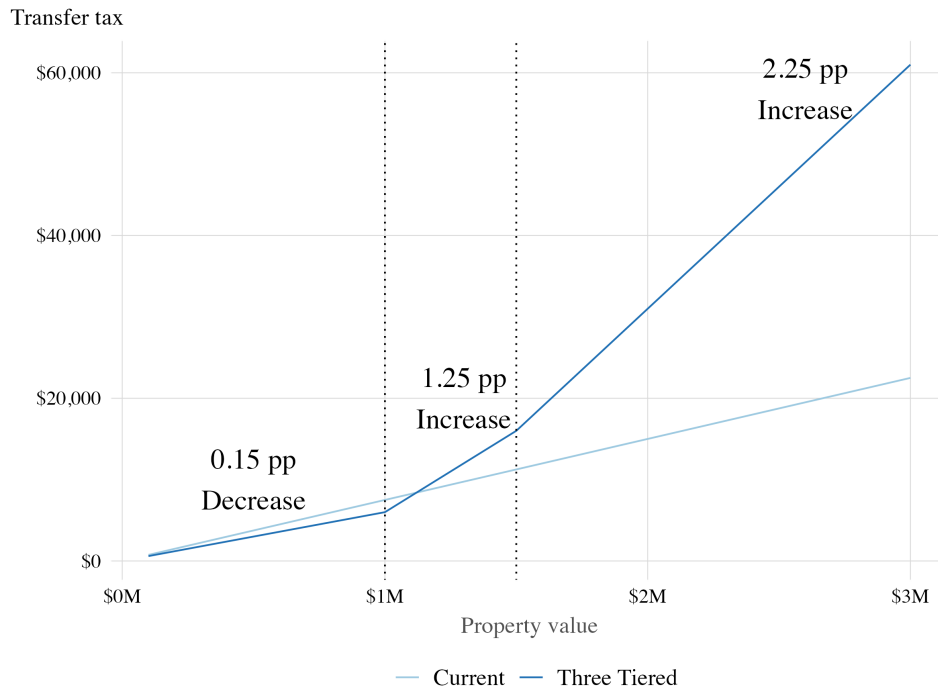
A Real Estate Transfer Tax is a tax that is collected on occasion of a property's sale. It is not an annual tax, but is instead collected only when a property is sold - for some properties this may be frequent, for others the tax may only be imposed once or twice in a century. In Chicago, the RETT is paid by the buyer and is currently set at a flat rate of 0.75% (that is, three-quarters of one percent).² The current proposal shifts the rate to a three-tiered, marginal model, where properties valued at less than \$1M receive a tax decrease to 0.6%, properties valued between \$1M-1.5M pay a RETT at a rate of 2%, and properties valued more than \$1.5M pay a RETT at a rate of 3%.

A graphical representation of the change in tax is shown below. On the x-axis is a hypothetical property value, and on the y-axis is the City of Chicago RETT. The light blue line shows the current flat tax rate, which grows proportionally with property value. The darker blue line represents the amount of revenue that would hypothetically be generated by a sale of the same value under the proposed three-tiered system.

¹Municipal RETT rates in Illinois may be reduced by a city council vote, but any increase requires approval in a citywide referendum.

²There is an additional transaction tax of 0.3% paid by the seller and dedicated to the Chicago Transit Authority (CTA). The State of Illinois and Cook County additionally levy a transfer tax of 0.15%, typically paid by the seller.

Figure 1: Transfer Tax under Current and Proposed Policies



Many other cities and states have also recently proposed or enacted RETT increases. These include increases of up to 6% in Los Angeles, and 5.975% in New York City. A table below shows where Chicago's RETT stands in relation to those of several peer cities and neighboring municipalities. For Chicago and neighboring municipalities, only the municipal RETT rate is presented.

Table 1: RETT Rates - Selected Peer and Neighboring Municipalities

City	Top Tax Bracket	Highest RETT Rate
Chicago, IL (Municipal Rate)	\$1.5M +	3.0%
Evanston, IL (Municipal Rate)	\$5M +	0.9%
Oak Park, IL (Municipal Rate)	Flat Rate	0.8%
Skokie, IL (Municipal Rate)	Flat Rate	0.3%
Los Angeles, CA	\$10M +	5.95%
San Jose, CA	\$10M +	1.5%
San Francisco, CA	\$25M +	6.0%
New York, NY	\$25M +	5.975%
Baltimore, MD	\$1M +	3.75%

The rest of the memo details the consequences this tax increase is likely to have on revenue and residential rental rates. In the first section, this memo details the amount of additional revenue the tax is expected to raise, using real estate tax data from 2013 - 2022 as a baseline. We pay particular attention to how the change in tax may shift the burden among different types of property owners, looking at property value and property type.

In the second section, this memo examines some of the economic impact of this change in the RETT. There are two areas of focus. First, we examine the economic impact on the price at which different

properties are sold. The tax increase may cause buyers and sellers to change their behavior, as property over \$1.5M becomes more expensive to purchase as a result of the tax increase, and property under \$1M becomes less expensive. Second, we examine the effect this tax may have on rent and the cost of housing. Third, we briefly consider the impact the tax may have on construction and development.

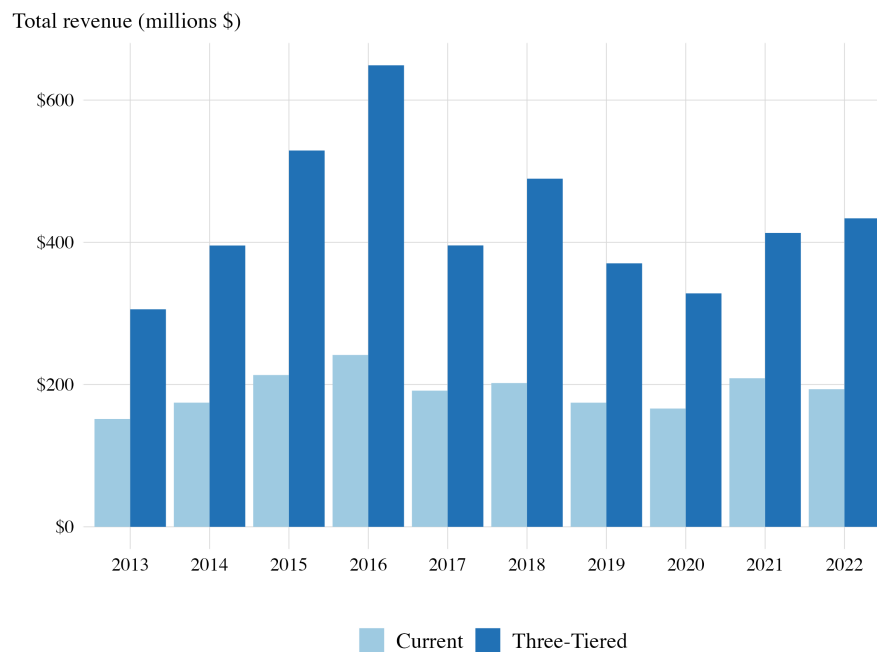
We conclude with an overall summary of the tax changes and an appendix including our methodology.

3 Revenue Analysis

3.1 Retrospective Analysis (2023 - 2022)

Based on historical experience, we expect the proposed RETT to bring in approximately \$160M in additional annual revenue. Figure 2, below, shows how much the proposed RETT would have raised over the last ten years had it been in place instead of the current flat rate. This additional revenue varies significantly on a year-by-year basis, from a low of \$106M in 2020 and as high bound of \$324M in 2016.

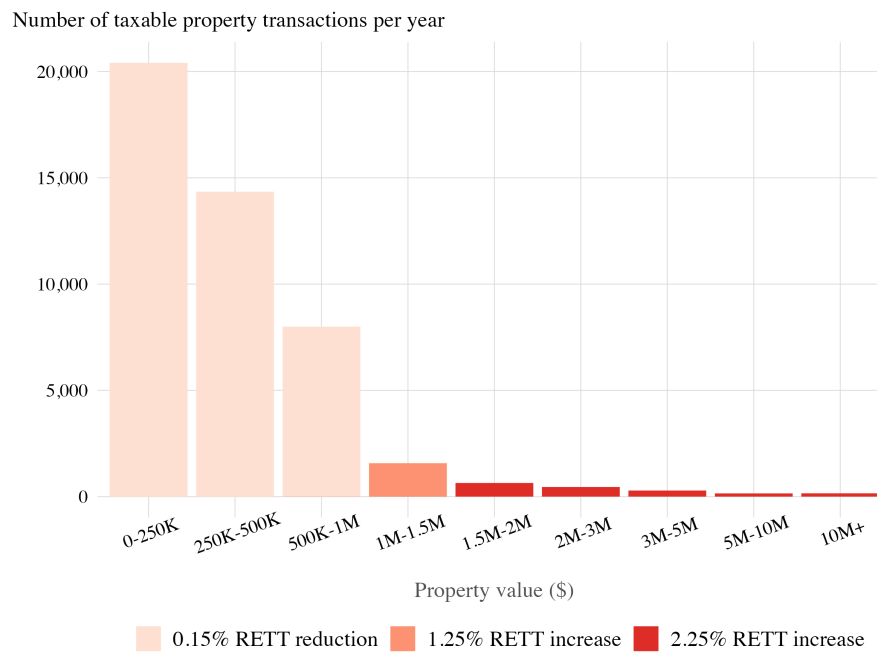
Figure 2: RETT Revenue by Year



Note: The dollar amounts are adjusted for inflation and are in constant 2022 dollars.

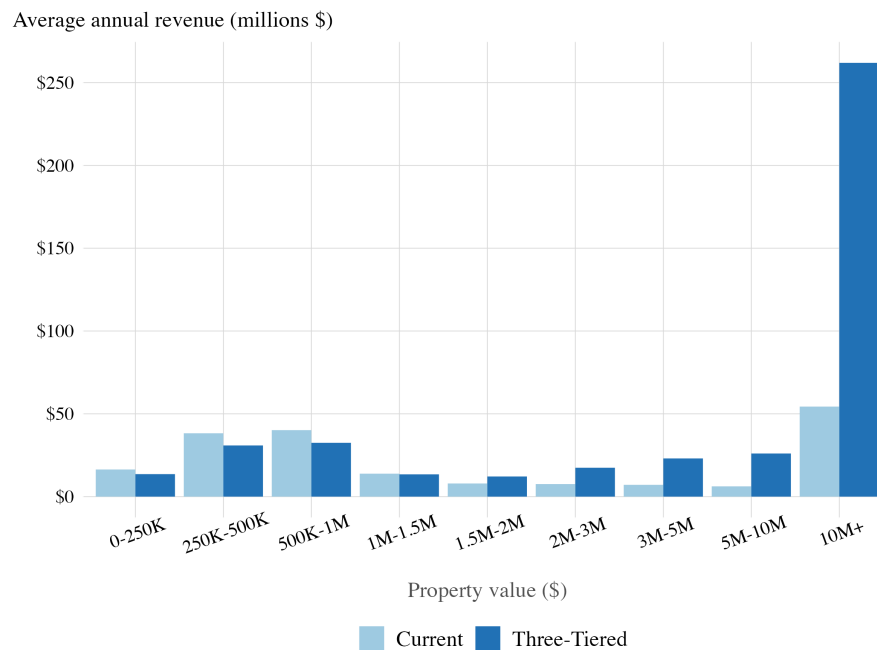
One of the reasons for this high and increased volatility is the narrow base of the new tax rate. As Figure 3 shows below, the vast majority of transactions are for properties worth less than \$1 million, all of which would see their taxes reduced. Only highly valuable properties - a small portion of properties overall - would see their taxes increase.

Figure 3: Number of Transactions by Property Value (2013-2022)



However, as the following figure shows, these high-value properties would provide large amounts of revenue. Properties worth above \$10M already provide a large amount of revenue—as Figure 4 shows below, these properties would see taxes go up by nearly a factor of 4, while properties worth less than \$1M would see their taxes fall.

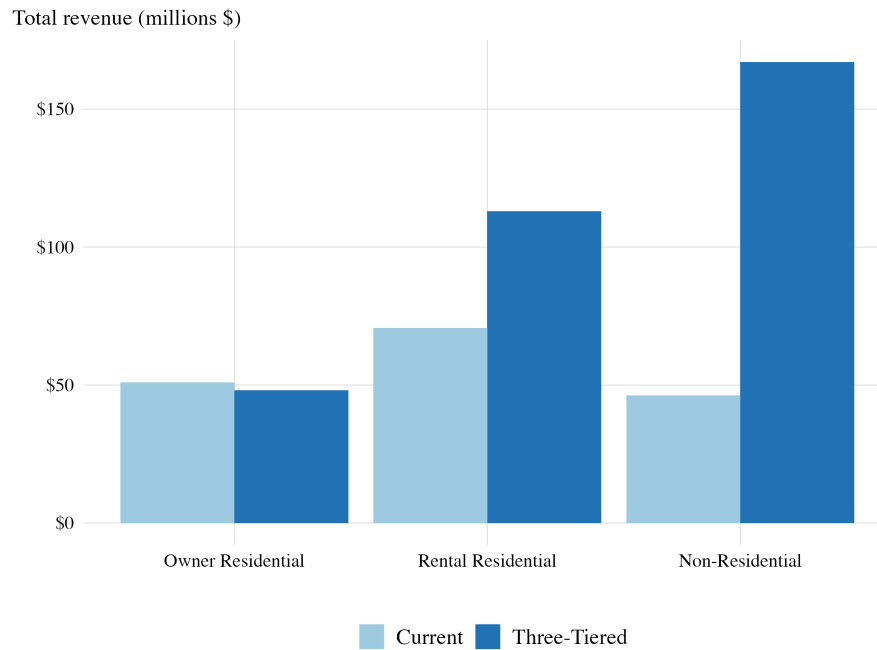
Figure 4: Revenue Collected by Property Value (2013-2022)



To look at the effects on owner-occupied vs. rental housing specifically, we combined RETT data with the publicly available homeowner tax exemption data from the Cook County Assessor's Office. This

analysis, as seen in the figure below, shows that total revenue derived from the sale of owner-occupied homes will decrease, while residential rental properties will see their RETT tax burden rise by 60%, and non-residential properties will see an increase to more than three times current levels.

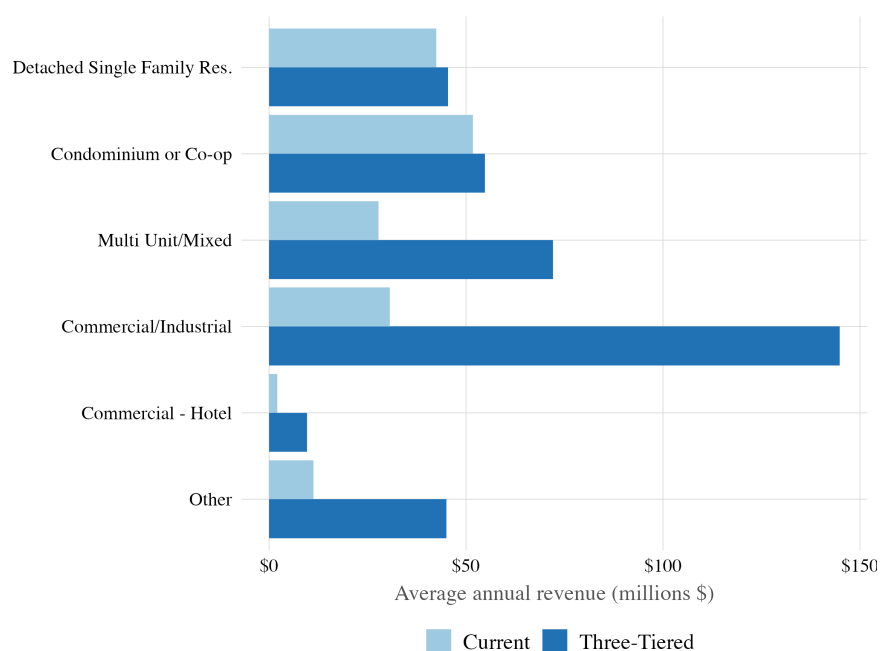
Figure 5: Revenue Collected by Occupancy and Residential Status (2013-2021)



Notes: We use homeownership exemption data from the Assessor’s Office as a proxy for whether or not a property is rented or owner-occupied. Some properties, such as owner-occupied two-flats, or homes with backyard “granny flats” may be simultaneously owner- and renter-occupied but will be classified here as owner-occupied if they receive an homeownership tax exemption.

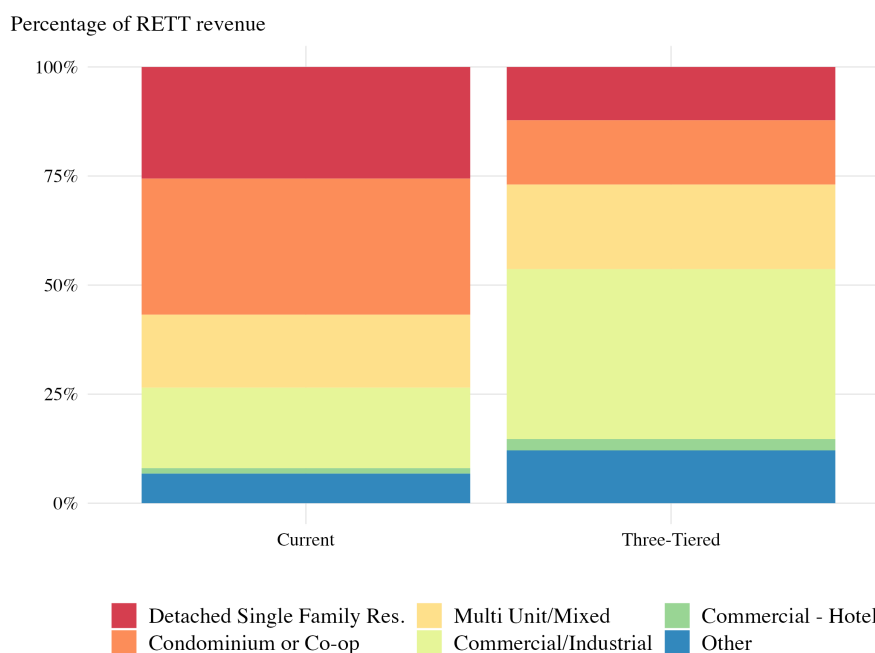
The increased revenue from properties worth \$10M or more is driven primarily by an increase in taxes on multifamily housing and commercial buildings. As shown in Figure 6, below, these two types of property contribute significantly more revenue in the proposed scenario, while the amount of revenue collected from the sale of single family homes and condos is approximately constant. The “other” property type section includes industrial real estate, vacant land, and un-categorized real estate transactions like the 2022 sale of a \$2B stake in the the Chicago Tollway.

Figure 6: Relationship Between Property Type and RETT Revenue Collected in Dollar Amount



Another way to conceptualize the changes is by considering the share of revenue from different types of property. Under the current tax system, approximately 75% of revenue is sourced from the sale of residential or mixed use property, while under the proposed system, the tax burden is evenly split between residential and commercial properties. This is summarized below in Figure 7.

Figure 7: Percentage of RETT Revenue by Property Type (2013-2022)



Altogether each figure tells different variations on the same story: the tax increase will bypass lower-value properties, many of which are owner-occupied homes or small rental properties. In many cases,

these properties will see their taxes fall. Instead, the tax burden will shift significantly towards high-value transactions, which predominantly consist of large apartment buildings and commercial properties.

3.2 Additional Factors to Consider

The analysis that has been conducted uses 2013 - 2022 RETT data to estimate future tax revenue. However, the real estate market is not static, and there are three trends that lead us to believe that - all things equal, our retrospective analysis overestimates the increase in revenue.

1. **Falling demand for office space.** There has been a significant decline in the demand for office space as a result of Covid-19 as an increasing number of downtown employees work from home part- or full-time. Downtown office vacancy rates recently hit a record high of 23.7%, according to data from brokerage CBRE. Given that commercial property makes up a large portion of the increase in RETT revenue, the rising vacancy rates and falling value of office space suggest that 2013 - 2022 trends in sales may not accurately represent the upcoming decade. That said, Class A office rents remain strong for now and vacancy is highest among Class B & C properties - some of which are being eyed for residential conversion. Moreover, office development has slowed by not stopped altogether and is continuing in the West Loop.
2. **Increasing share of affordable housing.** The proposed RETT increases include a carve-out for affordable housing. Though an exact determination of what qualifies as "affordable housing" for RETT purposes remains to be developed, all indications suggest that residential buildings will qualify as affordable as at least 20% of their units are affordable at a 60% AMI (Area Median Income) level. Under the most recent ARO (Affordable Requirements Ordinance), this is the same level of affordability required for buildings requiring a zoning change or city funding (usually though not always through TIF funding) in a high-cost neighborhood. As most large developments are in high-cost neighborhoods and require some type of zoning change, this covers most new large residential developments. As the most recent ARO was passed in 2021 and the very first new buildings subject to the new rules are nearing completion in 2023, it is difficult to quantify the financial effects of this change. However, we can be relatively certain it will remove a significant number of new residential developments from the RETT tax rolls. Moreover, the rising RETT will increase developers' and landlords' incentives to reach the 20% affordability threshold.
3. **Enterprise Zone Exemption.** Commercial and industrial properties purchased within Chicago's Enterprise Zones are eligible for an exemption from Chicago's RETT according to city law. Our retrospective analysis accounted for this and other exemptions. However, as the RETT rate increases, the benefits of locating in Enterprise Zones increase commensurately. This may lead developers to shift further shift investment into Enterprise Zones, where they would be unaffected by increases in the RETT. Chicago's Enterprise Zones include significant portions of the West Loop, North Branch, Southwest Side, and Southeast Side - all of which have recently seen significant commercial and/or industrial developments.

4 Economic Analysis

4.1 Adjusting Revenue Estimates for Property Value Changes

The previous estimates simply assume that property prices would continue as usual, even under a new RETT schedule. However, in practice, we can expect people to alter their behavior in response to tax changes. For example, someone looking to buy a commercial property well above \$1.5M will face a significant tax increase, lowering their willingness to pay for the property, and likely leading them to negotiate a lower price with the seller. Likewise, people interested in condos valued below \$1M will no longer have to pay as much in transfer taxes, which could lead them to use these savings to bid up the price of the property.

To adjust for these particular kinds of changes in behavior, we alter the sales price of each property, in a way that splits the change in RETT between the buyer and the seller.³ On properties where the RETT increases, we simulate a partial adjustment downward in the price the seller receives. For properties where the RETT decreases, we simulate a higher price paid by buyers to sellers. To calibrate the split in tax burden (or relief) between buyer and seller, we incorporate estimates of how sensitive sellers and buyers are to price changes using existing research studies. Where possible, we rely on estimates specific to the Chicago Metropolitan area.⁴

The following table shows our adjusted estimates of how revenue and sales volume may change as a result of the above-described adjustment in prices between buyers and sellers. Overall, we expect to see a very small downward change in revenue as property buyers and sellers change their behavior in this fashion.

Table 2: Adjusted Revenue Estimates - 2022

	All Properties	Residential	Nonresidential
Current Revenue (\$M)	194.7	153.8	40.9
Three Tier Tax Revenue (\$M)			
No Change in Behavior	358.9	217.6	141.3
Adjust for Behavioral Change	355.5	215.6	139.9
New Revenue Raised (Adjusted) (\$M)	160.8	61.8	99.0
Revenue Leakage (\$M)	3.3	2.0	1.4
Revenue Leakage as a % of New Revenue Raised	2.1%	3.2%	1.4%
Sales Volume (\$M)	26,000	20,500	5,500

The first row of Table 2 shows the amount of taxes collected in 2022 under the existing RETT. The next row shows total revenue with the three-tiered RETT. First, we show the estimates with and without an adjustment for the change in prices between buyer and sellers. As can be seen, the difference in revenue as a result of accounting for this behavior is modest. The increased revenue raise is shown

³The tax is nominally paid by buyer, but in practice prices will likely adjust such that sellers will bear some of the burden of the tax.

⁴See [Appendix A.2](#) for more details on our methodology.

in the next row, \$160.8M. In the next two rows, we show the net effect of adjusted prices on revenues, a “leakage” in revenue of \$3.3M, which, as a percentage of all revenue raised, is 2.1%. Lastly, we give the total amount of sales in that year, with or without this adjustment in prices, which again results in a minor reduction. Columns 2 and 3 reveal that leakage we estimate is higher for residential properties than for non-residential ones.

The adjustment in revenue in Table 2 is modest, in part because there is a mix of two types of properties. The first experiences a tax reduction for properties below \$1M. For these properties, we adjust sale prices *upward*, because buyers now have additional resources with which to purchase property. This partially offsets the reduction in tax revenue from these properties. On the other hand, for most properties above \$1M, there is an increase in the RETT. That results in a *downward* adjustment in sale prices for these properties, and thus an offset of the revenue increase for these properties. The downward revenue adjustments slightly outweigh upward increases in this case, with a net impact that is relatively small.

While Table 2 suggests that the taxes might only have a small economic impact, it is important to note that we have not modeled all types of behavioral responses. While we have addressed the possible adjustment of prices between buyers and sellers, another effect is the change in sales that actually happen. For properties that face a tax increase, transactions with very small margins may no longer go through. Likewise, for properties where the tax has decreased, some formerly unprofitable transactions may find a way to happen. The net effect is uncertain and beyond the scope of this report, but because the change in the RETT on net raises revenue, we might expect this effect to result in fewer property transactions, further reducing our revenue estimate. In Appendix A.3 we discuss some of the existing research that might speak to these effects, and also how the context and nature of the tax change here may differ from prior studies.

Another source of revenue leakage would emerge if buyers and sellers engage in creative ways to avoid the RETT, through accounting and other methods. For example, a developer may prefer to develop a 6-unit building as condos, which could sell for \$1M each and receive a tax cut, rather than sell the building as a single property for \$6M and pay a higher tax rate. Another possibility is that if the policy is announced ahead of its onset, many buyers and sellers may rush to make transactions before the change takes place. This would create a one-time reduction in revenue, since sales that would have taken place after the RETT change was in effect will have already taken place. In the long-run, this type of revenue leakage driven by the re-timing of sales would fade.

4.2 Rental Impact

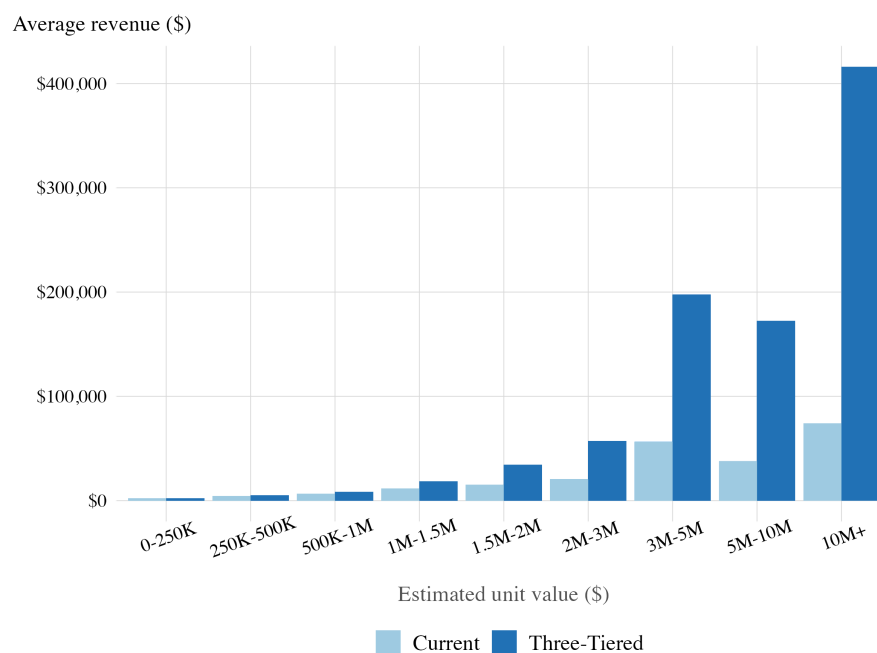
The proposed increase in the RETT is levied at the property level. It is therefore natural to ask “How will this affect rents in expensive properties that nonetheless are full of inexpensive units? For example, what about a courtyard building with 20 apartments that sells for \$4 million?”

To examine this question, we have matched property transaction tax data with publicly available property characteristic data from the Cook County Assessor’s office which includes the number of residential units for each property. We were able to match most of the data on the basis of common

“primary PIN’s” (property identification number). However, while using PIN’s enabled us to match 96% of residential transactions in 2021 (the most recent year for which Chicago commercial assessment data is available), the missing 4% of PINs included 36% of 2021 revenue from residential transactions, predominantly for larger rental properties. Unmatched transactions buildings include St. Regis and Tribune Tower.

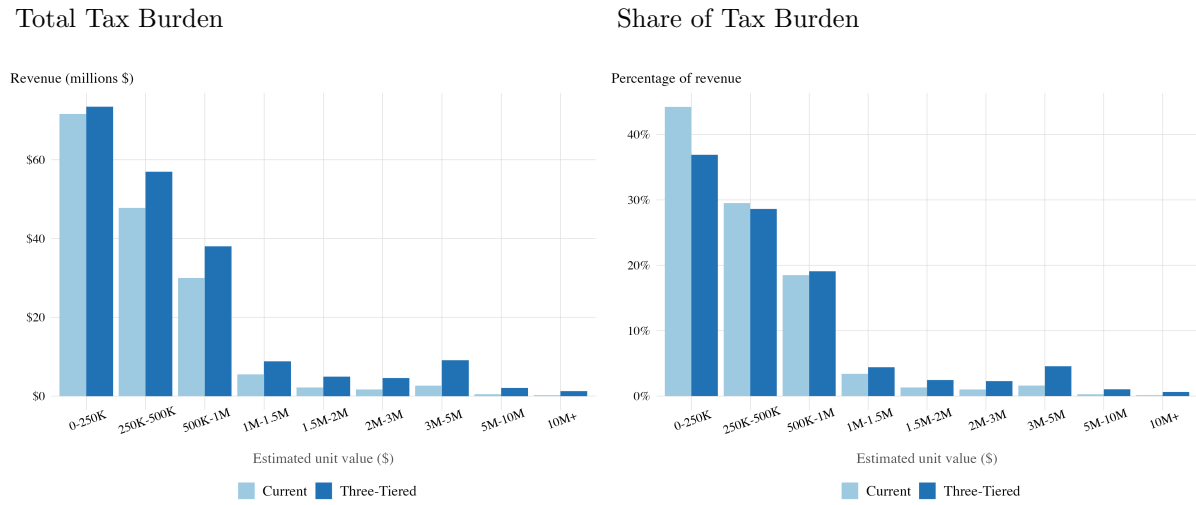
Figure 8 accounts for this by estimating the tax impact by unit values rather than property values, by dividing the sales price of residential buildings by the number of residential units they possess. The figure shows that the tax increase will occur primarily for units that, if sold on the market, would cost more than \$1 million. The figures include both owner-occupied and rental units to best account for the cost of occupancy.

Figure 8: Average Tax Burden by Estimated Residential Unit Value (2021)



However, it is important to note that there are not many units — occupied by either renters or owners — which, if sold, would be worth over a million dollars. The figure below to the left shows show that both the current RETT and the proposed three tier RETT get most of their revenue from units which are worth less than \$1 million. Nevertheless, as the figure to the right shows, the proposed RETT is progressive in the sense that lower costs units will contribute a smaller share and expensive units will contribute a larger share under the proposed tax.

Figure 9: Tax Burden by Estimated Unit Value (2021)



Notes: Estimated unit value is based on transacted property values in 2021 divided by the number of units.

Finally, we examine the likely impact of the three tiered RETT on the cost of housing overall. We calculate the expected change in cost for properties, assuming that the renter of a newly-purchased apartment bears the entire cost of the tax, and pays increased rents in that proportion.⁵ Table 3 shows that rents in units worth less than \$1M rise by an average of 0.10% or less, which comes out to less than \$1 per month on an apartment renting for \$1,000 per month (middle column).

The fact that the change in rents is close to zero reflects the effect of two forces that approximately cancel each other out. First, there is a tax increase for units that would sell for less than \$1 million in buildings that would sell for more than \$1 million. Second, there is a tax decrease for units that would sell as a part of buildings valued less than \$1 million.

Table 4 shows this, focusing on the “1x pass-through” scenario. As can be seen, within most ranges of unit prices, some properties see a tax increase and some see a tax decrease. These effects mostly even out - the *median* unit evaluated sees a small tax decrease, though the *mean* tax burden increases slightly. As previously mentioned, this table only evaluates the properties for which we were able to produce residential unit counts - roughly 36% of residential transactions by value are missing.

⁵For owner-occupied units, our calculation correspond to the increase in the user cost of ownership.

Table 3: Rental Impacts by Unit Value – 2021 Transactions

Unit Value (\$)	Number of Residential Units	Rent Increase (%) Partial pass-through	Rent Increase (%) 1x pass-through	Rent Increase (%) 2x pass Through
0–250K	96,155	-0.008%	-0.036%	-0.073%
250K–500K	16,936	0.022%	0.143%	0.285%
500K–1M	5,751	0.026%	0.178%	0.355%
1M–1.5M	576	0.063%	0.415%	0.831%
1.5M+	335	0.173%	1.163%	2.325%
All Units	119,753	-0.002%	0.005%	0.010%

Notes: We project the change in rents under three scenarios. First, we assume in our main estimates that the RETT is passed through 1-for-1 into rents (1x pass-through). Second, we assume a more extreme pass-through rate, twice as large (2x pass-through), from Dachis, Duranton and Turner (2012). Finally, in our “partial pass-through” scenario, we assume the seller bears roughly 80% of the tax burden, and the remaining 20% is passed-through to renters. Data are for 2021, combining public records from the Illinois Department of Revenue and the Cook county Assessor’s Office.

Table 4: Rental Impacts by Unit Value, Disaggregated by Increasing and Decreasing Tax Burden (2021)

Unit Value (\$)	Number of Residential Units	% Cost Change for the Average Unit	Number of Units		Total Cost Change (\$)		Net Revenue Change
			<i>Cost Increase</i>	<i>Cost Decrease</i>	<i>Cost Increase</i>	<i>Cost Decrease</i>	
0–250k	96,155	-0.04%	7,558	88,597	\$13.2M	-\$11.9M	\$1.3M
250–500k	16,936	0.14%	4,219	12,717	\$14.7M	-\$6.5M	\$8.2M
500k–1M	5,751	0.18%	1,679	4,072	\$11.0M	-\$4.0M	\$7.0M
1M–1.5M	576	0.42%	418	158	\$3.1M	-\$0.1M	\$3.0M
1.5M+	335	1.16%	335	0	\$12.1M	-	\$12.1M
All Units	119,753	0.005%	14,209	105,544	\$54.0M	-\$22.4M	\$31.6M

Notes: We disaggregate the impact on cost looks at units subject to cost increases and cost decreases to examine how a seemingly small change in average cost can still lead to a considerable increase in revenue. We first show the number of units within each range of values and their average change in cost, using the “1-for-1” pass-through scenario from Table 3. We then show within each range, how many units are subject to a cost increase and a cost decrease (as properties receive a tax cut on their first \$1M of value). Lastly, we look at the total change in cost (property cost plus tax) due to these changes for units with increasing vs. decreasing cost. Data are for 2021, combining public records from the Illinois Department of Revenue and the Cook county Assessor’s Office.

4.3 Construction Impacts

An increase of the RETT could have a negative impact on construction and development by increasing the cost of land acquisition and decreasing the price for which a developed property could be sold. The precise impact is unclear, and depends both on the economic incidence of the tax under given market conditions and developer strategies. As the RETT is a tax only on real estate transactions, we expect the tax to be most impactful on "merchant builders" who build with an aim of selling immediately after construction. In contrast, developers who build with the intention of continuing to manage the property would be less impacted. Nevertheless, lower potential re-sale values of a property may make it harder to obtain financing and therefore cause a decrease in construction. However, developer pro forma analysis at that level of detail is outside the scope of this analysis.

In addition, we expect other market fundamentals to have a much larger impact on development and construction than the RETT. For example, the cost impact of the increase in the RETT for a building that costs \$10M is roughly equivalent to an increase in financing costs from 5% to 5.15%, assuming the building is completely financed through a fixed-rate 30 year mortgage. Though development financing can be more complicated, with funding stacks that include multiple sources at different rates, this example points to the overriding importance of interest rates, construction costs, and market demand for development and construction, as well as zoning constraints and other regulatory barriers.

Moreover, to avoid the RETT, developers may choose to include more affordable units in residential developments, or locate new commercial and industrial facilities in enterprise zones. The increased RETT may therefore, on the margin, shift development and construction patterns in accordance with other city policy objectives.

One strategy available to ameliorate potential impacts on construction would be to exempt the first transfer of multifamily or commercial property after construction. A similar exemption has been adopted by Culver City, CA. Our analysis of 2021 sales data suggested that a similar exemption in Chicago, which would apply to the first transfer of multifamily residential property in the first five years after construction, would reduce RETT revenue by approximately \$5M per year.

5 Conclusion

This memo analyses the proposed changes to Chicago's RETT. We find that the increased RETT could be expected to raise approximately \$160M per year on average, using the 2013 - 2022 period as a baseline. Of this revenue, historical data suggests an increase of roughly \$40M from residential properties and an increase of \$120M for non-residential properties. The increase in revenue from residential properties will primarily arise from an increase in rents at units which are valued at least \$1 million. This analysis leaves open several important questions including how the spending provisions of the Bring Chicago Home proposal will affect residents and the distributional impacts of the increase in taxes on non-residential buildings.

Appendix A Methodology

Appendix A.1 Calculating Tax Revenue

We used two sources of data for our analysis - "PTAX" data on real estate transactions, and Cook County Assessor's Office data. Both data sources are publicly available. **Transaction data** is published by the Illinois Department of Revenue and provides data concerning transactions that took place between 2014 and 2023. The PTAX data that we used was provided by the City of Chicago in a cleaned form.

We were specifically interested in three pieces of information that could be sourced through the Assessor's Office:

As also used **Assessor's Office data**. We were specifically interested in three pieces of information that could be sourced through the Assessor's Office:

1. Homeowner property tax exemptions (used as a proxy for owner-occupancy): This data can be found on the Assessor's Office GitHub in this **ptaxsim repository**. The ptaxsim SQLite Database has 13 tables included within it. For the home ownership data, we specifically use the pin table.
2. Number of units by property (to examine the effect on rental properties): This data had to be pulled from three different files from the Assessor's Office by declared type. Those three files are:
 - **Single and Multi Family Residences**
 - **Residential Condominiums**
 - **Commercial**
3. Year built (to examine the potential effect on new properties): For this data, we used the same three files used to fetch data concerning the number of units.

To merge elements of the two datasets, we matched on the basis of "Primary PIN." As mentioned previously, we were able to match 96% of 2021 transactions on the basis, but the 4% of transactions that were not matched included 36% of transactions by value.

Appendix A.2 Calibrating Buyer and Seller Price Adjustments

We adjust our revenue estimates to reflect the fact that buyers and sellers may negotiate different prices in the presence of a tax increase or tax decrease. We implement the adjustment as follows:

1. For each past property transaction, we calculate the change in RETT from a baseline flat tax rate of 0.75% to the new, three-tiered tax schedule, holding the sales price constant.
2. Next, we calibrate the share of this tax change that will fall on sellers, α , as a lower price. As approximation of this split, we draw on estimate of property demand and supply elasticities, which capture how sensitive sellers and buyers are to price changes.

- (a) For residential housing demand, we use estimates from [Albouy, Ehrlich, and Lui, 2016](#): Specifically the estimate for "uncompensated own price elasticity of housing demand" in Table 1, either -0.492 or -0.828.
- (b) For residential housing supply, we use estimates specific to the Chicago region from [Wheaton, Chervachidze, and Nechayev, 2014](#): Appendix tables 3 and 4, either 0.158 or 0.172.
- (c) For non-residential housing demand, we use estimates from [Marcato and Tong, 2016](#): Table 7, either -0.36 or -0.385.
- (d) For non-residential housing supply, we also use estimates from [Marcato and Tong, 2016](#): Table 7, either 0.26 to 0.465.

Once we have an elasticity of demand, η_D and an elasticity of supply η_S , we calculate the share of the tax change born by the seller as:

$$\alpha = \frac{\eta_D}{\eta_S - \eta_D} \in [-1, 0]$$

This is the standard incidence formula in a competitive market.

3. The price of the property is then adjusted by $\alpha \times \Delta RETT$, where the change in RETT could be positive or negative. Since $\alpha < 0$, when the tax increases, the selling price decreases, and when the tax decreases, the selling price increases.
4. Finally, our adjusted revenue estimate applies the newly proposed RETT tax to the adjusted prices.

Appendix A.3 Prior Studies on the Economic Impact of Transfer Taxes

The list below summarizes, in reverse chronological order, several papers from the field of economics on the effects of the transfer taxes. In most cases, the authors find that the taxes do generate behavioral responses and economic distortions, which can be costly. However, there is a range of conclusions and estimates, both in terms of economic impact and, to a lesser extent, regarding the share of the tax that is born by the seller or buyer. A key challenge is that in the most recent evidence, which benefits from the latest advancements in methodology, the focus is on so-called "notched" transfer taxes, which trigger a discrete jump in taxes once the property value exceeds a threshold. This generates a very strong incentive for sellers and buyers to locate on the lower side of the tax increase. That behavior may or may not translate more generally to how people may respond to transfer taxes that evolve in a more gradual fashion, as in the case of the proposed, three-tiered marginal tax schedule in Chicago. In addition, the tax change in Chicago combines a tax decrease on a majority of properties with a tax increase on the smaller set of the most high-valued properties. This contrasts with the studies of below which either look at the introduction of a new tax, behavior near a threshold where taxes discretely jump, or temporary decreases in the tax. For this reason, any application of the results below to the Chicago context requires care and discretion.

- Best, Michael Carlos, and Henrik Jacobsen Kleven. "Housing market responses to transaction taxes: Evidence from notches and stimulus in the UK." *The Review of Economic Studies* 85.1 (2018): 157-193.
 - The authors study transfer taxes in the United Kingdom. The tax in the UK features several notches, or jumps, for example a jump from 1% to 3% at about \$400K in USD. In addition, in 2008 and 2009, the tax was repealed for 16 months to stimulate house purchases. They find that sales, prices, and the timing of sales. At the thresholds where the tax changes, prices change by 2 to 5 times the amount of the tax increase. They argue that this significant over-adjustment can in part be explained by borrowing constraints: the tax is on the total value of the home, while most people only make a down payment on a fraction of the home value at the time of purchase. They also find that during a temporary repeal of the transfer tax, there was a 12% increase in sales that would not have happened otherwise, and an additional 8% in sales that were accelerated to fall within the window of the tax holiday. The authors conclude that transfer taxes can be very distortionary, although the focus of their paper is on how temporarily suspending these taxes can stimulate consumer spending.
- Slemrod, Joel, Caroline Weber, and Hui Shan. "The behavioral response to housing transfer taxes: Evidence from a notched change in DC policy." *Journal of Urban Economics* 100 (2017): 137-153.
 - The authors study the a "notched" tax increase in transfer taxes in Washington, DC, introduced in 2003, which increase the transfer tax from 2.2% to 3% for houses sold above \$250K. This notch was removed in 2004, and a new one was introduced for houses at or above \$400K in 2006. The authors do find that transactions locate on the lower side of the thresholds, but were not as likely to be re-timed to happen before the tax increases went into effect. Furthermore, when comparing sales in general among houses above and below the threshold, before and after the tax introduction, they do not find any strong evidence of an effect on sales. They conclude that this tax does not cause major economic disruption.
- Kopczuk, Wojciech, and David Munroe. "Mansion tax: The effect of transfer taxes on the residential real estate market." *American economic Journal: economic policy* 7.2 (2015): 214-257.
 - They study the imposition of an increase in transfer taxes of 1% on the entire value of a property once the property exceeds \$1M, in New York and New Jersey. That is, this implementation features a "notch:" once the home sales for one dollar above \$1M, the transfer tax increases by \$10K. The authors find that purchases "bunch" or disproportionately locate just below \$1M relative to just above, where the tax increase is triggered. The authors also find that 1% of the transactions that would have happened in the absence of this notch no longer happen, causing economic disruption. The authors also caution against extrapolating from their evidence right around threshold to economic behavior at other prices far away from the notch.

- Besley, Timothy, Neil Meads, and Paolo Surico. "The incidence of transaction taxes: Evidence from a stamp duty holiday." *Journal of Public Economics* 119 (2014): 61-70.
 - These authors also look at the temporary transfer tax holiday in the United Kingdom, in 2008 and 2009. They focus on the change in prices during this period when the tax was reduced, in order to learn about how the tax is shared between sellers and buyers. They find that selling prices did reduce by about 60% of the reduction in average taxes, suggesting that buyers received 60% of the benefits of lower taxes and sellers retained the remaining 40%. The authors also find that sales were elevated by 8% during the tax holiday, but that this is largely driven by transactions that were accelerated to happen during the window of the tax holiday. They therefore conclude that aside from this short-run effect, the tax does not appear to have a large impact on economic activity.
- Dachis, Ben, Gilles Duranton, and Matthew A. Turner. "The effects of land transfer taxes on real estate markets: evidence from a natural experiment in Toronto." *Journal of economic Geography* 12.2 (2012): 327-354.
 - These authors study the introduction of a land transfer tax in Toronto in 2008. They find that a 1.1% transfer tax was associated with a 15% decline in the number of housing sales. They argue that a property tax is more efficient. They also find that sellers' prices drop by an amount similar to the tax increase, which implies that sellers bear the full burden of the tax. One limitation of this study is that the comparison group for Toronto is the neighboring suburban community. If property sales are shifting just across the border, this will overstate the impact of the tax by double-counting such shifts. In addition, the authors note that trends in Toronto and the surrounding communities may not have been parallel prior to the tax change.
- Benjamin, John D., N. Edward Coulson, and Shiawee X. Yang. "Real estate transfer taxes and property values: The Philadelphia story." *The Journal of Real Estate Finance and Economics* 7 (1993): 151-157.
 - This study uses data from Philadelphia before and after a transfer tax increase in 1988 from 3.5% to 5.07%, comparing outcomes to neighboring Montgomery County. The authors find that the seller's price decreases by 8%, but the estimates are noisy. The decrease is enough to fully offset buyer's share of the tax, but they do not have enough precision to say whether the reduction is significantly more than one would expect in the case that sellers bear the full tax burden.