Economic and Demographic Impacts of Tax Abatement Zones on Franklin County Communities

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Executive Summary & Key Findings

In our 2021 research study for the Franklin County Auditor, we thoroughly analyzed of how a specific type of tax abatement, known as Community Reinvestment Areas (CRAs) impacts home values within the county (Partridge & Messenger, 2021). CRAs are a type of property tax abatement program under Ohio law which allows municipalities to designate some areas for potential tax abatement. The policy goal is to generally promote neighborhood revitalization and to “foster private sector investment to build mixed income neighborhoods” (City of Columbus, 2018). There are currently 98 CRA zones of various sizes in Franklin County. Residents who own property within these CRA zones can perform renovations or improvements to their property and receive the value of the improvement as a reduction to their property tax bill. The benefits of a CRA may last up to 15 years after the owner completes their renovation and application for the abatement. A critical aspect of CRA abatements is that they are transferable. This means that they continue to exist on a property even if the home is sold to a new owner. The new owner then receives the property tax benefits for the remaining years on the original abatement at the time of the sale. Because CRA abatements continue when a home is sold, home-sales data is used to estimate an abatement’s value. Our original 2021 study examined whether abatements are an attractive marketing tool for sellers to utilize and do buyers, on average, pay more for homes with a property tax abatement than for a similar home in a similar neighborhood without an abatement.

Our 2021 and 2022 Study Conclusions.

The 2021 study concluded that CRAs do positively impact affected home prices. Buyers, on average, pay about 4% more per year of abatement remaining at the time of sale. This worked out to an estimated average of approximately $63,000 additional value for an abated home. While this number may seem large, it is plausible when considering that the average abatement term remaining on homes was 7.5 years. This highly suggests that buyers are essentially paying upfront for the value of their future property tax reductions, to the benefit of property sellers. For buyers, while property taxes remain low for the remainder of the abatement, in many cases, the value of the abated taxes are rolled into a home mortgage or paid upfront if the buyer uses cash.

Our subsequent 2022 report (Messenger and Partridge, 2022) found the proliferation of commercial and industrial property tax-abatements is one key driver of a tax shift in the county. As public services funded by property taxes experienced increasing revenue losses due to abatements and exemptions, agencies appear to have raised taxes on non-abated property owners. The raw data supports this hypothesis; Franklin County's property tax rates have increased about twice as fast as the state average and local Franklin County income taxes as share of income greatly exceed the Ohio average. It would be beneficial for future studies to examine to what degree abated revenues have contributed to rapidly rising tax rates for Franklin County. What is clear is that these tax increases have occurred despite the county having per-capita personal income and housing values well above the state average. The evidence also indicates that tax abatements led to higher school property tax rates for remaining taxpayers and a modest decrease in school resources. Finally, there is little evidence the county's economic growth improved after abatements proliferated in the early 2000s.

The housing-price estimates were produced by a statistical model using Franklin County home-sales data between 2014 and 2019. Using home data (such as square footage, bathrooms, bedrooms, and property age) and demographic and economic data from their neighborhood, we used machine learning to match homes within CRAs to otherwise comparable homes outside of CRAs within the same city. This allowed us to estimate if homes with CRA abatements (or homes that were *eligible* for future abatement) sold for higher prices than similar properties without these tax benefits.

We found that both *active property tax abatements* as well as *inclusion within a CRA (even for unabated CRA properties)* are positively capitalized into home prices, contributing to property values rising within CRAs by even more than the overall local market at-large. This has several potential consequences. First, CRAs may be playing a role in pricing some individuals out of neighborhoods by contributing to greater home prices in high-demand areas rising more rapidly. Second, CRAs present an opportunity for home flippers and real estate developers to become the beneficiaries of CRA abatements. Since the value of the property tax reduction is largely rolled into the original price of the home, the seller is the true beneficiary of the active abatement. Both potential consequences of CRA abatement policy have led to further questions about what happens to properties when CRA abatements expires.

In 2021, not enough data existed to rigorously evaluate this question. One major purpose of this study is to use new data from sales between 2020 and 2023 to better answer these lingering questions. With this additional sales and abatement data, this report expands the 2021 analysis and answers several fundamental questions about how CRAs change Franklin County neighborhoods and whether the positive effects of CRAs on home values fade alongside the abatements. These questions are also of particular interest to Ohio taxpayers as Ohio passed new changes to the CRA program in January 2023. Specifically, are CRAs and other tax abatements worth their large costs in Franklin County? Of course, the answer is multidimensional as their effects are complex. We provide answers to these core questions in this study, summarized below.

Part I: How Property Values and Sales are Impacted by Expiring Abatements

Here, the study examines how property prices and sales are impacted by a change in CRA abatement status. We ask and analyze three core questions about how values may change, whether owners are more or less likely to sell their property given its changing abatement status, and whether cities are likely to extend abatements.

1. Do the positive effects of CRA abatements on home values persist after the abatements expire?

This question extends the authors' 2021 report's finding that home buyers value abatements, which are capitalized into higher home prices. In that study, we examined multiple pathways and concluded buyers were willing to pay more when active abatements have more years remaining; was near an abated property (within 100 meters), in which a nearby home's renovation may signal improving neighborhood quality; or was within a CRA zone, providing the buyer the *future-option* to renovate and to qualify for an abatement.

The results of this study indicate that average sales prices decline after an abatement expires. The approximate estimated price declines from years 1 to 4 following the expiration of an abatement are: $35,000, $6,500, $105,000, and $131,000. For example, for a $290,000 home, the home's price declines roughly 11.0% one year after the expiration, with $290,000 being the sample's average price.[1] All post-CRA year effects are statistically significant in the model except for year 2. Averaging across the 4-year coefficients yields an average price decline of about $70,000, or larger than the approximately $48,000 average price premium for CRA-abated homes identified by Partridge and Messenger (2021). This means that resuming property taxes at higher levels may be larger than the perceived benefits at the time of the sale.

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[1] Note, again, that the model produces an estimate that should be interpreted as "all else equal" and attempts to isolate the effect of the expiring abatement. Any time invariant changes in other geographic factors (such as neighborhood improvements) or real estate market trends (such as generally rising market prices) that may act to raise a home's price we attempt to capture with fixed effects and control variables. We would not expect to observe a property sell for 11% less on the open market, as the 11% loss is offset by the positive coefficients on other variables. The results should be interpreted to mean that, had the abatement not expired in the previous year, the model estimates that the average home would have sold for 11% more than whatever it did, even if the observed "sticker price" of the home was already higher than in previous years. For more, see Appendix A's note about interpretation.

These large post-abatement price declines further support the notion that property taxes are the key feature driving home price changes due to a CRA rather than renovations or an improved neighborhood. For example, an average $70,000 loss after an abatement expires may seem large, but when considering the roughly 1 to 15 years of reduced (or eliminated) property taxes, their effects on a home's value can be considerable, especially for higher-priced houses with large taxable values in dollar-terms.

The net home-price effect after an abatement concludes sums various offsetting effects. Positive price effects include neighborhood "improvements" during the CRA period plus price premiums from renovations since the home was last sold. Of course, increased home values are usually considerably less than renovation costs—i.e., the CRA property tax break based on renovation costs likely greatly exceed the actual positive effects on home prices. As the renovation(s) updates age, the associated price premium declines, which can be considerable because tax-incentives for (say) a 15-year abatement are much greater if renovations occur early in CRA's establishment. Further, when an abatement expires, property values further decline from losing the property tax break.

Policymakers should be aware of long-term CRA effects. Property tax abatements lead to lost tax revenues for many public services for up to 15 years. The tax savings are capitalized into higher home prices of an average of $48,000, per our previous analysis. After expiration, houses lose about $70,000 in value—larger than active-CRA price appreciation, indicating that renovations and any positive changes in neighborhood quality are less important than the property tax break in active CRA price appreciation. Further, the lack of permanent large positive price effects for CRAs calls into question whether their benefits justify their large costs. If targeted are not experiencing permanent positive price effects, it seems impossible to justify their large costs.

2. Do residents and businesses offload properties before CRA tax abatements expire?

One implication of our finding that the positive effects of CRA abatements are not a permanent increase in property value is that property owners may attempt to sell the property before the abatement expires. To test this, we use county-wide property sales data to estimate the likelihood that a property will sell in a specific year. Regarding abatements, our statistical model includes data on whether a property was (A) actively under a CRA abatement and (B) whether a property previously had an abatement that expired sometime in the four years prior to the sale. In estimating CRA effects, we account for key housing and neighborhood factors. A shortcoming is we do not have demographic or economic information about individual buyers and sellers, though it is unlikely to affect our key CRA results.

We separately examine residential housing and commercial and industrial (C&I) real estate given the different factors that influence buyer and seller decisions in these different markets. An example of these differences is that a business may have negotiated a CRA as part of its initial location decision. Tax abatements are often part of local economic development strategies to attract businesses to certain parts of a city. As such, a business may be more aware of when its abatements expire than a typical single-family homeowner who purchased an abated home many years ago. Additionally, a business may be more prone to engage in rent-seeking behavior than a residential homeowner and may shop around for a new tax incentive as its existing abatement draws closer to expiration.

Our results find that both residential and C&I properties with active CRA abatements are less likely to be sold, in general.[2] A key factor is the number of years remaining on an abatement. We find that properties with fewer than roughly 8 years left on their abatement are less likely to be sold, while properties with over 8 years remaining are more likely to be sold. This relates to price premiums for abated homes with longer terms left on their tax break (Partridge and Messenger, 2021). Sellers realize more financial benefits early in the CRA term because buyers enjoy lower property taxes over a longer spell. Since most CRAs last beyond 8 years, developers or "house-flippers" are especially motivated to sell early in an abatement's lifecycle. Moreover, because a renovation is required for a CRA abatement, properties with "middle-aged" abatement are unlikely to have been recently renovated, or its improvements are now dated.

Another possible explanation for abatement time effects is that residents effectively pay for the tax savings upfront when they purchase the house (in the form of a higher sales price). Thus, owners may be more reluctant to sell and lose the property tax benefits that already capitalized into their purchase. Finally, a home's declining value as its abatement ages may distort the homeowner's perception of market values. Since the value of the abatement lessens as fewer years remain, owners may view the house as "undervalued" by potential buyers relative to their own perceived value and be unwilling to sell it at a “low” price—at least until they adjust expectations to the current market.

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[2] Note that we use the appraisal definitions of Residential and C&I property. Although the detailed CRA terms may differ for certain properties, such as large apartment complexes, it is the belief of the authors that this more accurately captures end-use of the properties being sold (i.e., whether the property is likely to be owned by the occupants with the intention of living there or if the property is a commercial enterprise).

We find some evidence that residential properties whose abatements have expired are less likely to be immediately sold. Specifically, this is true for properties in the four years after their abatement expires. The average price decrease for selling within four years of an expiring abatement is approximately $70,000. There are several explanations for why a home may not be immediately sold once an abatement expires. First, while owner’s value their abatements they may not be acutely aware of when they expire, especially if they bought the home early in an abatement’s lifecycle. For example, an extreme case would be if an owner bought their home 1 year into the abatement’s maximum life cycle. That would mean that the owner did not apply for the abatement but has not paid their full property tax burden in fourteen years. It would be reasonable to assume that some owners in this situation are unaware that their property taxes are about to dramatically change until they are notified by their mortgage holder or until they receive the property tax bill. Further, preparing a house to sell can take significant time, which helps explain some of the delay in the appearance of formerly abated houses on the market. Once an owner becomes aware of their greater property taxes due to an expiring abatement, if they decide to relocate, they still need considerable time to prepare the home for market, hire a real estate agent, and locate a new home.

It is important to note that our results are inconclusive as to direct abatement effects on sales likelihood after one year of expiration. However, because the likelihood declines within one year of expiration, while after one year, this negative effect disappears from the model indicates that an owner’s reluctance to sell after the abatement’s expiration diminishes over time. This is fairly plausible and, again, may relate to the fact that a longtime homeowner’s expectations versus the actual *market value* of their property may take time to adjust for the reduced value after the abatement expires.

For commercial and industrial property (C&I), we find similar effects for active abatements. Companies with actively abated properties are statistically less likely to sell the property in any given year. Interestingly, the size of the negative effect of an abatement is almost completely offset by an equally large and statistically significant positive effect ***if*** *the abatement is in its final year*. What does this mean? For one, C&I property owners are likely more acutely aware of their abatement terms, since in some cases the abatement may have been a negotiated component of their location decision. Therefore, they are more likely to sell the property right before the abatement ends to avoid the property tax hike they would incur.

3. Are original abatements often extended by local governments?

A careful examination of the thousands of abated properties produced no evidence that CRA abatements are extended for either residential or C&I properties. This outcome is plausible based on how abated residential properties lose value as the abatement approaches its conclusion. Thus, it is unlikely that abated property owners would make further renovations as they would not anticipate or expect their CRA abatement to be extended.

Part II: How CRA abatements Impact Neighborhoods

The second portion of this study attempts to analyze how CRA abatement policy influences neighborhood demographics. These questions revolve around rental vs. owner occupied rates for CRA affected properties relative to comparable non-CRA properties and examine the possibility that CRAs contribute to gentrification.

4. Do abatements and CRAs impact the share of rentals vs owner-occupied housing?

Across county CRAs, we found little statistical evidence that the number of rental properties in CRAs increased between 2015 and 2022. We statistically test this question with models that estimate the likelihood that a given property is a rental and find no significant effect of CRAs or abatement status. When the data sample only includes properties which have been sold, active abatements reduce the likelihood of rentals by about 3%. This suggests that it is more profitable to renovate properties that are to be owner-occupied homes as compared to properties that are intended to be rental properties.

5. Do CRAs and abatements alter neighborhood demographics?

We examined racial, income, and educational attainment trends within CRAs. Many CRAs are in historically minority neighborhoods where changing racial demographics are driven primarily by in-migration of white residents who are attracted by the housing development. In some areas, this in-migration displaces the neighborhood’s minority residents, while in other areas, the white population may simply grow faster than the minority population. These two similar yet different patterns of gentrification are often hard to disentangle. In terms of Franklin County, we find that raw U.S. Census data suggests that early in the 2010s, minority residents were displaced from CRAs, while later in the decade, the white population within CRAs simply grew at a faster rate than the county’s white population overall. We find that within CRAs, segregation trends increased (became less like the county population) in the early part of the last decade before reversing after the pandemic. We discuss several possible explanations for this.

At first, we hypothesized that the reversal in segregation trends may be caused by the COVID-19 pandemic. Here, white affluent residents were more able to relocate from the urban core and work remotely. However, the data does not support this hypothesis, instead showing that the CRA population of both black and white residents rose following the pandemic. We suspect a possible “second gentrification stage” is occurring as prices and rents reached high-water marks with historically low mortgage interest rates. In this stage, not only are whites continuing to move in, but at a faster rate than blacks, especially in CRAs located in the city. In this second stage of gentrification, minority residents may not be displaced as rapidly from CRA neighborhoods, because simply, they represent a smaller share of CRA population. Further research should be conducted with more detailed data to substantiate this explanation.

Other gentrification measures used by economists and sociologists include neighborhood income and education levels. Gentrifying areas typically have sharp increases in income as more affluent households move in. These more affluent residents are more likely to have college degrees. We find very clear evidence that CRA areas experienced a rise in both median-household income and in their population share with a bachelor’s degree between 2012-2022. Both trends peak in approximately 2019 and reverse slightly during the pandemic. This is more consistent with the hypothesis that COVID-19 played a role in shaping CRA neighborhoods. That is, while our results do not suggest that COVID-19 had a racial dimension in terms of how neighborhoods were impacted, it likely had wealth and education dimensions with higher income and more educated individuals moving away from CRA neighborhoods. This is again consistent with the closure of amenities (restaurants, shops, and nightlife) that draws young professionals to downtown neighborhoods and consistent with the remote-work transition of many jobs which require a college degree.

Policy Recommendations

The conclusions of this report should give policymakers some pause about the concerns raised in the economic research literature regarding place-based development policy. Namely, policies such as CRAs may be well intended, but they come with unintended consequences including displacing low-income or minority residents, or unintentionally shifting investment to already-more-affluent parts of CRA zones at the expense of other areas in the county. Further, as we discussed in our 2022 report (Messenger and Partridge, 2022), CRAs appear to be the driver behind Franklin County’s property tax rates rising about twice as fast as the state average, while local income-tax collections as a share of income are also well above the state average (this even as the county has considerably higher property values and incomes than the state).

There are ways to reduce these unintended consequences.

First, policymakers may totally forego using CRAs given their high opportunity costs. Yet, if CRAs remain a policy tool, policymakers could draw smaller future CRA zones to include higher proportions of blighted property than the state's 20% requirement. This would help ensure that the incentivized investment occurs where it's most needed.

Second, state and local policymakers could change current CRA practice to only offer the incentives to original residents to target benefits on intended beneficiaries, not developers or flippers.

Third, state policymakers could revise CRA program law to incentivize municipalities to scale the CRA tax benefits based on tract economic or demographic data or when developers create sufficient affordable housing. Investors then would receive larger benefits if blighted parts of CRAs are revitalized or if the underlying demographic and economic profiles are preserved, which mitigates the displacement of low-income residents.

Finally, policymakers should consider the location of high-value amenities such as entertainment districts, parks, or anchor institutions like universities or sports arenas when drawing CRA boundaries. By including these amenities (which already raise home prices) within CRAs, policymakers may promote inequitable access to parks, transportation, or retail establishments like grocery stores, bars, and restaurants.

A Note on Results Interpretation

In interpreting our results, note that our statistical models include measures for each year (i.e., annual Franklin County real estate appreciation is "picked up" by these effects) and neighborhood (census-tract) effects, which capture variation in housing prices across neighborhoods. Thus, if sales price is reduced due to some factor (say an abatement's conclusion), this negative effect does not mean that the *total actual sales price* decreased. Other factors can more than offset the price loss including standard appreciation. In other words, a home's price may rise due to other factors such as neighborhood or market trends, but the price would have risen faster if (say) the abatement continued. For more, **see Appendices A and B.**

Introduction

What are CRAs and Why Do Policymakers Create Them?

The State of Ohio allows municipalities (cities, villages, or a county) "to designate areas where investment has been discouraged as a Community Reinvestment Area (CRA) to encourage revitalization of the existing housing stock and the development of new structures." Property within the geographic zone that the municipality designates is eligible to receive a property tax abatement for conducting renovations or new construction. For residential homes, the amount of property tax reduction a property receives can be up to 100% of the real value of the improvements to the property and the abatement can last up to 15 years. These terms are generally decided when the CRA zone is created, and the same terms are available to all residents who perform at least a minimum renovation that the city sets. For commercial and industrial properties, the terms are similar, but the amount of exemption is typically decided on a project-by-project basis. For commercial and industrial abatements of more than 50% of the improvement value, school district approval is needed unless it is determined the school will receive equivalent revenue through other payments. In practice, this often materializes as a side-agreement between the commercial entity seeking the abatement and the school district.

Policymakers often utilize CRAs as a tool to attempt and revitalize blighted areas of cities and promote "mixed-income housing". Mixed-income housing refers to neighborhoods composed of households with different incomes levels of income, typically through a mix of subsidized and market-rate housing. In short, the goal is to de-concentrate poverty and promote economic mobility among a city's most impoverished residents. When poverty is concentrated, services such as transportation, healthcare, and education can suffer and reinforce cycles of poverty. Additionally, many municipalities view mixed-income communities as a practical way to secure and redevelop valuable inner-city land and make revitalization both profitable for capital holders and politically viable (Case Western, n.d.).

Mixed-income housing is not without critics, who note that what constitutes "affordable" is important and some residents in most need are still priced out by new development. In Franklin County, it appears that some CRA zones that are aimed at promoting mixed-income housing also include high-demand, higher-priced neighborhoods. In these cases, the CRAs may incentivize even more capital to locate in already well-off areas instead of targeting the most blighted areas. Additionally, as we discuss later, mixed-income housing may contribute to the gentrification of historically minority neighborhoods, which themselves were established by the "white-flight" phenomenon last century.

What Our Previous CRA Reports Found

The authors previously analyzed six years of Franklin County property transactions in our 2021 report and found that Community Reinvestment Areas (CRAs) and active CRA abatements are positively capitalized into home values (Partridge and Messenger, 2021). We achieved this by first matching homes sold within CRAs to similar homes outside of CRAs using a machine-learning algorithm. Like clinical-medication tests, this creates a comparison group (or treatment group) of sold homes (CRA-impacted homes) and a control group (similar homes that are not impacted by CRAs). We then constructed a statistical model that compares the CRA and non-CRA properties, which controlled for both time trends (real-estate market conditions) and place-based effects which do not change over time (proximity of homes to amenities such as parks and school districts).

We estimated that the price of a home increased by roughly 4% for each year remaining on an active CRA property tax abatement, with the mean abatement having about 7.5 years remaining, equating to roughly $63,000 for the average home sold in the sample. Further, we found that abated homes had positive spillover-price effects on neighbors within about 100 meters. This means that when one home performs renovations and receives a CRA abatement, it positively influences prices in the immediate neighborhood. This is plausible when considering that realtors may note that a neighborhood is “up and coming” to prospective buyers and renovated homes with higher sales prices (partially due to the abatement) would also appear in market comparisons generated by software utilized by real-estate appraisers. Finally, we found that even unabated and unrenovated properties within a CRA gain slight price premiums because buyers have options to later apply for and receive a property tax abatement if they undertake a renovation. Again, this seems plausible. If a buyer considers two homes with similar characteristics and in similar neighborhoods and if they would plan to conduct renovations on either home, it is to their advantage to buy the home in the CRA due to being eligible for the renovation tax abatement.

However, both the 2021 report and this year’s analysis find that there are unintended consequences from the increasing use of Franklin County CRAs. First, CRAs facilitate rapidly rising prices within their boundaries. Many of the county’s CRAs include neighborhoods that are already in high demand. As a result, CRAs contribute to some neighborhoods becoming even more pricey relative to non-CRA neighborhoods. What does this mean? Put simply, property owners outside of CRAs—who aren’t eligible to receive CRA property tax benefits—effectively experience a decline in their property value *relative to* similar properties located within a CRA.

Our subsequent report in 2022 (Messenger and Partridge, 2022) found the proliferation of commercial and industrial property tax-abatements is one key driver of a tax shift in the county. As public services funded by property taxes experienced increasing revenue losses due to abatements and exemptions, agencies appear to have sought additional taxes from non-abated property owners. The data supports this hypothesis; Franklin County's property tax rates have increased about twice as fast as the state average and local Franklin County income taxes as share of income greatly exceed the Ohio average. Both tax increases have occurred despite the county having per-capita personal income and housing values well above the state average. The evidence also indicates that tax abatements led to higher school property tax rates for remaining taxpayers and a modest decrease in school resources. Finally, there is little evidence the county's economic growth improved after abatements proliferated in the early 2000s.

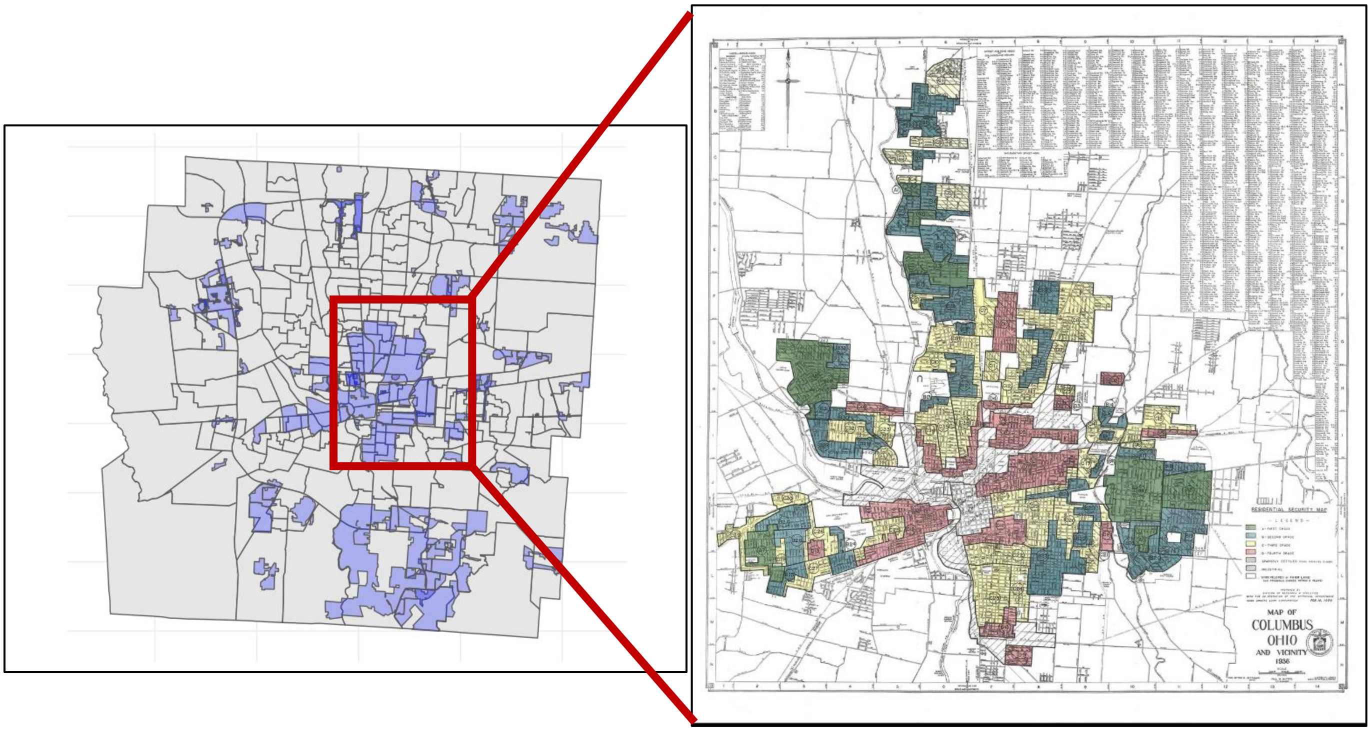
What's New in This Report?

In this 2023 report, we have more years of post-COVID-19 housing transaction data as well as more data on properties when tax abatements expired. This allows us to analyze other questions about Franklin County CRAs, including (1) whether properties retain increased value attributed to the CRA abatement once it expires, (2) are residents and businesses more likely to sell their property once a CRA abatement expires, and (3) how CRA abatements impact the underlying neighborhood characteristics, including race and education demographics and supply of rentals.

The answers to these questions have important policy implications and recent media coverage of fading tax abatements in downtown Columbus highlights the impact on residents and businesses. Given that the timeframe of many approved abatements is the maximum of 15 years, the consequences after an abatement's conclusion are not typically high on the minds of policymakers at their inception. In many cases, policymakers and the residents involved at the beginning of an abatement are not the same as those when it concludes, leading to potential financial "surprises" for households when the abatement ends and new, higher property tax bills arrive.

One implication of our previous reports is the value of an active property tax abatement is capitalized at the time of a property's first sale after the abatement is approved. Effectively, the first buyer pays for the property tax abatement upfront. The party which realizes the financial gains is the seller. Since CRAs and active abatements raise the home price, they could potentially shift demographics of neighborhoods toward more affluent individuals and price out low-income residents from purchasing or renting in the neighborhood. There are harmful consequences to this when considered within the context of structural inequality and racial inequity of U.S. real estate markets. Up until 1968, racism was an explicit feature of housing markets across the nation through practices such as red lining, which affected many historic Columbus minority neighborhoods. Many Franklin County neighborhoods were graded by the Federal Housing Administration (FHA) in the 1930s as having low quality housing. In these red-lined neighborhoods, Black residents were allowed to purchase property. These heavily Black neighborhoods of the 1930s typically overlap with locations of modern-day CRAs (see **Figure 1**). As Seitles (2018) notes, the use of tax incentives by suburban communities to lure manufacturing jobs out of the city combined with location of public-housing by governments in the 1950s and 1960s further promoted segregation and the establishment of mostly white suburban neighborhoods and majority minority urban neighborhoods.

Figure 1. Comparing 2023 Columbus CRAs to 1936 Federal Redline Map



(A) Columbus CRAs, 2023. **Source:** Franklin County Auditor

(B) Columbus Red Line Map, 1936. **Source:** Ohio Wesleyan University

In the 2000s, changing preferences and large declines in crime after the early 1990s led to a partial reversal of “white flight” to desirable parts of central urban areas. Doubtless, some motivation for the *initial* surge in CRAs related to this pattern.[3] Following Richard Florida’s influential 2003 book (Florida, 2003), efforts using what urban economists refer to as “consumption amenities” were undertaken to attract young adults. Florida argued young adults are the heart of dynamic, prosperous metropolitan areas. The plan was promoting central-city entertainment districts (to a lesser extent walkable neighborhoods) that attract relatively more mobile young adults who tend to be more educated (“creative class”). These districts would provide rich *milieux* of trendy restaurants; vibrant nightlife; entertainment venues such as theaters; museums, professional sports teams; denser development; and improved public transit, all facilitated by proximate job opportunities (Couture and Handbury, 2020; Florida, 2003; Glaeser et al., 2001).[4]

Research prior to the COVID-19 pandemic suggests a “youthification” of urban areas. For one, international immigrants, who mainly locate in urban areas, are also relatively young. Likewise, young recent college-graduates relatively value living in high-density areas where there are other young recent college-graduates (Moos, 2016). These trends are not without concerns, with most-cited being gentrification—a process where typically low-income urban neighborhoods are changed by influxes of relatively affluent residents and businesses that displace previous, poorer residents. Taken together, the problem becomes clearer. Historically after WWII, racial discrimination in policy and practice in U.S. real estate markets segregated housing into white and minority neighborhoods, with the former increasingly suburban and the latter in typically high-density urban areas.

Changing preferences and falling crime rates enabled demographic disruptions in many historically-minority neighborhoods. Facilitated by policies such as CRAs, influxes of younger, more affluent adults into these neighborhoods potentially displaced poor residents by driving up property prices and incentivizing house “flipping.” Questions asked in this study relate to these patterns and unintended consequences of policies such as CRAs. They include whether property-value increases are permanent after CRAs expire, whether residents and businesses remain in neighborhoods once their tax abatements expire, and whether underlying demographics and rental supply change inside CRAs. The answers are crucial in understanding when and if CRAs are sensible for neighborhood revitalization.

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[3] We are referring to young adults moving to central cities. Overall patterns of net-out-migration from metropolitan central or “principal” cities to their suburbs have **not** reversed. U.S. Census Bureau data show that since the Great Recession, there has been a relative reduction of net out-migration from U.S. metropolitan-area central cities to suburbs. For example, in the two post-Covid years 2021-2022, through domestic migration, central cities **lost** 3.7 million domestic residents vs. suburban areas **gaining** 3.9 million. In the two post-Great Recession years 2011-2012, central cities **lost** 4.0 million residents through migration vs. suburbs **gaining** 4.3 million residents. The large losses for central cities are an improvement from prior years: e.g., from 1988-89, central cities **lost** 5.6 million through domestic migration vs. a 5.9 **gain** for suburbs. Central cities offset some of these out-migration population losses via international immigrants—e.g., even at low levels of immigration in 2021-22, nearly a million immigrants moved into central cities (it was 1.7 million in 2006-07).

[4] Consistent with his hypothesis of attracting young “creative” adults, Florida (2003) further stressed notions of tolerance in attracting creative and innovative people—e.g., think San Franscisco and Silicon Valley and stereotypes of creative or innovative people who lean “eccentric” or “different” in many ways. Florida proposed a “gay index,” for which he argued areas with higher shares of “gay” individuals signaled tolerance to diverse ideas (he used “gay,” not modern wording such as LGBTQ), which facilitated an environment of innovation and creativity (this is not the same as arguing that gay individuals *cause* innovation). Florida’s arguments remain controversial. See Glaeser (2005) for a critique.

The remainder of this report is organized as follows: we first explore the price and sale effects of CRAs. This includes analyzing if the price effects we found in our 2021 stay intact after an abatement expires. We also examine whether property owners are likely to sell their property before their abatement ends and whether cities tend to extend abatements beyond their initial term. Second, we look at demographic indicators of gentrification to examine how CRAs may be changing neighborhoods in the macro.

Do Residential Properties Retain Increased Value When Abatements Expire?

Our 2021 study found that active CRA abatements are associated with greater home prices in CRAs and increases were larger for (a) greater abatement values, which also relate to the renovation’s value (b) longer periods remaining on the abatement, reflecting the longer span for property tax savings. A key question is whether increased home-values persist after abatements expire, typically after 15 years. If not, that suggests abatements did not even (permanently) increase overall home values in targeted zones. Costs include the lost tax revenue pressuring funding for services, as well as the offsetting increases in property tax millage rates for the county’s unabated homes (e.g., Messenger and Partridge, 2022). We find, somewhat expectedly, that the increased value of home attributable to an active property tax abatement disappears once the abatement expires.

To arrive at this answer, we use what is known as a repeated-sales model. The model uses data *comprised of housing sales for the same parcels that occur both before and after their abatement expired*. With repeated sales, unmeasured characteristics of a specific home then (roughly) equally affect the “first sales price” and the “second sales price,” or the unmeasured characteristics do not measurably affect *changes* in home prices pre- and post-tax abatement. We augment our data with census-tract American Community Survey (ACS) data from the U.S. Census Bureau, which has detailed economic and demographic neighborhood (tract) data. We specifically control for the age, racial composition, and education levels of neighborhoods at the Census tract level. Franklin County Auditor records have basic home characteristics such as square footage. The model once again adjusts for neighborhood effects that influence housing prices and year effects to reflect annual countywide real-estate trends.

The statistical model estimates the determinants of Franklin County home prices (in $10,000s), focusing on the effects of expiring abatements. A condensed version of relevant results is shown in **Table 1**. A full description of the model and full regression output is in **Appendix B.**

Table 1. Price Effects of Expiring Abatements for Residential Homes

Variables	Home price ($10,000)
Abatement expired 1 year ago	-3.517***
	(1.194)
Abatement expired 2 years ago	-0.657
	(4.058)
Abatement expired 3 years ago	-10.50***
	(3.241)
Abatement expired 4 years ago	-13.17**
	(4.940)
Observations	2,030
Home characteristic controls	Yes
Neighborhood demographic controls	Yes
Census tract fixed effects	Yes
Year fixed effects	Yes
R-squared	0.508

Tract cluster robust standard errors in parentheses; These are abbreviated results. Full results are in Appendix A.
p<0.01, ** p<0.05, * p<0.1

The net home-price effect after a CRA abatement expires includes the sum of various offsetting effects. Positive effects include neighborhood "improvements" during the CRA period and price appreciation from renovations after the home was last sold. Of course, increased home values are usually considerably less than renovation costs—i.e., the CRA property tax break based on renovation costs likely greatly exceed the actual price effects. Then, as a renovation's updates age, the associated price premium declines, which can be considerable because tax incentives for (say) a 15-year abatement are greater if renovations occur early in the CRA term. Further, when abatements expire, property values further decline due to lost property tax breaks.

The estimates are consistent with our 2020 and 2021 results and with anecdotal expectations. They indicate that average sales prices decline after abatements expire. The approximate estimated price declines from years 1 to 4 after expiration are: $35,000, $6,500, $105,000, and $131,000. For example, for a $290,000 home, prices decline 11.0% one year after the expiration ($290,000 is the sample average price). All post-CRA year effects are statistically significant except year 2. Averaging across the four post-expiration year-coefficients yield an average price decline of about $70,000 over four years, or larger than the approximately $48,000 price premium for CRA-abated homes identified by Partridge and Messenger (2021). For context, in 2022, the county's median CRA abatement was $182,400. Thus, for many homes, the negative price effect after the expiration represents a considerable reversion—that is, the property value increase that the 2021 study attributes to abatements appears transitory. We suggest that understanding local property tax effects, including CRA abatements, would be enhanced if the county's municipalities more accurately gathered property remodeling data.

These large price declines support the notion that property taxes are the key feature driving home price changes due to a CRA rather than renovations or improved neighborhood quality. An average $70,000 loss after an abatement expires may seem large but considering the roughly 1 to 15 years of reduced (or eliminated) property taxes, the lost home-values can be considerable, especially for higher valued houses.

Policymakers should be aware of long-term CRA effects. Property tax abatements lead to lost tax revenues for up to 15 years. After expiration, houses lose about $70,000 in value—larger than the active-CRA price appreciation, indicating that renovations and any positive changes in neighborhood quality are less important than the *active* CRA price appreciation due to the property tax break. Further, the lack of permanent positive price effects for CRAs calls into question whether their benefits justify their large costs. If targeted neighborhoods are not experiencing permanent home price gains, it is challenging to justify their large costs.

There is also strong evidence of a bifurcated real estate market defined by properties selling at roughly $300,000. One plausible explanation is fierce competition for affordable starter homes with lower capital requirements. For homes under $300,000, there is a positive and statistically significant price premium for neighborhoods with higher average education levels. Further, there are significant positive price effects (roughly between $12,000 and $14,000) for homes in neighborhoods with higher populations of 20–34-year-olds – the age cohort typically associated with first time buyers. This finding has important implications for considering shifting demographics within CRAs, which are in central urban areas that past research indicates is appealing to this age-group.

Are Residents and Businesses Selling Properties as CRA Abatements Expire?

One feature of tax abatements, such as those granted by CRAs, is that they are rarely permanent. While this is good news for funding local services, such as schools, which can begin collecting revenue on the full taxable value of a property once abatements expire, it is unclear how expiring abatements affect their existing homeowners and businesses. A key question is whether owners attempt to sell the once-abated property now that higher property tax bills resume. A key challenge with analyzing the impacts of expiring Franklin County abatements has been that almost all CRA abatements granted after 2005 did not begin to expire until 2020. Now, with multiple years of both post-COVID sales data and larger numbers of expiring abatements, an early analysis is possible.

To assess whether property owners are leaving properties as abatements roll off, we construct and estimate a propensity-to-sell model. Appendix A describes the statistical model in detail and has full statistical results. The model measures the relationship between how long ago a property lost its tax abatement and the probability that the same property is sold within a given year. We include all sales across the county from 2018 to 2022 and account for neighborhood demographic and economic factors, as well as the characteristics of the sold property, such as square footage and the number of bedrooms and bathrooms (for residential properties). Data from the U.S. Census Bureau and our calculations allow us to account for neighborhood characteristics, such as proximity to downtown or other stable amenities such as parks or schools.[5] We account for annual trends during a given year, such as price appreciation in Franklin County's real estate market.

We estimate two different statistical models. One estimates the impacts of expiring property tax abatements on single-family residential parcels. The second estimates the impacts of expiring abatements on C&I parcels. Condensed versions of the output are shown in **Tables 2** and **3.**

The results from **Table 2** reveal several things. First, *actively tax-abated single-family homes* are statistically less likely to be sold each year by approximately 6.7%, all else equal. Unless the current homeowner is a "flipper," the incentive to sell is less than for unabated homes. Specifically, except for owners who originally completed the renovations, the results of our (2021) study show that the current homeowner paid a premium for the house when it was purchased (roughly a $48,000 premium on average, unless they were the original owner who performed the renovation). This premium mostly reflects property tax savings from the abatement. Yet, our prior study also indicates that the price premium due to the CRA abatement declines over time as cumulative tax-savings decline. Thus, this homeowner would sell at a reduced premium **and** would also lose their property tax break (unless they found another home in a CRA, reducing their choices where to relocate). Together, this can significantly decrease the net-benefits of selling an abated home.

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[5] The Census Bureau uses "census tracts" to approximate city neighborhoods.

Consistent with the pattern just described, increasing the number of years remaining on the abatement increases the likelihood of selling the home by about 0.9% per additional year. This means that the 6.7% negative active-abatement effect dwarfs the positive effect from years remaining on an abatement if there are fewer than 8 years remaining (8 years * 0.9% = 7.2% vs. the original -6.7% direct abatement effect). That is, if over 8 years remain on the abatement, the premium from selling an abated home is sufficiently large to offset the other potential losses from selling an abated home—i.e., due to the buyer’s willingness to pay a larger price premium if the tax savings are for a longer period.

Table 2. Relationship Between Expiring Abatements and the Probability a Single-Family Home is Sold

Variables	Effect on a Parcel's Likelihood to be Sold
Actively Abated	-0.0679*** (0.0252)
Abatement ended 1 year ago	-0.0744** (0.0298)
Abatement ended 2 years ago	-0.00666 (0.0449)
Abatement ended 3 years ago	0.0933 (0.0767)
Abatement ended 4 years ago	0.0838 (0.0750)
Number of years remaining on abatement	0.00897*** (0.00320)
Abatement expires this year	0.00221 (0.0277)
Parcel is within CRA	0.00678 (0.00624)
Observations	306,862
Demographic controls	Yes
Housing characteristic controls	Yes
Census tract fixed effects	Yes
Year fixed effects	Yes
R-squared	0.008[6]

Notes: Robust standard errors in parentheses. These are abbreviated results. Full results are in Appendix A.
*** p<0.01, ** p<0.05, * p<0.1

For abatements that expired in the previous calendar year (when owners would have received an increased tax bill), the results show that homes are about 7.4% less likely to be sold (significant at 5% level), but if an abatement ended 2 or more years before, the results are statistically insignificant, suggesting little affect. An explanation for the first-year decline is some homeowners are surprised their abatement expired. Not until they face an unexpectedly high property tax bill will they feel more incentivized to sell. Delay is further reinforced by the time to hire a Realtor, prepare the home for market, engage in negotiations, delays in financing, find a new home, and home closing. Another plausible explanation is owners in previously abated homes may not understand the lost price premium stemming from losing their property tax break. Effectively, they do not realize that the value of the active tax abatement was rolled into the purchase price they paid for the home and that with an expired abatement, the value of the home is less to potential buyers than it would otherwise be. It may take time for owners to adjust their price expectations, all things equal, adding time before they sell their home.

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[6] The relatively low R-square value reflects that a household's decision to relocate is highly idiosyncratic and mainly based on household characteristics: e.g., new jobs, birth of children, proximity to family, divorce, children moving out, children entering their school, and personal health. Such individual data is unavailable. Yet, this should have little effect on our statistical inferences from the results.

Table 2 presents the results for expiring C&I tax abatements on property-sale likelihood. Like residential properties, an active abatement is negatively related to the likelihood that a commercial or industrial property is sold (statistically significant)—i.e., a 9.4% decline. Yet, unlike residential properties, C&I properties in the CRA abatement's final year are roughly 9.3% more likely to sell. Thus, in the final year, the increased likelihood of selling a property almost completely offsets the decreased likelihood directly attributable to the abatement. Here, C&I owners are likely acutely aware of expiring tax abatements and attempt to sell beforehand. What is less clear is why a prospective buyer might purchase a C&I property at the end of its abatement lifetime and whether it would negotiate a lower price. Since C&I abatements are negotiated project-by-project, it likely depends on the type of business locating at the property and the submarket for that specific type of C&I property. For example, whether the property is already a restaurant location, and the buyer is another restaurant, likely matters.

Table 3. Relationship Between Expiring Abatements and Probability a Commercial/Industrial Property is Sold

Variables	Effect on a Parcel's Likelihood to be Sold
Actively abated	-0.0947***
	(0.0234)
Abated ended 1 year ago	-0.0377***
	(0.00505)
Abated ended 2 years ago	0.0184
	(0.0205)
Abated ended 3 years ago	-0.00831
	(0.0165)
Abated ended 4 years ago	-0.00383
	(0.0227)
Years remaining on abatement	0.0158***
	(0.00387)
Abatement expires this year	0.0930***
	(0.0317)
Property is industrial	0.0115*
	(0.00639)
Building square footage	2.14e-06
	(1.88e-06)
Sale year is 2019	0.00494
	(0.00497)
Sale year is 2020	-0.00485
	(0.00372)
Sale year is 2021	0.0141***
	(0.00460)
Constant	0.0412
	(0.0409)
Observations	100,780
Demographic controls	Yes
Census tract fixed effects	Yes
R-squared	0.020

Robust standard errors in parentheses***; These are abbreviated results. Full results are in Appendix A. p<0.01, ** p<0.05, * p<0.1

We also find that in years after an abatement expires, parcels are about 3.7% less likely to be sold than properties that never had an abatement or the abatement expired at least 5 years before. This effect is a little over one-third as large as for an active abatement. This means that C&I parcels with a recently expired abatement are more likely to sell than properties with active abatements, but still less likely to sell than unabated properties (or if the abatement ended at least 5 years before). This pattern likely relates to greater difficulties in selling C&I properties. Additionally, because our results suggest that firms are more prone to sell in the abatement's final year, this negative effect could reflect firms who "missed the boat" to sell, or like some homeowners, it may take time for some owners to realize the lost value from losing the tax break.

Industrial properties are slightly more likely to sell (~1.1%) relative to commercial properties. The 2021 coefficient is positive and statistically significant, suggesting a 1.4% greater chance of selling relative to 2022, which may relate to troubles some firms faced during the pandemic.

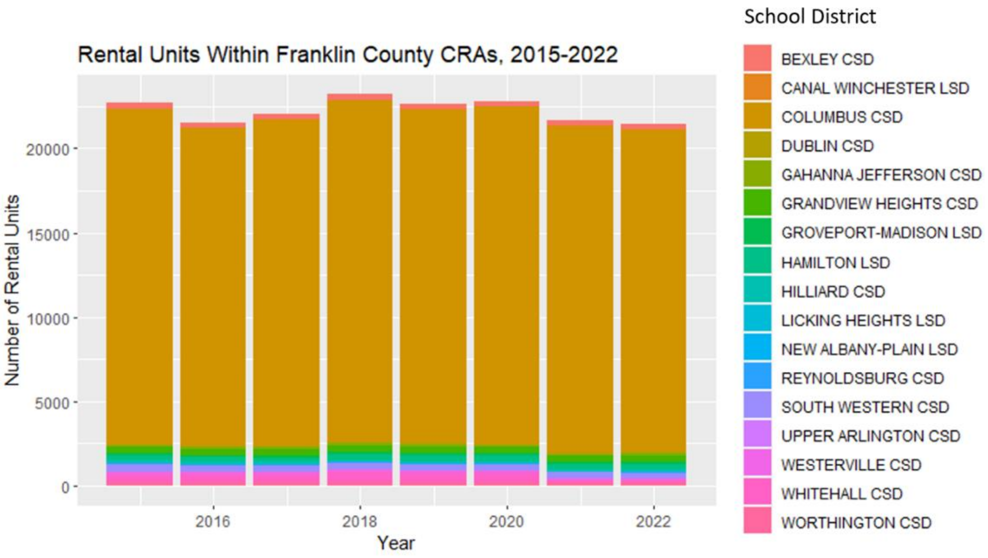
Do Municipalities Extend Expiring Abatements?

Do municipalities extend CRA abatements? We find little to no evidence of this pattern. As such, we do not estimate related statistical models given there are no cases of extended abatements. Local governments choosing to not extend abatements is sensible in many ways given that otherwise, businesses and residents could receive perpetual tax breaks. It's unclear that future net benefits would reach that of the original CRAs. First would be perpetual tax losses for Franklin County governments. Then, from a property owner's financial perspective, to receive a new CRA abatement, they need capital because the abatement equals renovation costs. Further, to entice renovations, owners would need the tax-savings to exceed the net-renovation costs, assuming they even have a renovation need. An interesting future research question is whether businesses threaten relocating when their abatement ends to leverage future tax incentive packages (such as tax increment finance agreements or direct grants).

Have Rental Trends Changed Within CRAs?

An important way CRAs may impact neighborhoods is by changing rental availability. **Figure 2** shows the overall trend between 2015 and 2022 for rentals within Franklin County CRAs broken down by school district for better context regarding rental locations. Note that these properties include both abated and unabated properties within the CRAs across Franklin County. The figure shows that annual rentals within CRAs stayed relatively constant, generally hovering between 20,000 and 23,000 units.

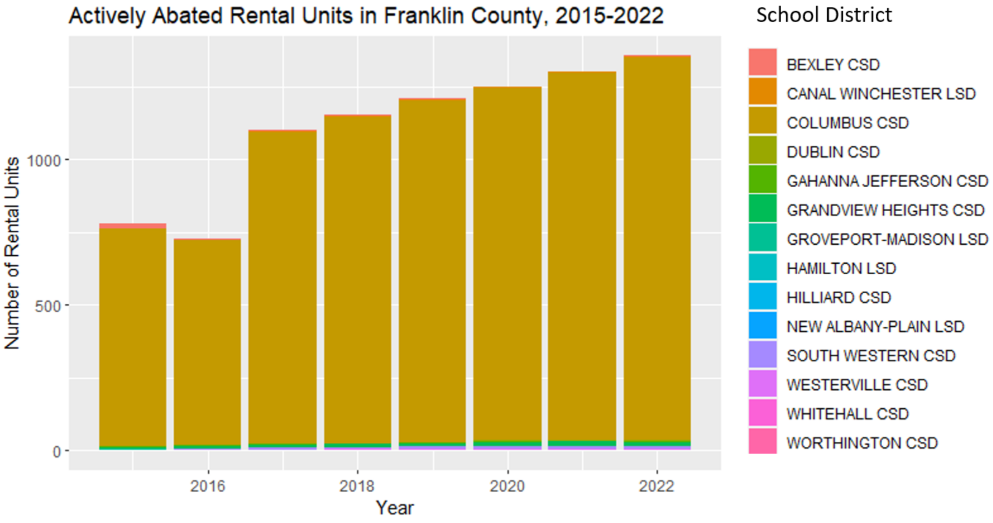
Figure 2.



Data Source: Franklin County Auditor

When rental data is broken down to only include only properties with active CRA abatements, the trend changes. **Figure 3** shows the annual number of registered Franklin County rental units with active CRA property tax abatements. Note that these measures are *not* per capita, and so have limited interpretation in relation to one another but are helpful in seeing which districts are driving overall raw trends. We then account for population in the detailed models in Table 4 and 5.

Figure 3.



Data Source: Franklin County Auditor

Between 2015 and 2022 the number of actively abated rentals grew dramatically, primarily driven by properties within Columbus City School District (CCSD), where the majority of CRA parcels are located. In CCSD, over this time frame, the number of actively abated rentals grew by 75.9%. Although there are a small absolute number of parcels, Grandview Heights School City School District also saw the number of rental properties with active property tax abatements double between 2015 and 2022.

We test these trends more rigorously by constructing a propensity-to-rent model, similar to our propensity-to-sell model earlier in the report. Now, instead of testing the impact of abatements on whether a property is likely to be sold, we estimate the impact various factors have on the probability that a property is a rental. The model controls for other variables that may influence the probability of having a rental, such as neighborhood racial composition, age, and education level. We also control for parcel characteristics such as the number of bedrooms and bathrooms and include tract and year effects to capture time-invariant neighborhood features and general county time trends across years. We also explicitly control for whether the property is within the boundaries of Columbus City School District, to capture the effect of being within the city on the likelihood of being a rental, since the vast majority of rental properties in the county are in Columbus. The results are reported in **Table 4** for all CRA parcels and **Table 5** for only actively abated parcels.

Table 4. Propensity to Rent Model, All CRA Properties

Variables	Likelihood to be rented
Actively abated = 1	0.0122
	(0.0325)
Residential = 1	-0.0574***
	(0.0203)
CCSD	-0.0223
	(0.0218)
Number of bedrooms	0.00591***
	(0.000513)
Number of bathrooms	-5.81e-05
	(0.000814)
Area (sq. ft)	3.26e-05***
	(4.97e-06)
Property age	8.61e-05
	(7.26e-05)
Under age 18 pop. Share	3.70e-05
	(4.99e-05)
Over age 65 pop. Share	-7.35e-06
	(1.62e-05)
Non-white pop. Share	-0.0732
	(0.0539)
Bachelor’s and above pop. share	-2.49e-05
	(3.98e-05)
Population	3.38e-05
Observations	255,502
Census tract fixed effects	Yes
Year fixed effects	Yes
R-squared	0.152

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5. Propensity to Rent Model, Only CRA-Abated Properties

Variables	Likelihood to be rented
Residential = 1	-0.0291
	(0.0636)
Columbus City Schools	-0.00139
	(0.00302)
Bedrooms	0.000355
	(0.00141)
Bathrooms	-0.00397**
	(0.00183)
Area (sq. ft)	0.000109**
	(4.44e-05)
Age of Property	0.000456
	(0.000506)
Under age 16 pop. share	9.81e-06
	(0.000143)
Over age 65 pop. share	8.82e-05
	(0.000124)
Non-white pop. share	0.282
	(0.331)
Bachelor’s and above pop. Share	-2.81e-05
	(0.000413)
Population	-0.000282
	(0.000243)
Observations	12,231
Census tract fixed effects	Yes
Year fixed effects	Yes
R-squared	0.329

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Data Sources: Franklin County Auditor, American Community Survey

Table 4 shows that residential properties in CRAs are about 5.7% less likely to be rented than C&I properties. The results also indicate that the number of bedrooms and a property’s square footage are statistically significant and positively influence the probability a parcel is a rental, though both effects are small (less than 1%). There is a positive but insignificant effect for properties with active abatements and an insignificant increase in probability for properties in CCSD.

Table 5’s results are from a model that explicitly tests trends in **Figure 3**—i.e., only includes properties with active CRA abatements. The results indicate no significant increase in probability that abated properties in the CCSD are likely to be rented. What does this mean? Our statistical modeling indicates that CRA policy is not directly shifting the county’s rental behavior. It is plausible that CRAs influence other factors over long periods (e.g., neighborhood demographics and housing quality) that in turn could shift rental trends, but CRA policy appears to be directly unrelated to rental probability.

Are CRAs and Abatements Shifting Neighborhood Demographics?

It is critical for Ohio policymakers to understand how CRAs change neighborhood racial, educational, and socioeconomic characteristics. For example, it is concerning that gentrification often occurs in historically low-income or minority neighborhoods. Many people have different definitions of “gentrification” and this applies even in academic research (Hawkins, et al., 2022). Gentrification is often defined as a rise in a neighborhood’s average income or average educational attainment (Lee, 2010; Grube-Cavers & Patterson, 2015). A common theme of all definitions of gentrification, however, is that it involves a displacement of low-income residents and “low-value” businesses by higher-income residents and “higher-value” businesses. Academic studies sometimes omit racial components of gentrification (Kirkland, 2008). However, structural, and systematic U.S. housing discrimination has often displaced residents in what were disproportionately Black neighborhoods (Rucks, 2021).

In terms of tax incentives, two dimensions deserve more interest. First, a large economic literature suggests place-based policies (policies targeting geographic areas rather than specific individuals) may redirect investment away from low-income areas in most need (Partridge et al., 2005; Layser, 2021; Brazil & Portier, 2022). CRAs may fall in this category because Ohio law requires that only 20% of properties within a CRA need rehabilitation. CRAs can be drawn to include relatively wealthy neighborhoods—highlighting a key problem facing place-based policy is it can shift resources to unintended beneficiaries including local elites. This is a well-documented problem occurring with the so-called “opportunity zones” created by the 2017 tax-reform law signed by President Donald Trump, which was predominantly taken advantage of by wealthy investors. Similarly, when individuals, developers, or C&I firms seek CRA abatements, they can locate their capital investments in “nicer” parts of CRAs rather than neighborhoods in desperate need of investment. In other words, drawing CRAs boundaries may be like painting with an overly broad brush, if the intended purpose is to help the most disadvantaged residents. The risk is the local “elite” with more real estate market savvy, such as commercial developers, reap the majority of the benefit instead.

Another concern is CRAs *induce* gentrification. Our 2021 study finds **both** active CRA abatements and eligibility zones are capitalized into higher home prices. This study expands those results to conclude that higher home price effects persist only for so long as abatements remain active. Both studies show CRA abatements are linked to higher property prices, but *only* within the zone, while areas outside generally experience lower home prices as demand is redirected by tax incentives. Prior studies show that greater neighborhood amenities or housing quality increase home prices, which further stresses low-income households (via a higher income share dedicated to housing). Hence, affluent residents displace low-income residents (Immergluck & Balan, 2018). Moreover, Zapatkaf and Beck's (2021) analysis infers that gentrification is a self-fulfilling force. They find that a 1% increase in gentrification is linked to a 2.7% increase in housing values, further pricing out low-income residents.

Altogether, CRAs pose a danger by raising home prices in areas with potential for desirable retail, parks, transportation, and nightlife, leading to influxes of relatively affluent residents. The increase in affluent residents can lead to further home price increases, perpetuating the cycle.

To examine the impact of CRA zones on their underlying demographics, we use a measure called the dissimilarity index. Following Massey and Denton (1988) and Massey, Rothwell, and Domina (2009), we construct a black-white dissimilarity index score for residents within CRAs.[7] The index ranges from 0 to 100 with 0 indicating that the CRA distribution of black and white residents is equally distributed to match the county's population shares of both groups, while 100 indicates complete segregation. The idea is to assess how a given CRA's racial composition is relative to the case if it exactly matched Franklin County's racial composition. To achieve this, we again use Census Bureau ACS tract data.[8]

Demographic Background

The pandemic was a major economic shock affecting national housing markets. It also had large, likely temporary, effects on national settlement patterns. When discussing demographic changes in CRAs, to better access recent developments, an understanding of recent changes in migration and settlement patterns is necessary.

First, for national perspective, Fry and Cohn (2021) note the pandemic likely exacerbated pre-pandemic trends of weak net-migration levels for most large cities. In fact, U.S. Census data shows only 6 of the largest 20 cities gained population between Census 2020 and July 1, 2021. Led by New York City's loss of over 345,000 people, losers remarkably included Sunbelt cities such as Dallas, Houston, and San Diego, as well as rapidly growing cities like Denver and Seattle. Between 2021-2022, those cities partially rebounded with only 7 losing residents, though New York lost another 123,000. Only 9 of these cities gained people between 2020-2022. Nonetheless, net-migration into suburbs allowed most large metropolitan areas to eke out population gains—i.e., Census Bureau data shows 23 of the 40 largest metro areas gained people from 2020 to 2022. Surprisingly, despite the relative reversal of prospects for major metro areas, their housing markets boomed after Covid. S&P's Case-Shiller Index of home prices for 20 large cities soared 43.5% from the pandemic's start in March 2020 to July 2022, before retreating slightly (the national rise was 43.3%).

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[7] The dissimilarity index is $D = \frac{1}{2}\sum_{i=1}^{I} \frac{n_{ij}}{N_j} - \frac{n_{ik}}{N_k}$ where j and k are district racial groups (e.g., Blacks and Whites). Capital N is total population of the racial group and lowercase n gives the population of the group in CRA i

[8] First, we use geographic information system (GIS) mapping software to overlay CRA shapefiles from the Franklin County Auditor onto a census-tract map. We then use an algorithm to calculate the percentage of the census-tract's geographic area that overlaps with a CRA. We apply these tract-CRA weights to tract-demographic data and then sum across tracts overlapping the same CRA to estimate its demographics.

With these national trends in mind, the relatively weak population performance of greater Columbus for the 2020-2022 period is unsurprising. Using Census Bureau data, between 2010 and 2020, the City of Columbus annually gained an average of about 12,000 people, reaching 906,000 in 2020, ranking the 14th largest U.S. city. Yet, it lost 3,000 over the 2020-2021 period, before gaining 4,000 in the following year for a net gain of only 1,000 over the 2-year span, or a growth rate of less than 1% of the prior decade's rate. Franklin County fared even worse. It gained over 160,000 in the 2010-2020 decade but lost 2,000 people in the 2020-2022 period (1.32 million total population). Led by Delaware County, the 10-county Columbus metro area still gained nearly 23,000 residents over 2020-2022 period, reaching 2.16 million, despite Franklin County's loss. That is a considerable slowdown from the 237,000 population increase in the prior 10 years.

Like the nation, despite seeming demographic weakness, Franklin County's housing market is red-hot post-Covid. Columbus Realtors Association data shows that Franklin County's median home price rose from $203,388 in February 2020 to $296,000 in July 2022, or growth almost exactly tracked the nation.[9]

Data & Results:

The dissimilarity indexes for CRAs between 2014-2021 are shown in **Figure 4**.

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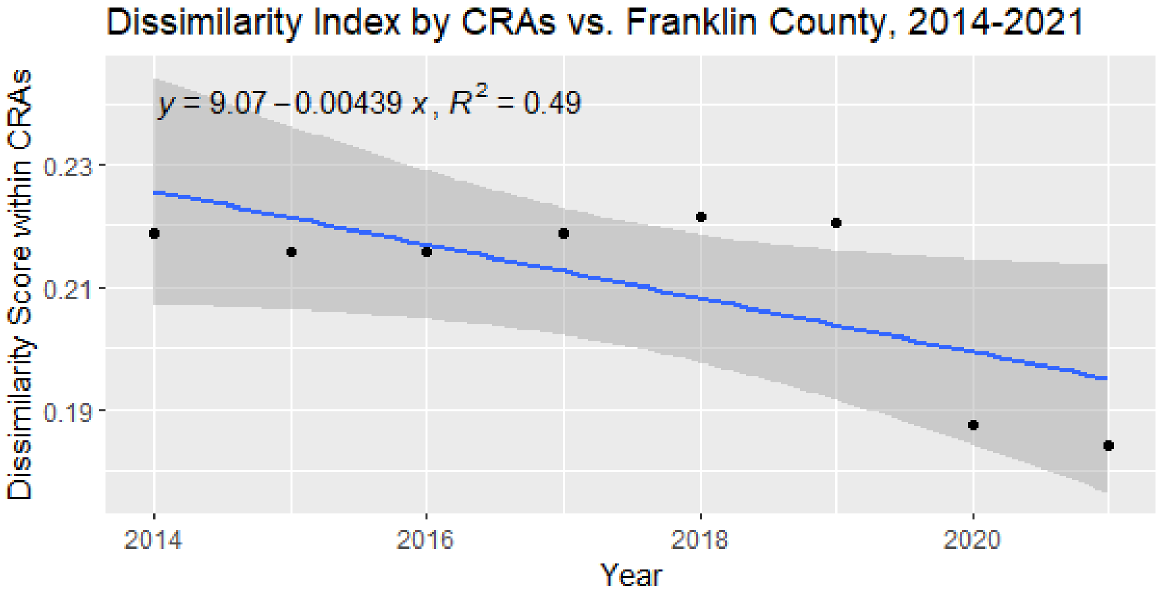
[9] As of August 2023, the county's median home price is $305,000, or as for the nation, high interest rates have slowed price growth.

Figure 4



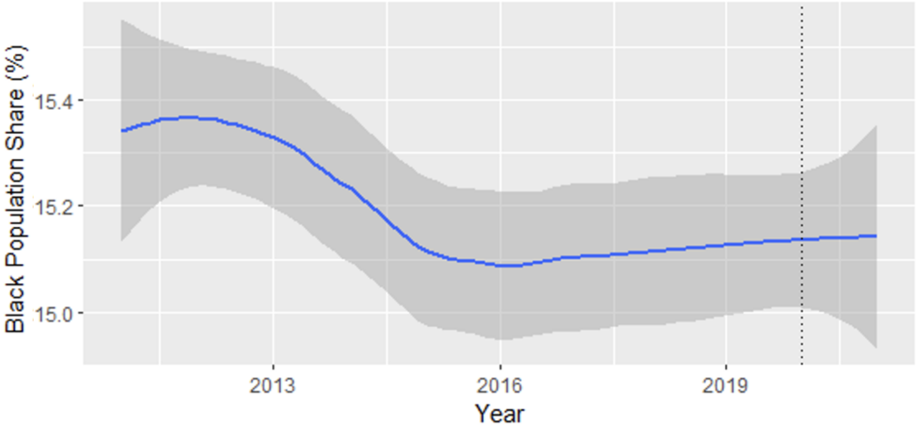
Dissimilarity Index by CRAs vs. Franklin County, 2014-2021

*The dissimilarity index utilizes a 0 to 1 scale, where 0 represents "perfect integration," meaning that the CRA demogrpahics perfectly mirror expected county-wide demographics. A higher value indicates that CRAs are increasingly departing from county demographic shares.

The figures above show that between 2014 and 2021, racial dissimilarity decreased within CRAs relative to the county. What does this mean? Unfortunately, without detailed individual-resident data, it is difficult to conclude if CRA racial trends are driven by relocation of residents within CRA neighborhoods or if some CRA residents are displaced by new residents arriving from outside. Such detailed individual data, including residential history, is often only found in income-tax return data. We attempt to untangle some of the macro-trends in CRA population demographics below to assess whether declining segregation is a feature of all CRAs or is it being driven primarily by ongoing integration of suburban areas.

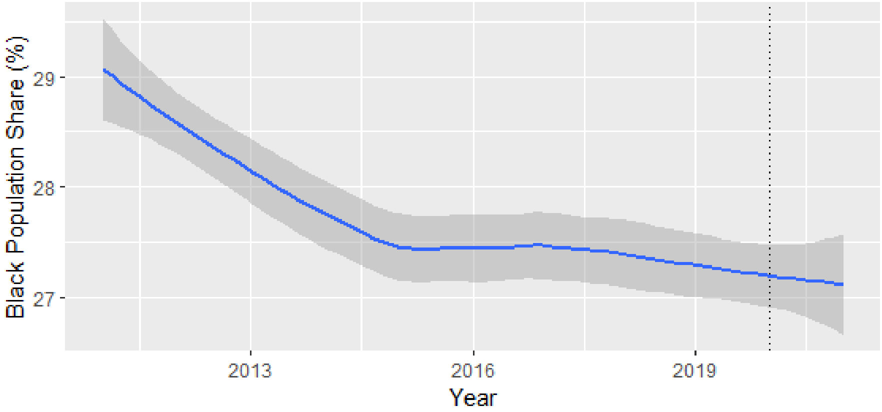
To explore this, we examine black population trends for Franklin County CRAs and then for just Columbus CRAs, the county's densest portion. By stripping away the county's suburban CRAs, we remove CRAs more prone to have mainly white residents to focus on CRAs most likely to experience out-migration of affluent whites. We now turn to ACS data to assess changing demographic trends in the county's CRAs. The data spans 2009 to 2021 based on availability from the Census Bureau at the time of writing.

Figure 5. Black Population Share in Franklin County CRAs, 2011-2021



Data Sources: U.S. Census Bureau, ACS, Franklin County Auditor

Figure 6. Black Population Share in Columbus CRAs, 2011-2021



Data Sources: U.S. Census Bureau ACS, Franklin County Auditor

Figures 5 and **6** support the hypothesis that “increased segregation” (CRAs experiencing a larger deviation from county-wide population shares) prior to the pandemic followed by a slight “decrease in segregation” (CRAs moving closer to county-wide population shares) during the COVID-19 pandemic is driven in part by a declining share of black residents in CRAs. Black population within CRAs declined most between 2011 and 2015, before somewhat stabilizing. The Black population share within Columbus CRAs declined even more during the same period and then continued to gradually decline after 2017. This contrasts with non-Columbus CRAs which experienced a slight growth in black population, suggesting slight diversity growth in the county’s CRAs that are outside of Columbus. It is important to note, however, these results are about the city and county’s CRAs in the aggregate and *not* about specific patterns within individual CRAs.

CRAs in the 2010s appear to have facilitated the displacement of black residents, particularly as highly desirable areas, such as the Short North, underwent rapid redevelopment. White-CRA population trends alone do not speak to the Black displacement hypothesis because 2020 Census Bureau data indicates that whites residents reflect about 57% of the Columbus population, black residents represent about 31%, leaving another approximately 12% that are neither black nor white, including about 7% of residents who are Asian. This 12% of residents who are neither black nor white in turn, could represent those displacing former black CRA residents.[10] Using data reported in footnote 8, the "other race" share in the city increased from about 5% to about 12% over the 2010-2020 span, showing that focusing on the white-CRA share alone is insufficient (the city's white share fell about 8 percentage points over the decade and the black share rose one percentage point). Thus, we can only conclude that black residents were displaced within the county's CRAs early in the decade but cannot directly conclude which Census demographic group displaced them.

The corresponding Franklin County and Columbus CRA-white population shares are in **Figures 7** and **8.** Their patterns confirm a declining non-Columbus CRA-white share, further supporting the trend of increasing diversity in CRAs outside the city. Surprisingly, **Figure 8** shows that white population trends do not indicate an out-migration of affluent white residents from the city's CRAs during the pandemic, even as the city overall saw a relatively large decline in its white population share during the prior decade. Indeed, over the whole 2011-2021 period, the Columbus CRA white population share slightly increased by about one-half of a percentage point, contrary to the city's overall white population share falling roughly 8 percentage points. Similarly, the falling Columbus CRA black population share runs counter to the city's slight increase in its black population share over the decade.

The Columbus CRA white share is above its overall 2020 city share, but in 2011, it was below its city-wide share, whereas the city's CRA black population share is increasingly falling below its citywide average. Thus, the overall pattern is that Columbus CRAs reached a tipping point of becoming more segregated relative to the city as the gap between the city's CRA Black and white shares increasingly deviated from their respective city averages.

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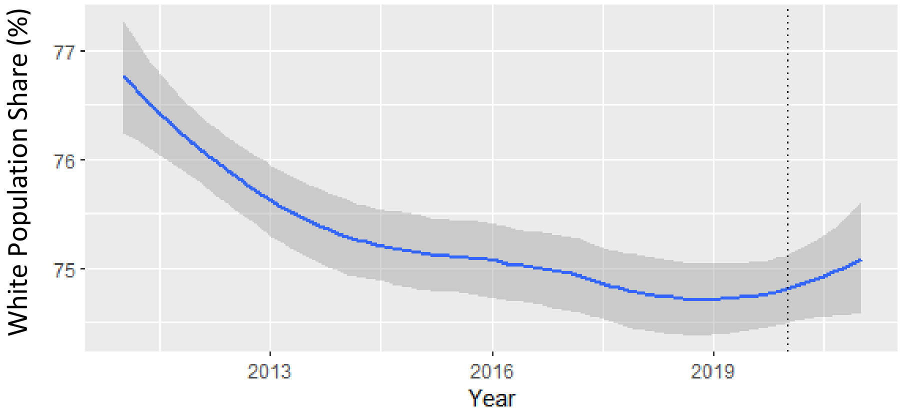
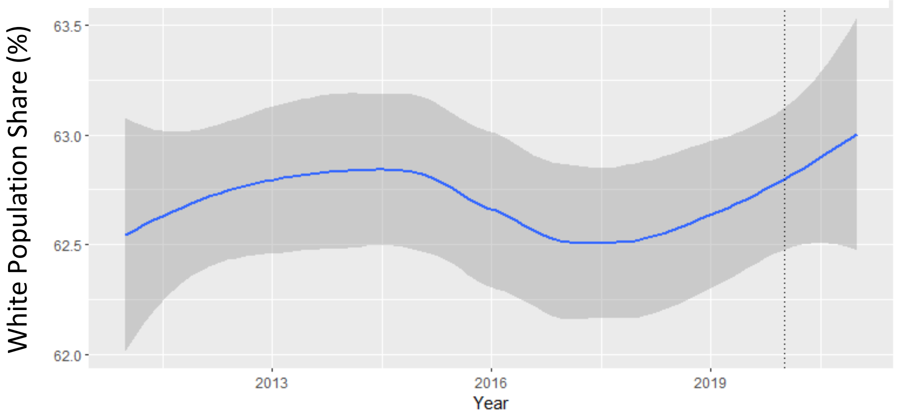
[10] The 2020 population shares are based on the 93% of the city's residents that report only one race. For comparison, the corresponding 2010 Census Bureau racial figures for Columbus are 65% white, 30% Black, and 5% other race, with the Asian population share being about 4%.

Figure 7. White Population Across All Franklin County CRAs, 2011-2021



Data Sources: U.S. Census Bureau, ACS and Franklin County Auditor

Figure 8. White Population in Only Columbus CRAs, 2011-2021

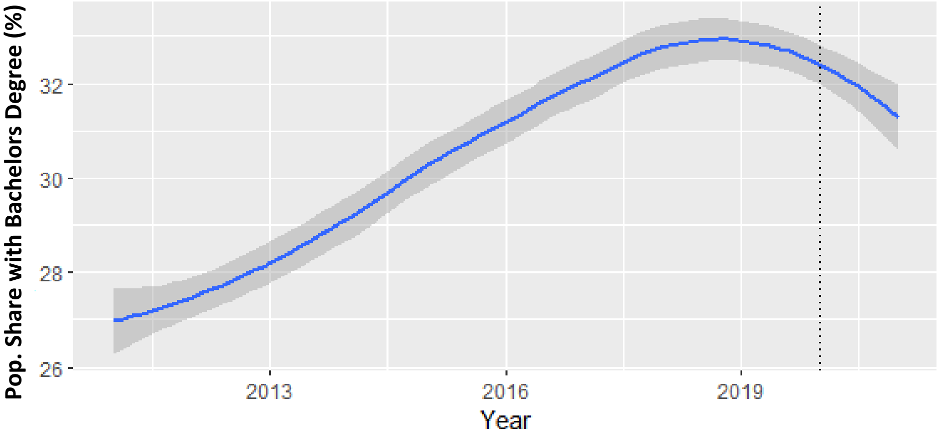


Data Sources: U.S. Census Bureau ACS, Franklin County Auditor's Office

Thus, the overall cause of the growing relative segregation in the County's CRAs is that it is happening in the city, not suburbs, for which the latter shows signs of increasing integration. Moreover, Columbus CRAs maintain a steady or slightly growing white share even as the city's overall white share declines below the corresponding CRA white share. Conversely, the corresponding Columbus Black population shares follow the opposite pattern. In sum, these trends reached a threshold that led to the city's CRAs becoming more segregated than the city, although county trends overall (which include non-Columbus CRAs) show a decreasing segregation trend.

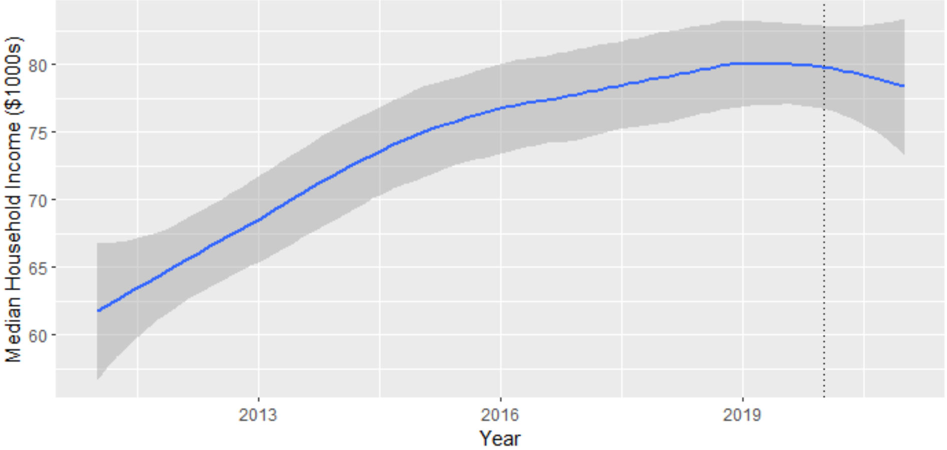
To further examine gentrification trends, we follow the research literature and examine two key indicators: income and educational attainment in the CRAs. We construct these the same as for race by using CRA GIS shapefiles and weighting the ACS data. Here, the results are much clearer. **Figure 9** indicates that over decade 2011-2021, educational attainment as measured by population share with at least a bachelor's degree increased within the county's CRAs. **Figure 10** shows that, inflation adjusted, average median household income of CRA tracts generally increased as well. Overall, from 2011-2021, CRA average educational attainment moved closer to the county average, while CRA median-household income growth greatly exceeded the county's overall growth. For comparison, in 2021, 41.8% of the county's population had a bachelor's degree and median-household income was $65,988. [The corresponding 2010 Franklin County values were 34.9% with at least a Bachelors Degree and $59,553 median household income (2021dollars).][11]

Figure 9. Bachelor's Degree Population Share Across Franklin County CRAs, 2011-2021



Sources: U.S. Census Bureau ACS, Franklin County Auditor

Figure 10. Average Median Household Income for Franklin County CRAs, 2011-2021



Sources: U.S. Census Bureau ACS, Franklin County Auditor

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[11] The 2021 Columbus share with a Bachelors degree or higher was 38.4% vs. 31.6% in 2010, while the Columbus median-household incomes were $51,839 (2021dollars) in 2010 and $58,202 in 2021.

Trends in educational attainment and especially in income within the county's CRAs are consistent with growing gentrification. However, as discussed, our results indicate that the gentrification of CRA neighborhoods—particularly later in the decade—is occurring more along class lines than racial ones. Notably, this data is more consistent with the pandemic relocation hypothesis. That is, after 2019, both the median-household income and educational attainment of CRA zones decline, likely as more educated and affluent workers were able to afford to relocate and potentially keep remote jobs. In sum, policymakers should note that CRA zones generally have strong indicators of gentrification.

While at face value more educated and affluent citizens living in neighborhoods is not a bad thing, but policymakers should consider what happens to the residents that these newcomers displace. In the future, as the literature suggests, more targeted incentive policies could spur investment in truly blighted areas and should be implemented with protections for low-income residents. This is especially true for Columbus if the city intends to meet its goal of promoting mixed-income housing.

Conclusions

This study is a detailed follow-up to the authors' 2021 study (Partridge and Messenger, 2021). The prior study concluded that CRAs positively contribute to rising home prices. In this study, several additional conclusions were drawn.

First, we find that the positive contribution to a home's value created by CRA abatements is only temporary. Once an abatement expires, homes lose a considerable amount of value in the subsequent four years due to the lost tax savings. Again, we are not saying that homes with expired abatements have lower *sticker prices* once abatements expire – general price appreciation can more than offset the lost value of an expired abatement. However, homes with expired abatements sell for less than they *would have otherwise sold for* if the abatement was active—i.e., the price appreciation we identified for CRAs only lasts until it expires. Policymakers should weigh whether the benefits that CRAs aim to achieve are worth the costs that include lost tax revenue for schools and other services, higher property taxes for non-abated properties, higher local income taxes, and shifting demand away from non-abated properties that lowers their prices.

Second, residential properties with active property tax abatements are less likely to be sold as one gets closer to the abatement's expiration. Conversely, properties are more likely to sell in the early years of an abatement (e.g., this is when renovators or home flippers are more likely to earn larger profits). This is consistent with our 2021 findings that buyers typically pay for the value of the property tax benefit upfront in a higher sales price. It makes sense for owners to delay selling as the remaining years on the abatement declines since each year of the abatement that the owner "uses" before selling diminishes how valuable the abatement is to prospective buyers. We find that properties are also less likely to sell immediately after an abatement expires (within 1 year). This could be because some owners are surprised to find that their property taxes have significantly increased after the abatement's end, and to do not consider selling until they receive this bill. Selling a home also takes time (both to stage their home and acquire a new one). Our results indicate that the reduced probability of selling vanishes the longer it is from the abatement's expiration date.

For C&I properties, we likewise find that businesses are unlikely to sell their property while it is actively abated. However, an almost exact offsetting effect is businesses are more likely to sell their property in an abatement's final year. This suggests that businesses are more savvy than residential homeowners and are acutely aware of expiring abatements. Many wish to relocate before property tax bills increase.

Third, the overall number of rentals in Columbus CRAs with abatements has generally increased. Yet, our statistical model shows that this does not appear to be related to tax abatements. Rather other factors are at work in driving this trend.

Fourth, CRA zones are on average gentrifying. Gentrification, to some degree, is occurring along racial dimensions, as well as economic ones, with the racial effect most pronounced in Columbus CRAs where white residents have in-migrated faster than non-white residents. The black resident share within CRAs rapidly declined from 2011 to *ca.* 2015 and has slightly fallen thereafter. The declining black share is consistent with the CRA policy displacing black residents. At the same time, the population share with at least a bachelor's degree and (especially) average CRA median-household income has sharply increased for the last decade (until a small dip in 2020-2021). These signals strongly point to ongoing gentrification.

Fifth, Franklin County CRAs experienced falling segregation levels until 2020 before the trend reversed itself. This reversal is mainly a Columbus CRA phenomenon as suburban CRAs continue experiencing growing diversity. The cause is mainly that the city's CRAs are experiencing a slightly rise white population share even as the city's overall share is sharply declining. In 2010, the city's CRAs had a white share just below the city average, whereas today, their white share exceeds the overall city average. Correspondingly, the city's CRA-Black share is falling even as it is slightly rising across the city (the city's CRA black population share is below the city average). Thus, these demographic trends crossed a tipping point in 2020 so that Columbus CRAs were more segregated than the city average. Unlike an apparent city trend of falling white population shares, this pattern has not extended to the city's CRAs.

These trends should give policymakers some pause about the concerns raised in the economic research literature regarding certain place-based development policies. Namely, policies such as CRAs may be well intended, but they come with unintended consequences including displacing low-income or minority residents, or unintentionally shifting investment to already-more-affluent parts of CRA zones at the expense of other areas in the county. Or, as previously mentioned, CRAs appear to be the key driver behind Franklin County's property tax rates rising about twice as fast as the state average, while local-income taxes as a share of income are also well above the state average (this even as the county has considerably higher property values and incomes than Ohio).

There are ways to reduce these unintended consequences. First, policymakers could drastically scale back their use of CRAs given their high opportunity costs. However, if they continue to use CRAs, minimally they could draw smaller future CRA zones to include much higher proportions of blighted property than the state requirement of 20%. This would help ensure that the incentivized investment occurs in the most needed parts of the county. Second, state and local policymakers could change current CRA practice to only offer incentives to original residents to target benefits on intended beneficiaries, not developers or flippers. Third, state policymakers could revise CRA program law to incentivize municipalities to scale the CRA tax benefits based on tract economic or demographic data or when developers create sufficient affordable housing. Investors then would receive larger benefits if blighted parts of CRAs are revitalized or if the underlying demographic and economic profiles are preserved, which mitigates the displacement of low-income residents. Policymakers should also consider the location of high-value amenities when drawing CRA boundaries. By including amenities (which already raise home prices) within CRAs, policymakers may promote inequitable access to parks, transportation, or retail establishments like grocery stores, bars, and restaurants.

References:

Brazil, N., & Portier, A. (2022). Investing in gentrification: The eligibility of gentrifying neighborhoods for federal place-based economic investment in US cities. *Urban Affairs Review*, *58*(5), 1234-1276.

Case Western. (n.d.) https://case.edu/socialwork/nimc/about-us/what-is-mixed-income

Couture, V., & Handbury, J. (2020). Urban revival in America. *Journal of Urban Economics*, *119*, 103267.

Eavis, P., Creswell, J., & Rennison, J. (2022, November 17). *Why office buildings are still in trouble*. The New York Times. https://www.nytimes.com/2022/11/17/business/office-buildings-real-estate-vacancy.html

Ferenchik, M., & King, D. (2022). Redlining practices decades ago still influence life in Columbus neighborhoods. *Columbus Dispatch.* https://www.dispatch.com/story/news/local/2022/10/09/columbus-redlining-practices-still-affect-neighborhoods-families-real-estate/69519817007/

Florida, R. (2003). Cities and the creative class. *City & community*, *2*(1), 3-19.

Fry, Richard, and Cohn, D. (2021). *In 2020, fewer Americans moved, exodus from cities slowed*. Pew Research Center. https://www.pewresearch.org/short-reads/2021/12/16/in-2020-fewer-americans-moved-exodus-from-cities-slowed/#:~:text=Overall%2C%204.9%20million%20Americans%20left,3.1%20million%20for%202016%2D2018.

Glaeser, E. L., Kolko, J., & Saiz, A. (2001). Consumer city. *Journal of economic geography*, *1*(1), 27-50.

Glaeser, E. L., & Gottlieb, J. D. (2009). The wealth of cities: Agglomeration economies and spatial equilibrium in the United States. *Journal of economic literature*, *47*(4), 983-1028.

Grube-Cavers, A., & Patterson, Z. (2015). Urban rapid rail transit and gentrification in Canadian urban centres: A survival analysis approach. *Urban Studies*, *52*(1), 178-194.

Hawkins, J., Ahmed, U., Roorda, M., & Habib, K. N. (2022). Measuring the process of urban gentrification: A composite measure of the gentrification process in Toronto. *Cities*, *126*, 103708.

Immergluck, D., & Balan, T. (2018). Sustainable for whom? Green urban development, environmental gentrification, and the Atlanta Beltline. *Urban geography*, *39*(4), 546-562.

Kirkland, E. (2008). What's Race Got to Do With it? Looking for the Racial Dimensions of Gentrification. *Western Journal of Black Studies*, *32*(2).

Layser, M. D. (2021). Subsidizing Gentrification: A Spatial Analysis of Place-Based Tax Incentives. *UC Irvine L. Rev.*, *12*, 163.

Lee, Y. Y. (2010). Gentrification and crime: Identification using the 1994 Northridge earthquake in Los Angeles. *Journal of Urban Affairs*, *32*(5), 549-577.

Moos, M. (2016). From gentrification to youthification? The increasing importance of young age in delineating high-density living. *Urban studies*, *53*(14), 2903-2920.

New Ohio Law Changes Community Reinvestment area exemptions for commercial and industrial projects. Vorys. (n.d.). https://www.vorys.com/publication-new-ohio-law-changes-community-reinvestment-area-exemptions-for-commercial-and-industrial-projects

Partridge, M. D., & Rickman, D. S. (2005). High-poverty nonmetropolitan counties in America: Can economic development help?. *International Regional Science Review*, *28*(4), 415-440.

Partridge, Mark D., and Messenger, N. (2021). Supplemental Economic Study for the Tax Incentive Review Council: An Analysis of the Impact and Costs of Tax Abatements in Franklin County. *Franklin County Auditor*. September 29.

Partridge, Mark D., and Messenger, N. (2022). Evaluating the Impact of Commercial Tax Incentives in Franklin County. *Franklin County Auditor*. September.

Rucks-Ahidiana, Z. (2021). Racial composition and trajectories of gentrification in the United States. *Urban Studies*, *58*(13), 2721-2741.

Seitles, M. (2018). The perpetuation of residential racial segregation in America: Historical discrimination, modern forms of exclusion, and inclusionary remedies. *Florida State University Journal of Land Use and Environmental Law*, *14*(1), 3.

Weiker, J. (2023, March 16). *Downtown Columbus property taxes spike for some residents as abatements fade*. The Columbus Dispatch. https://www.dispatch.com/story/business/real-estate/2023/03/16/taxes-jump-after-abatements-fall-off-pricey-downtown-condos/69954548007/#:~:text=Downtown%20Columbus%20property%20taxes%20spike%20for%20some%20residents%20as%20abatements%20fade&text=Property%20tax%20abatements%20are%20falling,homeowners%2C%20the%20change%20is%20dramatic.

Zapatka, K., & Beck, B. (2021). Does demand lead supply? Gentrifiers and developers in the sequence of gentrification, New York City 2009–2016. *Urban Studies*, *58*(11), 2348-2368.

Appendix A: Propensity-to-Move Model & Results

To analyze how an expired abatement impacts the likelihood of a given parcel to sell in a specific year, we construct a propensity to sell model. This model uses Franklin County Auditor's Office historical parcel data as well as abatement data and property transaction data from their web reporter. We modify transaction data to exclude $0 deed transfers and to only include valid property sales. For neighborhood demographic data, we use Census tract-level data from the American Community Survey (ACS). This section includes the raw results for Table 1 and Table 2ff

The Model:

$$Sale_{int} = A_{int} + (E_{int-1} + E_{int-2} + E_{int-3} + E_{int-4}) + Y_{int} + C_{int} + \boldsymbol{H_{it}} + \boldsymbol{D_{nt}} + \alpha_n + \gamma_t$$

Where $Sale_{int}$ is a binary variable indicating whether parcel i in Census tract n sold in year t. A_{int} is a binary variable indicating whether parcel i in Census tract n was actively abated in year t. The collection of indicator variables E_{int-1} through E_{int-4} represent whether the house had an abatement which had expired within one year prior to the sale we observe up until 4 years removed from expiration. C_{int} indicates if an abatement expires in the same year as the sale of the parcel and Y_{int} indicates how many years are remaining on an active abatement.[12] while $\boldsymbol{H_{int}}$ *and* $\boldsymbol{D_{it}}$ are vectors of housing characteristics of parcel i in year t and demographic characteristics of Census-tract n in year t. Housing characteristics include the number of bedrooms of the parcel, the square footage of the parcel, the age of the property (in years) at the time of sale, and the number of bathrooms of the parcel. Census tract characteristics include the percent of the tract population that is non-white, the percentage of the tract that is under age 18 (children), the percentage of the tract that is over age 65 (elderly), the total population of the tract, and the percentage of the tract population with a bachelor's degree or higher. The Census-tract fixed effect α_n controls for time-invariant geographic effects (such as school district or proximity to static establishments such as parks or entertainment districts) and the time fixed effect γ_t controls any general time trend present in the data, such as general real estate time trends or interest rate changes between years. The coefficients from the model should be interpreted to represent the marginal change in probability (as a percentage) that a home is sold that is related to each variable. The full output of the regression model follows.

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[12] Y_{int} = 0 for properties without active abatements.

Single-Family Residential Raw Results

	(1)
VARIABLES	sale_year
abated	-0.0679***
	(0.0252)
one_year_end	-0.0744**
	(0.0298)
two_year_end	-0.00666
	(0.0449)
three_year_end	0.0933
	(0.0767)
four_year_end	0.0838
	(0.0750)
Years remaining	0.00897***
	(0.00320)
expire_this_year	0.00221
	(0.0277)
in_CRA	0.00678
	(0.00624)
bedrms	-0.00361***
	(0.00101)
baths	0.00594***
	(0.00125)
area_a	-7.27e-06***
	(1.40e-06)
home_age	-1.24e-05
	(6.40e-05)
under18	-0.0837*
	(0.0500)
over65	0.0173
	(0.0359)
non_white	0.00522
	(0.0246)
higher_ed	-0.00938
	(0.0320)
estimatetotal_pop	-4.99e-06
	(3.16e-06)
2.tract	-0.0298***
	(0.00216)
3.tract	-0.0136***
	(0.00261)
4.tract	-0.0197***
	(0.00382)
5.tract	-0.0332**
	(0.0143)

6.tract	-0.00156
	(0.0134)
7.tract	-0.0215
	(0.0174)
8.tract	-0.0535***
	(0.00404)
9.tract	-0.0216***
	(0.00177)
10.tract	-0.00249
	(0.00609)
11.tract	-0.0139*
	(0.00784)
12.tract	0.0149
	(0.0194)
13.tract	0.0298
	(0.0255)
14.tract	-0.0481*
	(0.0265)
15.tract	-0.0210
	(0.0161)
16.tract	-0.0535***
	(0.0185)
17.tract	-0.00430
	(0.0258)
18.tract	-0.0660**
	(0.0275)
19.tract	-0.00756
	(0.0185)
20.tract	-0.0265
	(0.0179)
21.tract	-0.0655***
	(0.0166)
22.tract	-0.0638***
	(0.0204)
23.tract	-0.0196
	(0.0184)
24.tract	-0.100***
	(0.0212)
25.tract	-0.0469
	(0.0300)
26.tract	-0.0976***
	(0.0297)
27.tract	-0.000254
	(0.0201)
28.tract	-0.0333**
	(0.0154)

29.tract	-0.0679***
	(0.0156)
30.tract	-0.0107*
	(0.00640)
31.tract	-0.0415***
	(0.00945)
32.tract	-0.0307***
	(0.00821)
33.tract	0.00898
	(0.00600)
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	(0.0116)
35.tract	0.0429***
	(0.0146)
36.tract	-0.0105
	(0.0274)
37.tract	-0.0373
	(0.0259)
38.tract	0.00448
	(0.0219)
39.tract	-0.0552**
	(0.0230)
40.tract	-0.0340
	(0.0252)
41.tract	-0.0215***
	(0.00726)
42.tract	-0.0108
	(0.0252)
43.tract	-0.0217*
	(0.0125)
44.tract	-0.0556**
	(0.0244)
45.tract	-0.0225**
	(0.00940)
46.tract	0.0349
	(0.0244)
47.tract	0.0697**
	(0.0292)
48.tract	-0.0129
	(0.0100)
49.tract	-0.0442**
	(0.0204)
50.tract	0.00338
	(0.0146)
51.tract	0.0191*
	(0.0100)

52.tract	-0.119***
	(0.0219)
53.tract	-0.0662***
	(0.00707)
54.tract	-0.0156
	(0.0230)
55.tract	0.00348
	(0.0162)
56.tract	0.0122
	(0.00774)
57.tract	-0.0282
	(0.0193)
58.tract	-0.000405
	(0.0209)
59.tract	-0.00741
	(0.0137)
60.tract	-0.0467**
	(0.0180)
61.tract	-0.0221
	(0.0181)
62.tract	-0.0462***
	(0.0175)
63.tract	0.00428
	(0.0210)
64.tract	-0.0921***
	(0.0234)
65.tract	0.0266***
	(0.00784)
66.tract	0.0425**
	(0.0190)
67.tract	0.0465
	(0.0290)
68.tract	-0.0220
	(0.0280)
69.tract	0.0860***
	(0.0261)
70.tract	0.0445*
	(0.0247)
71.tract	0.0886***
	(0.0191)
72.tract	0.0168**
	(0.00763)
73.tract	0.0293***
	(0.00718)
74.tract	0.0220**
	(0.0102)

75.tract	0.00656
	(0.0259)
76.tract	-0.0336*
	(0.0187)
77.tract	-0.0370**
	(0.0187)
78.tract	-0.00916
	(0.00760)
79.tract	-0.0186*
	(0.00990)
80.tract	-0.0390***
	(0.0105)
81.tract	-0.0111
	(0.0139)
82.tract	0.0210***
	(0.00596)
83.tract	0.0225
	(0.0143)
84.tract	-0.0109
	(0.00852)
85.tract	-0.0269***
	(0.00676)
86.tract	-0.0185***
	(0.00346)
87.tract	-0.0222***
	(0.00448)
88.tract	-0.0280***
	(0.00353)
89.tract	0.000600
	(0.00399)
90.tract	-0.0195***
	(0.00455)
91.tract	-0.0344***
	(0.00521)
92.tract	-0.0397***
	(0.00892)
93.tract	-0.0229**
	(0.0107)
94.tract	-0.00676
	(0.0123)
95.tract	-0.0201**
	(0.00914)
96.tract	-0.0186***
	(0.00715)
97.tract	-0.0233***
	(0.00802)

98.tract	-0.00795
	(0.00582)
99.tract	-0.0208***
	(0.00417)
100.tract	-0.0161**
	(0.00751)
101.tract	-0.0280***
	(0.00882)
102.tract	-0.0365***
	(0.00745)
103.tract	-0.0284***
	(0.00932)
104.tract	-0.0135
	(0.0122)
105.tract	-0.0166**
	(0.00684)
106.tract	-0.0174***
	(0.00284)
107.tract	-0.0192***
	(0.00459)
108.tract	-0.0269***
	(0.00667)
109.tract	-0.0206***
	(0.00507)
110.tract	-0.0403***
	(0.00564)
111.tract	-0.0304***
	(0.00296)
112.tract	-0.0247***
	(0.00581)
113.tract	-0.0333***
	(0.00466)
114.tract	-0.0237***
	(0.00862)
115.tract	-0.0403***
	(0.00491)
116.tract	-0.0451***
	(0.00720)
117.tract	-0.0217
	(0.0138)
118.tract	-0.0219
	(0.0137)
119.tract	-0.0352*
	(0.0182)
120.tract	-0.00898
	(0.0214)

121.tract	-0.0152
	(0.0207)
122.tract	-0.00402
	(0.0237)
123.tract	-0.0179
	(0.0166)
124.tract	-0.0277**
	(0.0109)
125.tract	-0.0561**
	(0.0228)
126.tract	-0.0420***
	(0.00391)
127.tract	-0.0254***
	(0.00339)
128.tract	-0.0362*
	(0.0190)
129.tract	-0.0343***
	(0.0132)
130.tract	-0.0156
	(0.0129)
131.tract	-0.0218***
	(0.00642)
132.tract	-0.00941
	(0.0115)
133.tract	-0.00435
	(0.0109)
134.tract	-0.0352***
	(0.00964)
135.tract	-0.00592
	(0.0115)
136.tract	-0.00598
	(0.0111)
137.tract	-0.0173***
	(0.00528)
138.tract	0.00961
	(0.0114)
139.tract	0.0154
	(0.0177)
140.tract	-0.00396
	(0.0181)
141.tract	-0.0211
	(0.0143)
142.tract	-0.0135
	(0.0182)
143.tract	0.00408
	(0.0111)

144.tract	-0.00896
	(0.0103)
145.tract	-0.0298***
	(0.00818)
146.tract	-0.00780
	(0.0149)
147.tract	-0.0275*
	(0.0149)
148.tract	0.0292***
	(0.0101)
149.tract	0.00838
	(0.0169)
150.tract	0.0296***
	(0.00633)
151.tract	0.0166***
	(0.00539)
152.tract	-0.00137
	(0.00871)
153.tract	-0.0494***
	(0.00820)
154.tract	0.00681
	(0.0105)
155.tract	0.0116
	(0.0163)
156.tract	-0.0101
	(0.0110)
157.tract	0.0234**
	(0.0114)
158.tract	-0.0256***
	(0.00700)
159.tract	-0.0189***
	(0.00463)
160.tract	-0.00187
	(0.00930)
161.tract	0.00613
	(0.0115)
162.tract	0.0443**
	(0.0188)
163.tract	-0.0161
	(0.0153)
164.tract	-0.0247**
	(0.0116)
165.tract	-0.0190***
	(0.00589)
166.tract	-0.0164
	(0.0103)

167.tract	-0.0174**
	(0.00729)
168.tract	-0.0305***
	(0.0109)
169.tract	-0.0787***
	(0.0300)
170.tract	-0.0711***
	(0.0274)
171.tract	-0.00937
	(0.0263)
172.tract	-0.0471**
	(0.0224)
173.tract	-0.0323
	(0.0263)
174.tract	-0.0471*
	(0.0256)
175.tract	-0.0465*
	(0.0254)
176.tract	-0.0353*
	(0.0207)
177.tract	-0.0299
	(0.0242)
178.tract	-0.00620
	(0.0225)
179.tract	0.0110
	(0.0183)
180.tract	0.00667
	(0.0239)
181.tract	-0.0234
	(0.0164)
182.tract	-0.0203
	(0.0127)
183.tract	-0.0575***
	(0.0116)
184.tract	-0.0198***
	(0.00317)
185.tract	-0.0343***
	(0.0103)
186.tract	-0.0182
	(0.0158)
187.tract	-0.0211*
	(0.0114)
188.tract	-0.0495***
	(0.00839)
189.tract	-0.0225***
	(0.00522)

190.tract	-0.0163
	(0.0101)
191.tract	-0.00951
	(0.00898)
192.tract	-0.0200**
	(0.00891)
193.tract	-0.0203***
	(0.00457)
194.tract	-0.0387***
	(0.0118)
195.tract	0.0172*
	(0.00959)
196.tract	-0.0737***
	(0.00691)
197.tract	-0.0140**
	(0.00647)
198.tract	-0.00818
	(0.00925)
199.tract	-0.0110
	(0.00977)
200.tract	0.0258*
	(0.0131)
201.tract	-0.0251***
	(0.00659)
202.tract	-0.0111
	(0.0110)
203.tract	-0.00399
	(0.0141)
204.tract	-0.00889
	(0.0169)
205.tract	0.00215
	(0.0164)
206.tract	-0.0454***
	(0.0159)
207.tract	-0.00339
	(0.0157)
208.tract	-0.0240*
	(0.0145)
209.tract	-0.00152
	(0.00746)
210.tract	-0.00735
	(0.0158)
211.tract	-0.00730
	(0.0150)
212.tract	0.0220*
	(0.0120)

213.tract	0.0295**
	(0.0121)
214.tract	-0.0162
	(0.0120)
215.tract	-0.000194
	(0.00901)
216.tract	-0.0108
	(0.0173)
217.tract	-0.00130
	(0.0149)
218.tract	-0.0190*
	(0.0113)
219.tract	-0.0222
	(0.0175)
220.tract	0.00516
	(0.0194)
221.tract	-0.0254
	(0.0157)
222.tract	-0.0311*
	(0.0161)
223.tract	-0.0617***
	(0.0178)
224.tract	-0.0257
	(0.0175)
225.tract	0.00677
	(0.0179)
226.tract	-0.00690
	(0.0154)
227.tract	0.00962
	(0.0163)
228.tract	0.0213
	(0.0152)
229.tract	-0.00511
	(0.0106)
230.tract	-0.0259***
	(0.00321)
231.tract	-0.0151**
	(0.00765)
232.tract	-0.0292
	(0.0255)
233.tract	-0.0259
	(0.0231)
234.tract	-0.112***
	(0.0249)
235.tract	-0.0611***
	(0.0183)

236.tract	-0.0303
	(0.0226)
237.tract	-0.0314
	(0.0259)
238.tract	-0.0124
	(0.0156)
239.tract	-0.0264
	(0.0187)
240.tract	-0.0230
	(0.0194)
241.tract	-0.0191*
	(0.0106)
242.tract	-0.0293***
	(0.00656)
243.tract	-0.0216***
	(0.00692)
244.tract	-0.0516***
	(0.0193)
245.tract	0.0111
	(0.0185)
246.tract	-0.0316*
	(0.0176)
247.tract	-0.0388*
	(0.0206)
248.tract	-0.0974***
	(0.0261)
249.tract	-0.0398*
	(0.0208)
250.tract	-0.0228
	(0.0222)
251.tract	-0.0390*
	(0.0221)
252.tract	-0.0457**
	(0.0216)
253.tract	-0.0520**
	(0.0263)
254.tract	0.00534
	(0.0226)
255.tract	-0.0257
	(0.0216)
256.tract	-0.0347
	(0.0263)
257.tract	-0.0369
	(0.0260)
258.tract	-0.0520**
	(0.0213)

259.tract	-0.0500**
	(0.0200)
260.tract	-0.0291*
	(0.0148)
261.tract	-0.0286
	(0.0215)
262.tract	-0.0203
	(0.0236)
263.tract	0.00688
	(0.0146)
264.tract	-0.0273
	(0.0199)
265.tract	-0.00496
	(0.0181)
266.tract	-0.0545**
	(0.0264)
267.tract	-0.0483***
	(0.0159)
268.tract	-0.0252**
	(0.0117)
269.tract	-0.0194
	(0.0250)
270.tract	-0.0177
	(0.0189)
271.tract	-0.0195
	(0.0165)
272.tract	0.00297
	(0.0176)
273.tract	-0.0178*
	(0.0101)
274.tract	-0.00667
	(0.00695)
275.tract	-0.0183
	(0.0176)
276.tract	-0.00876
	(0.0182)
277.tract	-0.0169
	(0.0141)
278.tract	-0.0123
	(0.0150)
279.tract	-0.0106
	(0.0124)
280.tract	-0.0373**
	(0.0161)
281.tract	-0.0187
	(0.0159)

282.tract	0.0327**
	(0.0155)
283.tract	-0.0171
	(0.0157)
284.tract	-0.0106
	(0.0111)
285.tract	0.0136
	(0.0133)
286.tract	-0.0112
	(0.00896)
287.tract	-0.0163
	(0.0104)
288.tract	-0.00528
	(0.0143)
289.tract	-0.102***
	(0.0151)
290.tract	-0.0785***
	(0.0106)
291.tract	-0.0447***
	(0.0102)
292.tract	-0.00922
	(0.0134)
293.tract	0.00699
	(0.00779)
294.tract	-0.0783***
	(0.0171)
295.tract	0.0185
	(0.0179)
296.tract	0.0154
	(0.0169)
297.tract	-0.00335
	(0.0137)
298.tract	0.0166
	(0.0196)
299.tract	-0.0266**
	(0.0109)
300.tract	-0.0177**
	(0.00786)
301.tract	-0.0193***
	(0.00704)
302.tract	-0.0333***
	(0.00587)
303.tract	-0.0117
	(0.00768)
304.tract	-0.0127
	(0.00987)

305.tract	-0.0341***
	(0.0109)
306.tract	-0.0182*
	(0.0104)
2019.year	-0.0102***
	(0.00232)
2020.year	-0.0333***
	(0.00218)
2021.year	-0.0259***
	(0.00225)
recent_end	
Constant	0.154***
	(0.0226)
Observations	306,862
R-squared	0.008

Robust standard errors in parentheses, clustered at Census tract level

*** $p<0.01$, ** $p<0.05$, * $p<0.1$

For commercial and industrial properties, estimate the same model on a dataset that includes only such parcels and include a binary variable indicating whether or not the parcel is industrial in order to delineate the two. The raw output of this model is shown below:

Commercial and Industrial Parcel Raw Results

VARIABLES	(1) sale_year
abated	-0.0926***
	(0.0237)
one_year_end	-0.0386***
	(0.00497)
two_year_end	0.0182
	(0.0210)
three_year_end	-0.00689
	(0.0171)
four_year_end	-0.00253
	(0.0226)
remaining	0.0156***
	(0.00387)
expire_this_year	0.0929***
	(0.0323)
under18	0.0184
	(0.124)

over65	-0.163**
	(0.0747)
non_white	0.0371
	(0.0383)
higher_ed	-0.0189
	(0.0548)
2.tract	0.0180***
	(0.00543)
3.tract	-0.00255
	(0.00301)
4.tract	0.0145**
	(0.00576)
5.tract	0.0147
	(0.0219)
6.tract	0.00131
	(0.0194)
7.tract	0.0448*
	(0.0258)
8.tract	0.00545
	(0.00833)
9.tract	0.0305***
	(0.00294)
10.tract	-0.0185**
	(0.00827)
11.tract	0.0201
	(0.0140)
12.tract	-0.0149
	(0.0255)
13.tract	0.0347
	(0.0299)
14.tract	-0.000968
	(0.0363)
15.tract	0.0338
	(0.0221)
16.tract	0.0558**
	(0.0233)
17.tract	0.0313
	(0.0329)
18.tract	0.00868
	(0.0345)
19.tract	-0.0306
	(0.0251)
20.tract	-0.0210
	(0.0333)
21.tract	0.0108
	(0.0400)

22.tract	0.0253
	(0.0304)
23.tract	-0.0309
	(0.0341)
24.tract	-0.0190
	(0.0318)
25.tract	-0.0236
	(0.0380)
26.tract	-0.0316
	(0.0366)
27.tract	0.0526
	(0.0358)
28.tract	-0.0118
	(0.0217)
29.tract	-0.0283
	(0.0228)
30.tract	-0.0321
	(0.0283)
31.tract	0.0134
	(0.0110)
32.tract	-0.00862
	(0.0134)
33.tract	0.00253
	(0.0115)
34.tract	0.0124
	(0.0104)
35.tract	-0.000928
	(0.0168)
36.tract	-0.0146
	(0.0187)
37.tract	0.00329
	(0.0339)
38.tract	-0.00554
	(0.0324)
39.tract	-0.00881
	(0.0285)
40.tract	0.0472
	(0.0320)
41.tract	-0.0237
	(0.0344)
42.tract	0.0798**
	(0.0335)
43.tract	0.00454
	(0.00909)
44.tract	0.0394
	(0.0331)

45.tract	0.000575
	(0.0183)
46.tract	0.0146
	(0.0309)
47.tract	0.0193
	(0.0143)
48.tract	-0.0144
	(0.0287)
49.tract	-0.0125
	(0.0366)
50.tract	0.0124
	(0.0197)
51.tract	-0.0190
	(0.0162)
52.tract	0.00151
	(0.0250)
53.tract	0.00486
	(0.0200)
54.tract	0.00384
	(0.0117)
55.tract	-0.0184
	(0.0195)
56.tract	-0.0182
	(0.0193)
57.tract	-0.0154
	(0.0216)
58.tract	-0.00150
	(0.0128)
59.tract	-0.0217
	(0.0273)
60.tract	0.0450**
	(0.0223)
61.tract	0.00974
	(0.0120)
62.tract	0.00401
	(0.0260)
63.tract	0.0403
	(0.0269)
64.tract	0.0334*
	(0.0194)
65.tract	0.0841***
	(0.0240)
66.tract	0.0523**
	(0.0246)
67.tract	0.0164
	(0.0213)

68.tract	0.0205
	(0.0268)
69.tract	-0.00130
	(0.0310)
70.tract	0.0174
	(0.0137)
71.tract	0.0155
	(0.0251)
72.tract	-0.00924
	(0.0356)
73.tract	0.0185
	(0.0356)
74.tract	0.00552
	(0.0349)
75.tract	0.0466*
	(0.0274)
76.tract	0.0327
	(0.0220)
77.tract	0.0429***
	(0.0113)
78.tract	0.0305***
	(0.0101)
79.tract	0.0160
	(0.0148)
80.tract	0.00379
	(0.0307)
81.tract	0.0460*
	(0.0262)
82.tract	0.0443*
	(0.0231)
83.tract	-0.00889
	(0.0107)
84.tract	0.0368***
	(0.00874)
85.tract	0.0385***
	(0.00961)
86.tract	0.0157
	(0.0211)
87.tract	-0.00972
	(0.00897)
88.tract	0.00643
	(0.0120)
89.tract	0.0303***
	(0.0110)
90.tract	-0.0157
	(0.0109)

91.tract	-0.0151**
	(0.00676)
92.tract	0.0118
	(0.00844)
93.tract	-0.00309
	(0.00790)
94.tract	0.0137***
	(0.00302)
95.tract	0.00536
	(0.00646)
96.tract	0.0114
	(0.00691)
97.tract	-0.0129
	(0.0174)
98.tract	0.00150
	(0.0157)
99.tract	0.0101
	(0.0143)
100.tract	0.00799
	(0.00945)
101.tract	0.0177
	(0.0110)
102.tract	0.0303***
	(0.00632)
103.tract	0.0375***
	(0.00621)
104.tract	-0.0139**
	(0.00647)
105.tract	0.00562
	(0.00752)
106.tract	-0.0229**
	(0.0113)
107.tract	0.0483***
	(0.0132)
108.tract	0.0115
	(0.0137)
109.tract	0.0446***
	(0.0138)
110.tract	0.0692***
	(0.00890)
111.tract	-0.0183***
	(0.000643)
112.tract	0.0258***
	(0.00488)
113.tract	0.0203**
	(0.00988)

114.tract	0.0139**
	(0.00615)
115.tract	-0.00208
	(0.00566)
116.tract	0.00624
	(0.00518)
117.tract	0.0136
	(0.00858)
118.tract	0.00385
	(0.00384)
119.tract	0.0128
	(0.0147)
120.tract	-0.00625
	(0.00467)
121.tract	0.0491***
	(0.00424)
122.tract	0.00768
	(0.0205)
123.tract	0.0430**
	(0.0189)
124.tract	-0.00829
	(0.0273)
125.tract	-0.0137
	(0.0288)
126.tract	0.0208
	(0.0268)
127.tract	-0.0233
	(0.0328)
128.tract	-0.00353
	(0.0232)
129.tract	0.0219
	(0.0166)
130.tract	0.0484
	(0.0321)
131.tract	0.0305***
	(0.00221)
132.tract	0.0380***
	(0.00379)
133.tract	0.0404
	(0.0274)
134.tract	0.00391
	(0.0208)
135.tract	0.0169*
	(0.0101)
136.tract	0.0162**
	(0.00774)

137.tract	0.0197
	(0.0155)
138.tract	-0.0340**
	(0.0137)
139.tract	-0.0244*
	(0.0140)
140.tract	0.0799***
	(0.0119)
141.tract	0.0183
	(0.0190)
142.tract	0.0647***
	(0.00935)
143.tract	-0.0335*
	(0.0184)
144.tract	0.0366
	(0.0234)
145.tract	-0.00598
	(0.0238)
146.tract	0.0940***
	(0.0206)
147.tract	-0.0179
	(0.0247)
148.tract	0.00875
	(0.0159)
149.tract	0.0498***
	(0.00828)
150.tract	0.0148*
	(0.00834)
151.tract	-0.00865
	(0.0176)
152.tract	-0.0302
	(0.0206)
153.tract	0.0157
	(0.0130)
154.tract	0.0224**
	(0.0108)
155.tract	0.0396***
	(0.00826)
156.tract	0.00434
	(0.00593)
157.tract	0.0395***
	(0.0107)
158.tract	0.00895
	(0.0155)
159.tract	0.0503***
	(0.00826)

160.tract	-0.0142
	(0.0225)
161.tract	0.0189
	(0.0161)
162.tract	0.0163
	(0.0150)
163.tract	0.0274**
	(0.0125)
164.tract	-0.0255***
	(0.00797)
165.tract	-0.00673
	(0.0123)
166.tract	0.0250
	(0.0173)
167.tract	0.0253
	(0.0233)
168.tract	0.0164
	(0.0174)
169.tract	-0.00988
	(0.0172)
170.tract	0.0305***
	(0.00932)
171.tract	0.0184*
	(0.0106)
172.tract	0.0349***
	(0.00729)
173.tract	-0.00717
	(0.0140)
174.tract	-0.0241
	(0.0351)
175.tract	-0.00911
	(0.0362)
176.tract	-0.0292
	(0.0344)
177.tract	-0.00772
	(0.0298)
178.tract	-0.0203
	(0.0354)
179.tract	0.0107
	(0.0327)
180.tract	0.0101
	(0.0343)
181.tract	0.0373
	(0.0283)
182.tract	-0.0474
	(0.0332)

183.tract	0.0122
	(0.0345)
184.tract	0.0181
	(0.0266)
185.tract	-0.00507
	(0.0316)
186.tract	0.0271
	(0.0231)
187.tract	-0.0112
	(0.0173)
188.tract	0.0246
	(0.0172)
189.tract	0.00789
	(0.00503)
190.tract	-0.00199
	(0.0155)
191.tract	-0.0264
	(0.0243)
192.tract	-0.0127
	(0.0185)
193.tract	0.0333***
	(0.00556)
194.tract	-0.0229
	(0.0141)
195.tract	0.0709***
	(0.0135)
196.tract	0.0314***
	(0.0115)
197.tract	-0.0173
	(0.0179)
198.tract	-0.0320**
	(0.0139)
199.tract	-0.0217***
	(0.00622)
200.tract	0.0507***
	(0.0164)
201.tract	0.0147
	(0.0176)
202.tract	0.0470***
	(0.00807)
203.tract	-0.0141
	(0.0202)
204.tract	-0.00635
	(0.0216)
205.tract	0.0372
	(0.0252)

206.tract	0.0215
	(0.0197)
207.tract	-0.0199
	(0.0219)
208.tract	0.0204
	(0.0222)
209.tract	0.0384*
	(0.0214)
210.tract	-0.0102
	(0.00970)
211.tract	0.0247
	(0.0231)
212.tract	0.0373
	(0.0246)
213.tract	0.0382**
	(0.0184)
214.tract	-0.00479
	(0.0179)
215.tract	-0.0334*
	(0.0186)
216.tract	-0.0147
	(0.0123)
217.tract	0.0232
	(0.0251)
218.tract	0.0163
	(0.0311)
219.tract	-0.000789
	(0.0224)
220.tract	0.0268*
	(0.0142)
221.tract	0.00231
	(0.0252)
222.tract	0.00661
	(0.0278)
223.tract	0.115***
	(0.0240)
224.tract	0.0565**
	(0.0248)
225.tract	0.0151
	(0.0271)
226.tract	0.0194
	(0.0260)
227.tract	-0.0176
	(0.0223)
228.tract	0.0705***
	(0.0189)

229.tract	0.0140
	(0.0236)
230.tract	0.00819
	(0.0249)
231.tract	0.0263
	(0.0168)
232.tract	0.0548***
	(0.00460)
233.tract	0.000322
	(0.00566)
234.tract	-0.0463
	(0.0335)
235.tract	0.000290
	(0.0306)
236.tract	0.00248
	(0.0320)
237.tract	0.0287
	(0.0257)
238.tract	0.0192
	(0.0324)
239.tract	0.0235
	(0.0353)
240.tract	0.00705
	(0.0259)
241.tract	0.000876
	(0.0257)
242.tract	0.0156
	(0.0246)
243.tract	0.0415***
	(0.0112)
244.tract	-0.0138***
	(0.00267)
245.tract	0.0197***
	(0.00390)
246.tract	0.0156
	(0.0244)
247.tract	-0.0135
	(0.0253)
248.tract	-0.0255
	(0.0249)
249.tract	0.00977
	(0.0251)
250.tract	-0.00819
	(0.0352)
251.tract	-0.00243
	(0.0298)

252.tract	-0.0126
	(0.0282)
253.tract	0.0539*
	(0.0297)
254.tract	0.0695**
	(0.0296)
255.tract	-0.0441
	(0.0285)
256.tract	0.00382
	(0.0357)
257.tract	0.0223
	(0.0322)
258.tract	0.0726**
	(0.0322)
259.tract	-0.0578*
	(0.0312)
260.tract	-0.0398
	(0.0346)
261.tract	-0.00201
	(0.0242)
262.tract	-0.00191
	(0.0336)
263.tract	0.0400
	(0.0280)
264.tract	-0.00280
	(0.0272)
265.tract	0.0220
	(0.0218)
266.tract	-0.0458
	(0.0293)
267.tract	0.0217
	(0.0297)
268.tract	0.0125
	(0.0232)
269.tract	0.213***
	(0.0156)
270.tract	-0.0539*
	(0.0306)
271.tract	0.0636***
	(0.0190)
272.tract	-0.0249
	(0.0288)
273.tract	-0.00849
	(0.0260)
274.tract	0.0208
	(0.0355)

275.tract	0.0555**
	(0.0228)
276.tract	0.000922
	(0.0180)
277.tract	0.00268
	(0.0335)
278.tract	-0.0262
	(0.0289)
279.tract	-0.0345
	(0.0241)
280.tract	0.120***
	(0.0227)
281.tract	-0.00363
	(0.0164)
282.tract	0.0410***
	(0.0109)
283.tract	-0.0140
	(0.0248)
284.tract	0.0325
	(0.0243)
285.tract	0.0133
	(0.0200)
286.tract	-0.00121
	(0.0204)
287.tract	-0.00478
	(0.0162)
288.tract	0.0533**
	(0.0215)
289.tract	0.0474**
	(0.0215)
290.tract	0.0257
	(0.0220)
291.tract	0.0546***
	(0.0209)
292.tract	0.000539
	(0.0139)
293.tract	-0.0208
	(0.0148)
294.tract	-0.0225*
	(0.0125)
295.tract	-0.0234
	(0.0172)
296.tract	0.0162
	(0.0132)
297.tract	0.0629***
	(0.0162)

298.tract	0.0179
	(0.0248)
299.tract	0.0295
	(0.0259)
300.tract	-0.0160*
	(0.00862)
301.tract	-0.0195
	(0.0252)
302.tract	-0.00356
	(0.0281)
303.tract	-0.0428*
	(0.0243)
304.tract	-0.00361
	(0.0198)
305.tract	-0.0304
	(0.0293)
306.tract	0.0767***
	(0.0246)
307.tract	0.0454***
	(0.0123)
308.tract	0.0671***
	(0.00830)
309.tract	-0.0195*
	(0.0101)
310.tract	0.0256***
	(0.00784)
311.tract	-0.0130
	(0.00907)
312.tract	0.0102
	(0.0170)
313.tract	0.0302**
	(0.0143)
2019.year	0.00494
	(0.00497)
2020.year	-0.00485
	(0.00372)
2021.year	0.0141***
	(0.00460)
Constant	0.0412
	(0.0409)
Observations	100,780
R-squared	0.019

Robust standard errors in parentheses, clustered at Census tract level
*** p<0.01, ** p<0.05, * p<0.1

Appendix B: Sales Model

To assess whether the price of a residential home on the market declines relative to what it would have otherwise been after an abatement expires (i.e., whether an expiring abatement influences the value of a property) we construct a model that includes only observed sales of properties which at one time were actively abated, dating back to 2009.

A note about interpretation:

An important aspect of interpreting these results is awareness that year effects account for the overall rising price trend in the county's real estate market. It would be a mistake to interpret the results to mean that we observe a home to sell for $74,000 less than its previous sale four years after its abatement ends. That is because, when examining the coefficients on the year fixed effects, we see the year coefficients are statistically significant, positive, and larger in magnitude than the coefficient on the abatement dropoff variables. For example, a home sold in 2020—when consumer interest rates were at record lows and housing demand and prices were very high—experienced an estimated price premium of $159,000 (15.90 * $10,000). If the same hypothetical home lost its abatement in 2017 (four years prior) and was compared to a prior sale in 2016, where it's year coefficient would indicate a price premium of $77,630 (7.763 * $10,000), then the net effect (all else equal) are:

$$(\$159{,}000 - \$77{,}630) - \$74{,}630 = \$6{,}740$$

Difference in year fixed effects (market trends) between 2021 and 2014

4-year abatement expiration effect

Net positive effect on home price, all else equal

Therefore, it is possible that a home visibly goes up in price relative to its own previous sale, despite its abatement expiring. The key conclusion is that the home goes up in price by much less than it *otherwise would have* if the property tax abatement remained active. In other words, a competitive real estate market in Central Ohio over the last decade has likely preserved home values for abated homes once their abatements have expired. Policymakers should be wary of this fact, given the volatility and sudden declines that can occur in real estate markets during economic downturns.

The Model:

$$Price_{int} = E_{int-1} + E_{int-2} + E_{int-3} + E_{int-4} + Y_{int} + C_{int} + \boldsymbol{H_{it}} + \boldsymbol{D_{nt}} + L_{int} + (L_{int} * \boldsymbol{d_{nt}}) + \alpha_n + \gamma_t$$

This is similar to the model in Appendix A, with several important changes. First, we estimate the marginal effect of each variable on the price (in $10,000s) of the parcel, rather than the probability that a parcel is sold. The included variables are the same, with minor changes. We add a variable to $\boldsymbol{H_{it}}$ that includes whether the property is a registered rental and we further delineate some of the variables in $\boldsymbol{D_{nt}}$ to specifically break non-white population into black and other races as well as to break higher education into bachelor's degree holders and those with masters, doctorate, and professional degrees. We break the age groups of 20-34 out as well, to better capture the effect of young professional concentration on home prices within tracts. We add Census tract median income to the regression as well. We also add a variable indicating if the sale price of the home was below $300,000. This captures any differing effects of a bifurcated market (such as the market for sub $300,000 "starter homes", which may be more attractive to younger buyers with less capital). We interact this term with several Census tract demographic variables including race and age to capture the differing effects of these demographic variables within the sub $300,000 market, if any exist. The full regression results are shown below, corresponding to Table 3 in the main report.

Variables	Home price ($10,000)
Abatement expired 1 year ago	-3.517***
	(1.194)
Abatement expired 2 years ago	-0.657
	(4.058)
Abatement expired 3 years ago	-10.50***
	(3.241)
Abatement expired 4 years ago	-13.17**
	(4.940)
Number of bedrooms	0.348
	(1.299)
Number of bathrooms	6.749***
	(1.335)
Area (sq. feet)	0.0187***
	(0.00411)
Property age at sale	-0.0996
	(0.0992)
Rental registration = 1	-1.619
	(1.134)
Neighborhood share under 18	2.504
	(34.38)
Neighborhood share over 65	95.69*

	(54.46)
Non-black minority population share in neighborhood	0.244
	(0.170)
Black population share in neighborhood	0.550***
	(0.173)
Neighborhood share with bachelor’s degree	-0.179
	(0.166)
Neighborhood share with advanced (masters, doctorate, professional) degree	-0.0414
	(0.137)
Neighborhood share age 20-24	0.657***
	(0.188)
Neighborhood share age 25-29	0.322*
	(0.164)
Neighborhood share age 30-34	0.182
	(0.311)
Tract Fixed Effects	
4.tract	9.870
	(7.909)
5.tract	62.61***
	(15.04)
6.tract	60.62***
	(14.94)
8.tract	-18.47***
	(6.567)
9.tract	3.264
	(6.033)
10.tract	2.095
	(3.142)
11.tract	-1.201
	(4.702)
12.tract	35.14***
	(12.62)
13.tract	55.93***
	(15.90)
14.tract	11.94**
	(5.134)
15.tract	10.79
	(10.04)
16.tract	210.7***
	(8.629)
17.tract	32.55**
	(12.94)

18.tract	24.92**
	(10.58)
19.tract	18.12*
	(9.861)
20.tract	25.87**
	(11.97)
21.tract	17.91
	(11.76)
22.tract	-6.124
	(6.625)
23.tract	7.180
	(5.388)
24.tract	4.297
	(5.193)
25.tract	18.59*
	(9.995)
26.tract	45.59**
	(16.54)
27.tract	37.79**
	(14.88)
28.tract	4.678
	(6.142)
29.tract	14.43
	(12.85)
30.tract	19.01*
	(10.06)
38.tract	40.38***
	(13.45)
Year Fixed Effects	
Sale year = 2010	2.936***
	(1.002)
Sale year = 2011	0.435
	(1.337)
Sale year = 2012	5.451**
	(2.468)
Sale year = 2013	10.01**
	(3.797)
Sale year = 2014	9.544**
	(3.609)
Sale year = 2015	16.52***
	(4.617)
Sale year = 2016	13.03***
	(4.394)
Sale year = 2017	13.09**

	(5.318)
Sale year = 2018	17.20***
	(4.916)
Sale year = 2019	17.39**
	(6.334)
Sale year = 2020	21.03***
	(5.488)
Sale year = 2021	29.54***
	(6.634)
Constant	-68.39***
	(21.31)
Observations	2,030
R-squared	0.508

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix C: Propensity to Rent

To assess the relationship between the probability that a parcel is registered as a rental and its abatement status, we construct a similar model as that in Appendix A.

The Model:

$$Rental\ Status_{int} = A_{int} + R_{int} + S_{int} + \boldsymbol{H_{it}} + \boldsymbol{D_{nt}} + \alpha_n + \gamma_t$$

Here, we add whether the home is residential (to determine differential effects as opposed to commercial and industrial properties) as well as whether the parcel is in Columbus City School District (to more rigorously assess the trend in the raw data). The raw output is shown below for both the full sample of parcels in CRAs and for a model we run on just the subsample of actively abated properties.

VARIABLES	(1) rentalbinary
abatedbinary	0.0122
	(0.0325)
resbinary	-0.0574***
	(0.0203)
CCSD	-0.0223
	(0.0218)
bdrms	0.00591***
	(0.000513)
bathrooms	-5.81e-05
	(0.000814)
area	3.26e-05***
	(4.97e-06)
age	8.61e-05
	(7.26e-05)
u18	3.70e-05
	(4.99e-05)
o65	-7.35e-06
	(1.62e-05)
non_white	-0.0732
	(0.0539)
highered	-2.49e-05
	(3.98e-05)
population_total	3.38e-05
	(4.88e-05)
3.tractid	0.0304
	(0.0304)
4.tractid	-0.0882***

	(0.0269)
5.tractid	-0.179***
	(0.0349)
6.tractid	-0.212***
	(0.0298)
7.tractid	0.0200
	(0.0368)
8.tractid	-0.0208
	(0.0251)
9.tractid	-0.161***
	(0.0286)
10.tractid	0.0532***
	(0.0197)
11.tractid	-0.00174
	(0.0227)
12.tractid	-0.110***
	(0.0311)
13.tractid	0.0340**
	(0.0171)
14.tractid	0.239***
	(0.0179)
15.tractid	-0.354***
	(0.0344)
16.tractid	-0.261***
	(0.0253)
17.tractid	-0.230***
	(0.0392)
18.tractid	-0.222***
	(0.0323)
19.tractid	-0.171***
	(0.0332)
20.tractid	-0.0336
	(0.0379)
21.tractid	-0.218***
	(0.0286)
22.tractid	-0.192***
	(0.0258)
23.tractid	-0.184***
	(0.0188)
24.tractid	-0.204***
	(0.0266)
25.tractid	0.453***
	(0.0200)
26.tractid	-0.145***
	(0.0375)
27.tractid	-0.161***

	(0.0265)
28.tractid	0.00852
	(0.0295)
29.tractid	0.0327
	(0.0249)
30.tractid	-0.0327*
	(0.0183)
31.tractid	-0.157***
	(0.0308)
32.tractid	-0.212***
	(0.0314)
33.tractid	-0.208***
	(0.0235)
34.tractid	-0.237***
	(0.0276)
35.tractid	-0.227***
	(0.0280)
36.tractid	0.389***
	(0.0171)
37.tractid	-0.375***
	(0.0280)
38.tractid	-0.350***
	(0.0301)
39.tractid	-0.00768
	(0.0300)
40.tractid	-0.0119
	(0.0279)
41.tractid	-0.132***
	(0.0249)
42.tractid	-0.129***
	(0.0278)
43.tractid	-0.0871***
	(0.0296)
44.tractid	0.00945
	(0.0238)
45.tractid	-0.119***
	(0.0236)
46.tractid	-0.00348
	(0.0150)
47.tractid	0.426***
	(0.0170)
48.tractid	0.106***
	(0.0275)
49.tractid	-0.128***
	(0.0327)
50.tractid	-0.187***

	(0.0148)
51.tractid	0.162***
	(0.0312)
52.tractid	-0.244***
	(0.0238)
53.tractid	-0.0102
	(0.0274)
54.tractid	-0.245***
	(0.0235)
55.tractid	-0.140***
	(0.0276)
56.tractid	-0.103***
	(0.0340)
57.tractid	-0.268***
	(0.0322)
58.tractid	0.486***
	(0.0223)
59.tractid	-0.265***
	(0.0289)
60.tractid	-0.232***
	(0.0284)
61.tractid	-0.197***
	(0.0342)
62.tractid	-0.275***
	(0.0283)
63.tractid	-0.169***
	(0.0314)
64.tractid	-0.318***
	(0.0335)
65.tractid	-0.216***
	(0.0367)
66.tractid	-0.153***
	(0.0276)
67.tractid	-0.107**
	(0.0420)
68.tractid	-0.198***
	(0.0266)
69.tractid	0.0121
	(0.0239)
70.tractid	-0.0889***
	(0.0300)
71.tractid	-0.259***
	(0.0250)
72.tractid	0.108***
	(0.0252)
73.tractid	0.200***

	(0.0277)
74.tractid	0.209***
	(0.0145)
75.tractid	0.0162
	(0.0110)
76.tractid	0.111***
	(0.0188)
77.tractid	0.0344**
	(0.0164)
78.tractid	0.0286*
	(0.0166)
79.tractid	0.236***
	(0.0159)
80.tractid	-0.110***
	(0.0158)
81.tractid	0.0349*
	(0.0177)
82.tractid	0.0215
	(0.0228)
83.tractid	-0.0687*
	(0.0411)
84.tractid	-0.0817***
	(0.0269)
85.tractid	-0.0510**
	(0.0257)
86.tractid	0.202***
	(0.0153)
87.tractid	0.0363***
	(0.00899)
88.tractid	0.447***
	(0.0350)
89.tractid	0.0530*
	(0.0288)
90.tractid	-0.0296
	(0.0258)
91.tractid	0.0569**
	(0.0219)
92.tractid	-0.119***
	(0.0217)
93.tractid	-0.0171
	(0.0214)
94.tractid	-0.0452
	(0.0338)
95.tractid	-0.0886***
	(0.0243)
96.tractid	-0.0244

	(0.0148)
97.tractid	0.0352**
	(0.0141)
98.tractid	-0.0754***
	(0.0249)
99.tractid	-0.0800***
	(0.0258)
100.tractid	-0.0288*
	(0.0159)
101.tractid	0.00305
	(0.0193)
102.tractid	0.0354*
	(0.0185)
103.tractid	0.0621***
	(0.0197)
104.tractid	0.0573***
	(0.0216)
105.tractid	0.0191
	(0.0162)
106.tractid	0.0248
	(0.0154)
107.tractid	-0.00402
	(0.0269)
108.tractid	0.0471***
	(0.0164)
109.tractid	0.00746
	(0.0196)
110.tractid	0.0403**
	(0.0181)
111.tractid	-0.142***
	(0.0233)
112.tractid	-0.0511***
	(0.0159)
113.tractid	0.0166
	(0.0232)
114.tractid	-0.0165
	(0.0308)
115.tractid	0.0486
	(0.0308)
116.tractid	0.0143
	(0.0144)
117.tractid	0.0655**
	(0.0271)
118.tractid	0.0446**
	(0.0185)
119.tractid	0.0755***

	(0.0126)
120.tractid	-0.0387**
	(0.0166)
121.tractid	-0.0966***
	(0.0148)
122.tractid	-0.0742***
	(0.0151)
123.tractid	0.0230
	(0.0196)
124.tractid	0.0123
	(0.0134)
125.tractid	0.0935***
	(0.0152)
126.tractid	-0.408***
	(0.0285)
127.tractid	-0.227***
	(0.0260)
128.tractid	-0.193***
	(0.0283)
129.tractid	-0.208***
	(0.0275)
130.tractid	0.0235**
	(0.00988)
131.tractid	0.374***
	(0.0276)
132.tractid	-0.367***
	(0.0321)
133.tractid	-0.236***
	(0.0238)
134.tractid	-0.175***
	(0.0372)
135.tractid	-0.135***
	(0.0243)
136.tractid	-0.194***
	(0.0339)
137.tractid	-0.114***
	(0.0292)
138.tractid	-0.264***
	(0.0285)
139.tractid	-0.218***
	(0.0314)
140.tractid	-0.150***
	(0.0280)
141.tractid	0.0781***
	(0.0117)
142.tractid	-0.135***

	(0.0334)
143.tractid	-0.103***
	(0.0254)
144.tractid	-0.145***
	(0.0270)
145.tractid	-0.168***
	(0.0316)
146.tractid	-0.218***
	(0.0310)
147.tractid	0.322***
	(0.0204)
148.tractid	0.0526**
	(0.0252)
149.tractid	-0.182***
	(0.0441)
150.tractid	0.238***
	(0.0283)
151.tractid	-0.205***
	(0.0268)
152.tractid	0.0759***
	(0.0200)
153.tractid	-0.207***
	(0.0238)
154.tractid	-0.185***
	(0.0323)
155.tractid	-0.215***
	(0.0348)
156.tractid	-0.184***
	(0.0341)
157.tractid	0.293***
	(0.0172)
158.tractid	-0.244***
	(0.0182)
159.tractid	-0.189***
	(0.0305)
160.tractid	0.141***
	(0.0234)
161.tractid	-0.299***
	(0.0304)
162.tractid	0.504***
	(0.0343)
2019.year	-0.00741***
	(0.00202)
2020.year	-0.00272
	(0.00311)
2021.year	-0.0132***

	(0.00256)
Constant	1.237***
	(0.0558)
Observations	255,502
R-squared	0.152

Robust standard errors in parentheses, clustered at Census tract level
*** p<0.01, ** p<0.05, * p<0.1

VARIABLES	(1) Rental status
residential	-0.0291
	(0.0636)
CCSD	-0.00139
	(0.00302)
bdrms	0.000355
	(0.00141)
bathrooms	-0.00397**
	(0.00183)
area	0.000109**
	(4.44e-05)
age	0.000456
	(0.000506)
u18	9.81e-06
	(0.000143)
o65	8.82e-05
	(0.000124)
non_white	0.282
	(0.331)
highered	-2.81e-05
	(0.000413)
population_total	-0.000282
	(0.000243)
4.tractid	0.439
	(0.296)
5.tractid	0.225
	(0.286)
7.tractid	0.0975*
	(0.0508)
12.tractid	0.0395
	(0.0954)
14.tractid	1.239***
	(0.271)
23.tractid	1.167***

	(0.228)
26.tractid	0.235
	(0.281)
28.tractid	0.280
	(0.339)
29.tractid	-0.0217
	(0.106)
30.tractid	0.673***
	(0.102)
36.tractid	1.022***
	(0.240)
37.tractid	0.244
	(0.318)
43.tractid	-0.0705
	(0.0708)
46.tractid	1.074***
	(0.104)
47.tractid	1.163***
	(0.224)
49.tractid	0.0192
	(0.109)
50.tractid	0.0496
	(0.117)
53.tractid	0.641***
	(0.0685)
55.tractid	0.400
	(0.262)
57.tractid	0.187
	(0.251)
58.tractid	1.076***
	(0.204)
59.tractid	0.201
	(0.231)
60.tractid	0.127
	(0.269)
62.tractid	0.251
	(0.294)
63.tractid	0.204
	(0.258)
67.tractid	-0.00486
	(0.198)
69.tractid	-0.000194
	(0.0581)
70.tractid	0.101
	(0.211)
72.tractid	0.538***

	(0.0438)
73.tractid	0.548***
	(0.169)
74.tractid	0.463**
	(0.229)
76.tractid	0.189
	(0.227)
77.tractid	0.221
	(0.268)
78.tractid	0.747***
	(0.274)
79.tractid	1.022***
	(0.326)
80.tractid	0.272
	(0.287)
81.tractid	0.445
	(0.296)
82.tractid	0.391
	(0.258)
83.tractid	-0.0139
	(0.0543)
84.tractid	0.0169
	(0.0891)
85.tractid	0.142
	(0.125)
90.tractid	0.159
	(0.0976)
91.tractid	0.296***
	(0.0736)
92.tractid	0.252
	(0.252)
93.tractid	0.515*
	(0.307)
94.tractid	0.108
	(0.136)
95.tractid	0.338*
	(0.173)
96.tractid	0.366*
	(0.197)
98.tractid	0.273
	(0.219)
99.tractid	0.470**
	(0.224)
100.tractid	0.532***
	(0.162)
101.tractid	0.447***

	(0.132)
102.tractid	0.318
	(0.252)
103.tractid	1.068***
	(0.191)
104.tractid	1.019***
	(0.218)
107.tractid	0.256
	(0.267)
108.tractid	0.000366
	(0.0607)
109.tractid	0.330
	(0.201)
110.tractid	0.537***
	(0.194)
112.tractid	0.388
	(0.298)
113.tractid	0.426***
	(0.154)
114.tractid	0.0159
	(0.0572)
115.tractid	0.777***
	(0.0809)
116.tractid	0.149
	(0.124)
117.tractid	0.122
	(0.0964)
118.tractid	0.236
	(0.179)
119.tractid	0.122
	(0.0855)
120.tractid	0.483
	(0.327)
121.tractid	0.286
	(0.288)
122.tractid	0.293
	(0.261)
123.tractid	0.472***
	(0.0715)
124.tractid	0.461**
	(0.186)
125.tractid	0.454***
	(0.170)
127.tractid	0.0364
	(0.244)
132.tractid	0.220

	(0.271)
133.tractid	0.292
	(0.245)
137.tractid	0.198
	(0.299)
140.tractid	0.870***
	(0.240)
141.tractid	0.0766
	(0.175)
145.tractid	0.198
	(0.252)
148.tractid	0.159
	(0.204)
151.tractid	0.241
	(0.279)
152.tractid	0.0442
	(0.0501)
153.tractid	0.229
	(0.268)
155.tractid	0.202
	(0.301)
156.tractid	0.172
	(0.270)
159.tractid	0.196
	(0.247)
2019.year	0.0103
	(0.0120)
2020.year	0.0154
	(0.0242)
2021.year	0.0336
	(0.0266)
Constant	0.749**
	(0.334)
Observations	12,231
R-squared	0.329

Robust standard errors in parentheses, clustered at the Census tract level

*** p<0.01, ** p<0.05, * p<0.1