Supplemental Economic Study for the Tax Incentive Review Council
An Analysis of the Impact and Costs of Tax Abatements in Franklin County

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*The findings and conclusions of the report represent those of the authors and not necessarily those of The Ohio State University.

1. Background:

Beginning last year the Franklin County Auditor's Office compiled an annual report on the details and underlying data regarding the county's various tax incentive programs. This information for this report is submitted by municipalities to the Tax Incentive Review Council (TIRC) and the report represents a summation of over twenty Franklin County municipalities. The incentive programs include Community Reinvestment Areas (CRAs), Economic Zones (EZs) and Tax Increment Financing (TIFs) programs. The authors were commissioned to add a layer of economic analysis to the TIRC report and to attempt to construct economic models testing several hypotheses to address some of the larger picture questions about these various tax incentives in Franklin County.

Tax abatements and their spillover effects have garnered attention from the public and have been the subject of previous studies and reports[1,2,3]. A previous report on Franklin County incentives by the Lincoln Institute form the basis for some of the questions we posed as well as providing a starting point for our methodology.[4] Their work provides a robust summary of the institutional details of the county's tax incentive programs, as well as an empirical study of some of the key programs. They describe how that over the past two decades, the tax incentive landscape in Franklin County has shifted dramatically with more properties falling under abatement agreements. They also note that the use of abatements varies widely both within the City of Columbus and in surrounding jurisdictions. Further, they describe how Franklin County jurisdictions have generally increased their use of Tax Incremental Finance districts (TIFs) in the past decade.

These abatement programs have been evaluated and scrutinized in both the media and by policy analysts from outside organizations. These incentive programs have increasingly become topics of local political campaigns. Proponents of abatements and TIFs argue that these programs redirect development to lagging areas of their community. By increasing development, proponents argue that these lagging areas see new investments that stabilize their businesses and residential neighborhoods. Some hoped for gains include rising residential housing prices, new jobs for nearby residents, lower crime, and improved neighborhood schools. Proponents argue that TIFs may be the only politically feasible way to finance necessary infrastructure to attract and retain businesses and associated jobs.[5] Likewise, such incentives encourage the formation of new businesses and new businesses create a disproportionate share of net new job creation. In general, proponents assert that these tax incentives may be among the only policies

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[1] Greenstone, M., Hornbeck, R., & Moretti, E. (2010). Identifying agglomeration spillovers: Evidence from winners and losers of large plant openings. *Journal of Political Economy*, *118*(3), 536–598. https://doi.org/10.1086/653714

[2] Partridge, M. D., & Olfert, M. R. (2011). The winners' choice: Sustainable economic strategies for successful 21st-century regions. *Applied Economic Perspectives and Policy*, *33*(2), 143–178. https://doi.org/10.1093/aepp/ppr006

[3] https://www.policymattersohio.org/research-policy/quality-ohio/revenue-budget/tax-policy/columbus-property-tax-abatements-transparency-and-accountability-to-schools-and-community

[4] https://www.lincolninst.edu/es/publications/other/evaluation-real-property-tax-abatements-franklin-county-ohio

[5] TIFs are generally in a defined district in which some of the property taxes from business owner(s) are redirected to finance the construction of local infrastructure such as improvements to roads, sidewalks, and water and sewage lines. The owner's property taxes for the original value of the property is collected and redistributed to agencies in the traditional manner. See the Franklin County Auditor's website for more details.

to redirect private investment to lagging neighborhoods and for the redevelopment of blighted or polluted areas.

Critics of these incentive programs argue that they have unintended consequences and are often ineffective or poorly managed. Economists, for example, are skeptical of their general effectiveness and public resistance to their use has been increasing as well. Perhaps the largest criticism around abatements and TIFs is that they often provide tax breaks for actions that individuals were going to do anyhow. Another key criticism is that they shift a significant tax burden away from developers and directly affected property owners, pushing the burden onto the county's other taxpayers or face cuts to various public services such as education. This criticism is closely associated with the complaint that it is not the disadvantaged residents scoring the benefits of these programs, but are largely skewed to property owners, who are generally not the intended beneficiaries. Another critique is new **net** jobs or investment are not created, but rather they are just shifted to the neighborhoods receiving these incentive programs away from the remainder of the county—i.e., a zero sum gain. In contrast, proponents of incentive programs respond that they lead to a positive sum gain and further assert that the main purpose of these programs is to shift development to lagging neighborhoods—i.e., they are accomplishing what they aim to do.

Critics further contend that these incentives are too often targeted to neighborhoods that don't meet the goal of helping lagging neighborhoods, but really help middle class neighborhoods or provide benefits to new wealthy residents. Such complaints are often associated with gentrification in which largely (relatively) wealthy, often white, households move into targeted areas, displacing poor, largely minority residents—i.e., the program is helping unintended beneficiaries. A final criticism is that the incentives are aimed towards areas favored by favored developers, especially those who provide healthy campaign contributions. If so, growth shifts away from the highest-value uses of the land determined by the market and shifted to areas favored by these developers. Finally, in terms of business incentives, incentivizing firms place existing firms at a competitive disadvantage—e.g., an incentive that helps a restaurant benefits their owner, but places the owners other restaurants at a disadvantage, reducing economic efficiency. In 2015, the Franklin County Auditor estimated that abatements shifted over $300 million from taxpayers and agencies to property owners between 2010 and 2015.[6]

The Franklin County Auditor's office has taken increased interest in these incentive programs in terms of their effectiveness and for providing additional information to interested stakeholders. In June 2021, the Auditor's office developed a new online hub for incentive data: https://franklin-county-tax-incentives-fca.hub.arcgis.com/. The website provides a wealth of new information such that the public can assess the size of these programs in terms of abated tax revenue, which agencies specifically lost funding, and some self-reported details from the jurisdictions assessing the benefits of these programs. The historical data and mapping of the county's incentives is clearly best practice across the country in providing transparency to these programs. This has also been a focus of the Franklin County Auditor's Office.[7] A significant share of the data we use in this study is from the Auditor's website, as well as from other public sources such as the U.S. American Community Survey and the Ohio Department of Education

[6] https://www.dispatch.com/article/20151205/NEWS/312059793.
[7] https://www.goodjobsfirst.org/blog/good-day-subsidy-transparency-franklin-county-ohio-touts-new-tax-incentives-hub

2. Summary of the Goals of this Report and Our Findings.

The report provides an analysis covering the following three core areas at the Auditor's request.

(1) We provide a residential parcel-level property value analysis using sales data to estimate the impact that residential Community Redevelopment Areas (CRAs) have on countywide residential property values. Generally, CRAs are targeted at residential property and they are by far the largest source of property tax abatements in Franklin County.[8] We find (statistically significant) positive effects for parcel owners receiving a CRA abatement, slightly smaller (positive and significant) spillover effects for parcels within 100-meters of abated parcels, and smaller and significant effects for a parcel simply being within a CRA. We estimate that these effects have generated approximately $503 million in gained value for property owners. One thing is that we cannot directly sort out how much of the gain in residential property values are due to increased value of the property from the property improvements versus how much is due the owner paying lower property taxes for the remaining duration of the CRA incentive.[9] On the other hand, we estimate that this total $503 million in property value gain for landowners costs Franklin County taxpayers on average $1.204 billion in total forgone tax revenue, in present-discounted value terms, over the 13.9-year length of the average CRA abatement.

(2) We next provide an analysis of the effects of abatements on school district expenditure and tax millage rates using school district and abatement data from 2015 to 2020. We account for state funding changes, the effects of each individual district (e.g., Upper Arlington's per-student expenditures differ from Pickerington), and differences across years. Our results suggest that increases in abated taxes within school districts reduce school district instructional expenditure by a small amount with statistical significance. Increases in abated taxes within school districts are also significantly and positively associated with increases in real millage rates within school districts.

[8] Of the $108.1 million dollars in foregone taxes in CY2020, CRAs accounted for $101.0 million of the abated taxes benefiting over 4,000 parcels (see 2020 Franklin County Auditor, Tax Incentive Review Council (TIRC) report at https://franklincountyauditor.com/AUDR-website/media/Documents/Real%20Estate/TIRC%20TOOL/2020/FCAO-TIRC-Report-2020.pdf. Specifically, CRAs use property tax abatements for the value of improvements to a property in targeted areas. The property owner still pays property taxes on the initial valuation. Targeted areas for CRAs are usually lagging neighborhoods and the abatements are limited to a certain time period, usually 15 years. The 2020 TIRC report state that over $3.5 billion in Franklin County property is eligible for these tax abatements. See the Franklin County Auditor's website for further details: https://franklin-county-tax-incentives-fca.hub.arcgis.com/.

[9] On a permanent basis after the CRA expires, the value of property improvements has no net value to buyers of the property because the value of past improvements is offset by a higher property price. Hence, we assume that there is no long-run increases in net social value of the CRA after it expires because the positive price effects of lower property taxes would also elapse. However, this may be incorrect if the CRA leads to persistent improvements in factors such as less crime, better neighborhood schools, better access to jobs for low-income workers, etc, all of which would be capitalized into higher housing prices. Very little is known about whether CRA expiration has persistent effects on property values (aside from the value of improvements, which is offset by higher home prices for buyers). Future research could assess what happens to the value of residential property values after a CRA expires to assess the validity of our assumption.

(3) We provide an analysis examining whether Franklin County municipalities lead to new business start-ups from new TIF districts. Our proxy for start-ups is new business filings registered with the Ohio Secretary of State. We find no significant effect for a municipality changing the number of TIF agreements (as a percentage of their total parcels) on the number of new business startups in their community, indicating that at least in terms of start-ups, TIFs are not meeting this expected benefit.

III. The Capitalization of Abatements into Parcel Values

In the first portion of our analysis, we examine the parcel level impact of abatements granted by post 1994 community reinvestment areas (CRAs). We structure our model to answer several core questions:

1. Do active CRA property tax abatements impact the value of a parcel, as reflected by its sale price?

2. Do active CRA property tax abatements impact the value of *nearby* neighboring parcels, as reflected by their sale price? The reason for such spillovers is the associated property improvements in a property could be signal of an increased probability that the entire neighborhood will gentrify, benefiting all nearby property values.

3. Does inclusion of a parcel within a CRA impact its value, as reflected by the sale price, even if the parcel does not receive an abatement and no nearby parcel also receives an abatement? If so, what premium is placed on CRAs by homebuyers—i.e., an option value of possibly taking advantage of the abatement in the future?

These questions have important implications for the public and for understanding who most benefits from CRA property tax abatements. Perhaps most important is that at a first pass, our results provide evidence for whether CRAs pass benefit-cost tests. To answer these questions, we utilize data provided by the Franklin County Auditor via their annual Tax Incentive Review Commission reports and tax incentive datasets from 2014 to 2019. We combine the abatement data with property sales data publicly available from the Franklin County Auditor as well as neighborhood demographic data from the American Community Survey at the census tract level for the same period (census tracts approximate actual neighborhoods). We chose this period due to both consistency of data reporting and formatting and to ensure we analyze property sales post-Great Recession. Due to the COVID-19 pandemic, we also exclude property sales in 2020 from this portion of our analysis given the large disruption to employment and incomes which may have impacted individual decisions about homebuying in unobservable or unpredictable ways. This leads to a data set of home sales and abatements between 2014-2019 across Franklin County along with various neighborhood socioeconomic characteristics that may be associated with housing values.

One of the key challenges in assessing the impact of an abatement on property value is consideration of the counterfactual scenario. Ideally, we would like to compare the sales price of a given house when receiving a CRA abatement versus the price of the same house not receiving the abatement. Instead, we actually observe sale prices for abated properties, but we do not observe actual market sale prices for the same properties *without* abatements. This can make it exceedingly difficult to claim a causal impact one

way or another. After reviewing the economic literature on CRAs and EZs, we consider a methodology to produce counterfactuals that is consistent with prior research on place-based policies that is called matching.[10,11]

3.1 Description of the Matching Methodology

Matching is a statistical method to identify a counterfactual house by identifying similar houses to the one that sold. The difference being that the matched home did not receive the "treatment," which in our case is the tax abatement. Then by comparing the values of the house that received the abatement to the one that did not, we can identify how the tax abatement affected prices. Thus, we use the statistical program R to statistically match each abated residential parcel with another home that shared approximately the same set of home characteristics. For example, we wanted the abated house and the matched non-abated house to be as similar as possible in terms of number of bedrooms, full bathrooms, acreage, square footage, as well as from the same municipality. We also wanted the two houses to be in neighborhoods that share similar demographic characteristics including age distribution, racial composition, levels of education, and median household income. The idea is to control for as many of the non-tax-abatement factors that might influence someone's decision to buy a home and what price they are willing to pay. Ideally, if the matching works, the only difference in the two home prices would be one received the abatement and the other did not.

In our case, we begin with a sample of sales between 2014-2019 for which we had complete data and whose parcel number also appears in the abatement data over the same timeframe. We exclude 2020 property sales due to the yet-undetermined and potentially abnormal effects of the COVID-19 pandemic on homebuying and selling decisions. We then drew an imaginary 250-meter buffer-zone around each parcel and pick matched homes outside of this buffer. The goal is to match each sale of an abated parcel to a sale of a non-abated parcel that is far enough away to avoid any price spillover effects—i.e., to be a valid counterfactual, the matched property cannot be affected by sale of the abated parcel.[12] This effectively excludes parcels who may have become more valuable and sold for a higher price due to their neighbors receiving an abatement and remodeling.

Our exact matching procedure for identifying the CRA effects on those who take advantage of the abatement is to select a matched home that sold in the same year as the abated property. The properties had to be more than 250 meters apart, but both had to be in the same CRA and be eligible for the abatement. Because they are in the same CRA and share similar house and neighborhood characteristics, the difference in home values is some combination of the abated house price gaining simply due to some of the remodeling effects and because the buyer does not pay property taxes on any improvements for the CRA's remaining duration.

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[10]Neumark, D., & Simpson, H. (2015). Place-Based Policies. *Handbook of Regional and Urban Economics*, 1197–1287. https://doi.org/10.1016/b978-0-444-59531-7.00018-1.

[11] Some studies use an alternative method to establish causality called instrumental variables: e.g., Hanson, A. (2009). Local employment, poverty, and property value effects of geographically-targeted tax incentives: An instrumental variables approach. *Regional Science and Urban Economics*, *39*(6), 721–731. https://doi.org/10.1016/j.regsciurbeco.2009.07.002.

[12] Hanson, A., & Rohlin, S. (2013). Do spatially targeted redevelopment programs spillover? *Regional Science and Urban Economics*, *43*(1), 86–100. https://doi.org/10.1016/j.regsciurbeco.2012.05.002

Figure 1

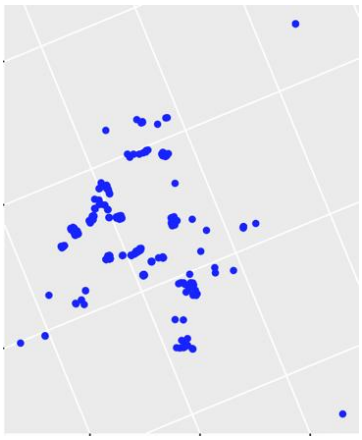


Figure 1 shows a collection of parcels which received an abatement from remodeling or new construction within the CRA.

Figure 2

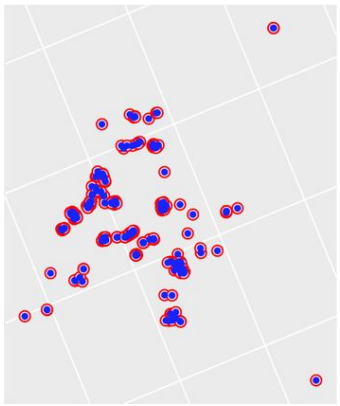


Figure 2 shows the 250-meter buffer-zone created around each sale. Sales within these buffer circles were assumed to be close enough to the abated parcel that they might experience spillover effects and were excluded from the matching process.

Figure 3

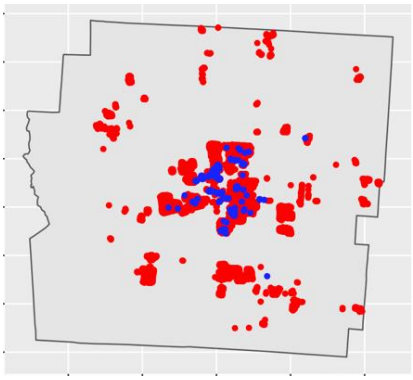


Figure 3 shows a representation of abated parcels (blue) and remaining non-abated sale observations around the county which would be in the pool of eligible matching properties, contingent on other controlled characteristics

The sample for the statistical regression analysis includes (1) parcels that sold between 2014 and 2019 with an active CRA abatement (red in Figure 3 above) and (2) the matched control parcels that sold in the same year (blue in Figure 3 above). The dependent variable is the natural log of the sale price, which follows convention in estimating real estate valuation models.

We consider two "treatment" variables: (1) the percent of the eligible improvement that is abated (abated properties could typically receive breaks for 50% to 100% of the value of the improvement) and (2) the years remaining on the abatement at the time of the sale for which a buyer would still receive the abatement. It is plausible that buyers place premiums on each of these factors. For the control parcels that are unabated, we assume that buyers receive no abatement effect.

Question #1: Do active remodeling property tax abatements impact the value of a parcel, as reflected by sale price?

Our results indicate that both the percentage of abatement (ranging from 0 to 100, but most commonly 100) and the years remaining on the abatement at the time of sale both positively impact the sale price of a home, with statistical significance[13]. Statistical significance is derived from -p-values and describes the probability that the results we see from our sample of property are due to "random chance" rather than an actual correlation. A 5 percent significance level indicates that the probability of just being random chance is 5% or below. Throughout the study, results are considered statistically significant only if they are determined to be non-random with a probability of 90% or more. Only the key regression results are reported below, with full results for all control variables included in Appendix A.

Table 1: Matched Regression of Log Sale Price on Active CRA Abatements

	Log Parcel Sale Price
Percent of Taxes Abated	0.0013**
	(0.0006)
Remaining Abatement (Years)	0.0406***
	(0.0050)
Year fixed effects	Yes
Neighborhood fixed effects	Yes
N	1,557
R^2	0.7344
Adjusted R^2	0.7181
Residual Std. Error	0.5146 (df = 1466)
F Statistic	45.0360*** (df = 90; 1466)
Notes:	***Significant at the 1 percent level.
	**Significant at the 5 percent level.
	*Significant at the 10 percent level.
	Standard errors clustered at taxing district level.

The R^2 of .7344 indicates that 73.44% of the variation in home prices can be explained by our model, which is quite strong given the idiosyncrasies of home prices. These results should be interpreted in following way. Each additional one percentage point of eligible improvements abated (0-100) increases the natural logarithm of the parcel's sale price by 0.0013 (i.e., approximately a 0.13% increase in home

[13] https://hbr.org/2016/02/a-refresher-on-statistical-significance

prices for each one percentage point increase in the percent of the property tax abated. Every additional year remaining on the abatement is associated with the natural logarithm of the sale price increasing by 0.0406 (or one additional year remaining for the abatement increases the selling price approximately 4.06%). We utilize these estimates and then use parcel data for the entire county to estimate the total gain in property value attributable to homeowners receiving the CRA abatement in given year. Specific, we use the statistical estimates and multiply them by their average sample value to determine the benefit for each homeowner receiving an abatement. We then multiply the average sale-price effect of abatements by the number of homes receiving the abatement to obtain the Franklin County total increase in value for owners receiving active abatements.

Abatement Characteristics and Estimated Average Gain for an Abated Parcel

Number of active CRA parcels in Franklin County (2020)	4,005
Average abated percent of improvements on CRA	93
Average years remaining on CRA	7.56
Average estimated housing value increase attributable to each active abatement	$63,912.06

Our results indicate that the average CRA abatement in Franklin County thus results in a gain in appraised total value of $63,912.06 for the 4,005 parcel owners receiving an abatement. Note that this average is estimated county-wide for all parcels under an abatement – not just the properties that sold on the market. This is the average benefit received by every landowner who owns a parcel currently under an active CRA abatement—although the gain is not realized until they sell their property. If the housing market is efficiently operating, the buyer would not be receiving the value of the improvements and property tax reductions because such gains would be offset by a higher price for the home. Moreover, while we count this $63,912 for the 4,005 parcel owners as a **benefit** of the CRA, it is likely an overestimate because some unknown number of the 4,005 owners who received an abatement for property improvements would have done many of the same improvements even without the CRA. Improvements that hypothetically would have been done without the CRA should not be included as a benefit of the CRA program.

Question #2: Do active remodeling property tax abatements impact the value of neighboring parcels, as reflected by their sale price?

Returning to the idea of spillover effects, we next construct a model to estimate if property that is not actively abated but is *nearby* abated properties receives any benefit due to this proximity. The core hypothesis is that the improvements or construction needed to receive a CRA abatement may have impacts within the immediate neighborhood – higher sale prices in a neighborhood may entice other owners to renovate and sell or may entice higher income buyers into a neighborhood perceived to be undergoing property improvements.

We re-estimate the model from Question 1, but now use *Proximity to Abated Property* as the treatment variable. The sample includes (1) properties within 100 meters (roughly a 1 block radius) of sold properties receiving a remodeling or new construction abatement and (2) the matched sales within a 100-meter radius of a property that is not abated. Further, the matched home had to be at least 100-meters from an abated property, in which 100 meters is our assessment of the sample's range of property-value spillovers.

The results of this estimation are reported below. The full regression output can be found in Appendix A.

Table 2: Matched Regression of Log Sale Price on Proximity to Abated Property

	Log Parcel Sale Price
Within 100 meters of an abated parcel	0.1107***
	(0.0339)
Year fixed effects	Yes
Neighborhood fixed effects	Yes
N	1,098
R^2	0.7440
Adjusted R^2	0.7262
Residual Std. Error	0.3559 (df = 1026)
F Statistic	41.9880*** (df = 71; 1026)
Notes:	***Significant at the 1 percent level.
	**Significant at the 5 percent level.
	*Significant at the 10 percent level.
	Standard errors clustered at taxing district level.

As indicated above, we find that unabated parcels within 100-meters of an abated property experience a positive (and statistically significant) price spillover effect of approximately 11.7%.[14] We show the estimated average results for all parcels in the county below. To identify the parcels receiving spillovers by being within 100-meters of an abated parcel, we create a buffer with a 100-meter radius around each

[14]When the dependent variable is measured in log form, the magnitude of regression coefficients for indicator variables such as "within one-hundred meters of an abated property" is measured as exp(B) - 1, in which B is the indicator variable's regression coefficient. In our case, the value is exp(.1107) - 1=.117 (or 11.7%) as the exact estimated effect of being within 100-meters of an abated property. For small values of the indicator variable regression coefficient (e.g., .02), there is very little difference between using .02 (e.g., 2%) or exp(.02) – 1.

of the 4,005 abated properties and select every eligible house in each buffer (except for the abated property). We then use the parcel values of those selected houses and multiply their parcel value by 11.7% to obtain the gain per parcel. By summing the resulting increased value across the 17,044 parcels in the 4,005 buffers, we obtain the county's total increased valuation due to spillovers from abated properties. Again, if the abated property owner would have improved their property without the CRA abatement, we should not attribute that gain due to the CRA. Hence, because we use all 4,005 abated properties regardless of whether they would have improved their property otherwise, we are overestimating the total spillover values of the CRAs by some unknown amount.

Average Estimated Gain for a Parcel within 100 Meters of an Abated Parcel

Number of eligible parcels in Franklin County within 100 meters of an active CRA abated parcel.	17,044
Average estimated parcel value increase attributable to spillover effects of abatements	$8,285

Question #3: Does CRA eligibility of non-abated parcels influence house valuation—i.e., do potential buyers pay extra due to the possibility of capturing future tax benefits from improving their property in unexpired CRA abatement areas?

Finally, at the parcel level we evaluate whether eligible parcels in a CRA still benefit even if they have not used their abatement or benefited from the 100-meter spillover effects. We perform the same estimation, following the matching and regression framework used above except use *CRA Inclusion* as the treatment variable—the CRA sample is those units that are **not** within 100-meters of an abated sale, including the abated property. Our matched sales sample includes sold houses in the same year that are not in a CRA (and thus not abatement eligible). The results are shown below.

Table 3: Matched Regression of Log Sale Price on CRA Eligibility

	Log Parcel Sale Price
In CRA, unabated, outside of 100m from abated	0.0428**
	(0.0206)
Year fixed effects	Yes
Neighborhood fixed effects	Yes
N	9,202
R^2	0.5197
Adjusted R^2	0.5065
Residual Std. Error	0.5060 (df = 8955)
F Statistic	39.3871*** (df = 246; 8955)

Notes:
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.
Standard errors clustered at taxing district level.

As indicated, just being within a CRA leads to (statistically significant) positive capitalization into the sale price, although to a lesser degree than close proximity to abated properties and to a much lesser degree than receiving a remodeling property tax abatement. Specifically, the CRA-location effect is approximately 4.4% higher prices than for an otherwise equal house located outside of an active CRA. One possible explanation is that homebuyers or developers place a premium on having the future option of remodeling or doing new construction and ultimately receiving a property tax abatement.

We also note that this 4.4% premium could manifest in different ways. Specifically, that differential between properties within CRAs and outside CRAs could be because of demand shifts away from non-CRA neighborhoods to CRA neighborhoods, leading to at one extreme, 4.4% lower prices outside of CRAs and no change within CRAs. At the opposite extreme, the differential could be due to CRA properties rising 4.4% in valuation and non-CRA properties experiencing no change in price. Of course, the actual effect could be a weighted average of the two extremes. Below, our estimates provide a range for the average CRA parcel by first assuming they receive the entire 4.4% premium, as well as the other extreme case when they receive none of the premium.

Potential Estimated Average Gain for a CRA Parcel

(Assumes full CRA effect is capitalized into parcel values within the CRA)

Number of CRA eligible parcels in Franklin County within CRAs but not abated and not within 100-meters of abated parcels	45,714
Average Appraised Value for these CRA Parcels	$109,404
Average estimated parcel value increase attributable to spillover effects of abatements	$2,316.38

Potential Estimated Average Loss for a non-CRA Parcel

(Assumes full CRA effect is capitalized into decreased parcel values outside of the CRA)

Number of parcels in Franklin County not within a CRA boundary and eligible for CRAs	318,678
Average Appraised Value for non-CRA Parcels	$165, 522
Average estimated parcel value decreases attributable to spillover effects of abatements	-$3,504.54

It seems most plausible that this is overall net-CRA effect is approximately zero. Specifically, the CRA program should have little net effect on the overall housing demand in Franklin County. Total housing demand mostly relates to whether households (including potential migrants) want to live in Franklin County based on its economic opportunities and quality-of-life. Because the net overall demand does not change for Franklin County, whatever gains in the CRA housing valuation is likely offset by whatever losses in housing valuation in non-CRA areas—indicating that the 4.4% CRA differential has no net effect on overall Franklin County housing valuation.

4. Discussion and Implications.

In all three scenarios ((1) receiving an abatement, (2) being near an abated parcel, and (3) being CRA eligible but not among those included groups (1) and (2)) we find statistically-significant positive effects on prices. Abatements capitalize into property values, with the greatest degree of capitalization and highest gains occurring for parcels which receive a CRA abatement, followed by properties proximate to abated properties due to spillover effects, and finally the smallest gains are for owners benefiting simply from being within a CRA's boundaries.

We utilize our regression results and the 2020 parcel and CRA data available for the entire county to estimate the total effect for Franklin County.

The Estimated Franklin County Net-CRA Abatements Impact (in 2020 dollars)

Source	Total Estimated Gain in Property Value ($)	Total Forgone Taxes Due to CRAs ($)
Active CRA Abatements	$255,967,786	$113,004,975 (annually)
Spillover from CRA Abatements	$141,223,450	$0
Within CRA Boundaries*	$ 105,891,142	$0
Estimated Total	$ 503,082,377	$1,204,243,268**

*Note that we assign 50% of the CRA-inclusion premium to CRA properties and assume the other half of the premium manifests as property value declines outside of the CRA.
** This estimates the entire "cost" of the CRA abatements as forgone tax revenue over the average CRA abatement length. (13.9 years * $113,004,975 in which the annual $113 million in forgone taxes is annually discounted using a social discount rate of 1.934%, which is the federal 30-year bond rate as of 9/10/21). For social costs, a much lower discount rate should be used compared to discounting private costs, in which a corresponding risk-adjusted private rate should be used (e.g., the national discount rate for loans to low-risk customers).

We are assuming that every year that a CRA is in effect, there are approximately 4,005 CRA abatements that generate similar direct abatement, spillover, and CRA-inclusion benefits that maintain the approximately $503 million gain in Franklin County property values. The gains to past abated CRA property improvements are not counted because the buyer of the abated property does not benefit from the CRA when all of the CRA net-benefits are capitalized into paying higher prices.[15] Two assumptions is that once a CRA expires, there are no social benefits (e.g., lower crime) that are capitalized into housing prices after the expiration. Second, there is a social benefit equal to additional tax revenue after the CRAs expire. That is, after approximately 13.9 years of the typical CRA abatement, Franklin County governments can collect additional tax revenue from ex-CRA parcels due to property improvements. However, such tax payments are increasingly heavily discounted from being even further in the future, and the improvements themselves are increasingly depreciating in value, meaning that each year after the expiration of the CRA, the increased revenue from CRA property improvements decline each year (in 2020 dollars). Further, any of the increased revenues due to CRAs should not include any property-tax gains from improvements that would have occurred even if no CRA was ever implemented. Finally, as noted earlier, to some extent, CRAs shift housing demand away from non-CRA areas of the county to areas that received CRA designations. Thus, some of the gains of property taxes due to CRA-induced improvements would be offset by the fewer improvements and lower tax collections that would occur in

[15]That is, CRAs are analogous of the county taking out a mortgage and receiving $503 million upfront, but having to pay $113 million dollars for the next 13.9 years to pay it off. After which, the county has no sustained gain in property values, but no longer foregoes tax revenue (assuming no more CRAs are implemented).

non-CRA areas of the county (in which these losses continue after the expiration of the CRAs). When taking all of these factors together, we believe assuming no **net**-property tax gains after the expiration of the CRAs is quite plausible. And our estimates have not taken account any negative economic effects from the shifting of $503 million dollars in taxes to non-CRA properties and/or from the loss of public services that support the local economy and quality-of-life.

Below, we provide two visual representations of CRA costs and benefits. In Figure 4, we show a map of CRAs indicating which regions of the county are forgoing the most tax dollars and in Figure 5 we show which CRAs our model estimates to receive the largest property value increases in dollar terms. One thing that stands out is that the effects differ across CRAs. Indeed, we were discussing average effects in assessing the estimated net-costs and benefits. But, some CRAs do better than average while others do worse than average.

Who receives the benefit of CRAs? Our model estimation implies that the benefit of CRAs is concentrated among landowners and particularly among those who can sell their properties and realize the value gains from the property. The person who purchases the property does not benefit from the CRA because the improvements and lower taxes are capitalized into higher prices. Note that the landowners also bear the costs of the improvements that make their parcels eligible for CRA abatements. Thus, we estimate that the full benefit of landowners of $516,333,186 is not purely profit and that private investment costs must be considered. Unfortunately, we did not have access to reliable private renovation cost data to subtract from the gain in value to determine net benefit.

Renters across the county, as well as landowners outside of CRAs, do not benefit from this gain in property values attributable to CRAs. Indeed, it is possible that some landowners outside of CRAs experience the CRA-premium we estimate as a decline in value relative to comparable property within the CRA boundaries.

In terms of overall tax shift, our results suggest that while landowners may benefit directly, renters and non-CRA landowners and particularly those who utilize the county's property tax funded services partially bear the cost of CRAs and abatements while receiving none of the direct or indirect property value benefits. They may bear these costs through increased tax rates to subsidize the forgone revenue from CRAs or through reduced service quality. We explore one aspect of such CRA impact on public schools in the following section.

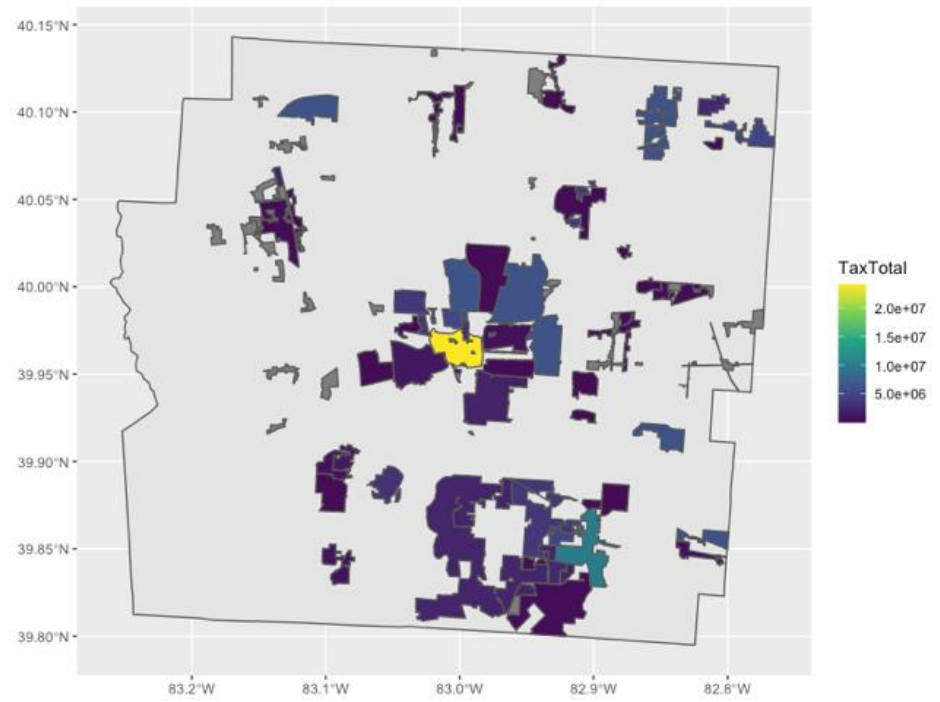


Figure 4. Map of CRAs by annual total property taxes forgone ($), 2020.

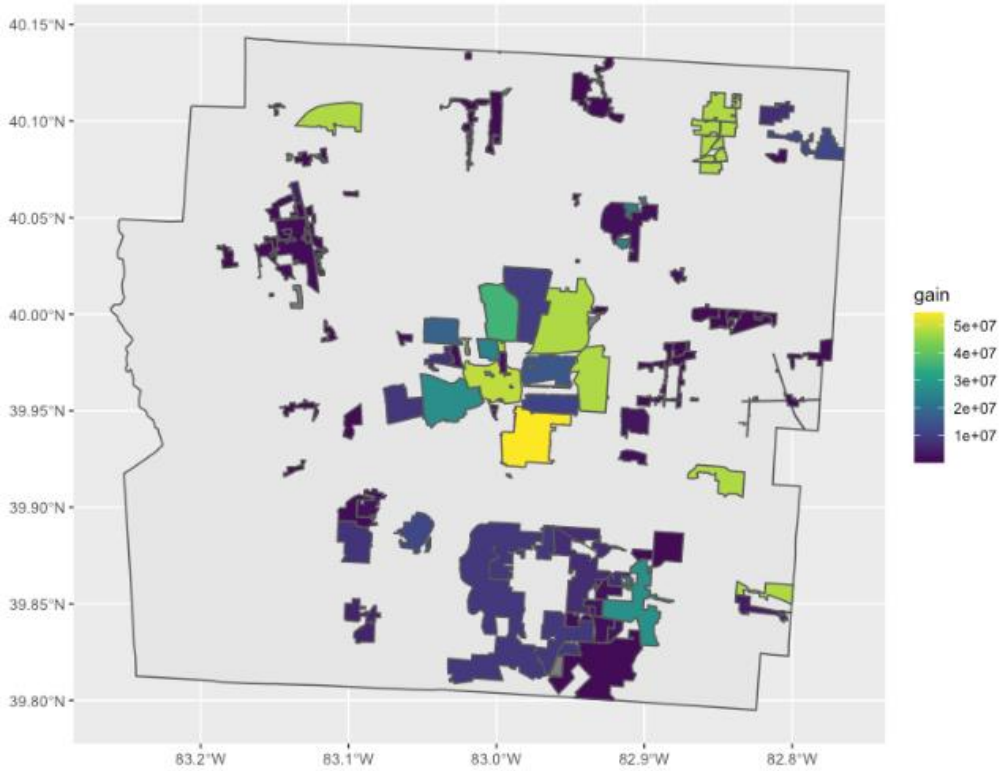


Figure 5. Map of CRAs by estimated gained property value ($), 2014-2020.

Section 2: School District Funding, Expenditure and Tax Abatements

In Franklin County, as across the state, public school districts rely heavily on local property tax revenue. The next phase of our analysis examined school district revenue and per pupil expenditure in the context of forgone revenue from abatements. We calculate that in the six years between 2014 and 2020, Franklin County schools collectively lost $341,506,777in forgone taxes from CRA property tax abatements. However, it is important to note that school districts are not entirely powerless when it comes to abatement approval.

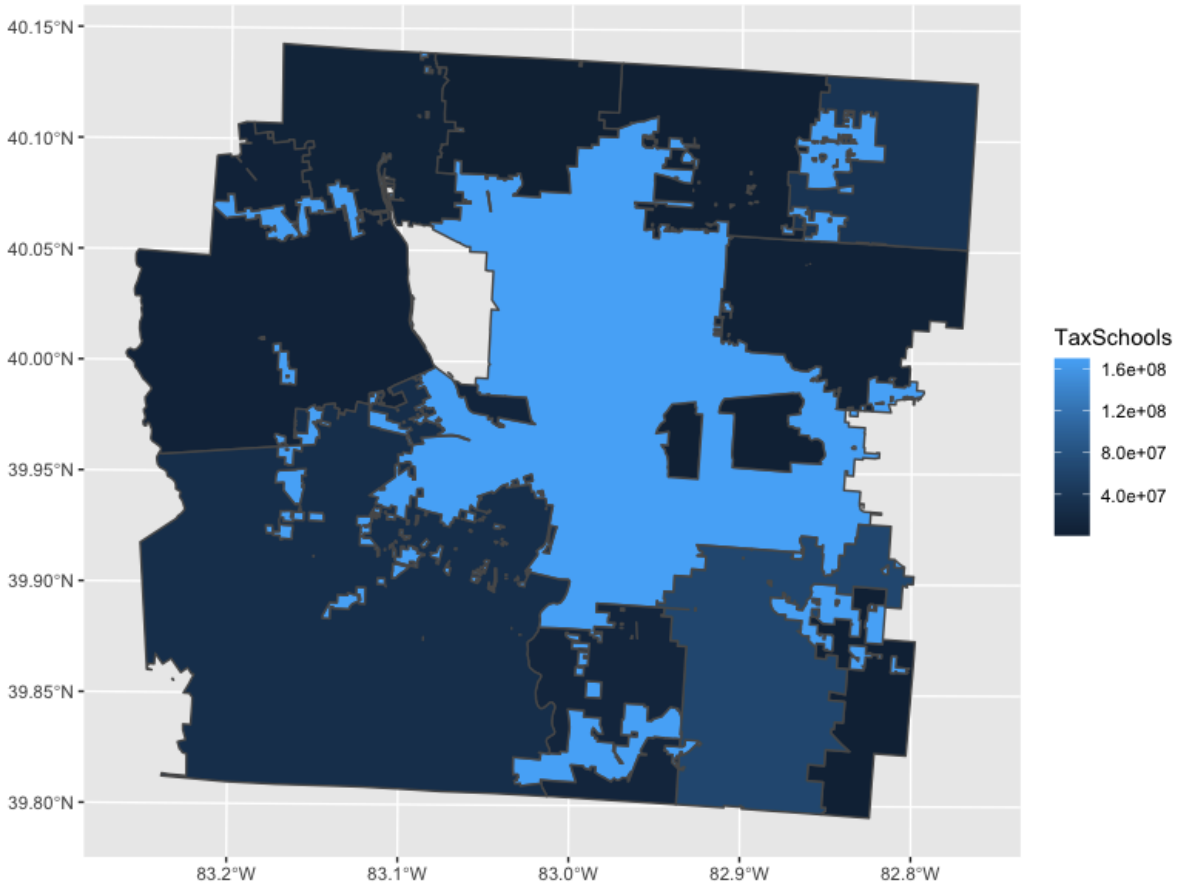
Although our study focuses on residential property tax CRA abatements, under Ohio law, "The exemption percentage and term for commercial and industrial projects are to be negotiated on a project specific basis. If the proposed exemption exceeds 50%, local school district consent is required unless the legislative authority determines, for each year of the proposed exemption, that at least 50% of the amount of the taxes estimated that would have been charged on the improvements if the exemption had not taken place will be made up by other taxes or payments available to the school district." Additionally, some districts negotiate agreements with developers or enterprises and receive payments to offset lost revenue from property tax abatements. The specific terms and natures of these agreements vary from district to district and are difficult to incorporate into a comprehensive dataset.

A breakdown of the total school forgone taxes in selected school districts is shown below, calculated from the CRA abatement datasets provided by the Franklin County Auditor.

Forgone School Taxes from CRAs 2015-2020, By District

School District	Forgone School Taxes from CRAs
Bexley CSD	$1,340,594
Canal Winchester LSD	$1,972,268
Columbus CSD	$170,183,253
Dublin CSD	$5,878,705
Gahanna Jefferson CSD	$4,917,733
Grandview Heights CSD	$9,762,362
Groveport Madison LSD	$63,236,688
Hamilton LSD	$11,177,444
Hilliard LSD	$5,623,109
New Albany Plain LSD	$37,005,337
Southwestern LSD	$26,592,341
Westerville CSD	$1,532,882
Whitehall CSD	$1,734,627
Worthington CSD	$549,434
Total	$341,506,777

Figure 4: Spatial Map of School District Forgone Taxes, 2014-2020



Data Source: https://franklin-county-tax-incentives-fca.hub.arcgis.com/pages/abatement

To assess the impact of these forgone taxes from CRA abatements on school expenditure, we examined the following questions:

(1) Do CRA property tax abatements have an impact on school district expenditures per-pupil? This is an analysis aimed at examining whether abating parcels within a school district directly impacts a district's operations.

(2) Do CRA property tax abatements have an impact on school district real millage rates? This is an analysis aimed at determining if school districts raise rates as a response to lost revenue to abatements.

(3) Do property tax abatements from CRAs have an impact on school district real property values? This is an analysis aimed at determining if a rise in property values offsets the forgone property tax revenue from abatements.

To assess these questions, we construct a dataset using data from the Ohio Department of Education on school district expenditures between 2015 and 2020 as well as data on school district tax revenue. We combine this with data from the Franklin County Auditor on abatements and U.S. Census demographic data for the school districts. We test the impact of abated values within each district annually as a percentage of total taxes charged by the district.

In Ohio, expenditures are reported as traditional expenditure per pupil (EPP) which are total expenditures divided by average daily membership (ADM), determined at the end of the end of the school year. Expenditures are also reported by expenditure per equivalent pupil (EPEP) in which special education learners, English learners, and economically disadvantaged students are given a higher mathematical weight in the calculation. We regress both calculated sets of expenditure variables on the abatement data.

Our results are reported in the tables below. Note that the dependent expenditure variables are reported as logarithms. For full regression tables, refer to Appendix B.

Table 4: Regression of School District Expenditure Per Pupil on Abatements

	Operating	Instructional	Pupil Support	Staff Support	Administration
	(1)	(2)	(3)	(4)	(5)
Log(Abated Taxes)	-0.0140^{*}	-0.0192^{**}	0.0083	0.0031	-0.0085
	(0.0085)	(0.0080)	(0.0208)	(0.0414)	(0.0292)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes
N	66	66	66	66	66
R^2	0.9644	0.9797	0.9373	0.9031	0.7691
Adjusted R^2	0.9461	0.9693	0.9053	0.8536	0.6509
Residual Std. Error (df = 43)	0.0330	0.0265	0.0947	0.1833	0.1163
F Statistic (df = 22; 43)	52.8969^{***}	94.4384^{***}	29.2298^{***}	18.2207^{***}	6.5098^{***}

Notes:

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.
Standard errors clustered by school district.

Table 5: Regression of School District Expenditure Per Equivalent Pupil on Abatements

	Operating	Instructional	Pupil Support	Staff Support	Administration
	(1)	(2)	(3)	(4)	(5)
Log(Abated Taxes)	-0.0154^{*}	-0.0206^{**}	0.0067	0.0016	-0.0100
	(0.0085)	(0.0080)	(0.0208)	(0.0414)	(0.0292)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes
N	66	66	66	66	66
R^2	0.9453	0.9729	0.9225	0.9009	0.6757
Adjusted R^2	0.9173	0.9590	0.8829	0.8502	0.5098
Residual Std. Error (df = 43)	0.0361	0.0313	0.0981	0.1838	0.1150
F Statistic (df = 22; 43)	33.7872^{***}	70.1346^{***}	23.2719^{***}	17.7700^{***}	4.0725^{***}

Notes:

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.
Standard errors clustered by school district.

Because these regressions are log-log regressions, we can interpret the results as a percentage comparison. A 1% increase in total CRA forgone taxes within a school district correlates with a reduction in the school district's expenditure per pupil on instruction by approximately .02%. Though an increase in total forgone taxes within school districts is also negatively correlated with other types of school expenditure beyond instructional expenditure, these impacts were statistically insignificant in our sample, and it appears an instructional reduction is driving the overall slightly significant decrease in operating expenditures.

Even in the significant case of instructional expenditure, the dollar loss in expenditure is extremely small with district and year fixed effects included in the regression. This suggests that school districts effectively may compensate for the foregone tax revenue in other ways.

How does this occur? We propose four possible explanations for how school districts could compensate for the lost revenue and test two of those explanations.

(1) School districts increase rates on non-abated property owners via levy and bond initiatives.
(2) School districts naturally benefit from the increase in overall property value generated in part by both abatements and time.
(3) School districts explore other revenue streams or may seek to offset forgone property taxes via income taxes.
(4) School districts secure private agreements with those who receive tax abatements to offset the losses. (In the case of CRA property tax abatements this is generally not possible as in the case of some tax increment financing arrangements.)

To explore how school districts may be offsetting lost revenue, we perform two regressions. First, we regress real mill rates obtained from the Ohio Department of Education on the natural logarithm of forgone value in the district and the same control variables as above. This tests for the idea that school districts seek increased tax rates on remaining unabated property owners as abatements increase within a district. We also regress the natural logarithm of forgone value on the real property value of the district. The results are reported below, and the full regression output can be found in Appendix B.

Table 6: Regression of School District Real Mills on Abatements

	Log Real Mills
Log(Abated Taxes)	0.3051^{***}
	(0.0791)
Year fixed effects	Yes
District fixed effects	Yes
N	66
R^2	0.9839
Adjusted R^2	0.9757
Residual Std. Error	0.0356 (df = 43)
F Statistic	119.4048^{***} (df = 22; 43)
Notes:	***Significant at the 1 percent level.
	**Significant at the 5 percent level.
	*Significant at the 10 percent level.
	Standard errors clustered by school district.

Table 7: Regression of School Real Property Value on Abatements

	Log Real Property Value
Log(Abated Taxes)	0.0008
	(0.0040)
Year fixed effects	Yes
District fixed effects	Yes
N	72
R^2	0.9998
Adjusted R^2	0.9997
Residual Std. Error	0.0162 (df = 50)
F Statistic	11,954.6300*** (df = 21; 50)
Notes:	***Significant at the 1 percent level.
	**Significant at the 5 percent level.
	*Significant at the 10 percent level.
	Standard errors clustered by school district.

In the regressions of expenditure and millage on abatements, we include fixed effects for both districts and years as well as controls for the previous year's change in state funding and the percentage of parcels within a district under a TIF. As noted in the Lincoln Institute's report, TIFs have increased rapidly in the county, and it is not implausible that school districts consider future possible abatements when making decisions that might raise millage. Additionally, it is reasonable to assume that district's consider recent changes in state funding revenue when making future decisions and budget projections.

We find a significant and positive impact of CRA abatements on real millage rates (Table 6). A 1% increase in the forgone taxes within a school district corresponds to a 0.305% increase in real millage. To help illustrate, a 10% increase in abated taxes within a school district would be associated with a 3% increase in real millage. In our sample, the average real millage was 43.78. Thus, we estimate that a 10% increase in abated taxes within a school district would raise real millage by 1.3. For a $250,000 unabated property in the district, this would result in an additional $325 annual tax increase. This result is suggestive that districts compensate for foregone abatement revenue by seeking additional increases in mill rates and shifting the cost of the abatements even further onto non-abated, non-proximal, and non-CRA property owners. Our finding that abatements correlated with significantly increased school property tax rates on unabated properties contrasts with the 2017 study by the Lincoln Institute, which seemingly does not include school district fixed effects in regression and utilizes older data from 1999-2015. We suspect older data may change the results for several possible reasons:

(i) CRAs and abatements created near the turn of the century may have been created in areas that were already prone to development and thus been more effective at producing value than more recently awarded abatements.
(ii) Older data likely includes sales and values from during the Great Recession and housing bubble.

We believe these issues are alleviated by using more recent data from 2014 onward.

In terms of whether increasing the abated taxes leads to increases in real property value within a school district (Table 7), we find a very small positive but statistically insignificant effect. We also note for both of these results that it is difficult to assess the counterfactual where no abatements are present within a school district. We cannot assess the cost of forgone possibilities to school districts from the data. For example, if a school district has proposed an operating levy that raises millage or an income tax to generate new revenue, would it still have proposed the levy or income tax if it did not lose revenue from abatements? If the answer is yes, then absent abatements the district may have collected more revenue and may have *increased* expenditure per pupil. Such a scenario is not unreasonable to imagine, in which case abatements could have a hidden cost to school districts which do not appear in the data. We simply cannot calculate the cost to a district which decides not to hire an additional staff teacher, decides not to offer additional curriculum options to students, or does not provide additional classroom resources to teachers in a hypothetical world with no CRA abatements.

Section 3: Tax Increment Financing and New Business Filings

Our final analysis conducted in effort to address the concerns raised by the Franklin County Auditor, we evaluate the correlation of an increase in the number of parcels that receive tax increment financing (TIF) abatements on the number of new business filings as reported by the Ohio Secretary of State. This is consistent with prior exploration of examining if economic incentives create new businesses and thus new jobs.[16] We evaluate the period between 2014 and 2020 at the municipality level for 17 of the larger municipalities within Franklin County.

Below, we provide summary data on the active number of TIFs in 2019 in each of these municipalities as a percentage of their total parcels. We provide data up to the start of 2019 due to the COVID-19 pandemic and its effect on new business filing decisions.

Summary Data for TIFs in Municipalities within Franklin County

Municipality	Active TIFs (2019)	Percentage of Parcels
Bexley	192	4.0%
Canal Winchester	63	2.0%
Columbus	16,212	8.8%
Dublin	490	4.0%
Gahanna	557	4.4%
Grandview Heights	210	6.9%
Grove City	1687	11.1%
Groveport	13	0.5%
Hilliard City	487	4.4%
New Albany	1,105	25.6%
Reynoldsburg	2	0.02%
Upper Arlington	98	0.7%
Westerville	306	2.7%
Whitehall	1,428	23.8%
Worthington	77	1.2%

The results of our regression of TIFs as a percentage of parcels within the municipality are reported on the next page.

[16] Partridge, Mark D., Alexandra Tsvetkova, Sydney Schreiner, and Carlianne Patrick. (2020). "The Effects of State and Local Economic Incentives on Business Start-ups in the U.S.: County-level Evidence." *Economic Development Quarterly.* (34) 171-187.

Table 8: Regression of New Business Filings on Tax Increment Financing

	Number of New Business Filings
Active TIFs (% of total parcels)	1,101.7150
	(675.7202)
Pop. Over Age 65 (%)	−609.4616
	(565.9003)
Pop. Under Age 17 (%)	−338.1386
	(367.6764)
Non-White Population (%)	−158.9041
	(178.4234)
Median Income (10,000)	−2.3255
	(4.1854)
Pop. Bachelor Degree or Higher (%)	−634.6856*
	(379.0512)
Population (Log)	−60.6279
	(89.2980)
Number of Parcels (Log)	395.1335
	(245.4208)
Year fixed effects	Yes
City fixed effects	Yes
N	89
R^2	0.9844
Adjusted R^2	0.9779
Residual Std. Error	40.9171 (df = 62)
F Statistic	150.7311*** (df = 26; 62)
Notes:	***Significant at the 1 percent level.
	**Significant at the 5 percent level.
	*Significant at the 10 percent level.
	Standard errors clustered by taxing municipality.

The interpretation of these results implies that an increase in the percentage of parcels with an active TIF agreement within a municipality by 1% increases the number of new business filing by 1,101. However, in our sample these results are statistically insignificant and cannot conclude that increasing the number of parcels with an active TIF agreement has a net impact on new business creation within the municipality.

Due to data limitations and formatting inconsistencies in both the Ohio Secretary of State new business data and the historical TIF data from the Franklin County auditor, we were unable to evaluate the dollar value of the TIF agreements relationship to new business filings. We believe this is a significant shortcoming and recognize that the Franklin County Auditor is working toward making improvements in the data formatting and reporting process for tax incentives. In order to prevent these types of analysis issues in the future, we highly recommend that future Tax Incentive Review Council reporting processes offer municipalities a drop-down option for key variables and provide municipalities with uniform guidelines to input their data. Input discrepancies and inconsistencies across both years and

municipalities proves a significant data challenge. We provide several examples below to illustrate the need for consistency which would enable better analysis and for consideration in the future:

(a) The use of all capital letters or lower-case letters
(b) The use of punctuation, such as a comma before 'LLC' in names or not
(c) The input of variables as numeric or categorical
(d) The use of dollar signs and commas when inputting monetary values
(e) The use of 'Y' versus "yes" versus "Yes" when inputting some responses
(f) The inclusion of geographic data in all files where possible

In general, we believe that standardizing as many responses from municipalities as possible via formatting requirements or dropdown options would enable much better data analysis in the future, particularly around TIF agreements.

Appendix A: Parcel Analysis Model and Full Regression Results

Table 9: Matched Regression of Log Sale Price on Active CRA Abatements

	Log Parcel Sale Price Abated Parcels
Percent of Taxes Abated	0.0013^{**} (0.0006)
Remaining Abatement (Years)	0.0406^{***} (0.0050)
Property Age (years)	-0.0017^{***} (0.0004)
Finished Area (sq. ft)	0.0004^{***} (0.0001)
Lot Size (acres)	-0.0113 (0.0338)
Number of Full Bathrooms	-0.000001 (0.000001)
Tract Median Income	-1.2168^{**} (0.5869)
Tract White Population(%)	0.0182 (0.6044)
Tract Black Population (%)	-1.4937^{**} (0.7239)
Tract Under Age 17 (%)	-5.4545^{***} (0.9435)
Tract Over 65 Population	1.4140^{*} (0.7567)
Tract Population Only High School Diploma/GED (%)	0.0953 (0.5065)
Tract Population with Some College (%	0.5964^{*} (0.3613)
Year fixed effects	Yes
Neighborhood fixed effects	Yes
N	1,557
R^2	0.7344
Adjusted R^2	0.7181
Residual Std. Error	0.5146 (df = 1466)
F Statistic	45.0360^{***} (df = 90; 1466)

Notes:
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.
Standard errors clustered at taxing district level.

Table 10: Matched Regression of Log Sale Price on Proximity to Abated Property

	Log Parcel Sale Price
Within 100 meters of an abated parcel	0.1107^{***}
	(0.0339)
Property Age (years)	-0.0009^{**}
	(0.0003)
Finished Area (sq. ft)	0.0004^{***}
	(0.00003)
Lot Size (acres)	0.1207^{***}
	(0.0241)
2 Bedrooms	0.000002
	(0.000001)
3 Bedrooms	−0.0244
	(0.5509)
4 Bedrooms	0.7808
	(0.6029)
5 Bedrooms	-1.0385^{*}
	(0.6161)
6 Bedrooms	-2.1638^{***}
	(0.6202)
7 Bedrooms	0.9995
	(0.6241)
8 Bedrooms	0.3179
	(0.4410)
Number of Full Bathrooms	0.3913^{*}
	(0.2232)
Year fixed effects	Yes
Neighborhood fixed effects	Yes
N	1,098
R^2	0.7440
Adjusted R^2	0.7262
Residual Std. Error	0.3559 (df = 1026)
F Statistic	41.9880^{***} (df = 71; 1026)

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.
Standard errors clustered at taxing district level.

Table 11: Matched Regression of Log Sale Price on CRA Eligibility

	Log Parcel Sale Price
CRA Inclusion	0.0428**
	(0.0206)
Property Age (years)	−0.0018***
	(0.0003)
Finished Area (sq. ft)	0.0003***
	(0.00002)
Lot Size (acres)	0.0955***
	(0.0117)
Number of Full Bathrooms	0.000001**
	(0.000000)
Tract Median Income	0.2024
	(0.1988)
Tract White Population(%)	0.3422*
	(0.2035)
Tract Black Population (%)	0.2107
	(0.1833)
Tract Under Age 17 (%)	0.2646
	(0.2078)
Tract Over 65 Population	0.6335***
	(0.2334)
Tract Population Only High School Diploma/GED (%)	0.3538**
	(0.1717)
Tract Population with Some College (%	0.4869***
	(0.1357)
Year fixed effects	Yes
Neighborhood fixed effects	Yes
N	9,202
R^2	0.5197
Adjusted R^2	0.5065
Residual Std. Error	0.5060 (df = 8955)
F Statistic	39.3871*** (df = 246; 8955)

Notes:

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.
Standard errors clustered at taxing district level.

Appendix B: Full Regression Outputs for School Analysis

Table 12: Regression of School District Expenditure Per Pupil on Abatements

	Operating	Instructional	Pupil Support	Staff Support	Administration
	(1)	(2)	(3)	(4)	(5)
Log(Abated Taxes)	−0.0140*	−0.0192**	0.0083	0.0031	−0.0085
	(0.0085)	(0.0080)	(0.0208)	(0.0414)	(0.0292)
Bachelor Degree or Higher (%)	−0.8444	−0.5573	1.3091	−6.9169**	−1.9616
	(0.5994)	(0.5203)	(1.3734)	(2.9164)	(2.5648)
Age 17 or below (%)	1.0466***	1.1038***	2.6516	−4.3095*	0.8090
	(0.2806)	(0.3819)	(1.9550)	(2.4079)	(1.1842)
Non-White Population (%)	0.4382*	0.8492***	0.2006	−2.6275	0.5956
	(0.2638)	(0.2052)	(0.6364)	(2.1963)	(0.9939)
ln(District Enrollment)	−0.0388	−0.0278	0.0876	0.2741	0.0251
	(0.0345)	(0.0290)	(0.1147)	(0.2002)	(0.1281)
Residential Parcels (%)	6.7282	9.4573**	−8.2001	−0.9339	−0.8462
	(4.2127)	(3.9521)	(8.5745)	(19.8755)	(13.0957)
Agricultural Parcels (%)	50.7581**	68.9886***	38.7862	−106.1373	−17.1592
	(20.3783)	(19.4382)	(48.5708)	(126.2977)	(56.0871)
Apartment Parcels (%)	−62.8882*	−98.0947***	81.1874	−166.9622	−85.7001
	(32.0867)	(28.0962)	(73.9009)	(177.3242)	(124.9667)
Exempt Parcels (%)	112.4183**	152.7568***	−75.7549	131.6950	87.2684
	(45.4017)	(40.2298)	(109.4037)	(246.3654)	(173.4229)
Lagged Logged Change in State Revenue	0.0000	0.0000	0.0000**	−0.0000	0.0000*
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Percent of District Parcels with TIF	−1.7209	−2.9533*	−4.2557*	−0.9662	−2.9874
	(1.6244)	(1.5972)	(2.4346)	(7.0687)	(3.6437)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes
N	66	66	66	66	66
R^2	0.9644	0.9797	0.9373	0.9031	0.7691
Adjusted R^2	0.9461	0.9693	0.9053	0.8536	0.6509
Residual Std. Error (df = 43)	0.0330	0.0265	0.0947	0.1833	0.1163
F Statistic (df = 22; 43)	52.8969***	94.4384***	29.2298***	18.2207***	6.5098***

Notes:

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.
Standard errors clustered by school district.

Table 13: Regression of School District Expenditure Per Equivalent Pupil

	Operating	Instructional	Pupil Support	Staff Support	Administration
	(1)	(2)	(3)	(4)	(5)
Log(Abated Taxes)	-0.0154^{*}	-0.0206^{**}	0.0067	0.0016	-0.0100
	(0.0085)	(0.0080)	(0.0208)	(0.0414)	(0.0292)
Bachelor Degree or Higher (%)	-0.7855	-0.4991	1.3671	-6.8666^{**}	-1.9111
	(0.5994)	(0.5203)	(1.3734)	(2.9164)	(2.5648)
Age 17 or below (%)	1.2173^{***}	1.2745^{***}	2.8197	-4.1466^{*}	0.9753
	(0.2806)	(0.3819)	(1.9550)	(2.4079)	(1.1842)
Non-White Population (%)	0.3035	0.7148^{***}	0.0633	-2.7499	0.4592
	(0.2638)	(0.2052)	(0.6364)	(2.1963)	(0.9939)
ln(District Enrollment)	-0.0317	-0.0207	0.0949	0.2798	0.0319
	(0.0345)	(0.0290)	(0.1147)	(0.2002)	(0.1281)
Residential Parcels (%)	4.7220	7.4622^{*}	-10.2175	-2.7148	-2.7991
	(4.2127)	(3.9521)	(8.5745)	(19.8755)	(13.0957)
Agricultural Parcels (%)	36.7736^{*}	55.0364^{***}	24.7503	-118.8906	-30.9425
	(20.3783)	(19.4382)	(48.5708)	(126.2977)	(56.0871)
Apartment Parcels (%)	-64.5926^{**}	-99.8573^{***}	79.5018	-169.9084	-87.7508
	(32.0867)	(28.0962)	(73.9009)	(177.3242)	(124.9667)
Exempt Parcels (%)	98.1280^{**}	138.5597^{***}	-90.0536	119.5802	73.5699
	(45.4017)	(40.2298)	(109.4037)	(246.3654)	(173.4229)
Lagged Logged Change in State Revenue	0.0000	0.0000	0.0000^{**}	-0.0000	0.0000^{*}
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Percent of District Parcels with TIF	-2.4695	-3.6975^{**}	-5.0055^{**}	-1.6609	-3.7187
	(1.6244)	(1.5972)	(2.4346)	(7.0687)	(3.6437)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes
N	66	66	66	66	66
R^2	0.9453	0.9729	0.9225	0.9009	0.6757
Adjusted R^2	0.9173	0.9590	0.8829	0.8502	0.5098
Residual Std. Error (df = 43)	0.0361	0.0313	0.0981	0.1838	0.1150
F Statistic (df = 22; 43)	33.7872^{***}	70.1346^{***}	23.2719^{***}	17.7700^{***}	4.0725^{***}

Notes:

***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.
Standard errors clustered by school district.

Table 14: Regression of School District Real Mills on Abatements

	log_mills
Log(Abated Taxes)	0.3051***
	(0.0791)
Bachelor Degree or Higher (%)	0.3010
	(0.5846)
Age 17 or below (%)	0.2745
	(0.3020)
Non-White Population (%)	−0.1643
	(0.2922)
ln(District Enrollment)	−0.0868**
	(0.0372)
Residential Parcels (%)	7.7139**
	(3.7046)
Agricultural Parcels (%)	58.0555***
	(17.6682)
Apartment Parcels (%)	−18.2939
	(30.6207)
Exempt Parcels (%)	71.7674*
	(42.7491)
Lagged Logged Change in State Revenue	−0.0000
	(0.0000)
Percent of District Parcels with TIF	0.2195
	(1.2423)
Year fixed effects	Yes
District fixed effects	Yes
N	66
R^2	0.9839
Adjusted R^2	0.9757
Residual Std. Error	0.0356 (df = 43)
F Statistic	119.4048*** (df = 22; 43)

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.
Standard errors clustered by school district.

Table 15: Regression of School Real Property Value on Abatements

	Log Real Property Value
Log(Abated Taxes)	0.0008
	(0.0040)
Bachelor Degree or Higher (%)	-0.5779^{*}
	(0.3386)
Age 17 or below (%)	-1.2975^{***}
	(0.2111)
Non-White Population (%)	0.2635^{**}
	(0.1180)
ln(District Enrollment)	-0.0037
	(0.0146)
Residential Parcels (%)	39.2263^{***}
	(1.0683)
Agricultural Parcels (%)	292.2766^{***}
	(7.1695)
Apartment Parcels (%)	-107.2052^{***}
	(16.2514)
Exempt Parcels (%)	399.2705^{***}
	(17.8637)
Year fixed effects	Yes
District fixed effects	Yes
N	72
R^2	0.9998
Adjusted R^2	0.9997
Residual Std. Error	0.0162 (df = 50)
F Statistic	$11{,}954.6300^{***}$ (df = 21; 50)

Notes: ***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.
Standard errors clustered by school district.