A Case Study on Economic Development Agreements: Did the Sears Mega-Deal Increase Economic Activity in Hoffman Estates

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A Case Study on Economic Development Agreements: Did the Sears Mega-Deal Increase Economic Activity in Hoffman Estates

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The following study is the result of a collaboration between the Center for Tax and Budget Accountability ("CTBA"), the Daily Herald and the Local Reporting Network of ProPublica, a non-profit investigative outlet. The Daily Herald and ProPublica commissioned CTBA to examine the long-term effects of the economic development agreement entered into by Hoffman Estates and Sears, Roebuck & Company.

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Table of Contents
1. Introduction ..................................................................................................................................................4
2. How EDAs work ........................................................................................................................................4
3. How TIFs work ........................................................................................................................................4
4. What did Sears explicitly promise ........................................................................................................5
5. Initially under the Sears EDA, property value growth was positive but limited ..............................6
6. Over the length of the Sears EDA, these positive impacts on EAV diminished significantly ..........9
7. The Sears EDA failed to satisfy its employment targets .................................................................12
APPENDICES ............................................................................................................................................14
i. DID Model Overview .............................................................................................................................14
ii. DID Matching Algorithm ......................................................................................................................15
iii. DID Model Design .............................................................................................................................19
iv. Endnotes ...............................................................................................................................................20
A Case Study on Economic Development Agreements: Did the Sears Mega-Deal Increase Economic Activity in Hoffman Estates

1. Introduction

Economic development agreements (“EDAs”) are often used by governments in an attempt to generate new or additional investment in communities. Under an EDA, governments agree to provide material incentives to private businesses, typically in the form of either direct subsidies or tax breaks. In exchange, these publicly subsidized private businesses are supposed to deliver robust improvements in key economic factors, such as new and/or additional job creation, or new tax revenue from growth in income or sales activities the subsidized businesses generate. In 1989, Hoffman Estates entered into a significant EDA that contained subsidies and tax breaks totaling $242 million with Sears, Roebuck & Company (“Sears”). Under the Sears EDA, Hoffman Estates provided public subsidies to Sears, to induce Sears to relocate its headquarters to Hoffman Estates from Chicago. In return, Sears promised to develop an area of Hoffman Estates in a manner that would “yield a high assessed value, thereby strengthening the overall tax base” for the municipality, while maintaining at least 2,000 full time jobs that were existing in the company at the time. Sears specifically promised to encourage the development of “a wide range of first quality office, light industrial, research, and commercial facilities providing a variety of new employment opportunities consistent with the needs of northeastern Illinois.” One of the core subsidies in the Sears EDA was the creation of a Tax Increment Financing or TIF district to help pay for project costs. Following is a detailed statistical analysis of the impact this development by Sears had on the two key metrics that were the focus of the Sears EDA: property values and employment.

2. How EDAs work

EDAs are contracts between government entities and private businesses. The contracts can be complex due to the vast array in types of assistance governments provide and the outcomes required of subsidized businesses. When effective, EDAs provide subsidies to businesses that generate investment in communities that otherwise would not have taken place. This in turn benefits both the residents living in the government providing the subsidy, as well as the government itself, through some combination of increased economic expansion and growth in tax revenue base. Impact estimates performed prior to the enactment of EDAs outline project goals, estimate the economic benefits to be generated, and identify how these benefits will manifest. EDAs may also contain minimum requirements the subsidized business has to satisfy. An EDA can even afford local governments the opportunity to recoup the value of subsidies or tax breaks given should economic performance by the subsidized businesses not meet established minimums. Effectively, a final EDA identifies the choices made about how best to implement a public subsidy package for private sector businesses that will generate the desired impacts.

3. How TIFs work

“TIF” stands for “Tax Increment Financing.” TIFs were initially established by California in 1952 as a method for the public sector to subsidize community improvement projects, infrastructure, or redevelopment in “blighted” areas. Illinois began authorizing TIF funding when the state adopted the Tax Increment Allocation Redevelopment Act in 1977. The area being developed with public subsidies derived through a TIF is called the “TIF District.” A TIF District is often much larger than the area being redeveloped to provide the needed borrowing capacity. In Illinois, from the date of the creation of a TIF District, and for a period of 23 or 35 years thereafter, the Equalized Assessed Value (“EAV”) of said District is frozen for the purpose of computing the property tax rate needed to pay the levies extended by each local taxing authority with jurisdiction over said TIF District. For the duration of the TIF District, local taxing authorities do not receive any property tax revenue from the growth in the TIF District EAV (“TIF EAV”). The aggregate property tax rate of all local taxing authorities applicable to the municipality in question is then applied to the growth in EAV occurring in the TIF district. The property tax revenue generated by applying this aggregate property tax rate to the growth in EAV in the TIF District is diverted from other local taxing authorities in the municipality to fund the projects in the Development Plan. This revenue is called the “tax increment”. If, at the end of a TIF’s duration, the total tax increment revenue
A Case Study on Economic Development Agreements: Did the Sears Mega-Deal Increase Economic Activity in Hoffman Estates

raised exceeds total project costs, the surplus is returned to the other local taxing jurisdictions in proportion to their respective tax levies.

Proponents argue that TIFs grow assessed property values within TIF districts quickly, and then benefit the rest of the municipality over the long haul. And while the data confirm property values in a TIF District do indeed grow rapidly in the short run, most studies of EAV growth municipality-wide indicate TIFs usually do not generate long-term benefits, especially after controlling for factors like combined tax rate, population, income per capita, non-residential share of EAV, land use, home rule authority, and EAV per square mile. In fact, the data show that non-TIF areas of municipalities that use TIF grow no more rapidly, and perhaps more slowly, than municipalities which are similar in size, population and land use, but do not use TIF.4

This is because on average, EAV growth in TIF areas is typically offset by a decline in EAV elsewhere in the municipality utilizing the TIF.5 The data also show that land use is a major factor in the long-term efficacy of employing a TIF to grow EAV.6 For example, commercial TIF districts tend to decrease commercial development in the non-TIF portion of the municipality due to “cannibalization” of commercial EAV outside of the TIF District.7 Industrial land use, on the other hand, typically does not offset property growth in non-TIF areas of the same municipality.8

4. What did Sears explicitly promise

The expectations set forth in the Sears EDA were clear. It identified that the EAV of the project area to be developed was $5.2 million as of 1988.9 It then projected that the new development Sears promised to generate after receiving public subsidies would increase the EAV in the TIF district to $611 million (in 1989 dollars) by 2012.10 Similarly, the Sears EDA anticipated that Sears would maintain at least 2,000 jobs at its facility in the TIF District, while generating in excess of 10,000 full-time equivalent new jobs from other employers attracted to the TIF District.11 Moreover, the Sears EDA anticipated that property tax revenue growth from the development would be significant. “Once the project is complete, annual [property tax revenue] equal to or exceeding $50,000,000 will be available to all of the participating taxing jurisdictions. It is anticipated that this agreement will provide revenue to these taxing jurisdictions totaling as much as $150,000,000 before September 1, 2012.”12

The results actually produced under the Sears EDA significantly underperformed expectations. According to the Illinois Department of Revenue (“IDOR”), in 2012, the EAV of the TIF District was $273 million in nominal dollars.13 After adjusting for inflation, that is only $147 million in 1989 dollars, or more than $460 million or 75 percent less than the original estimate.14 In 1988, one year prior to the establishment of the Sears EDA, the Illinois Department of Employment Security (“IDES”) reported there were 25,408 employed residents in Hoffman Estates.15 IDES also pegged the unemployment rate for the municipality at 3 percent at that time.16

By 2012, the number of employed residents in Hoffman Estates had only grown to 27,796.17 That represents an increase of just 2,388 jobs, which is 7,612 jobs or 76 percent less than the 10,000 targeted.18 Moreover, the labor force, or number of individuals who were either actively seeking or had attained employment in Hoffman Estates, had grown from 26,201 in 1989 to 29,967 in 2012.19 Because the growth in the labor force (3,766) outpaced the growth in employment within Hoffman Estates from 1989 to 2012, and the Sears EDA created 7,612 fewer jobs than promised, the municipality actually found itself with a larger share of workers seeking employment at the end of this sequence than when it began. This is reflected in the growth of Hoffman Estate’s local area unemployment rate to 7.2 percent in 2012, as contrasted with 3 percent in 1988, the year before the Sears EDA was established.20

Finally, the dollar value of the TIF extension in 2012 was only $25.2 million according to IDOR, which is barely half of the initial projection of $50 million in property tax revenue that would be generated in the TIF District at that time.21 In other words, Sears did not come close to satisfying any of the standards for economic development established in the Sears EDA.
5. Initially under the Sears EDA, property value growth was positive but limited

While a simple before and after analysis can identify property values in Hoffman Estates prior to and after the establishment of the Sears EDA, it will not isolate the unique impact of the development made under the Sears EDA itself. A difference-in-differences model ("DID model") was utilized for this purpose. A DID model can disaggregate economic changes already occurring independently within Hoffman Estates from those that occur as a consequence of the development occurring under the Sears EDA. It does so by comparing Hoffman Estates to a "control group", made up of municipalities that were on similar trajectories to Hoffman Estates prior to the establishment of the Sears EDA in 1989. Please see Appendices i-iii for detailed information on the identification process for control group municipalities and DID model design.

As shown in Figure 1, from 1989 to 1998, the development under the Sears EDA generated statistically significant growth in the Total EAV of Hoffman Estates, increasing it by 32.97 percent, as identified by the coefficient, or estimate, on Hoffman * After. For conversion of log-based estimates to percentages, please see Appendix iii. The impact of development under the Sears EDA on non-TIF EAV was more limited. According to the DID model, non-TIF EAV in Hoffman Estates increased by only 11.96 percent as a function of the development under the Sears EDA, but this result was not statistically significant, suggesting that the impact could also be either zero or negative. The "adjusted R²s" for both DID models above are greater than 60%. The adjusted R² is a measurement of the explanatory power of a statistical model. As such, the factors included in this model (the existence of the Sears EDA among them) explain greater than 60% of the change in the EAV in Hoffman Estates and the control group. This indicates that the models have identified a correlational effect between the EAV and the Sears EDA.

Comparing the growth in total property values over time in Hoffman Estates versus the control group bolsters what was identified in the DID model. As shown in Figure 2, Hoffman Estates initially saw its Total EAV significantly increase after implementation of the Sears EDA, which is represented by the notable change in Hoffman Estates’ total EAV (the solid line) post-1989. Hoffman Estates, based on prior performance, would have been expected to exhibit property values in line with Palatine without the Sears EDA. Instead, Hoffman Estates was more like Elgin after 1989. Hence, the data indicate the Sears EDA generated a significant amount of property value for Hoffman Estates over this time frame.
A Case Study on Economic Development Agreements: Did the Sears Mega-Deal Increase Economic Activity in Hoffman Estates

Figure 2: Total EAV for Hoffman Estates & Control Group 1980-1998

However, the same type of growth does not exist when looking at property values in non-TIF areas of Hoffman Estates. As shown in Figure 3, the DID model revealed that non-TIF EAV in Hoffman Estates remained on the same trajectory as Palatine. This highlights a key finding: the development under the Sears EDA did not generate a positive spillover impact on non-TIF property value in Hoffman Estates. The majority of property value growth in the entirety of Hoffman Estates was isolated within the TIF District. This is important because non-TIF property value is what was available to generate tax revenue for local government authorities in Hoffman Estates until the TIF District expired in 2012. This indicates that for the short run, property tax revenue did not grow as a function of greater property values being generated throughout Hoffman Estates, in contrast to what the Sears EDA promised. As depicted in Figure 3, Hoffman Estate’s non-TIF property value actually begins to grow at slower rates beginning in 1994, when compared to Palatine.
Prior research has suggested that commercial TIF District development has a cannibalizing impact on non-TIF commercial development in other areas of the municipality creating the TIF. This may be what happened in Hoffman Estates during this time period, since under the Sears EDA, Hoffman Estates subsidized Sears to develop land that was primarily vacant to create a new, commercial district.
6. Over the length of the Sears EDA, these positive impacts on EAV diminished significantly

To identify the long-term impact of the Sears EDA, this analysis extends to cover the five-year period occurring immediately after the initial completion of the Sears EDA in 2012, and into the beginning of the extension of the second Sears EDA signed in that same year. As shown in Figure 4, for the time period encompassing 1989 to 2017, development under the Sears EDA grew Total EAV in Hoffman Estates by the same 32.97 percent that it had when analyzing the short-run period of 1989 – 1998. This finding indicates that all the property value growth attributable to the Sears EDA was concentrated during the first 9 years of the TIF and did not extend beyond that. The Sears EDA’s impact on Total EAV in Hoffman Estates was material, but also quite limited in duration. Put another way, for the nineteen years of the Sears EDA occurring after 1998, development made under the Sears EDA had no impact at all on growing Total EAV in Hoffman Estates. Of more concern, in the nineteen-year period after 1998, including the additional five year period after the Sears EDA was extended in 2012, the rate of EAV growth in the non-TIF areas of Hoffman Estates attributable to development under the Sears EDA declined to just 10.96 percent in comparison to the control group. This result also fails to reach statistical significance, indicating that the true impact could have been zero or negative.
A Case Study on Economic Development Agreements: Did the Sears Mega-Deal Increase Economic Activity in Hoffman Estates

Figure 5 displays total EAV in Hoffman Estates from 1980 to 2017. After the first 9 years of the Sears EDA, the growth in EAV for Hoffman Estates starts to converge with that of the control group municipalities. Moreover, during the 19 years of the Sears EDA immediately following its initial nine years of existence, the positive impact of the Sears EDA diminished substantially. So much so, in fact, that the Sears EDA generates no tangible benefits for well over half of its total duration. Hence it should be no surprise that the TIF created under the Sears EDA generated only $25 million in property tax revenue by 2012 – or fully 50 percent less than the initial $50 million projection.

Non-TIF EAV fared significantly worse in comparison. While the Sears EDA had a positive short-term impact on total EAV in Hoffman Estates, the areas not located within the TIF District created under the Sears EDA struggled. In fact, by 1995 and continuing thereafter, EAV growth in the non-TIF areas of Hoffman Estates failed to keep pace with EAV growth in neighboring Palatine. Beginning in the year 1994 and continuing through 2017, EAV growth in non-TIF areas of Hoffman Estates underperformed all the other municipalities in the control group, as shown in Figure 6.
These results are consistent with the existing literature on the impact of TIF on property values. Initially, development under the Sears EDA generated material EAV growth for the property located within the TIF District it created. And due to the significant dollar value of the public subsidy under the Sears EDA, there was a concomitant material increase in total EAV within Hoffman Estates. But the positive impact on EAV of the Sears EDA was limited to the TIF District itself, as it generated no statistically significant spillover impact for non-TIF areas. Furthermore, the positive impact within the TIF District itself was time limited, occurring only within the first 9 years of the Sears EDA. After those initial 9 years, growth in total EAV normalized for Hoffman Estates, while non-TIF property values began to underperform in comparison.
7. The Sears EDA failed to satisfy its employment targets

The Sears EDA also promised that the publicly subsidized development it generated would improve employment outcomes for Hoffman Estates by generating 10,000 new jobs. The reality, however, was a far cry from what was supposed to happen. For the first nine years of the Sears EDA covering the 1989 to 1998 sequence, the size of the labor force in Hoffman Estates — i.e. the number of people who were either actively seeking or currently employed in the municipality — grew 1.9 percent slower than the control group, as shown in Figure 7.

Figure 7: Labor Force Regression From 1980-1998

<table>
<thead>
<tr>
<th></th>
<th>Labor Force</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hoffman Estates</td>
<td>-0.223***</td>
</tr>
<tr>
<td>Std. Err</td>
<td>-0.04</td>
</tr>
<tr>
<td>After</td>
<td>0.526***</td>
</tr>
<tr>
<td>Std. Err</td>
<td>-0.131</td>
</tr>
<tr>
<td>Hoffman * After</td>
<td>-0.019</td>
</tr>
<tr>
<td>Std. Err</td>
<td>-0.052</td>
</tr>
<tr>
<td>Observations</td>
<td>133</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.39</td>
</tr>
</tbody>
</table>

Note: Labor Force is log transformed. The models utilize robust standard errors and year fixed effects.

The long-term results are even worse. Including the full duration of the initial Sears EDA and its extension in 2012 through 2017, the size of the labor force in Hoffman Estates grew 2.5 percent slower than the control group, as shown in Figure 8.

Figure 8: Labor Force Regression From 1980-2017

<table>
<thead>
<tr>
<th></th>
<th>Labor Force</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hoffman Estates</td>
<td>-0.223***</td>
</tr>
<tr>
<td>Std. Err</td>
<td>-0.04</td>
</tr>
<tr>
<td>After</td>
<td>0.516***</td>
</tr>
<tr>
<td>Std. Err</td>
<td>-0.139</td>
</tr>
<tr>
<td>Hoffman * After</td>
<td>-0.025</td>
</tr>
<tr>
<td>Std. Err</td>
<td>-0.045</td>
</tr>
<tr>
<td>Observations</td>
<td>266</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.332</td>
</tr>
</tbody>
</table>

Note: Labor Force is log transformed. The models utilize robust standard errors and year fixed effects.

The results here are less clear as both impact estimates after the Sears EDA’s implementation (Hoffman * After) in both time periods are not statistically significant. The DID models measuring the impact of the Sears EDA on the labor force also only explain a small portion of the change in the size of the labor force as evidenced by the low Adjusted R²’s. The impact of the Sears EDA on employment is likely negative, but to what extent it had a causal relationship with employment seems limited. That said, whether or not
A Case Study on Economic Development Agreements: Did the Sears Mega-Deal Increase Economic Activity in Hoffman Estates

the development under the Sears EDA actually caused slower job growth, it sure failed to generate the promised growth of 10,000 jobs.

8. Conclusion

The development under the Sears EDA failed to live up to the expectations set forth at the outset. From 1989 to 1998, the development under the Sears EDA generated a statistically significant increase in the Total EAV of Hoffman Estates, increasing it by 32.97 percent. This, however, was primarily due to the significant dollar value ($242 million) of the public subsidies provided under the Sears EDA. But the positive impact on EAV of the Sears EDA was limited to the TIF District itself, as it generated no statistically significant spillover impact for non-TIF areas, in which EAV increased by only 11.96 percent over the same time period. Hence, property tax revenue did not grow as a function of greater property values being generated throughout Hoffman Estates, in contrast to what the Sears EDA promised.

The positive impacts that were generated in the first nine years of the Sears EDA diminished substantially in the following 19 years thereafter. In fact, after the first 9 years of the Sears EDA, the growth in Total EAV for Hoffman Estates not only slowed but actually began to converge with that of the Control Group municipalities, which were similar in composition to Hoffman Estates but did not employ an EDA over this sequence of time. For the non-TIF areas of Hoffman Estates, the results were even worse. Beginning in the year 1994 and continuing through 2017, EAV growth in non-TIF areas of Hoffman Estates underperformed all the other municipalities in the control group.

Labor force outcomes under the Sears EDA fared even worse. For the first nine years of the Sears EDA, covering the 1989 to 1998 sequence, the size of the labor force in Hoffman Estates grew 1.9 percent slower in comparison to the Control Group. For the full duration of the Sears EDA, including its extension through 2017, the size of the labor force in Hoffman Estates grew 2.5 percent slower than in the control group. The model suggests the impact of the Sears EDA on employment is likely negative, but to what extent it had a causal relationship with employment seems limited. That said, development under the Sears EDA failed to generate the promised growth of 10,000 jobs in Hoffman Estates.

Taking these findings into consideration, it’s apparent that the Sears EDA was ineffective. It failed to achieve its stated goals, falling well short of its own targeted outcomes.
A Case Study on Economic Development Agreements: Did the Sears Mega-Deal Increase Economic Activity in Hoffman Estates

APPENDICES

i. DID Model Overview

A DID model is a quasi-experimental statistical evaluation that analyzes changes between two groups who had exhibited similar behavior prior to an intervention by performing a linear regression. The group that receives the intervention or treatment is identified as the treatment group. The control group is the one that does not. By identifying groups with similar patterns prior to the treatment, the DID model can identify how much the treatment group has been affected by the intervention alone. The control group acts as a counterfactual, or as an example of how the treatment group would have performed without the intervention, as seen in Figure 9.

Figure 9: DID Model Structure

![DID Model Structure](image)

Source: Columbia University – Mailman School of Public Health

The DID model is ideal for a situation like the one presented by the Sears EDA with Hoffman Estates. First, we identify the municipalities that are most like Hoffman Estates. Once the municipalities are identified and the control group defined, the model identifies the impact of the EDA for all municipalities that engaged in one. After conducting the matching process, the municipalities that were identified for the control group were also ones that did not participate in any EDAs, leaving Hoffman Estates as the only one that did. This distinction allows for neatly performing a DID model that could produce well designed estimates of the impact of the EDA on Hoffman Estates alone, by having a distinct treatment group to compare to the control group. The Sears EDA was established in 1989. While construction on the Sears development was not slated to begin until 1990 and was not completed until 1992, for the purpose of this analysis, 1989 was used as the basis for implementation.

As the Sears EDA clearly outlined its potential impact, two parameters were chosen as ways of testing how effective the Sears EDA ultimately proved to be for Hoffman Estates: property values and employment. In order to assess the impact on property values, the EAV of property in each municipality throughout the State of Illinois was obtained via request from IDOR. This data contained the total amounts of the EAV of all properties within TIF districts (“TIF EAV”), outside of TIF districts (“non-TIF EAV”), and in combination (“Total EAV”) annually, from 1980 to 2017. IDES provided data on several
A Case Study on Economic Development Agreements: Did the Sears Mega-Deal Increase Economic Activity in Hoffman Estates

labor force statistics for 107 municipalities in the state. This dataset contained the total size of the labor force (“Labor Force”), the total number of employed individuals residing in a municipality (“Employed Residents”), the total number of unemployed individuals residing in a municipality (“Unemployed Residents”), and the local area unemployment rate (“Unemployment Rate”) for each municipality annually from 1974 to 2018. These two series of variables served as sources for both the matching process and performing the DID model.

ii. DID Matching Algorithm

Several key assumptions are necessary for the DID model to be effective at evaluating the impact of a treatment. Chief among these assumptions is the parallel trends assumption, which states that the treatment group should be exhibiting similar performance to the control group, prior to any treatment or intervention. This means that Hoffman Estates should be as similar as possible to a variety of other municipalities used as a comparison in the time period before the Sears EDA was agreed to. The matching algorithm generated municipalities with well identified parallel trends while simultaneously leaving only Hoffman Estates as a municipality that had engaged in any type of EDA. This created a sample that was effective for performing the DID model.

In order to produce matches that reflected broader characteristics of Hoffman Estates, additional information was collected. Annual information on the population and median income for municipalities was obtained from the United States Census Bureau. Population and median income in the years 1980, 1990, and 2000 were obtained from decennial census measures. From 2010 onwards, all subsequent estimates for population and median income were obtained from both decennial census measures and annual American Community Survey (ACS) estimates. For all intermittent years, population and median income were imputed. Good Jobs First's Subsidy Tracker provided data on the total number of subsidies provided by municipalities in Illinois by type and by amount of subsidy. This information was used for identifying if any municipalities that were utilized in the control group were also engaged in subsidy packages of the size used in the Sears EDA.

Using the data collected, the behavior of all the municipalities in our sample across were tracked across property value and labor force characteristics, as well as key demographic factors such as income and population size. This helped reduce bias by allowing municipalities to be similar to Hoffman Estates beyond the immediate measures of performance identified through the Sears EDA.

In order to do so, the following economic variables were converted into yearly growth rates for the years 1981 through 1988 (the pre-period):

- Total labor force
- Total employed residents
- Total unemployed residents
- Unemployment rate
- Total EAV
- Total TIF EAV
- Total non-TIF EAV
- Median income
- Population

For each of the variables listed, the minimum, median, maximum, mean, and variance of the growth rates for each municipality for the period encompassing 1981 through 1988 were calculated to identify the trends in each municipality.

The standard deviation of all these summary statistics were then calculated to provide a range for comparison to the summary statistics for Hoffman Estates. Then using Hoffman Estates' trends in the pre-
A Case Study on Economic Development Agreements: Did the Sears Mega-Deal Increase Economic Activity in Hoffman Estates

period as a baseline and the standard deviations as a range, municipalities were filtered by each economic variable for their similarity to the trends exhibited by Hoffman Estates.

As shown in Figure 10, the municipalities initially identified as matches (the dashed lines) performed similarly to Hoffman Estates (the solid line) in growth in property values prior to the establishment of the Sears EDA. This visualization confirms that the municipalities identified by the matching process make for good members of the control group when analyzing the impact of the Sears EDA on Hoffman Estates.

Figure 10: Total EAV for Hoffman Estates & Control Group 1980-1989

In addition to the municipalities that were identified as statistical matches via the matching algorithm, neighboring municipalities (those geographically abutting Hoffman Estates) were introduced to identify local trends. Elgin, IL and Palatine, IL, initially just outside the bounds of the matching algorithm, were introduced into the sample. As shown in Figure 11, these two municipalities exhibited trends that were similar enough to Hoffman Estates to qualify for our control group and were subsequently included in our analysis.
A Case Study on Economic Development Agreements: Did the Sears Mega-Deal Increase Economic Activity in Hoffman Estates

Figure 11: Total EAV for Hoffman Estates & Control Group 1980-1989

Matching across performance is a crucial element to satisfying the conditions necessary for the DID model. However, there are elements that contribute significantly to economic performance that are not immediately identifiable through the data used in the matching process alone. Validating the results of the matching process required identifying the geography of Hoffman Estates and the control group. Mapping the municipalities in the control group in relation to Hoffman Estates afforded the opportunity to identify what impact regional differences might have on economic performance and assess any potential bias in the results if large geographic differences were present. Several common factors emerged through the geospatial analysis.
Given the proximity of the statistically matched municipalities (in blue) and the geographically abutting municipalities (in green) to Hoffman Estates (in red) and then to each other as a whole, concerns about differences in economic performance being attributable to broader regional trends can be dismissed. As seen in Figure 12, the municipalities in the control group share geographic characteristics with Hoffman Estates: northeastern municipalities in the state of Illinois, suburban communities of Chicago (in gray), and reasonable proximities to O'Hare Airport (commutes within 35 minutes). This suggests that any unique regional trends in economic performance due to geographic factors are likely shared, thus diminishing the impact of a regional bias in the analysis.
A Case Study on Economic Development Agreements: Did the Sears Mega-Deal Increase Economic Activity in Hoffman Estates

### iii. DID Model Design

A DID model measures the performance of both control and treatment groups at a time before an intervention occurs and then once again after the intervention has taken place for the treatment group. It does so by identifying an overall trend for all groups and the treatment group itself while also comparing the change in the treatment group after the intervention takes place. These relationships can be expressed as a linear regression as shown in Figure 13.

![Figure 13: DID Model Design](image)

\[
Total\ EAV = \alpha + \beta_1Hoffman + \beta_2After + \beta_3After * Hoffman + \epsilon
\]

This regression generates numerical estimates of the impact of the treatment and of the general trend. The overall trend is identified through the coefficient on the After variable while the interaction between Hoffman * After identifies the impact of the Sears EDA on Hoffman Estates. Growth in the property value within the TIF District created by the Sears EDA would not be surprising given the substantial amount of subsidies contributed toward the development of the Sears’ headquarters in Hoffman Estates. Due to this, the DID model focuses on what impact the Sears EDA had on total property value in Hoffman Estates and on property values outside of the TIF District itself.

The data for EAV and labor force were log converted in order to provide a percentage increase in property value and size of the labor force in Hoffman Estates due to the presence of the Sears EDA. Due to this conversion, the estimates generated by the DID model require a calculation in order to be presented as a percentage increase, as shown in Figure 14.

![Figure 14: Percentage Increases Using Binary Variables and Log Transformed Dependent Variables](image)

\[
Percent\ Change = 100 * (\exp(\beta) - 1)
\]

Additionally, the DID models include yearly fixed effects, to minimize the impact of events outside of the model influencing the estimates of the Sears EDA’s impact. This helps the DID model account better for the impact of the Sears EDA itself while reducing the bias of events in individual years like large fluctuations in performance due to economic cycles or unique events like natural disasters.

![Figure 15: DID Model Design Including Year Fixed Effects](image)

\[
Total\ EAV = \alpha + \beta_1Hoffman + \beta_2After + \beta_3After * Hoffman + \beta_{1980} + \beta_{1981} + \cdots + \beta_{2017} + \epsilon
\]

As a result, the model utilized is more reflective of Figure 15, where individual years are identified as binary variables. Additionally, the model utilizes robust standard errors.
iv. Endnotes

A Case Study on Economic Development Agreements: Did the Sears Mega-Deal Increase Economic Activity in Hoffman Estates


https://www.goodjobsfirst.org/subsidy-tracker.