

# The Effect of Industrial Real Estate on Residential Real Estate Prices

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## Introduction

- The rise of E-commerce in this country over the past two decades has led to increasing demand within the industrial real estate market. Since its founding, Amazon's network of industrial fulfillment centers has grown to more than 100 facilities across the country.
- Residential housing values are a major aspect of the consumer's life that has the potential to be affected through the increased demand in industrial real estate.
- At the county-level, the installment of a fulfillment center generates roughly a 30% increase in jobs within warehousing and storage while increasing local job opportunities as well (Zhang, Chen, and Wang 2021, Grislain-Letrémy and Katosky 2014).
- Negative externalities such as increased traffic, pollution, and even health risks outweigh the positive externalities with respect to how they impact residential housing prices (Currie et al. 2013).

## Key Findings

- Overall, we find that the placement of an Amazon fulfillment center does not influence housing prices in the respective county or the surrounding ones.
- Controlling for Square Feet in this analysis shows that larger fulfillment centers negatively impact the growth in HPI for both treatment and control counties.

## Methods

- This analysis is conducted at the county-level with data from 31 counties with Amazon fulfillment centers and 115 surrounding counties, employing change Housing Price Index to measure housing prices.
- Our regression uses data for 3 years before the Amazon facility was built and 3 years after the facility begins operation for each group of counties containing control (surrounding) and treatment (with fulfillment center) counties:

$$HPI_{i,t} = \beta_0 + \beta_1 \text{fulfill}_{i,t} + \beta_2 \text{treatment}_{i,t} + \beta_3 \text{fulfill}_{i,t} * \text{treatment}_{i,t} + \beta_4 \text{SquareFeet}_{i,t} + \beta_5 \text{percap\_inc}_{i,t} + \beta_6 \text{pop}_{i,t} + \beta_7 \text{pov}_{i,t} + \beta_8 \text{rate30}_{i,t} + u$$

- $\text{fulfill}_{i,t}$  = indicates the presence of an Amazon fulfillment center in a group of counties
- $\text{treatment}_{i,t}$  = designates treatment counties which are a 1 for counties that actually have a fulfillment center present.
- $\text{SquareFeet}_{i,t}$  = size of fulfillment center (hundreds of thousands of square feet)
- $\text{percap\_inc}_{i,t}$  = annual average income per capita (tens of thousands of dollars)
- $\text{pop}_{i,t}$  = county population (tens of thousands of people)
- $\text{pov}_{i,t}$  = county poverty level (%)
- $\text{rate30}_{i,t}$  = annual national average for 30-year fixed mortgage rate
- $HPI_{i,t}$  = yearly percentage change in the Housing Price Index (base = 2000, HPI normalized to 100)

## Analysis

TABLE 1. Summary Statistics for Dependent Variable and Control Variables observations.

	Observations	Mean	Std. Dev.	Range
$HPI_{i,t}$	914	2.503	6.786	-31.111 - 34.003
$SquareFeet_{i,t}$	914	4.844	4.885	.64 - 12.5
$percap\_inc_{i,t}$	914	4.403	1.655	1.47 - 15.133
$pop_{i,t}$	914	46.686	70.319	.473 - 525.468
$pov_{i,t}$	914	23.362	17.847	11.509 - 80.363
$rate30_{i,t}$	914	4.713	1.052	3.65 - 8.05

TABLE 2. Difference-in-Differences regression on Percent Change in Housing Price Index.

	(1)	(2)	(3)	(4)	(5)
<b>fulfill</b>	.218 (.592)	3.731*** (1.393)	3.792** (1.459)	3.749** (1.493)	.875 (1.352)
<b>treatment</b>	.539 (1.146)	.539 (1.147)	.522 (1.114)	.536 (1.117)	.593 (.727)
<b>fulfill*treatment</b>	-1.136 (1.387)	-1.014 (1.397)	-1.079 (1.392)	-1.081 (1.393)	-1.064 (.935)
<b>Square Feet</b>		-.409*** (.134)	-.493*** (.138)	-.486*** (.144)	-.241* (.128)
<b>Per Capita Income</b>			.414*** (.138)	.439*** (.132)	-.338*** (.106)
<b>Population</b>			-.002 (.005)	-.002 (.005)	-.0002 (.003)
<b>Poverty Level</b>			.056*** (.008)	.056*** (.008)	-.012 (.069)
<b>30-year Mortgage</b>				.087 (.236)	
<b>Year Fixed Effects</b>	N	N	N	N	Y
<b># of counties</b>	914	914	914	914	914
<b>F-statistic</b>	0.27	3.14	17.96	15.67	39.54
<b>R<sup>2</sup></b>	0.001	0.022	0.065	0.065	0.551
<b>Root-MSE</b>	6.795	6.729	6.593	6.597	4.629

Notes: Used robust standard errors at the county-level. Year fixed effects regression conducted in column (5).

\*\*\* Significant at the 1% level.  
\*\* Significant at the 5% level.  
\* Significant at the 10% level.

## Results

- Regression (1) is a parsimonious difference-in-differences regression that suggests that the growth in HPI values do not differ between treatment and control counties after the opening of a fulfillment center.
- Regression (2) adds a control for the size of the fulfillment center (Square Feet). Controlling for Square Feet shows that there is an average of a .409% decrease in the growth of HPI for every extra 100,000 sqft. of facility size. Secondly, we see there is approximately a 3.731% increase in the growth of HPI in the 3 years following the opening of a fulfillment center for both the treatment and control counties.
- Regression (3) adds controls for county characteristics. fulfill and Square Feet remain significant in this regression. As the per capita income of a county increases by ten thousand dollars, there is an approximate .414% increase in the growth of HPI. Poverty Level carries significance positive coefficient. This is an odd result because poverty should seemingly contribute to a decline in housing values, but in this case, an increase in Poverty Level of 1% leads to a .056% increase in the growth of HPI on average.
- Regression (4) adds a control for the yearly national average 30-year mortgage rate, which is insignificant. Control coefficients are fairly consistent with regression (3).
- The last regression (5) adds year fixed effects to regression (3). This is probably the most useful regression in our analysis even though there are fewer significant variables present than in previous regressions. Square Feet remains significant but decreases in the magnitude of its overall impact on the growth of HPI. What is most interesting here is the shift to a negative coefficient in Per Capita Income (-.338). The lack of significance of the interact variable in this regression suggests that both treatment and control counties grow at similar rates following the opening of a fulfillment center, on average.

## Conclusion

- Both regression (3) and (5) demonstrate that larger Amazon fulfillment centers reduce the growth rate of housing prices in both the county where the center is located and the surrounding counties.
- Our analysis was limited to a select number of Amazon fulfillment centers and observing specifically Amazon facilities does not allow us to capture the entirety of the effect of industrial real estate assets on residential home prices.
- Several things could be done to sharpen this analysis such as: increasing the number of observations and types of industrial facilities in focus, narrowing the scope of the study using data within a small circumference from a facility, and even, gathering data on housing and neighborhood characteristics in areas being evaluated

## References

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