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Abstract

A modern land bank is a public entity that purchases and demolishes blighted housing to remove negative externalities. We estimate the impact of land bank demolitions on surrounding property values for a medium-sized municipality. Using a spatial correction hedonic model of house prices, we find modest increases in sales prices associated with land bank activity in a neighborhood. In general, the impact estimates we find are smaller than those found in the literature for a much larger metropolitan area. We speculate on the cause of this difference in findings.

Keywords: Land bank, spatial econometrics, property values.

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1 Introduction

Vacant, abandoned, and tax-delinquent properties impose negative externalities on surrounding properties (e.g. crime, fire and safety hazards, lower property values, and neighborhood destabilization). Under the right conditions, the private market will purchase and redevelop distressed properties. When the private market is unable or unwilling, local governments can use a land bank to redevelop distressed properties and address the negative externalities. Land banks are nonprofit organizations or governmental entities created to purchase abandoned and nonproductive real estate to return them to productive use and generate property tax revenue. As of April 2019, 21 states have at least one land bank in operation.[1]

Whether land banks are effective in reducing the negative externalities imposed on surrounding homes, and are able to recoup the costs involved, is an empirical question. Whitaker and Fitzpatrick (2016) provides the only estimate of land bank effectiveness in the literature; using house prices for the Cleveland area, they find that the demolition activity of the Cuyahoga County Land Bank increased sales prices of nearby homes by 3.4% for a total increase in market value of $200 million. It is an open question whether the impacts found in Cleveland are applicable to the many land banks created across the country. Important dimensions to explore heterogeneity in effects are the size of the municipality, and the scale and density of land bank activity. For instance, the Ohio General Assembly passed land bank authorization legislation in 2009, which led 41 counties and 1 municipality in the State to create land banks. However, only two of the land banks are in municipalities of similar size to Cuyahoga County.[2]

In this paper we apply the spatial correction hedonic price model used in Whitaker and Fitzpatrick (2016) to housing data for a medium-sized municipality covering the 2012-17 period - Butler County, Ohio (368,000 population). In contrast to their results, we find increases in sales prices of only half the magnitude (1.4% vs. 3.4%), and modest increases in the surrounding property values and taxes collected. In the discussion, we speculate on the reasons for the difference in findings.

2 Materials and Methods

For comparability, our specifications mimic those of Whitaker and Fitzpatrick (2016). We use a hedonic house price model that provides two ways to capture distance-weighted unobservable amenities and disamenities in the area surrounding a given house (Anselin, 1988). We briefly describe the intuition and estimation. A complete discussion of the model can be found in Whitaker and Fitzpatrick (2016).

$$\mathbf{P} = \lambda \mathbf{W_1 P} + \mathbf{ZB} + \mathbf{e} \tag{1}$$

[1]The Center for Community Progress, National Map of Land Banks and Land Bank Programs. Available at: http://www.communityprogress.net/land-bank-map-pages-447.php. Accessed April 24, 2019.

[2]Cuyahoga County (1.2 million); Hamilton County (Cincinnati) 800 thousand; and Franklin County (Columbus) 1.2 million population. The remainder of land banks are located in counties with population between 24,000 and 504,000, with the majority below 100,000 population.

$$\mathbf{e} = \rho \mathbf{W_2} \mathbf{e} + \mathbf{m} \tag{2}$$

$$\mathbf{m} \sim N(0, \sigma^2 \mathbf{I}). \tag{3}$$

where $\mathbf{P}$ is a matrix of log sales prices, $\mathbf{Z}$ is a matrix of a rich set of property- and sale-specific characteristics.[3] $\mathbf{W_1}$ and $\mathbf{W_2}$ are weight matrices meant to capture the unobserved amenities and disamenities that affect house prices with effects that vary inversely with distance.[4] The inclusion of prices of nearby home sales in Equation 1 captures the information contained in those prices about all the unobserved location specific amenities, where $\mathbf{W_1}$ places more weight on sales of nearby homes. Equation 2 allows for spatially correlated errors, with $\mathbf{W_2}$ putting more weight on error terms of nearby sales. We estimate the models and spatial parameters using a GMM procedure developed by Kelejian and Prucha (1999), for varying choices of the k nearest neighbors to include in the weighting matrices. Sales further than the k^{th} sale receive zero weight. We choose the preferred model with the lowest residual sum of squares (RSS).

Data on land bank purchases and demolitions come directly from the Butler County Land Reutilization Corporation. We measure a sale's exposure to land bank activity within 500 feet by creating three variables: the count of properties that will become land bank demolitions in the future (pre-land bank), the count of properties acquired by the land bank but not yet demolished (land bank acquired), and the count of land bank demolitions.[5] Pre-land bank demolitions capture the negative externality imposed on nearby properties by the parcels that the land bank will eventually purchase and demolish. The count of land bank acquired properties is meant to capture any removal of the negative externalities that occurs without actually demolishing the home. For example, residents might believe the land bank will take better care and upkeep of the distressed property than the previous owners. The main interest of this paper is the difference in the coefficients on the pre-land bank demolitions and the land bank demolitions variables, which captures the reduction in negative externalities associated with land bank demolitions.

Data on sales prices, property characteristics, foreclosures, demolitions, assessment values, taxes paid, and tax delinquencies were provided by the Butler County Auditor's office.[6] Census tract poverty rates and proportion of population with a Bachelor's degree or higher are from American FactFinder (U.S. Census Bureau). In addition to house characteristics,

[3]See Appendix Table A1 for a full list. These include: year of construction, condition, rooms, heating, style, and month of sale indicators, among others.

[4]We use the same weight matrix as Whitaker and Fitzpatrick (2016) based on the inverse distance of the k-nearest neighbors. For a matrix where $k = 3$, sale A is 25 feet from sale B, 50 feet from sale C, and 100 feet from sale D. The weights for sale A would be calculated as:
$\frac{\frac{1}{25}}{\frac{1}{25}+\frac{1}{50}+\frac{1}{100}} Price\ B + \frac{\frac{1}{50}}{\frac{1}{25}+\frac{1}{50}+\frac{1}{100}} Price\ C + \frac{\frac{1}{100}}{\frac{1}{25}+\frac{1}{50}+\frac{1}{100}} Price\ D$

[5]For a given home sale, each land bank parcel within 500 feet is placed into one of these three mutually exclusive variables based on the sales date and the purchase and demolition dates of the land bank parcel. For example, suppose that a land bank parcel was purchased by the land bank on March 1, 2015 and the building demolished on August 1, 2015. This parcel would increment the pre-land bank count for any sale prior to March 1, 2015. It would increment the land bank acquired count for any sale between March 1 and August 1, 2015. Finally, any sale occurring after August 1, 2015 would have the land bank demolished count incremented.

[6]Butler County Ohio Auditor's Office (2018) http://www.butlercountyauditor.org/GIS_DATA. Accessed on August 30, 2018.

all models include the count of foreclosures within 500 feet over the passed year, and a set of indicators for if the observation is a recent foreclosure, tax delinquent at time of sale, or is a future non-land bank demolition. We limit our sample to only include valid arm's length transactions. Sales to related individuals, to banks holding notes, by sheriff's sale, or of land bank treated parcels are excluded.

3 Results

Table 2 reports estimates of the impact of land bank activity on sales prices allowing for spatial dependence. The number of k-nearest neighbors used to estimate the model varies across columns. Across all specifications, both λ and ρ are positive and significant, which implies that house prices are spatially dependent, and error terms are spatially correlated; nearby sales contain information about unobserved location specific factors.

Results are similar across all specifications. The preferred model uses 15 nearest neighbors, which has the lowest RSS. At values for $k > 20$, RSS continues to increase. The coefficients from the $k = 15$ model suggest that each property eventually purchased by the land bank imposed a statistically significant 6 percent (-0.0599) negative externality on nearby home prices. This isn't surprising as the land bank's purpose is to redevelop the worst properties that private developers are uninterested in. However, we do not find strong evidence that land bank purchases or land bank demolitions removed a substantial portion of the negative externality; the coefficients on land bank acquired and land bank demolitions are both negative and statistically significant. The difference in pre-land bank demo and land-bank acquired coefficients is 0.66%, but is not statistically significant. The point estimates suggest that an additional land bank demolition increased the sale's price by 1.64% $[-.0436 - (-0.0599)]$, but again the difference is not statistically significant ($P = 0.282$). The 95% confidence interval ranges from -1.35 to 4.62 percent.

The bottom of Table 2 reports value recovery estimates. In the absence of any land bank activity the negative externality of the distressed properties would have continued. The value recovered in actual sales is estimated by multiplying the point estimate for the treatment effect of a single demolition by the count of actual land bank demolitions within 500 feet of each sale multiplied by the actual sales price, and summed over the entire dataset of sales from 2012-2017. The remainder of the rows repeat the process using the sample of *all* single-family residential housing in Butler County to estimate the increase in property tax collections and market value recovered for unsold homes.

The estimates from the preferred model suggest that land bank demolitions increased sales prices of nearby homes by a total of $505 thousand dollars. Assuming that the increased property values were transmitted immediately to assessed values, the county experienced an annual increase in taxes assessed of $227 thousand. The third row adjusts the estimated increase in taxes assessed by the 2017 proportion of taxes paid for each parcel. Taxes collected are estimated to increase by $186 thousand annually. Finally, the largest value recovery is in increased market values of unsold nearby properties. Land bank demolitions added an estimated $9.1 million dollars to the market value of residential property.

4 Discussion

In general, we find that land bank demolitions in Butler County caused modest but imprecisely estimated reductions in the negative externalities associated with blighted housing. However, the confidence interval includes both large increases in price and small decreases in price. In any case, the value recovered by unsold homes must be taken into account for the program to pass a cost-benefit analysis. The Butler County Land Bank spent $7.3 million dollars over the five years included in the sample. It would take the county 39 years to recover the expenditures from the additional taxes collected on an annual basis. However, our benefit calculations might be understated to the extent that harm reduction from distressed properties is not capitalized into home values within 500 feet, or residents further than 500 feet from land bank demolitions also experience gains.

The primary purpose of this paper has been to document the effect of land bank activity on surrounding property values for a medium-sized county in the Rust Belt. The only other estimate in the literature is for a large metropolitan county. Whitaker and Fitzpatrick (2016) finds that the Cuyahoga County (Cleveland) land bank *fully* removed the externalities of the blighted housing and increased prices by 3.4% for sales within 500 feet of a demolition. The difference in estimates might be driven by the fact that Butler County tended to demolish homes with much larger estimated externalities on average (6% vs. 3.4% in Cleveland). Moreover, Cuyahoga County's land bank demolished a larger number of properties and tended to cluster those demolitions closer in space. Thus, the positive impacts from land bank demolitions might be larger when contiguous properties are combined and redeveloped together. We leave to future work to further explore the causes of potential heterogeneous effects of land bank demolitions across metro areas.

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5 Tables

Table 1: Summary statistics

	Median	Mean	SD	Min	Max
Log Sale Price	12.07	12.02	0.59	6.91	14.31
Sale Price	175,410	194,290	110,430	1,000	1,645,000

Counts in 500-foot buffers	Mean	SD	Min	Max	Sales with counts > 0
Pre-Land Bank	0.02	0.30	0	12	268
Land Bank Acquired	0.01	0.14	0	4	190
Land Bank Demolished	0.03	0.36	0	13	314
Foreclosure	2.30	3.59	0	33	15,330

Aggregate values	$ Millions
Sales Prices (01/2012 - 08/2018)	4,958.3
Taxes Assessed (2018)	317.8
Taxes Collected (2018)	312.7
Market Value (2018 Appraised Value)	16,079.4

Notes: Sales (N=25,520) represent all valid arms-length sales of single-family homes in Butler County, Ohio between January 2012 and August 2018. Counts are of land bank activity or foreclosures within 500 feet of the sale.
Sources: Data on land bank demolition activity provided by the Butler County Land Reutilization Corporation. Sales, foreclosure, tax, and market value data provided by the Butler County Auditor's Office.

Table 2: Spatial Correction Hedonic Price Models

	(1) $k = 5$	(2) $k = 10$	(3) $k = 15$	(4) $k = 20$
Pre-Land Bank Demo	-0.0670***	-0.0612***	-0.0599***	-0.0564***
	(0.0109)	(0.0108)	(0.0105)	(0.0107)
Land Bank Acquired	-0.0516**	-0.0480*	-0.0533**	-0.0561**
	(0.0250)	(0.0252)	(0.0253)	(0.0254)
Land Bank Demo	-0.0521***	-0.0497***	-0.0436***	-0.0425***
	(0.0128)	(0.0125)	(0.0127)	(0.0129)
Foreclosures	-0.0146***	-0.0138***	-0.0132***	-0.0125***
	(0.000785)	(0.000786)	(0.000779)	(0.000783)
Lambda (λ)	0.159***	0.181***	0.196***	0.214***
Rho (ρ)	0.300***	0.435***	0.499***	0.555***
RSS	1201.2	1199.3	1197.7	1198.0
Observations	25,520	25,520	25,520	25,520
Estimated treatment effect on sale price (in percent)				
Point Estimate	1.49	1.15	1.64	1.39
Upper Bound	4.56	4.16	4.62	4.41
Lower Bound	-1.60	-1.86	-1.35	-1.63
Value recovery estimates ($1,000s)				
Sales Prices	550.6	439.6	505.1	377.5
Taxes Assessed	206.5	160.0	227.4	193.2
Taxes Collected	169.3	131.1	186.4	159.4
Market Value	8,302.1	6,431.2	9,142.7	7,768.8

Notes: Estimated coefficients are from regressions of log sales prices on counts of land bank properties with standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1. Each regression includes controls for distressed status of the property, decade, quality, and style of construction, condition, exterior material, heat type, # of beds, # of baths and half baths, attic, fireplace, size of lot, year and month of sale, and the census tract poverty rate and proportion with a Bachelor's degree or higher.
Sources: Data on land bank demolition activity provided by the Butler County Land Reutilization Corporation. Sales, property characteristics, foreclosure, tax, and other demolition data provided by the Butler County Auditor's Office. Census tract poverty rate and proportion of population with a Bachelor's degree or greater provided by American Fact Finder.

6 Figures

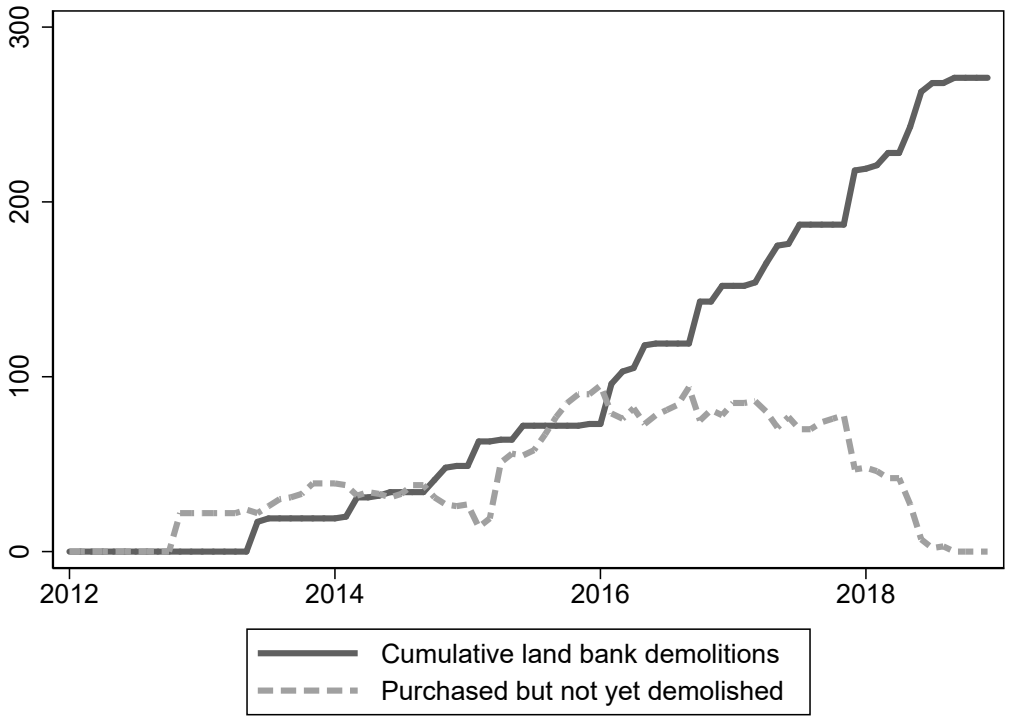

Figure 1: Time series of Butler County land bank demolition activity

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Supplemental Appendix

Table A1 reports the full results from our favored spatial correction hedonic price model of home sale prices in Butler County, Ohio. The coefficients are interpreted as that characteristic causing a percent change in the sales price. For example, the estimated coefficient for "Fireplace" is 0.058, which is interpreted as a house having a fireplace as increasing the market price of the home by 5.8 percent.

Table A1: Full list of coefficients from 15-nearest neighbor mixed model

	Coef.	SE	t-value	p-value
Pre-Land Bank	-0.060***	0.011	-5.696	0.000
Land Bank Acquired	-0.053*	0.025	-2.105	0.035
Land Bank Demolished	-0.044***	0.013	-3.429	0.001
Foreclosures	-0.013***	0.001	-16.939	0.000
House is a Recent Foreclosure	0.025***	0.007	3.445	0.001
House is Tax Delinquent	0.027	0.070	0.389	0.697
House is a Pre-Other Demolition	-0.063***	0.016	-3.906	0.000
Fireplace	0.058***	0.004	15.192	0.000
Pre-1910	-0.023	0.023	-1.039	0.299
1910-1919	0.012	0.027	0.450	0.653
1920-1929	0.075***	0.018	4.259	0.000
1930-1939	0.042*	0.019	2.228	0.026
1940-1949	0.004	0.013	0.323	0.747
1960-1969	-0.022**	0.008	-2.867	0.004
1970-1979	-0.006	0.008	-0.719	0.472
1980-1989	0.027**	0.009	3.040	0.002
1990-1999	0.095***	0.009	10.411	0.000
Post-2000	0.191***	0.010	18.482	0.000
Condition poor	-0.669***	0.073	-9.177	0.000
Condition fair	-0.286***	0.015	-19.086	0.000
Condition good	0.113***	0.005	20.629	0.000
Condition very good	0.236***	0.007	35.390	0.000
Construction AA	0.382***	0.017	22.891	0.000
Construction A+	0.512***	0.020	25.368	0.000
Construction A-	0.329***	0.013	25.534	0.000
Construction B+	0.260***	0.009	28.255	0.000
Construction B	0.176***	0.006	27.441	0.000
Construction B-	0.100***	0.005	19.277	0.000
Construction C	-0.097***	0.005	-20.255	0.000
Construction C-	-0.194***	0.010	-18.936	0.000
Construction below C-	-0.202***	0.018	-11.275	0.000
Exterior brick	0.051***	0.005	9.994	0.000
Exterior wood	0.027***	0.006	4.248	0.000
Exterior other	0.034***	0.004	8.709	0.000

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Table A1 – *Continued from previous page*

	Coef.	SE	t-value	p-value
Heat forced air (AC)	0.076***	0.010	7.842	0.000
Heat pump	0.073***	0.011	6.572	0.000
Heat other	0.191***	0.039	4.962	0.000
Rooms four	0.132	0.119	1.111	0.267
Rooms five	0.204	0.119	1.714	0.087
Rooms six	0.283*	0.119	2.377	0.017
Rooms seven	0.333**	0.119	2.792	0.005
Rooms eight	0.350**	0.119	2.930	0.003
Rooms nine+	0.385**	0.119	3.226	0.001
Baths two	0.125***	0.005	22.870	0.000
Baths three+	0.256***	0.007	35.939	0.000
Half baths one	0.087***	0.004	20.052	0.000
Half baths two+	0.141***	0.007	19.301	0.000
Bedrooms two	-0.046	0.044	-1.040	0.298
Bedrooms three	0.047	0.045	1.048	0.295
Bedrooms four	0.087	0.045	1.954	0.051
Bedrooms five+	0.152***	0.046	3.299	0.001
Attic finished	0.049*	0.023	2.131	0.033
Attic unfinished	0.060***	0.012	5.041	0.000
Style cape cod	0.054***	0.012	4.589	0.000
Style other	-0.022***	0.005	-4.448	0.000
Style ranch	0.079***	0.006	13.219	0.000
Lot small	-0.021***	0.004	-4.807	0.000
Lot large	0.061***	0.004	15.300	0.000
College Degree (% in tract)	-0.000*	0.000	-2.284	0.022
Poverty (% in tract)	-0.001**	0.000	-3.019	0.003
12-Feb	0.025	0.023	1.077	0.282
12-Mar	0.055*	0.028	1.972	0.049
12-Apr	0.048*	0.023	2.112	0.035
12-May	0.110***	0.022	4.900	0.000
12-Jun	0.162***	0.021	7.618	0.000
12-Jul	0.251***	0.023	10.707	0.000
12-Aug	-0.028	0.029	-0.958	0.338
12-Sep	0.016	0.025	0.665	0.506
12-Oct	0.028	0.024	1.181	0.238
12-Nov	0.072**	0.024	2.976	0.003
12-Dec	0.109***	0.025	4.323	0.000
13-Jan	0.155***	0.023	6.591	0.000
13-Feb	0.239***	0.026	9.116	0.000
13-Mar	-0.041	0.027	-1.479	0.139
13-Apr	0.018	0.021	0.870	0.384
13-May	0.046*	0.023	1.995	0.046

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Table A1 – *Continued from previous page*

	Coef.	SE	t-value	p-value
13-Jun	0.082***	0.022	3.669	0.000
13-Jul	0.144***	0.020	7.146	0.000
13-Aug	0.187***	0.020	9.136	0.000
13-Sep	0.223***	0.022	9.968	0.000
13-Oct	0.004	0.021	0.207	0.836
13-Nov	0.040	0.021	1.917	0.055
13-Dec	0.054*	0.022	2.461	0.014
14-Jan	0.088***	0.022	4.064	0.000
14-Feb	0.121***	0.021	5.863	0.000
14-Mar	0.189***	0.021	8.961	0.000
14-Apr	0.248***	0.022	11.465	0.000
14-May	0.013	0.021	0.616	0.538
14-Jun	0.051*	0.020	2.512	0.012
14-Jul	0.076***	0.020	3.765	0.000
14-Aug	0.106***	0.020	5.215	0.000
14-Sep	0.135***	0.020	6.768	0.000
14-Oct	0.196***	0.020	9.719	0.000
14-Nov	0.284***	0.021	13.684	0.000
14-Dec	0.009	0.021	0.436	0.663
15-Jan	0.049*	0.020	2.396	0.017
15-Feb	0.072***	0.020	3.567	0.000
15-Mar	0.104***	0.020	5.207	0.000
15-Apr	0.166***	0.020	8.401	0.000
15-May	0.220***	0.020	11.095	0.000
15-Jun	0.292***	0.021	14.108	0.000
15-Jul	0.016	0.021	0.753	0.451
15-Aug	0.066**	0.020	3.247	0.001
15-Sep	0.075***	0.020	3.790	0.000
15-Oct	0.092***	0.020	4.591	0.000
15-Nov	0.160***	0.020	7.942	0.000
15-Dec	0.233***	0.020	11.416	0.000
16-Jan	0.316***	0.021	15.030	0.000
16-Feb	0.016	0.020	0.780	0.435
16-Mar	0.062**	0.020	3.086	0.002
16-Apr	0.073***	0.021	3.557	0.000
16-May	0.105***	0.021	4.994	0.000
16-Jun	0.152***	0.020	7.419	0.000
16-Jul	0.219***	0.020	10.854	0.000
16-Aug	0.284***	0.022	13.116	0.000
16-Sep	0.038	0.021	1.825	0.068
16-Oct	0.055**	0.021	2.666	0.008
16-Nov	0.084***	0.021	4.045	0.000

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Table A1 – *Continued from previous page*

	Coef.	SE	t-value	p-value
16-Dec	0.112***	0.020	5.561	0.000
17-Jan	0.148***	0.021	7.083	0.000
17-Feb	0.242***	0.021	11.671	0.000
17-Mar	0.018	0.021	0.840	0.401
17-Apr	0.059**	0.022	2.718	0.007
17-May	0.059**	0.021	2.837	0.005
17-Jun	0.109***	0.021	5.071	0.000
17-Jul	0.158***	0.020	7.763	0.000
17-Aug	0.225***	0.021	10.589	0.000
17-Sep	0.029	0.021	1.366	0.172
17-Oct	0.067**	0.021	3.144	0.002
17-Nov	0.086***	0.023	3.759	0.000
17-Dec	0.110***	0.022	5.089	0.000
18-Jan	0.181***	0.021	8.548	0.000
18-Feb	0.267***	0.022	12.387	0.000
18-Mar	0.020	0.023	0.865	0.387
18-Apr	0.065**	0.021	3.074	0.002
18-May	0.071**	0.022	3.253	0.001
18-Jun	0.140***	0.022	6.482	0.000
18-Jul	0.177***	0.021	8.382	0.000
18-Aug	0.251***	0.022	11.461	0.000
Intercept	8.753***	0.163	53.623	0.000
Lambda	0.196***	0.009	22.040	0.000
Rho	0.499***	0.013	39.840	0.000

Notes: Estimated coefficients are from regressions of log sales prices on counts of land bank properties with standard errors in parentheses: *** p<0.01, ** p<0.05, * p<0.1. Each regression includes controls for distressed status of the property, decade, quality, and style of construction, condition, exterior material, heat type, # of beds, # of baths and half baths, attic, fireplace, size of lot, year and month of sale, and the census tract poverty rate and proportion with a Bachelor's degree or higher.
Sources: Data on land bank demolition activity provided by the Butler County Land Reutilization Corporation. Sales, property characteristics, foreclosure, tax, and other demolition data provided by the Butler County Auditor's Office. Census tract poverty rate and proportion of population with a Bachelor's degree or greater provided by American FactFinder (U.S. Census Bureau).