The Value Impact of New Residential Construction and Neighborhood Disinvestment on Residential Sales Price

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Abstract. **The topic of neighborhood redevelopment is central to residential appraisal and the lending process. We examine both the effect of neighborhood upgrading and decline, captured by subsidized new residential construction and sustained property tax delinquency respectively, on the sales price of one-to-two family homes. The research uses a two stage hedonic price model of 12,100 individual residential sales in Cleveland, Ohio during 1992–94. Results show a significant positive effect of $670 on the sales price of existing housing for each new unit built in a one-to-two block area. A decrease in sales price of $778 is associated with a 1% increase in the tax delinquency rate. The spatial variability of these effects is also explored.**

Introduction

The topic of neighborhood transition is central to the work of the appraiser and the underwriter. Certain land uses can affect the values of existing properties nearby. These effects can be seen as desirable or undesirable depending on whether they affect the value of existing homes in a positive or negative way. Thus, the determination of these effects is a central consideration in the process of appraising the value of properties as well as determining underwriting considerations.

The purpose of this article is to assess the effects of new residential construction and neighborhood disinvestment (proxied by property tax delinquency) on the sales price of existing homes. This is important for lenders and appraisers engaged in central city neighborhoods experiencing new development or decline. This study pertains directly to locales such as Cleveland where new government-subsidized market-priced housing is being built in economically depressed areas where the new housing is substantially more expensive than existing units, and is thus expected to act as a positive externality. This research uses a hedonic price model of a cross section of 12,100 residential sales in Cleveland, Ohio pooled over the 1992–94 period. Most of the new units received

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development subsidies and were built in declining neighborhoods and/or those with available empty lots.

Previous Studies

The effects of neighborhood factors on the value of nearby properties have been systematically examined in the literature. For instance, the negative proximity influence of underground storage tanks (Simons, Bowen and Sementelli, 1996), landfills (Pettit and Johnson, 1987; Cartee, 1989; Nelson, Genereux and Genereux, 1992) and air pollution (Ridker and Henning, 1967) have been analyzed. A number of factors reflecting a neighborhood's social fabric have also been examined. These include racial considerations (Nourse, 1976; Vandell and Zerbst, 1984; Holmes and James, 1994) and crime and vandalism (Li and Brown, 1980). As a rule, undesirable traits (*e.g.*, pollution and crime) have been found to have a negative effect on house prices, and desirable traits have been found to have positive effects.

There seems to be some consensus in the literature about two aspects of these neighborhood effects, in particular with regard to residential uses (Varady, 1986). First, new housing concentrated in a particular block is more likely to have an impact on property values in the surrounding areas (Segal, 1977). This suggests that there is a correlation between the concentration of a large number of new units and the value of nearby existing properties. Second, even if an effect is present, the geographic impact of most new housing is expected to be limited (DeSalvo, 1974; Dear, Fincher and Currie, 1977; Quigley, 1982; Varady, 1986). These contentions, however, must be taken with caution because they refer mostly to the effect of subsidized housing.

In general, studies have used hedonic price methodology to assess the effect of neighborhood land uses on nearby properties. Hedonic approaches are based on the assumption that the selling price of an individual house can be expressed as a function of a set of components. Components or attributes can be divided into two parts: structural and neighborhood specific (Goodman, 1978). Structural components are those contained in the physical structure of the dwelling unit and lot. Neighborhood components pertain to off-site neighborhood attributes.

The assumption in most existing studies is that the effects of structural housing attributes are equally important within the broad housing market. Can (1990) shows that this assumption is incorrect, and that the influence of structural attributes on prices is characterized by spatial variability. The author uses expansion methodology to address the issues of spatial variability as well as spatial dependence (autocorrelation), which arise from the fact that there may be a clustering of similar or dissimilar values in geographic space. The author allows the contribution of structural attributes to price take different values, corresponding to variations in socioeconomic and environmental factors across the study area, which are captured with a neighborhood quality index (Can, 1990; p. 256). Although the emphasis is on the measurement of spatial variability in the price impact of structural attributes, one of the specifications in Can includes both structural and neighborhood attributes.

As the effect of structural attributes on price may vary depending on location, neighborhood attributes may also depend largely upon other neighborhood factors. For instance, the level of new construction in a neighborhood may be affected by sales price because higher prices can be seen as representing a desirable location, with larger potential builder profit. Similarly, housing disinvestment in an area may be associated with lower prices due to high crime, pollution or other undesirable traits. More generally, potential endogeneity of these effects at the neighborhood level can affect the pricing behavior of owners of existing units, as well as builders of new ones, and thereby are the result of, and lead to further, the process of neighborhood change (Rothenberg, Galster, Butler and Pitkin, 1991).

In this study, we test these contentions by considering both structural and neighborhood attributes in the empirical analysis. To capture the effect of both neighborhood downgrading and upgrading on the sale price of existing residential properties, two neighborhood factors are selected for close examination: housing disinvestment and new construction. These variables are assumed *a priori* to be endogenous, and are modeled using a two-stage approach. Parcel-level data from Cleveland, Ohio are used, which allow estimation of the proximity of disinvested properties and new subsidized residential construction to each property sold.

Theoretical Considerations and Model Specification

The examination of neighborhood effects on house prices is done within the hedonic price framework. The common view is that housing is a durable good, existing in long-run market equilibrium. On this basis, hedonic price coefficients can be interpreted as shadow prices that reflect streams of returns from given attributes of the house. Hedonic approaches are based upon the assumption that the selling price of an individual house can be expressed as a function of a set of components that are thought to contribute to that price.

The hedonic price of a given component is a reduced-form measure, an interaction of supply and demand market forces in the housing market. Following Goodman (1978), we estimate a general hedonic form expressed as a function of housing components, in a given submarket, at a given time. These hedonic prices are not necessarily long-run equilibrium supply prices, but rather a set of market prices that reflect the composition and location of existing stock of residential capital and neighborhood components. For the purpose of analysis, we define a housing submarket as a neighborhood.

Following Holmes and James (1994), house prices can be expressed as the interaction of supply and demand factors. The subscripts i and t, identifying the submarket and time respectively, have been omitted to simplify the presentation. Assume the functional forms of the supply and demand equations are:

$$q_D=f(S_o, P_h, M, P) \tag{1}$$

$$q_S=f(S_o, P_h, R, M, P, F) \tag{2}$$

and the equilibrium condition to be:

$$q_S=q_D=q \tag{3}$$

where:

q_S = Quantity supplied
q_D = Quantity demanded
P_h = Matrix describing structural attributes of the unit including lot and building
S_o = Matrix describing neighborhood attributes including crime, location, housing abandonment and new construction
M = Population change
R = Risk associated with investing in housing
P = Sales price of homes
F = Financial considerations

In structural form, the equations become:

$$q_D=J_1S_o+J_2P_h+J_3M+e_D, \tag{4}$$

$$q_S=Z_1S_o+Z_2P_h+Z_3R+Z_4M+Z_5P+Z_6F+e_S. \tag{5}$$

Given the equilibrium condition $q_D=q_S=q$, we can rearrange as:

$$J_1S_o+J_2P_h+J_3M+e_D=Z_1S_o+Z_2P_h+Z_3R+Z_4M+Z_5P+Z_6+F+e_S. \tag{6}$$

Solving this equation for *PRICE*, yields the reduced-form equation:

$$P=((J_1-Z_1)/Z_5)S_o+((J_2-Z_2)/Z_5)P_h+((J_3-Z_4)/Z_5)M+(Z_3/Z_5)R+(Z_6/Z_5)F$$
$$+(e_D-e_S/Z_5). \tag{7}$$

The terms in parentheses in Equation 7 can be relabeled to yield the reduced-form model, which represents the determinants of house price in theoretical form.

$$P=\beta_1S_o+\beta_2P_h+\beta_3M+\beta_4R+\beta_5F+e. \tag{8}$$

Model Specification

In the multiple regression hedonic model, the unit of observation is individual units and the dependent variable is sales price. Proximity to new housing construction and disinvestment, captured by property tax delinquency, are included among the independent variables. The model employs the Box-Cox power transformation, λ, for the dependent variable. The hedonic model operationalizes Equation (8), with the general form:

$$PRICE^{\lambda}=\beta_0+\beta_1 UNIT+\beta_2 TRACT+\beta_3 HOUSINDEX+\beta_4 NEWCONSTR+\beta_5 DELINQ+e, \quad (9)$$

where the notation is:

- *PRICE* = Sales price of the residential unit, and the λ is determined for the Cleveland market;[1]
- *UNIT* = A vector of housing unit and lot characteristics, including building square footage, condition, year of construction, bathrooms, fireplaces, garages, double (duplex unit) and style; and lot frontage and depth (P_h in Equation 8);
- *TRACT* = Census tract is used as a proxy for a vector of neighborhood locational characteristics including distance to CBD, income, poverty, race and crime rates (S_o in Equation 8);
- *HOUSINDEX* = Proxies for the spring, summer, fall and winter sales seasons, and the calendar year dummy variables over the study period (F and R in Equation 8);
- *NEWCONSTR* = A variable measuring the number of new housing starts in the immediate area; and
- *DELINQ* = A variable measuring neighborhood disinvestment (extended tax delinquency) in the immediate area.

Because of potential endogeneity problems, two stage least squares is employed for the key neighborhood variables: new construction and property tax delinquency. However, new construction is found to be poorly explained by other neighborhood variables in the model: adjusted R^2 values of models with new construction as a dependent variable with all tract and neighborhood variables as independent variables are in the range of .01 to .02, depending on year. This suggests new construction in the city may be largely determined by nonmarket factors such as political considerations. The actual values of new construction are used in final regression models. Property tax delinquency in the map book page are relatively well explained by other neighborhood variables in the model (adjusted R^2 of .43 to .46). Its predicted values are used in the regression models here.[2]

We expect that the positive externality of being located near new housing construction would increase the value of existing units. This effect should be capitalized into the sales price, and should be observable in the new construction variable's β coefficient. In theory, new construction could compete directly with existing housing in its own market segment, or indirectly by filtering through linked submarkets, thus potentially depressing the sales price of a nearby existing unit by increasing supply while holding demand constant. However, we do not expect this to be the case in Cleveland because the difference in average price between new units (over $90,000) and existing units

($35,100) is so large that it precludes direct competition. Due to the short time period between new construction and observed sales (a few years), and substantial price difference, the supply-related effects of new residential construction are not expected to be measurable in the coefficient.

Data and Variables

The Cuyahoga County Auditor/Amerestate database contains detailed parcel-by-parcel information on many physical and financial characteristics of all residential and commercial property in the county. Information on 12,100 single-family and duplex sales in the city over the 1992–94 period is used. Only sales with complete data and a sales price over $5,000 are considered. Data for each sale include sales price and approximately twenty physical characteristics of each unit's lot and structures. Because of the large data set, degrees of freedom are not a limitation. Hence, many property attributes based on the county assessor's records (*e.g.*, unit condition, basement, external wall) are specified as dummy variables, rather than as an index or ordinal scale. While this may appear to increase the number of variables in the model, results are more precise because the effects between intervals may not be equivalent.[3]

Neighborhood demographic characteristics were obtained from 1980 and 1990 U.S. Census data. These were generally measured on the tract level, and include income, poverty, race and other demographics. Crime rate and distance from the central business district were also reported on the tract level. Property tax delinquency in excess of 15% (an indicator of neighborhood disinvestment), was reported on the map book page level, and was obtained from the Cuyahoga County Auditor.

Summary data on thirty-three new housing projects initiated through January 1995 were provided by the Department of Community Development in Cleveland. It should be noted that nearly all new housing projects in the city are heavily subsidized by city government. For example, a typical new "market rate" housing unit would cost $130,000 to develop and build, but after city subsidy of $25,000 per unit, would be sold for $105,000. Personal communications with local not-for-profit developers provided the location and actual status of many of the larger projects, including announcement date, sales price, and number of units under construction and completed. The County Auditor provided a list of new group and scattered site housing construction in the city for 1992–93. The project location and timing were confirmed by the research team using the County Auditor's property tax map records.

A sale was determined to be "close" to new construction if it was in the same county auditor's "map book page" (*e.g.*, one-to-two blocks). This is the standard distance used in this study. The number of residential sales that were close to new construction was not that large. In most map book pages (there are 2,100 citywide) no new construction occurred: just over 100 pages had new housing construction. A total of ninety-seven residential sales occurred where new construction was present and active during 1992–94. If the zone of influence around new construction is expanded to four-to-five blocks, over 350 sales occurred during the same period.

Exhibit 1 includes a description of all the variables used in the model. The mean residential sales price is $35,100. Unit characteristics includes a mean 40 feet of lot frontage, 3.0 bedrooms, 1.3 baths, a mean age of 66 years and 1,380 square feet of living space. Neighborhood/tract attributes featured an average income of $21,700, and a 4% decrease in tract population between 1980 and 1990.

We cleaned the data and performed several diagnostic tests, including univariate analysis and functional form, influential outliers, multicollinearity and scatterplots for heteroskedasticity. Where necessary, the appropriate adjustments were made.[4] However, no adjustments were made to account for the potential effects of spatial autocorrelation.

Empirical Results

This section briefly presents the overall results of two models, and reports the findings concerning unit attributes, time and seasonal factors, and neighborhood attributes. More detail is provided for the key independent variables: proximity to new housing construction and property tax delinquency. Spatial variability of the results is also covered.

Model

Exhibit 2 presents the results from the base model of one-to-two family residential sales, citywide from 1992–94. The dependent variable sales price has been subjected to the Box-Cox power transformation. Exhibit 3 presents the same results except that the dependent variable (sales price) is shown in linear form, in real dollars. Both models have thirty-seven independent variables.

The overall results are that the model with a Box-Cox transformation has a slightly superior R^2 (.60 compared with .56 for the linear model) and F-Statistic (483 vs. 418). Both models are statistically significant at α=.0001. Although, statistical significance and sign on thirty-five of the thirty-seven independent variables are virtually the same under both model types, the t-tests from Exhibit 2 are considered more robust. To facilitate economic interpretation, the β coefficients from Exhibit 3 with a linear dependent variable are presented for discussion purposes. This approach is consistent with other published research (Simons, Bowen and Sementelli, 1996).[5]

Unit Characteristics and Time Variables

Consistent with the literature, most of the results on the unit-specific variables, are statistically significant at α=.05 or better, and have the expected sign. Unit age (in log form with a negative effect on sales price) and square footage are the unit variables with highest confidence levels. Condition of unit is also significant, with larger price effects when the unit is in much better condition than the typical unit (in the reference category). A basement crawl space has a negative effect on sales price, as do units with asbestos exterior walls. Double units also sold at a substantially reduced price,

Exhibit 1
Descriptive Statistics on Housing and Other Variables Used in the Model

Variable	Mean	Std. Dev.	Measurement
SALES PRICE	35134	18564	Deflated sales price
CONDIT-5	<0.01	0.07	Dummy-highest condition of unit
CONDIT-4	0.01	0.12	Dummy-2nd highest condition
CONDIT-3	0.45	0.49	Dummy-3rd highest condition
CONDIT-2	0.03	0.17	Dummy-2nd lowest condition
CONDIT-1	0.01	0.11	Dummy-lowest condition of unit
BASEMENT-1	0.08	0.28	Dummy-basement crawl space
BASEMENT-2	0.05	0.22	Dummy-basement finished
BASEMENT-3	0.13	0.33	Dummy-basement partly finished
STYLE	0.43	0.49	Dummy-style not colonial
EXTWALL-1	0.03	0.19	Dummy-asbestos exterior wall
EXTWALL-2	0.38	0.48	Dummy-vinyl exterior wall
EXTWALL-3	0.10	0.30	Dummy-all/part brick exterior
1993-SALE	0.36	0.48	Dummy-sale in 1993
1994-SALE	0.31	0.46	Dummy-sale in 1994
WINTER	0.21	0.40	Dummy-winter sale
SPRING	0.28	0.44	Dummy-spring sale
FALL	0.25	0.43	Dummy-fall sale
FIREPLACE	0.11	0.32	Dummy-fireplace
HEAT	0.04	0.20	Dummy-not forced hot air heat
PORCH	0.73	0.43	Dummy-porch
BATHROOMS	1.30	0.46	Number of bathrooms
SQFT LIVING	1379.22	419.44	Square feet of interior space
LOT FRONT	40.99	9.48	Lot frontage in feet
LOT DEPTH	124.00	130.89	Lot depth
GARAGE	293.23	162.36	Square feet of garage space
LOGAGE	4.18	0.33	Age in year of sale, logarithm
DISTCBD	5.82	1.91	Distance to CBD, in miles
POVERTY-89	19.86	13.45	Poverty % in tract, 1989
INCOME	21791.73	6110.55	Median H.H. income in tract, 1990
AFRICAMER	25.11	38.05	African-Amer.% in tract, 1990
HHCHANGE	−3.84	7.43	H.H. % change, tract, 1980–90
CRIME	26.09	11.41	Type 1 crime index, tract, sale yr.
EASTRIVER	0.38	0.48	Dummy-east side of city
DOUBLE	0.23	0.42	Dummy-two-family home
NEW CONSTR	0.02	0.36	# of new residential units built w/in 1–2 blocks, year of sale
REHAB INVEST	1.63	8.07	Value of housing lease-purchase investment within 1–2 blocks, sale year, $000's
DELINQ	2.63	2.92	% of housing property within 1–2 blocks over 15% delinquent on property taxes, sale year

Note: Dummy value reflects percentage in category.
Sources: CSU, HPRP.

Exhibit 2
Results of Hedonic Model, Box-Cox Transformation on Dependent Variables

Variable	Beta Coeff.	Std. Err.	*t*-Stat.
INTERCEPT	8222.22***	348.50	23.59
CONDIT-5	2267.88***	188.59	12.02
CONDIT-4	1225.79***	107.61	11.39
CONDIT-3	49.52*	28.68	1.73
CONDIT-2	150.18*	81.60	1.84
CONDIT-1	−13.58	122.55	−0.11
BASEMENT-1	−984.77***	53.94	−18.26
BASEMENT-2	−31.32	68.65	−0.46
BASEMENT-3	−168.79***	42.77	−3.95
STYLE	−138.45***	34.71	−3.99
EXTWALL-1	−248.80***	72.01	−3.46
EXTWALL-2	88.87***	29.86	2.98
EXTWALL-3	534.63***	49.80	10.74
1993-SALE	251.78***	32.46	7.76
1994-SALE	451.47***	37.45	12.06
WINTER	−290.33***	39.51	−7.35
SPRING	−54.78	36.62	−1.50
FALL	31.51	37.49	0.84
FIREPLACE	547.55***	43.94	12.46
HEAT	95.49	67.54	1.41
PORCH	124.74***	36.63	3.41
BATHROOMS	66.18	53.33	1.24
SQFT LIVING	1.20***	0.05	23.12
LOT FRONT	16.59***	1.56	10.66
LOT DEPTH	2.39***	0.46	5.21
GARAGE	1.16***	0.10	12.13
LOGAGE	−1566.86***	62.72	−24.98
DISTCBD	115.57***	12.82	9.01
POVERTY-89	−20.27***	4.14	−4.90
INCOME	0.04***	0.01	7.02
AFRICAMER	−1.96	1.33	−1.48
HHCHANGE	−7.87***	3.00	−2.63
CRIME	−12.06***	1.75	−6.88
EASTRIVER	−627.43***	50.63	−12.39
DOUBLE	−799.89***	59.55	−13.43
NEW CONSTR	88.64**	36.50	2.43
REHAB INVEST	−5.43***	1.74	−3.12
DELINQ	−92.01***	31.60	−2.91

Notes: Adjusted R^2=.60; *F*-Statistic=483.2; and Deg. Freedom=12,104.
*Significant at α=.10.
**Significant at α=.05.
***Significant at α=.01.

Exhibit 3
Results of Hedonic Model, Linear Specification

Variable	Beta Coeff.	Std. Err.	*t*-Stat.
INTERCEPT	57354.00***	2922.18	19.63
CONDIT-5	22072.00***	1581.23	13.96
CONDIT-4	11297.00***	902.34	12.52
CONDIT-3	407.13*	240.44	1.69
CONDIT-2	1889.12***	684.20	2.76
CONDIT-1	522.19	1027.59	0.51
BASEMENT-1	−8067.00***	452.31	−17.84
BASEMENT-2	256.01	575.63	0.45
BASEMENT-3	−1135.91***	358.65	−3.17
STYLE	−1145.55***	291.06	−3.94
EXTWALL-1	−1943.15***	603.77	−3.22
EXTWALL-2	588.53**	250.42	2.35
EXTWALL-3	4701.77***	417.60	11.26
1993-SALE	596.56**	272.17	2.19
1994-SALE	917.21***	314.03	2.92
WINTER	−2411.63***	331.28	−7.28
SPRING	−435.02	307.04	−1.42
FALL	302.18	314.36	0.96
FIREPLACE	4923.18***	368.41	13.36
HEAT	1171.17**	566.33	2.07
PORCH	868.14***	307.12	2.83
BATHROOMS	960.15**	447.20	2.15
SQFT LIVING	10.06***	0.44	23.10
LOT FRONT	144.41***	13.05	11.06
LOT DEPTH	19.18***	3.85	5.00
GARAGE	9.34***	0.80	11.63
LOGAGE	−12829.00***	525.93	−24.39
DISTCBD	1003.75***	107.52	9.34
POVERTY-89	−126.32***	34.70	−3.64
INCOME	0.37***	0.05	7.35
AFRICAMER	−18.08	11.12	−1.63
HHCHANGE	−58.15*	25.14	−2.31
CRIME	−96.51***	14.70	−6.57
EASTRIVER	−1550.71***	424.52	−3.65
DOUBLE	−6998.88***	499.28	−14.02
NEW CONSTR	669.60**	306.06	2.19
REHAB INVEST	−43.15***	14.58	−2.96
DELINQ	−788.39***	264.94	−2.98

Notes: Adjusted R^2=.56; *F*-Statistic=418.4; and Deg. Freedom=12,104.
*Significant at α=.10.
**Significant at α=.05.
***Significant at α=.01.

holding all else constant. Fireplace, porch, garage size and lot dimensions all had a positive and significant effect on sales price. As expected, lot frontage has a much larger effect than lot depth.

For time variables, both 1993 and 1994 sales are significantly higher than the 1992 base year, due to real property value increases after the 1992 recession. Sales during the fall and spring seasons were not significantly different than the summer season used in the reference category, but winter sales did have a significantly lower price.

Neighborhood Attributes

The neighborhood variables included demographic, locational and economic attributes. Consistent with the literature, most neighborhood/tract variables have the expected sign and are statistically significant. For example, residential sales prices of those units in census tracts where poverty rates are higher, the 1980–90 household decrease is faster and crime rates higher than city averages which are significantly lower than in other areas, holding all else constant. The percentage of African-American population in each tract in 1990 is not statistically significant.

One interesting finding pertained to the distance variable. Units further away from downtown sold for a significantly higher amount (about $1000 more per mile of distance), holding all other variables constant. This is consistent with a multiple employment center model (less than one-third of the metropolitan area's employment is in Cleveland's CBD). Moreover, there are a large number of empty residential lots near the city center.

Neighborhood Investment Activity

The main emphasis of this research is to determine the effects of new construction and neighborhood disinvestment on residential sales price of existing units. The two key variables are proximity to new housing construction and neighborhood disinvestment, proxied by the predicted value of the property tax delinquency rate. Both are measured on the map book page level (one-to-two blocks). The results refer to the average effect, citywide, on one-to-two family homes sold during 1992–94.

On the up side of neighborhood investment, proximity to new residential construction has a positive effect that is statistically significant at α=.05. Using the linear β coefficient from Exhibit 3 allows the following economic interpretation: for every new unit built in the same auditor's map book page (within one-to-two blocks) and year as the residential sale, the sales price increases by $670. Since most sales are close to one-to-three new homes, the typical price increase would be between $700–$2,000. Alternatively, a dummy variable for new construction (any activity at all, ignoring the number of units built) has a β of $1,962, significant at α=.12. Based on statistical significance, the number of units is the better variable specification for new construction.

On the downside, the variable capturing neighborhood disinvestment (property tax delinquency) is negative and statistically significant at α=.01. From Exhibit 3, it can be stated that for every additional percentage of substantial property tax delinquency in the same auditor's map book page in the year of the residential sale, the sales price decreases by $788.

A third variable reflecting the effect of housing rehabilitation in the immediate area has a modest and significant negative effect on existing sales price. This may be explained as follows: the positive externality effects of proximity to rehabilitated housing are smaller than the effect of the additional competitive supply on sales price, holding other variables and demand for housing constant.

Spatial Variability of Results

To address the issue of spatial variability raised by Can (1990), the sample is split into two parts, based on whether the sale was east or west of the Cuyahoga River. In addition to running a crooked path due south of downtown, the river is a natural barrier dividing the city's largely African-American east side and predominantly White and more affluent west side. The dummy variable is statistically significant: east side properties sold for substantially less than a comparable west side unit.

The results of this additional estimation indicate that spatial variability on neighborhood investment variables is indeed a consideration. Despite the caveat that the number of residential sales within one-to-two blocks of new construction is small (under 100), the β on new construction for the generally higher income areas west of the river is positive and significant at α=.05.

For the east side, the coefficient is slightly positive, but not significant with influential outliers removed (in particular, one sale near a twenty-five unit subsidized development). With the outliers in, the effect is also positive and significant at α=.01.[6] However, when the one-to-two block radius is extended to four-to-five blocks using adjacent map book pages, the β is likewise positive (having an economic interpretation of $574 per new unit, only slightly lower than the $670 per new unit discussed earlier) and significant at α=.05. This figure is based on over 350 residential sales near new construction.

For property tax delinquency, spatial variability is also evident, although the difference in results is not very large. The west side β is negative and significant at α=.10, and the east side β is also negative (but smaller), and significant at α=.01.[7] On the basis of statistical significance, findings suggest that disinvestment may have a smaller negative effect on price in areas where decline is more prevalent.

Conclusion

This research examines the effect of two neighborhood factors, new residential construction and property tax delinquency, on the sale price of nearby properties. The latter, a proxy for neighborhood disinvestment, is found to have a significant and negative impact on prices in all models. In contrast, new construction is found to have a significant and positive effect on prices in most, but not all, models. Subject to the caveat that there may potentially be spatial autocorrelation in the regression models due to the cross-sectional nature of the data, both these results suggest that neighborhood attributes capturing neighborhood changes should be included explicitly in valuation models. This result pertains not only to the appraisers conducting individual valuation assignments, but to underwriters striving to effectively manage default risk in central cities.

The study findings suggest two additional issues. First, the effects of new construction and disinvestment on sale price are found to differ depending upon location. Thus, consistent with Can (1990), we find that the influence of attributes, in this case neighborhood attributes, on residential sales price appears to be characterized by east-west side spatial variability.

Second, consistent with prior work (Segal, 1977; and Varady, 1986), we find some indication that degree of concentration of new construction makes a difference in terms of the significance of its effect. As with the outlier near the twenty-five unit new project on the city's east side, it also may imply that the upward positive externality price effects are magnified near large new projects. This could have implications for public investment seeking to efficiently maximize the positive externalities of housing subsidy for larger projects.

However, the findings are found to be very sensitive to variable measurement. Different variable measurement may shed different results. This is particularly the case with new construction, in part because the number of residential sales that are close to new construction is relatively small. We find the effect of new construction to be the most unstable. Overall, further research is warranted because of the importance of variable measurement in determining the level of impact. Ultimately, such future research needs to be closely integrated with policy formulation for urban redevelopment, and provided in accessible format for practitioners and academics alike.

Notes

[1]The Box-Cox transformation provides direction as to whether or not the functional form of sales price is linear or nonlinear. A recent residential sales study in Cuyahoga county includes sales price (Simons, Bowen and Sementelli, 1997) found the λ for sales price in the county to be .55. Using this as a starting point, the λ of sales price for Cleveland is determined by iterative means to be .80, which is closest to a linear form.

[2]Another neighborhood investment variable, local development corporation investment in not-for-sale housing, was also subjected to this procedure. Similar to new construction, it was found to be poorly explained by other neighborhood variables in the model. Thus, the actual variable was used in the model.

[3]For example, consider the county auditor's unit quality variable, which is given a grade from A-E based on the maintenance condition of the unit. The model shows a substantial difference between the typical unit and a property in "A" condition, while almost no difference is apparent for lower quality units.

[4]For each variable, examination of the range of values revealed a few which were very high or low. These outliers, generally the top 0.01% of observations for continuous variables (20 out of 12,000), were removed from the data set. For sales price, only sales over $5,000 were considered.

Detailed model runs on the city's east side revealed one sale that was located near a large new residential project of twenty-five units. Using this sale in the model had a large positive effect on the beta coefficient and confidence level of the new construction variable. It was removed from the base case to avoid overstating the results.

The model was subjected to regression diagnostics for multicollinearity. The TOL procedure was used to determine the extent of multicollinearity in this model for all variables. Based on this, certain variables which were multicollinear with others (*e.g.*, bedrooms, rooms) were excluded from the runs presented in Exhibits 2 and 3. The TOL statistic for the new construction variable was .97, indicating no problem with multicollinearity. Because predicted values of property tax delinquency were used, the TOL of this variable were very low, as expected.

[5]In that study, the dependent variable's λ was .55, and a discussion based on a linear specification was used. In the present paper, this seems to be even more reasonable because the λ of .80 is closer to a linear specification.

[6]The aforementioned influential outlier on the city's east side which is left out of the analysis did show a dramatic increase in sales price which could be attributed to proximity to a large new project. The policy implications of this increase being attributable to new construction would be substantial, and the issue deserved further study.

[7]Because different first stage models are used, both β coefficients are more negative than results from the model for the city as a whole.

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