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Landholders, Residential Land Conversion, and Market Signals

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Abstract

In some metropolitan real estate markets, large land dealers considerably influence the conversion of land for residential use. Their activities may affect the timing, direction, and type of new development. This study uses the Cleveland, Ohio metropolitan region to consider whether large landholders play a major role in residential land conversion in suburban markets and the extent to which their actions are driven by market signals.

The findings indicate that large holders of raw land targeted to residential conversion do sell, subdivide, and develop land parcels in response to definitive market signals that foreshadow housing demand. They are most active in jurisdictions that from 1990 to 2000 showed strong population and housing growth. Increasing growth rates have affected the zoning, platting, and densities of residential development; increased the number of permits issued for new construction; raised average housing resale prices; and increased the average amounts of home mortgages. Where favorable conditions prevail, the price of raw land exceeds the holding price, justifying sale and subdivision. Large land dealers respond to market signals by releasing land in expectation of development.

Keywords: Landholders, Residential Land Conversion, Market Signals

Introduction

In many metropolitan land markets, large land dealers hold, transfer to subsidiaries, or sell developable land. Because they are concentrated in a few metropolitan real estate markets and generally have superior access to capital markets, large dealers substantially influence the sale of raw land for residential use. In some cases, they determine the timing, direction, and type of new development as well as "purchase and sell undeveloped land parcels in order to take advantage of actual or anticipated price changes" (Martin 1976, p. 4). Some land dealer corporations even act as "quasifirms" – the owner-general operative or speculative builder is active in land investment, construction, real estate development, management, and

subcontracting to trade businesses. Over time, the participants may develop stable, noncompetitive bidding relationships, overlapping advisory boards, and working partnerships, and may even utilize identical ancillary services, such as law firms, brokers, and real estate professionals (Eccles 1981).

By acting in a quasi-monopolist manner, "development corporations can buy up land and hold it in land 'banks,' waiting for the land's value to rise in response to adjacent city development, including the building of government-financed highways" (Feagin and Parker 1989, p. 89). Such monopolistic practices allow large developers to control the strategic siting of prime land uses (i.e., industrial, commercial parks, and retail malls), and enables dealers to profit from building, leasing, or construction on surrounding properties. Collaboration between land dealers and local officials may even result in policies that reduce new firm entry and restrict the availability of land so that a small group of dominant firms may be able to exercise control over land and housing supply and prices (Carroll 1988; Logan 1993; Rosenthal 1999).

Because "the property market is itself a constructed institution reflecting social patterns of power and influence" (D'Arcy and Keogh 1998, p. 1219), the extensive networks built to sustain competitive advantage serve as a source of market power. Dominant builders influence consumer choice through inherent product differentiation (Rhoades 1985). To remain competitive, small builders copy the dominant developer's architectural designs, advertising, marketing, and pricing, or work as local or regional partners. Where market leadership involves monopoly zoning powers, land availability and consumer choices are limited. Dominion over the idiosyncratic location and contextual relationships of properties allows large developers to structure land markets (Logan and Molotch 1987), increase profits by exercising power over a fixed land supply, and through multi-area, multi-project operations, they may strongly influence dwelling attribute prices (Grebler 1973a, 1973b; Kinzy 1992; Somerville 1999).

Admittedly, practitioners and scholars disagree about the structure and operation of land markets, the rationale for land conversion, the institutional framework within which land development takes place, and the competitive advantages that are sources of market power or monopolistic control. The multiplicity of actors involved in development makes generalizations difficult. Nevertheless, land development is far from a random process. Developers must respond explicitly to market signals that portend market demand for products long before they are planned and built (Baerwald 1981; Hepner 1983; Luger and Temkin 2000).

This study explores how large land dealers affect suburban residential land conversion in the Cleveland, Ohio Primary Metropolitan Statistical Area (PMSA), which includes Cuyahoga, Geauga, Lake, and Medina counties. Two questions are considered: 1) Do large landholders play a major role in residential land conversion across the PMSA's suburban landscape? and 2) Do short- and long-run market signals stimulate large landholders to convert land to residential development?

In the new urban reality, housing distributions are shaped by market forces and consumer proclivities for specific neighborhoods, housing qualities, and jurisdictional amenities. Peng (1997, p. 1231) states that in this process, "residents follow employment and employment follows residents – i.e. businesses and households collocate to reduce commuting." But housing adjustments are improbable unless

landholders sell raw land, developers intercede to build housing coincident with home-buyer demand, and local governments expedite the planning review process by accommodating subdivision approval.

Because planning reviews are complex and time consuming, and often involve multiple governmental authorities, large volume, quasi-monopolistic land dealers and builders can, with the acquiescence of local governmental officials, exert considerable control over a fixed land supply. In many cases, their time horizons result in purchasing land parcels long before construction is feasible. Large developers can fetch higher rates of return by building higher-valued properties "because the price elasticity of demand for housing is relatively small for the highest-income households, and allow more regulatory costs to be passed forward" (Luger and Temkin 2000, p. 74). As long as homeowner migration to the metropolitan margins remains relentless, "wealthy speculators and industrial capitalists [can] shape the rules of the market system within which the ostensibly free land competition is taking place" (Feagin 1982, p. 40). As long as capital remains hyper-mobile and local governments seek tax-revenue augmentation through development, powerful land interests can shape future housing markets

The next section examines the study area and methodology. An overview of the study area is initially explored, then the data sources, statistical model, and hypothesized relationships are presented. This is followed by a statistical analysis of the data and a discussion of the results.

The Study Area

Cleveland's PMSA is representative of a polycentric metropolis in which urban decentralization, new functional forms, occupational sector shifts, and employer relocation are causing a restructuring of local housing markets (Margulis 2005). Higher median-income families are bypassing the central city and the mature inner suburbs because more distant areas now are within the commuting sheds of overlapping employment centers. In the newer distant suburbs, a mix of affordably priced housing, low government expenditures, and amenity and aesthetic richness are enticements to higher median-income households (Margulis 2001, 2002). Local amenities and public goods strongly affect the price of vacant land, as do workplace accessibility and neighborhood and other nonstructural housing characteristics.

Over the past three decades, there has been a consistent pattern of decentralization of both population and owner- and renter-occupied housing (Table 1). Cleveland and its contiguous suburbs have experienced a steady decline in decennial rates of change in population and owner-occupied housing units. Renter-occupied housing units in Cleveland declined in the decades from 1970 to 1980 and from 1980 to 1990, but increased slightly from 1990 to 2000. In contrast, the peripheral suburbs in Cuyahoga County and the inner- and outer-edge suburbs in Geauga, Lake, and Medina counties persistently gained population, and owner- and renter-occupied units.[1]

Although it could be argued that losses in population and housing units in Cleveland and its contiguous suburbs fed a stream of migration into more distant suburbs, the

[1]The contiguous ring suburbs include all jurisdictions in Cuyahoga County located adjacent to the incorporated boundaries of Cleveland. The peripheral ring suburbs comprise jurisdictions adjoining the outer boundaries of the contiguous suburbs and also located within Cuyahoga County. The inner-edge ring suburbs consist of jurisdictions located in Geauga, Lake and Medina counties bordering Cuyahoga County. The outer-edge ring encompass all jurisdictions lying adjacent to the outermost incorporated boundaries of the inner ring suburbs.

Table 1: The Rate of Change In Population, Owner- And Renter-Occupied Housing Units In Cleveland and the PMSA Rings

Rings	Population				Rate of change (%)		
	2000	1990	1980	1970	1990-2000	1990-1980	1980-1970
Central city	478,403	505,745	574,299	751,535	-17.50	-7.38	-3.24
Contiguous suburbs	510,956	535,078	582,526	644,189	-21.18	-11.28	-9.45
Peripheral suburbs	404,619	371,317	359,760	323,053	14.72	-112.89	8.52
Inner-edge suburbs	124,629	116,161	117,190	103,441	8.21	14.98	6.49
Outer-edge suburbs	344,837	302,821	282,607	239,045	12.15	32.13	9.80
Sum	**1,863,444**	**1,831,122**	**1,916,382**	**2,061,263**	**57.65**	**-21.48**	**-13.23**

Rings	Number of owner-occupied housing units				Rate of change (%)		
	2000	1990	1980	1970	1990-2000	1990-1980	1980-1970
Central city	92,535	95,811	105,412	114,777	-28.25	-9.98	-11.26
Contiguous suburbs	143,183	143,806	144,429	138,748	-229.83	-230.83	25.42
Peripheral suburbs	125,262	109,440	99,115	75,453	7.35	10.57	4.40
Inner-edge suburbs	39,528	34,151	30,921	23,894	5.39	7.84	3.57
Outer-edge suburbs	101,869	82,975	72,388	52,133	7.92	10.60	4.19
Sum	**502,377**	**466,183**	**452,265**	**405,005**	**13.88**	**33.49**	**9.57**

Rings	Number of renter-occupied housing units				Rate of change (%)		
	2000	1990	1980	1970	1990-2000	1990- 1980	1980- 1970
Central city	98,103	104,025	113,124	133,761	1.12	-0.10	-5.48
Contiguous suburbs	75,372	76,205	76,338	72,025	-90.48	-572.97	17.70
Peripheral suburbs	37,002	33,956	26,197	18,793	43.44	11.08	2.09
Inner-edge suburbs	7,472	7,300	6,641	3,464	11.76	6.28	4.62
Outer-edge suburbs	26,987	24,693	20,758	16,266	12.15	4.38	3.54
Sum	**244,936**	**246,179**	**243,058**	**244,309**	**-197.05**	**78.88**	**-194.29**

Number of cases: Central city = 1; Contiguous suburbs = 22; Peripheral suburbs = 36; Inner-edge suburbs = 13; Outer-edge suburbs = 59.

evidence suggests that population and homeownership gains are more complicated. Cleveland's population declined by 273,132 persons from 1970 to 2000; the contiguous suburbs declined by 133,233 persons. Meanwhile, the peripheral, inner- and outer-edge suburban population increased by only 108,546 persons. Thus, 297,819 persons left the PMSA in the three decades from 1970 to 2000.

Owner-occupied housing in Cleveland declined by 22,242 units from 1970 to 2000; increased in the contiguous suburbs by 4,435 units; and increased in the peripheral, inner- and outer-edge suburbs by 115,179 units. Thus, owner-occupied units in Cleveland's suburbs increased at a faster pace than the population, indicating that household size declined during this 30-year period.

Examination of rental housing shows that Cleveland lost 35,658 units from 1970 to 2000; the contiguous suburbs gained 3,347 units; and the peripheral, inner- and outer-edge suburbs gained 32,938 units. In the past decade alone, Cleveland lost 27,342 renter-occupied units, while the contiguous suburbs lost 24,122 units. In brief, it can be surmised that many households in renter-occupied housing units have left the PMSA, while many more have moved to homeownership in the more distant suburbs.

But, where specifically in the PMSA is homeownership demand increasing, and how does this affect landholder decisions to release land for housing development?

In suburban Cuyahoga County, the sale of vacant residential-zoned properties of 10 acres or more is highest in the contiguous suburb of Parma and the peripheral cities of Broadview Heights, North Royalton, Solon, Strongsville, and Westlake. In each of these jurisdictions, 300 or more plots of residential-zoned land of 10 acres or more were sold from 1995 to 1999; 500 or more new housing construction permits were issued from 1990 to 1998; and from 1995 to 2000, 700 or more existing single-family units were sold. Similar patterns are found in Lake County in the outer-edge suburbs of Eastlake, Mentor, and Willoughby and the Townships of Concord, Madison, and Painesville; and in Medina County in the inner-edge suburb of Brunswick and outer-edge suburbs of Medina, Wadsworth, and Medina Townships.

In contrast, in Geauga County, sales of vacant residential-zoned parcels of 10 acres or more and new single-family housing construction permits are greatest in Bainbridge Township – an inner-edge suburb – while the highest intensities of new single-family housing construction permits are found in the outer-edge suburbs of Auburn and Montville Townships.

In the older, mature municipalities in Cuyahoga and Lake Counties, few large parcels of vacant residential-zoned land remain; consequently, market activity is concentrated largely in the sale of existing single-family units.

Conceptually, large landholders, in determining where to sell parcels of residential-zoned land, search for market signals that pinpoint high consumer demand for new housing units or strong interest in purchasing existing units. In municipalities where these conditions are coterminous, competition for vacant land is intense. In seeking opportunities, developers and builders unequivocally pay attention to demographic and housing trends. However, some jurisdictions are receptive to residential development, while others are impeded by a lack of developable land or by restrictive residential zoning. Consequently, residential land conversion is uneven across the PMSA and

the opportunity structure for development varies from jurisdiction to jurisdiction.

Data and methodology

The study uses multivariate analysis of variance to test whether there are differences in residential land conversion based on landholder size and jurisdiction type. Seven data sources were used (see Appendix A for a detailed description of the data). The primary dataset is sales records for the suburban jurisdictions in the four-county PMSA (First American Real Estate Solutions 1999). The independent variable, derived from that dataset, is the number of vacant residential properties of 10 acres or more sold from 1995 to 1999.

The dependent variables include: the number of new single-family housing construction permits issues (1990 to 1998); the average resale house price (2000); the number of resale units sold (1995 to 2000); rates of change in population and housing density (1980 to 1990 and 1990 to 2000). Additional variables are added to determine whether landholders' decisions about where to convert land for residential use are influenced by school quality or mortgage credit availability. Education quality is represented by each school district's 2002 per-pupil expenditure and 2002 academic rating (Education Management Information System 2002). Availability of mortgage credit is indicated by federal data (Federal Financial Institutions Examination Council 2002) on the number of home loans purchased in the secondary market, using three-year aggregates for 1999, 2000, and 2001.

If land conversion is a random process, the multivariate analysis should find that, regardless of jurisdiction, small and large landholders sell equivalent amounts of land. On the other hand, if large land dealers, in responding to market signals sell or subdivide greater amounts of land than smaller agents, then suburban residential land conversion is a nonrandom process. In that case, large dealers are likely to exert, if not monopolistic control, at least greater influence in these marketplaces. (See Appendix B for a detailed presentation of the model.)

Findings: landholder size, jurisdiction type, and market signals

The means and standard deviations of the variables, shown in Tables 2 and 3, reveal that there are some confounding elements in the relationships between landholder size, type of jurisdiction, and the criterion variables. As expected, large landholders are more active where market signals show that average housing unit resale prices, the cost per square foot, the rates of change in population and housing, and school district indicators are positive. In these jurisdictions, landholders divide parcels into large lots of more than 1.5 acres, and, where down-zoning is permissible, smaller lots of 0.5 to 1.5 acres (Table 2). As anticipated, parcel subdivision is greatest in townships where rates of population and housing unit change are sustained for long periods of time.

Smaller land dealers are more energetic in suburbs where land scarcity limits subdivision to smaller lots, usually less than 0.5 acres. Typically, these jurisdictions have higher effective residential tax rates, per pupil expenditures, average unit housing prices, higher levels of housing resale, and higher average unit mortgage loans (Table 3). But smaller land dealers do not have a lock on land conversion in these markets – large landholders also may venture in from time to time.

The results of the multivariate analysis of variance, presented in Table 4, show that the main effects for landholder size and type of jurisdiction are significant, but there are no significant interaction effects.

Table 2. Variable Means and Standard Deviations for Landholder Size

Variables	Landholder Size 0 = Small land dealer 1 = Large land dealer	N	Mean	Std. Deviation
Number of single-family resale units sold per square mile, 1995–2000	0	71	73.11	71.78
	1	46	18.26	25.15
	Total	117	51.55	63.87
Number of permits for new construction per square mile, 1990–1998	0	71	11.75	13.59
	1	46	12.67	16.62
	Total	117	12.11	14.79
Average housing unit resale price, 2000	0	71	179,949.72	138,862.68
	1	46	230,036.04	219,168.55
	Total	117	199,641.78	175,710.25
Cost per square foot	0	71	94.72	31.80
	1	46	99.13	33.00
	Total	117	96.45	32.21
Rate population change per square mile, 1980–1990	0	71	0.04	0.25
	1	46	0.08	0.19
	Total	117	0.55	0.23
Rate population change per square mile, 1990–2000	0	71	0.46	0.14
	1	46	0.17	0.16
	Total	117	0.09	0.16
Rate housing unit change per square mile, 1980–1990	0	71	0.10	0.22
	1	46	0.18	0.21
	Total	117	0.14	0.22
Rate housing unit change per square mile, 1990–2000	0	71	0.10	0.15
	1	46	0.23	0.16
	Total	117	0.15	0.17
Number of square miles zoned single-family, greater than 1.5 acres	0	71	2.18	6.01
	1	46	9.29	10.53
	Total	117	4.98	8.77
Number of square miles zoned single-family, 0.5 to 1.5 acres	0	71	1.62	4.53
	1	46	2.66	5.97
	Total	117	2.03	5.15
Number of square miles zoned single-family, Less than 0.5 acres	0	71	2.42	3.14
	1	46	2.30	4.98
	Total	117	2.38	3.95
School district rating	0	71	17.55	4.84
	1	46	19.15	3.85
	Total	117	18.18	4.53
Effective residential tax rate	0	71	56.37	10.96
	1	46	49.48	7.17
	Total	117	53.62	10.21
Expenditure per pupil	0	71	9,505.21	2,018.81
	1	46	8,661.37	2,080.98
	Total	117	9,173.44	2,076.22
Average dollar amount of loans per square mile	0	71	1,245.04	147.29
	1	46	483.57	93.99
	Total	117	945.66	102.39

Table 3: Variable Means and Standard Deviations for Jurisdiction Type

Variables	Jurisdiction type (0 = City or village, 1 = Township)	N	Mean	Std. Deviation
Number of single-family resale units sold per square mile, 1995-2000	0	78	74.16	67.46
	1	40	6.63	8.79
	Total	118	51.28	63.66
Number of permits for new construction per square mile, 1990-1998	0	78	15.29	16.84
	1	40	5.98	5.66
	Total	118	12.14	14.73
Average housing unit resale price, 2000	0	78	202,801.14	193,306.78
	1	40	191,764.98	134,502.67
	Total	118	199,060.07	175,071.82
Cost per square foot	0	78	96.29	31.03
	1	40	96.75	34.41
	Total	118	96.45	32.07
Rate population change per square mile, 1980-1990	0	78	0.20	0.23
	1	40	0.11	0.23
	Total	118	0.05	0.23
Rate population change per square mile, 1990-2000	0	78	0.04	0.12
	1	40	0.20	0.18
	Total	118	0.09	0.16
Rate housing unit change per square mile, 1980-1990	0	78	0.11	0.19
	1	40	0.19	0.26
	Total	118	0.14	0.22
Rate housing unit change per square mile, 1990-2000	0	78	0.09	0.12
	1	40	0.26	0.19
	Total	118	0.15	0.17
Number of square miles zoned single-family, greater than 1.5 acres	0	78	0.58	1.78
	1	40	13.42	10.55
	Total	118	4.93	8.74
Number of square miles zoned single-family, 0.5 to 1.5 acres	0	78	0.98	2.88
	1	40	4.01	7.50
	Total	118	2.01	5.13
Number of square miles zoned single-family, Less than 0.5 acres	0	78	2.97	3.53
	1	40	1.20	4.43
	Total	118	2.37	3.93
School district rating	0	78	17.58	5.10
	1	40	19.33	2.76
	Total	118	18.17	4.51
Effective residential tax rate	0	78	56.50	10.90
	1	40	47.84	5.04
	Total	118	53.57	10.18
Expenditure per pupil	0	78	9,727.99	2,152.26
	1	40	8,084.25	1,358.89
	Total	118	9,170.79	2,067.53
Average dollar amount of loans per square mile	0	78	1,309.72	1,174.93
	1	40	217.80	357.57
	Total	118	939.58	1,104.79

Table 4. Multivariate Analysis of Variance - Test of Main and Interaction Effects[a]

Variables	Wilks Lambda[b]	F value
Intercept	0.47	9.26***
School district rating (SCHIND)[c]	0.72	3.15***
Expenditure per pupil (EXPPUPIL) [c]	0.70	3.53***
Average dollar amount of loans per square mile (LNSQMI) [c]	0.33	16.48***
Landholder size (LARGEHOL)[c]	0.78	2.28**
Type of jurisdiction (DJURISD)[c]	0.72	3.21***
Large landholder* type of jurisdiction[d]	0.88	1.11

[a] Design: Intercept + SCHIND + EXPPUPIL + LNSQMI + LARGEHOL + DJURISD + LARGEHOL * DJURISD

[b] Hypothesis df = 12; Error df = 99

[c] Between subject factors: Landholder size: Large holder, N = 71; Otherwise: N = 46.

[d] Between subject factors: Type of jurisdiction: City, village, N = 83; Township, N = 34.

Significance levels: **0.01; ***0.001.

Removing the influence of the three covariates (school district rating, expenditure per pupil, and average dollar amount of loans per square mile) shows that the centroid means for landholder size and type of jurisdiction are still significantly different, confirming that large and small landholders are equivalently active in these jurisdictions. Landholders sell and subdivide land because market signals show that high-median income home buyers are attracted to communities with high per pupil expenditures, and these home buyers can afford above-average housing prices.

All of the criterion variables are found to be significant except the number of permits issued for new construction per square mile, 1990 to 1998, and the number of vacant residential properties sold per square mile, 1995 to 1999 (Table 5).

However, landholder size and type of jurisdiction show no significant interaction effects. This is not surprising considering the frequent conflict between landholders' profit motive and local government regulatory functions. Usually, however, zoning boards work in tandem with landholders and the between-subject effects suggest that large landholders and local authorities prefer cooperation when mutual objectives are involved.

In the tests for landholder size, the rate of change in population and housing density from 1990 to 2000 are significant at p = 0.001; number of single-family resale units sold per square mile, 1995 to 2000, and number of square miles zoned for single-family development on lots of less than 0.5 acres are also significant at p = 0.01.

Table 5. The Influence of Market Signals on Landholder Decisions to Sell Vacant Zoned Residential Land

Multivariate Analysis of Covariance – Tests of Between Subject Effects

Source	Corrected model			Intercept			School district rating		
Dependent Variables	Type III sum of squares covariance	D F	F	Type III sum of squares covariance	D f	F	Type III sum of squares covariance	D f	F
Number of single-family resale units sold per square mile, 1995–2000	344011.35	6	48.84***	7797.33	1	0.01**	4722.53	1	0.05*
Number of permits for new construction per square mile, 1990–1998	2443.54	6	1.95	101.41	1	0.49	1489.1	1	0.01**
Cost per square foot	22475.61	6	4.21***	2490.36	1	0.1	9260.94	1	0.00***
Rate population change per square mile, 1980–1990	1.07	6	3.86**	0.04	1	0.34	0.6	1	0.00***
Rate population change per square mile, 1990–2000	0.92	6	8.33***	0.05	1	0.1	0.15	1	0.00***
Rate housing unit	1.04	6	4.10***	0.04	1	0.31	0.44	1	0.00***
Rate housing unit change per square mile, 1990–2000	1.08	6	9.11***	0.13	1	0.01**	0.17	1	0.00***
Number of square miles zoned single-family, Less than 0.5 acres	2537.39	6	7.27***	461.95	1	0.01**	35.7	1	0.43
Number of square miles	397.7	6	2.72*	67.75	1	0.1	19.71	1	0.37
Number of square miles zoned single-family, greater than 1.5 acres	219.07	6	2.53*	4.21	1	0.59	14.33	1	0.32
Average resale price, 2000	6.93E+11	6	4.40***	1.06E+11	1	0.05*	1.32E+11	1	0.03*
Number of vacant residential properties sold per square mile, 1995–1999	336.51	6	1.7	61.75	1	0.17	123.32	1	0.06

Source	Expenditures per pupil			Average dollar amount of loans per square mile			Large landholder		
Dependent Variables	Type III sum of squares covariance	D F	F	Type III sum of squares covariance	D f	F	Type III sum of	D f	F
Number of single-family resale units sold per square mile, 1995–2000	833.62	1	0.4	216395.66	1	0.00***	6324.42	1	0.02***
Number of permits for new construction per square mile, 1990-1998	693.25	1	0.07	711.63	1	0.07	0.15	1	0.98
Cost per square foot	4860.8	1	0.02*	582.43	1	0.42	63.14	1	0.79
Rate population change per square mile, 1980–1990	0.13	1	0.1	0.02	1	0.52	0	1	0.9

Rate population change per square mile, 1990–2000	0.11	1	0.02*	0.15	1	0.00***	0.15	1	0.00***
Rate housing unit change per square mile, 1980–1990	0	1	0.89	0.07	1	0.21	0.01	1	0.56
Rate housing unit	0.14	1	0.01**	0.15	1	0.01**	0.16	1	0.00***
Number of square miles	230.09	1	0.05*	534.18	1	0.00***	387.52	1	0.01**
Number of square miles	57.65	1	0.13	47.92	1	0.16	13.46	1	0.46
Number of square miles zoned single-family, greater than 1.5 acres	9.82	1	0.41	63.3	1	0.04*	1.96	1	0.71
Average resale price, 2000	2.95E+11	1	0.00***	193679591.1	1	0.03	31642128924	1	0.27
Number of vacant residential properties sold per square mile, 1995–1999	96.23	1	0.09	128.59	1	0.05*	33.86	1	0.31

Source	Type of jurisdiction			Large landholder * type of jurisdiction		
Dependent Variables	Type III sum of squares	Df	F	Type III sum of squares	Df	F
Number of single-family resale units sold per square mile, 1995–2000	559.73	1	0.49	1060.45	1	0.34
Number of permits for new construction per square mile, 1990–1998	155.09	1	0.39	56.4	1	0.6
Cost per square foot	1024.24	1	0.29	1244.49	1	0.24
Rate population change per square mile, 1980–1990	0.3	1	0.01**	0.01	1	0.71
Rate population change	1.44E-08	1	0.99	0.04	1	0.14
Rate housing unit change per square mile, 1980–1990	0.31	1	0.01**	0.02	1	0.52
Rate housing unit	0.02	1	0.36	0.05	1	0.11
Number of square miles zoned single-family, Less than 0.5 acres	62.71	1	0.3	49.62	1	0.36
Number of square miles zoned single-family, 0.5 to 1.5 acres	89.1	1	0.06	137.49	1	0.02
Number of square miles zoned single-family, greater than 1.5 acres	136.29	1	0.00**	5.2	1	0.55
Average resale price, 2000	11657733839	1	0.51	50786978519	1	0.17
Number of vacant residential properties sold per square mile, 1995–1999	22.89	1	0.41	18.37	1	0.46

Significance levels: *0.05; **0.01; ***0.001

For type of jurisdiction, the rate of change in population, 1980 to 1990; housing units per square mile, 1980 to 1990; and number of square miles zoned for single-family development with lot sizes of more than 1.5 acres are significant at $p = 0.01$.

These results imply that real estate markets functioned somewhat differently in the 1980s and 1990s. From 1980 to 1990, population growth in suburban jurisdictions generally was accommodated in housing units built on large lots of more than 1.5 acres. More raw land was consumed in this manner, but fewer units per square mile were built.

Suburban real estate markets apparently changed from 1990 to 2000. To accommodate decennial population growth, landholders, developers, and local planning authorities cooperated by building at higher densities on smaller lots (less than 0.5 acres). By building at higher densities, developers and builders were able to adjust to increasing land prices and labor and construction costs. As shown in the between-subject test effects, in amenity-rich jurisdictions with permissive zoning, average resale prices, costs per square foot, number of single-family resale units sold, and number of permits for new construction rapidly increased.

Concurrently, higher-priced home construction caused price appreciation in collocated older housing inventories. Rising housing prices – even if tax rates are low – benefit local governments because rising prices increase tax revenues. Jurisdictions with rising tax revenues can offer more attractive amenity packages (i.e., better schools and educational enrichment programs) than higher-taxed, older municipalities. But high median-income home buyers also have high mobility rates, and consequently these jurisdictions also have elevated turnover rates. High turnover leads to higher resale levels and quality service provision leads to premium resale housing prices. Moreover, zoning boards in such municipalities are inclined to down zone, so that increasingly, housing units targeted to high median-income buyers are platted on smaller lots and at increasing unit densities.

Conclusions

Rational landholders will retain ownership of property, based on their subjective expectations of anticipated future net benefits, until the discounted rate in the increase in property value equals its opportunity costs (Bahl 1968; Pasour 1973; Dunford, Marti, and Mittelhammer 1985). But market imperfections increase subjectivity in estimating holding costs, expected rents, or development timing, adding unpredictability to residential land use conversion.

This study shows that landholders reduce uncertainty by carefully scrutinizing the metropolitan landscape for market signals indicating rising housing demand and the need for residential land conversion. Large landholders are most active in suburban jurisdictions with strong decennial population and housing growth, robust housing resale markets, and where large-lot zoning is permissible, but at the same time where zoning boards are favorably disposed to down zoning residential platting densities.

Land is more abundant in townships, less available in villages and cities. Nonetheless, once parcels are zoned for residential development, land agents are free to develop parcels at approved unit densities. That planning boards are willing to down zone strongly suggests that landholders may indeed be quite influential in jurisdictions seeking residential development to enhance their tax base. But,

whether landholders can exert monopolistic control in specific land markets has not been proven in this study.

These transactions have some important policy implications. From the resident's perspective, the choice of housing reflects "the discounted value of access to the most likely employment site" (Crane 1996, p. 346) and rational workers will try to reduce their commuting distances because shorter commutes result in greater job stability (Clark and Kuipers-Linde 1994). In a metropolitan region consisting of multiple governmental entities and moving toward a multi-nodal structure, population growth persistently moves to the region's margins. This trend guarantees that landholders will pay particular attention to market signals showing the emergence of fast-growing economic centers, job intensification, and residential clustering near places of employment.

For local elected officials, land development is closely tied to revenues, with service levels playing an increasingly important role in homebuyers' location choices. Fiscally productive development sustains a community's tax base, stabilizes property taxes, and nourishes commercial and industrial development. Prolonged battles for regulatory approval are improbable because cooperation is mutually beneficial to landholders, developers, elected officials, and local growth elites. Projects are unlikely to be tied up in hearings, protests, or litigation if development results in increased service provision. As Lewis (1996, p. 42) states, "… if the location they desire for their project presents a regulatory or political thicket … [developers] may be more willing to 'satisfice' by taking their plans down the road to the next jurisdiction, even if the new site is a less optimal or less accessible location." In these circumstances, local governments are disposed to smoothing the regulatory path for developers, with parochial local municipal interests taking precedence over broader metropolitan concerns.

In the final analysis Cleveland is dying and many of its contiguous suburbs are in decline. Only an economic renaissance can make the city economically viable. Until then, population decentralization will continue and land dealers will expediently follow the trail of proliferating suburban profit-making opportunities.

Appendix A: Data sources

Seven data sources are employed to obtain the variables utilized in this study. The primary dataset is derived from the First American Real Estate Solutions (1999) sales records for the years 1995 to 1999 for the suburban jurisdictions in the four-county PMSA. The data include an extensive array of housing, buyer, seller, and mortgage characteristics as well as Ohio County and municipality tax identifiers. Also available is a land use code variable used for tax purposes by the State of Ohio for classifying property types.

The independent variable is derived from land use code 500 and comprises the number of vacant residential properties of 10 acres or more sold from 1995 to 1999 arrayed by county and location code (i.e., city, township, and village). The acreage of sellers of multiple properties in each jurisdiction is aggregated; then, if 60 percent of the total vacant land transferred is equal to or greater than 500 acres, the jurisdiction is assigned a 1 (otherwise 0). A second dichotomous independent variable is created by distinguishing cities and villages from townships. Cities and villages are coded 0; townships 1.

Incorporated cities and villages are splintered off from townships. Not only are there areal differences in geographical size,

but there are also functional differences in the provision of municipal public services. Households are sensitive to low local government expenditures, school quality, and improvements in amenities and aesthetics. To the extent that municipalities achieve these objectives, in-migration of high median-income households is highly likely. When municipalities are dependent for tax revenues on residential expansion, however, then the greater the quantity of vacant land, the greater the opportunity for achieving fiscal growth. Large townships have a distinct advantage in this contest over cities, villages, and especially mature suburbs constrained by fixed incorporated boundaries, fully built and deficient in raw land.

Ten acres or more is chosen as the cut-off based on the residential zoning. A 10-acre plot zoned at 1.5 acres would accommodate a minimum of seven housing units; zoned for less than 0.5 acres, it would accommodate about 20 units. Plots of land subdivided for multiple single-family unit construction generally involve corporate landholders that sell large land parcels, or large construction firms that subdivide these parcels for residential development.

From Realty One (O'Connor, McClelland, and Realty One 1999) three variables are obtained: the number of new single-family housing construction permits issued (1990–1998); the average resale price (2000); and the number of resale units sold (1995–2000).

Selected from Census data (the STF1A Cleveland Metropolitan Area Census of Population and Housing) for 1980, 1990 and 2000 (Northern Ohio Data and Information Service 2001) is each jurisdiction's land area in square miles, total population, and number of housing units. The density of population and housing units per square mile are calculated by dividing these variables by the land area of the jurisdiction. Then, the rate of change in population and housing unit density from 1980 to 1990 and from 1990 to 2000 is calculated.

Obtained from the Northeast Ohio Areawide Coordinating Agency (2001) is the residential land use zoning codes for each municipality in the four-county area; number of square miles of each type of residential land use; the zoning class associated with each code; and a generalized zoning classification number assigned for mapping purposes. Generalized codes for single-family residential properties are broken down into five categories: single-family, greater than 3 acres; single-family, 1.5 to 3 acres; single-family, 0.5 to 1.5 acres; single-family, greater than 15,000 square feet to 0.5 acres; and single-family, 15,000 square feet and less. Each municipality is assigned its Ohio tax county and location code. Then, the total number of square miles in each single-family residential zoning class category is aggregated by location code.

Because suburban jurisdictions vary in areal size, ranging from University Heights in Cuyahoga County (4.7 square miles) to Lakeline Village in Lake County (0.2 square miles) to Sharon and Hinckley Townships (67.5 and 69.2 square miles) in Medina County, it is necessary to standardize the variables (the exceptions being the average resale price and the dichotomous variables). The number of vacant zoned residential properties sold of 10 acres or more (1995–1999), number of new single-family housing construction permits (1990–1998), and number of single-family resale units (1995–2000) are divided by the areal size of each jurisdiction to obtain the number of vacant residential properties sold, number of new single-family construction permits, and number of resale units per square mile. Likewise, to reduce the number of data cells that would contain zero entries, the five single-family zoning

categories are reduced to three (single-family zoning greater than 1.5 acres; single-family zoning, 0.5 to 1.5 acres; and single-family zoning, less than 0.5 acres). Then, each of the three single-family land use zoning categories is divided by the number of square miles in the jurisdiction.

Three on-line variables are added to the above data sets as covariate dependent variables to determine whether landholders in choosing where to convert land for residential use are influenced by school quality or mortgage credit availability. Included for each jurisdiction is the 2002 school district's expenditure per pupil and the 2002 school district academic rating – excellent indicates that a district has met 21 of 22 performance indicators on standardized tests given in citizenship, mathematics, reading, writing, and science in the 4th, 6th and 9th grades, and on school district attendance and graduation rates; effective, 17 to 20 performance indicators; continuous improvement, 11 to 16 performance indicators; academic watch, 7 to 10 performance indicators (Education Management Information System 2002).

The last variable is derived from the aggregate tables of loans purchased by banks and other financial intermediaries by location of property and type of loan (Federal Financial Institutions Examination Council 2002). To determine if there were differences in housing investment flows into various jurisdictions, the aggregate dollar amounts for home purchase loans, refinancing, home improvement loans, and non-occupant loans for one- to four-family units is calculated for 1999, 2000, and 2001. The three-year aggregate dollar amount is averaged for each jurisdiction. The average dollar amounts are then divided by the jurisdiction's size to compensate for areal distortion.[2]

Appendix B: The model

In this study, a multivariate analysis of variance (MANOVA) and covariance (MANOCOVA) analysis are used to test the null hypothesis (where 'μ' is a centroid or vector of means for the dependent variables) that $H_o = \mu_1 = \mu_2$. The predictor variables landholder size and type of jurisdiction divide the criterion variables into groups so that the null hypothesis tests whether the mean joint distribution vector groupings are significant. The model assumes that the data are random samples of a dependent vector (or centroid) from a multivariate normal distribution (a set or composite of measures) with the same within-group dispersion and that the variance-covariance cell matrices are similar. The research objective of MANOVA is to determine whether there is a difference among the group centroids. MANOVA simultaneously tests for correlations among the variables and considers the various relationships among them. In conjunction with MANOVA, MANOCOVA covariance analysis is applied to remove the effects of any uncontrolled independent predictor variables (Hair, et al. 1979).

MANOVA uses a full factorial model containing all factor main effects, all covariate main effects, and all factor-by-factor interactions. A Type III method for balanced models is applied to calculate the sum-of-squares. MANCOVA derives a linear combination of the criterion variables whose variance is best explained by the independent variables, which is calculated

[2]The following jurisdictions were excluded from the study because datasets were unavailable: River Edge Township is omitted because it was annexed to Cleveland; Warrensville Township was annexed to the adjacent municipalities of Orange and Warrensville Heights. Also excluded were the villages of Aquilla (2000 population, 372), Burton (2000 population, 1,450), and Chardon (2000 population, 5,156) in Geauga County; Chiippeewa-On-The-Lake (2000 population, 823), Gloria Glens (2000 population, 538), Seville (2000 population, 2,160), Spencer (2000 popultion, 747), and Westfield Center (2000 population, 1,054) in Medina County.

in the sum of squares after removing the effect of any covariates. The contained effects are thus orthogonal.

The variable specification for the MANOVA and MANOCOVA models are as follows:
Predictor variables:
X to Y for landholder size and type of jurisdiction
Covariates:
Y to X for school district rating; expenditure per pupil; and average aggregate dollar amount of loans purchased for one- to four-family units per square mile
Criterion variables:
Y to X for the balance of the variables.

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