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Religious Value Halos: The Effect of a Jewish Orthodox Campus on Residential Property Values

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Ten years ago, there was a controversial expansion of an Orthodox Jewish religious campus in the suburb of a large Midwestern US city. This research takes a before and after approach to addressing the effects of this project on residential property values, especially within walking distance of the campus. Separate regression analyses have been run for 1997 and 2006, and the findings indicate that the campus has increased property values and prompted additional building permits. The findings show that the completion of the Jewish Orthodox campus increases residential property values between 17 percent and 20 percent within a quarter mile in the city where the facility is located.

Keywords

Hedonic regression model; Spatial lag model; Residential property values; Positive externality; Religious

1. Introduction

This paper examines the effect of the development of an Orthodox Jewish worship center, and the associated residential walking market on residential property values in the suburbs of a large Midwestern US City. The four building campus, each under separate ownership, is shown to represent a known critical mass that positively affects residential property value. The spatial and value measurements of this effect are the main contributions of this paper. It is a factor that appraisers can use to make adjustments to value, and can also be instructive if other communities are facing similar situations. The Orthodox campus also creates a node that provides a target market and anchor for this particular neighborhood. The finding that property value change is positive is also locally important because of the controversy that erupted about ten years ago when the rezoning for this campus was a hot community issue.

A hedonic regression analysis is commonly used to evaluate the effect of individual factors on housing prices, and this is based on actual transactions. The hedonic model developed by Rosen (1974) allows measurement of the implicit prices of goods by decomposing housing prices into attributes of physical characteristics, neighborhood characteristics, and amenities served to meet the needs and demand of a community.

About ten years ago, there was an attempt to organize a large Orthodox Jewish religious campus on Smith Street in suburban Elmhurst.[1] The city was already mostly Jewish, but there was substantial controversy about the effect that this campus would have on property values, especially within walking distance. The area went from having one Orthodox synagogue to having four buildings, which created an "Orthodox Campus." This research takes a before and after approach to answering this question: what effect did substantial expansion of this Orthodox campus have on residential property values in close proximity? This research examines the price changes of house sales within one mile of the Orthodox campus before construction (1997) and after the completion of the Orthodox campus (2006), and compares them to house prices in eight suburbs in Connor County by using a hedonic regression analysis. [2] In order to detect any halo effects (positive externality) of the

[1] The names of the city, suburb and streets have been changed for security reasons and privacy.

[2] Development of this project was controversial, and made national press in the late 1990s. Some property was optioned and acquired during the 1997 time frame. There was substantial local newspaper press, mostly negative, during the time where the public permission for development of these projects was being determined. This was primarily due to the tension between Orthodox and Reform Jews, mostly over lifestyle issues and public school finance and attendance.One or two articles in a local newspaper appeared in the second half of 1997, with the initial zoning and use requests. The bulk of additional press articles (several per year) appeared in the local press from 1998-

Orthodox campus on surrounding residential property values, buffer rings were drawn around the Orthodox campus in radial segments of a ¼ mile, ½ mile, ¾ mile, and one mile. The results show that there is premium attributable to the Orthodox campus within ¼ to one mile; with some other positive effects within a mile according to some statistical models. The highest premium is up to 20 percent within a ¼ mile, with results tapering off further from the Orthodox campus. However, to be conservative, there is a break in the effects at a ¼ to ½ mile, as well as two other potential proximity influences (a new, large attractive shopping mall and a small college campus), so we conservatively do not attribute the positive value changes solely to the Orthodox campus.

This study also separately examines new single family building permits near the campus issued from 2000 to 2006, and compares these with the rest of the suburb of Elmhurst. There were significantly more new houses built within walking distance of the Orthodox campus in Elmhurst than in other parts of the city.

The rest of this paper is organized as follows. First, the relevant literature that examines the proximity influences of religious facilities and more generally, the amenity externalities, are reviewed. In the following section, the background of the Jewish population in the study area is briefly discussed in order to provide evidence of demand for living adjacent to the Orthodox campus. The source of data and variables, and the model specification are addressed next. Last but not least are the empirical findings and conclusions.

2. Literature Review

A great deal of previous literature investigates externalities of amenities on property values. The hedonic model is a statistical tool that allows quantification of either these positive (halo) or negative effects. Unlike other amenities which have either positive or negative effects on property value, the previous literature indicates that religious facilities may have either or both effects. Whether they have a positive or negative effect is dependent on the type of religious facility.

Do, Wilbur, and Short (1994) examine the effect of proximity to neighborhood churches on housing value in Chula Vista, California. The finding indicates that there are negative externalities due to noise and traffic,

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2000. Thus the 1997 date should be satisfactory as a baseline year because a high likelihood of the Jewish Orthodox campus going forward was not assured until about 1999. If anything, prices may have risen before this time, which indicates that our conclusions understate the true effect of the Campus on housing prices, although it is also possible that the negative press could have reduced prices.

and that these externalities extend up to 850 feet. In contrast, Carroll, Clauretie, and Jensen (1996) find proximity to churches creates positive externalities on housing values as amenities. Large churches, in particular, increase neighborhood housing values more so than small churches. Different denominations of churches have also produced mixed externalities on housing value.

Ooi (2004), in a non-peer reviewed conference presentation paper, examines the effect of several different religious facilities – a Christian church, Chinese temple, Muslim mosque, and Hindu temple – on multi-family dwelling units in highly dense residential areas in Singapore. The negative effects of the religious facility resulted from noise, pollution from exhaust, and the presence and use of the church by people who ask for charity. On the other hand, the religious facility is the hub for worshipping and socializing, and regarded as a symbol of morality. In addition, the provision of schools and other convenient facilities such as day-care programs may be highly attractive for the community. Ooi finds a positive externality of the place of worship on high-rise apartment values. These positive effects extend out to a radius of 650 meters and are more pronounced within 200-300 meters.[3] Moreover, churches and mosques that provide child-care centers and kindergartens have a positive externality on property value.

More generally, Simons and Saginor (2006) summarize the literature related to the effects of amenities on property values by reviewing 58 peer-reviewed journal articles and several other case studies. In their study, the literature is divided into two categories: positive effects or negative effects of amenities on property values. There are the positive effects of desired amenities, and natural environments including: water view (Benson, Hansen, and Schwartz, 2000), water quality (Leggett and Bockstael, 2000), open space (Bolitzer and Netusil, 2000) ocean view (Fraser and Spencer, 1998), desert riparian areas (Colby and Wishart, 2002), historical designation (Coulson and Leichenko, 2001), and historical preservation (Leichenko, Coulson, and Listokin, 2001). On the other hand, negative externalities due to disamenities – noise (Frankel, 1991), traffic (Hughes and Sirmans, 1992), and waste sites (Greenberg and Hughes, 1993) – lead to housing price discounts.

Motivated by the idea that externalities of amenities on property values fade with distance from the subject site, Des Rosiers, Lagana, Thériault, and Beaudoin (1996) have analyzed the impact of distance to and size of shopping centers on neighborhood residential property values. They use various models and the effect of three different types of shopping centers on 4,000 single-detached owner-occupied housing units in Quebec City, Canada. The conclusion indicates that there is a positive relationship between the size of a

[3] The distance of 650 meters is approximately 2,132 feet, 0.4 mile is, 984 feet, 0.18 mile is 300 meters, and 656 feet is 0.12 mile or 200 meters.

shopping center and property values, but that being too close to the shopping center has a negative effect on residential housing prices. The authors find that the optimal distances of shopping center externalities extend up to 215 meters (705 feet), 310 meters (1,017 feet), and 532 meters (1,745 feet) for neighborhood, community, and regional shopping centers, respectively.

In light of the findings of this literature, the negative and positive externalities of an amenity have been found to extend up to a ¼ mile, and larger amenities can extend even further. The current research utilizes buffer rings of a ¼ mile, ½ mile, ¾ mile, and one mile around the Orthodox campus to determine the premium generated by proximity to the campus on residential property values.

3. Background of the Study Area

About ten years ago, there was only one Orthodox Jewish presence on Smith Street in Elmhurst. During that time, the Orthodox Jewish community slowly grew into the eastern suburbs. Although in the past there were some opponents to the campus, including members of other Jewish communities, the campus has become a main hub of worshipping and socializing for Orthodox Jewish life, attracting Orthodox families that desire the concentration of learning and prayer, as well as the social convenience of play dates for young children within walking distance. The physical size (measured in square footage of building space) of the Orthodox campus has now more than quadrupled to include two more synagogues and a girls high school[4]. This means that at least six minyanim (groups of ten or more men) are davening (praying) on a given Shabbat morning (Saturday Sabbath). This reflects a combined total of about 1,000 to 1,300 families. Orthodox Jews do not drive vehicles on the Sabbath. They walk to synagogue, often with a number of young children. Hence, there is a substantial premium for being within close walking distance.

This paper hypothesizes that these price premiums of housing within approximately a 20 minute walking time (about one mile) are due to the proximity of the Orthodox campus. We also assume that there is demand for living close to the campus because Orthodox families walk to prayers on Shabbat – encountering such factors as blustery and snowy winter weather – are accompanied by small children, and prefer to be inside the Eruv (the carrying zone boundary for Shabbat).[5]

[4] The school accommodates about 120-170 high schools girls in a non-residential setting. About half the girls live close enough to walk, while the rest come from the nearby suburbs or elsewhere. Typically, one or two minyanim also meet at the school building on the Sabbath.

[5] The Torah prohibits work on the Sabbath, and Orthodox Jews typically include carrying in public places as one of these prohibitions. The Eruv is a quasi-public space where carrying is allowed. The Eruv has its boundary defined with a contiguous unbroken complex of wires, usually on telephone poles. Although the results are not

According to the result of a recent demographic survey (Rosentraub and Hexter, 2004),[6] there are approximately 81,500 Jewish people living in Connor County and the nearby surrounding counties. About 33 percent reside in the eastern suburbs. Sixty one percent of Jews in the metro area are members of a synagogue – the national average is 46 percent – and about ¼ of metro area Jews is Orthodox. The survey also reports that 82 percent of respondents are homeowners and 69 percent of respondents have post graduate or college degrees.

Orthodox Jews who move into the community where the campus is located tend to sell their homes to other Orthodox Jews. Demand for homes near the campus is sufficiently high that in most years, houses sell by word of mouth, although during the current recession of 2009-2010, this has changed. Demand for living within walking distance to the campus pushes the housing prices up in the community.

The study area includes eight suburban cities, including Elmhurst and all suburbs that are contiguous or within about ½ mile of its borders.

There are two other large neighborhood factors of potential importance to this study. The first is the Jack Case University (located about ¾ mile west of the Orthodox campus in the nearby suburb of Plasma Heights). Jack Case is a well established small liberal arts school that has undertaken a modest expansion over the past decade. The other major issue is the existing upscale regional shopping center complex in Elmhurst which includes Elmhurst Mall. In 2004, an additional upscale "Lifestyle" shopping center was built in a nearby community about 1 mile northeast of the Orthodox campus. Lifestyle Village features outside village-like walking areas, and a large supermarket. Despite their presence, we find no connection between these institutions and residential property value, as discussed below.

4. Data and Variables

There were approximately 2,500 housing sales in the eight suburb market areas each year of the survey, and single family housing prices transacted in

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shown in the statistical analysis presented later, earlier runs showed that house sales within the area's Eruv are not statistically different than those outside, holding all other factors constant. This is probably because the percentage of Jews living within the multi-community Eruv designated area is only about 10% of the total population there.

[6] The purpose of the survey was to examine the Jewish demographic in Connor County. According to the Midwest Jewish News, "the demographic study was conducted by a professional surveying firm via telephone interview. A random sampling of metro area Jews was culled from these sources: the local Federation's master lists of local Jews and the purchased lists from commercial vendors."

1997 (several years before the Orthodox campus was created) and 2006 (a year after it was completed) were considered. Housing sales data were obtained from Connor County Appraiser records which are full of useful information, including lot size, number of rooms, number of bathrooms, types of housing, year built, and total living space, as well as housing prices. These were used as variables for physical characteristics in the model. Housing prices in Connor County have experienced modest increases over the past decade. Average single family housing prices in the study area were $148,984 in 1997 and $188,036 in 2006.

In addition to housing sales data, U.S. Census demographic variables were included. Neighborhood characteristics include race, income,[7] and percentage of public school students, percentage of private school students, and education attainment at the census tract level. The variables of education attainment were calculated based on the proportion of the population who graduated from high school, college, and graduate schools and above to the population age 25 and older. The detailed descriptions of these variables are described in Table 1a.

In order to control for the nuisance effect of automobile traffic, we also added dummy variables for houses on 10 main arterial roads as control variables. In addition, to control for differences in public school quality (which are capitalized into property value), the percentage of students that completed the 4th grade math test at and above the proficiency level, and the average expenditure per pupil, were included.

5. Model Specification

The hypothesis of this study is that there is a positive price change in house sale values measured from before (1997) to after (2006) the completion of the Orthodox campus, and that this is due to the proximity to the Orthodox campus. To test the hypothesis, the methodological approach of this study compares house prices of single family housings within a ¼ mile, ½ mile, ¾ mile, and one mile to those in eight eastern suburbs, including the balance of Elmhurst and the contiguous suburb of Plasma Heights. Hence, this study hypothesizes that there are positive externalities due to demand for living close to the campus, and that additional demand raises house prices within walking distance, holding all else constant.

[7] The data source of the income variable is the U.S. Census 2000. The same income was used for both 1997 and the 2006 models.Therefore, there is a possibility to have higher income in the 1997 model when more housing transactions occurred in the tract with higher income.

Table 1a Summary of Statistics and Variable Definitions

Variables	Descriptions	1997		2006	
		Mean	SD	Mean	SD
Dependent Variable					
Ln_HP	Log of housing prices	11.79	0.46	12.05	0.45
Physical Characteristics					
L_FRONT	Frontage in feet	62.58	39.04	61.74	37.98
BASESQFT	Basement square footage	924.77	448.05	895.46	419.36
BEDROOMS	Number of bedrooms	3.48	1.01	3.38	0.92
BATHS	Number of bathrooms	1.57	0.76	1.50	0.70
FIREPL	Number of fireplaces	0.78	0.66	0.72	0.67
LIVATOT	Total living square footage	1981.51	842.55	1871.99	752.30
AGE	Age of property in years	52.58	17.84	62.66	17.71
D_SPRING	Dummy for sales in the spring sales season	0.24	0.43	0.27	0.45
D_SUMMER	Dummy for sales in the summer sales season	0.34	0.47	0.33	0.47
D_FALL	Dummy for sales in the fall sales season	0.24	0.43	0.23	0.42
D_WINTER	Dummy for sales in the winter sales season	0.17	0.38	0.17	0.38
D_DOUBLE	Dummy for single family dwelling	0.94	0.25	0.94	0.24
Neighborhood Characteristics					
P_PUBLIC	Percentage of public school students in a tract	12.78	4.81	13.13	4.85
P_PRIVATE	Percentage of private school students in a tract	4.94	2.75	4.73	2.59

(*Continued*…)

(*Table 1a Continued*)

Variables	Descriptions	1997		2006	
		Mean	**SD**	**Mean**	**SD**
Neighborhood Characteristics					
P_WHITE	Percentage of white population in a tract	73.55	23.00	71.87	24.68
P_HIGH	Percentage of high school degree attainment in a tract	18.18	9.37	19.33	9.05
INCOME	Median household income in a tract	$61,713.50	$25,133.80	$59,082.17	$22,914.97
School Quality					
EXPENDITURE	Expenditure per pupil	$8,829.20	$1,180.24	$14,488.26	$1.972.87
TEST	4^{th} grade math % at or above proficient	82.05	7.18	57.62	13.22
Dummy Variables for Distance					
D_1_ELM	Dummy for buffer distance within one mile in Elmhurst	0.01 (18)	0.08	0.00 (10)	0.06
D_1_PH	Dummy for buffer distance within one mile in Plasma Heights	0.01 (24)	0.10	0.01 (20)	0.09
D_075_ELM	Dummy for buffer distance within three quarters mile in Elmhurst	0.00 (11)	0.07	0.01 (13)	0.07
D_075_PH	Dummy for buffer distance within three quarters mile in Plasma Heights	0.01 (27)	0.10	0.01 (25)	0.10
D_05_ELM	Dummy for buffer distance within a half mile in Elmhurst	0.01 (36)	0.12	0.01 (22)	0.09
D_05_PH	Dummy for buffer distance within a half mile in Plasma Heights	0.01 (35)	0.12	0.01 (33)	0.11
D_025_ELM	Dummy for buffer distance within a quarter mile in Elmhurst	0.01 (15)	0.08	0.01 (22)	0.09
D_025_PH	Dummy for buffer distance within a quarter mile in Plasma Heights	0.01 (22)	0.09	0.01 (14)	0.07

Notes: The variable of D_SUMMER is used as reference. The numbers in parentheses are the numbers of transactions in each buffer ring.

Table 1b. Summary of Statistics for Street Dummy Variables

Variables	Descriptions	1997		2006	
		Mean	Standard Deviation	Mean	Standard Deviation
Dummy variables for proximity to main road					
D_LEBANON	Dummy for houses having address on Lebanon	0.01	0.09	0.01	0.08
D_THAGRIN	Dummy for houses having address on Thagrin Road	0.00	0.05	0.00	0.05
D_FLARMAN	Dummy for houses having address on Flarman Boulevard	0.01	0.09	0.01	0.08
D_SMITH	Dummy for houses having address on Smith Road	0.01	0.07	0.01	0.11
D_LOGJAM	Dummy for houses having address on Logjam Road	0.00	0.06	0.00	0.07
D_LEE	Dummy for houses having address on Lee Road	0.00	0.04	0.00	0.05
D_MAYFIELD	Dummy for houses having address on Mayfield Road	0.00	0.04	0.00	0.03
D_RICHMAN	Dummy for houses having address on Richman Road	0.01	0.08	0.00	0.05
D_SLACKER	Dummy for houses having address on Slacker Avenue	0.01	0.10	0.01	0.08
D_WARRENS	Dummy for houses having address on Warrens Road	0.00	0.05	0.00	0.06

The first model set uses ordinary least squares (OLS), in a log-linear functional form, for both 1997 and 2006. The hedonic OLS model allows the estimation of the effects of housing physical characteristics, neighborhood characteristics, and its distance from the campus on single family housing prices. The model is specified as follows:

$$Ln\_HP = \beta_0 + \beta_1 S + \beta_2 N + \beta_3 Traffic + \beta_4 SQ + \beta_5 WD + \varepsilon \quad (1)$$

where

Ln_HP = natural log of house sale prices,

S = a vector of physical characteristics,
N = a vector of neighborhood characteristics,
Traffic = a vector of dummy variables for road,
SQ = a vector of school quality measures, and
WD = a vector of dummy variables for walking distance.
β_0 is the model intercept, the βs are the marginal propensity coefficients, and ε is the error term.

This study utilizes the spatial lag model[8] due to the concern that housing prices are spatially correlated. In other words, housing prices are affected by neighborhood' housing prices. Basu and Thibodeau (1998) assert that housing markets are spatially correlated since neighborhood properties have similar structures and share the same public amenities. The model is specified as follows:

$$Ln\_HP = \rho WLn\_HP + \beta_1 S + \beta_2 N + \beta_3 Traffic + \beta_4 SQ + \beta_5 WD + \varepsilon \qquad (2)$$

where
Ln_HP = natural log of housing sales prices,
ρ = coefficient of autocorrelation,
S = a vector of physical characteristics,
N = a vector of neighborhood characteristics,
Traffic = a vector of dummy variables for road,
SQ = a vector of school quality measures, and
WD = a vector of dummy variables for walking distance.

The second set of models uses the spatial autoregressive form, in a log functional form, for both 1997 and 2006. This study utilizes the spatial lag model due to the concern that housing prices are spatially correlated. In other words, housing prices are affected by neighborhood house prices. Results from both series models are reported and compared in Tables 2 to 6.

6. Empirical Results

This study hypothesizes that proximity to the Jewish Orthodox campus has a positive effect on residential property value**.** In order to test the hypothesis, two methodological approaches to modeling were made: the OLS model and the spatial lag model.

The first OLS hedonic model set specifies the physical characteristics, neighborhood characteristics, school quality variables, dummy variables for

[8] The result of the LM test indicates that the spatial lag model is more appropriate than the spatial error model. The spatial lag model handles the spatially lagged variable as an exogenous variable in the equation. By including the spatial matrix in the equation, the spatial lag model modifies the spatial autocorrelation problem.

proximity to the main roads, and dummy variables for proximity to the Orthodox campus. The adjusted R^2 for the OLS models are 79.9% for the 1997 model and 69.6% for the 2006 model, with F-values of 271.5 and 155.4, respectively (see Table 2). These measures are satisfactory for this type of model.

Table 2 Statistical Results of OLS Models (Dependent Variable – Log of Sale Prices)

Variables	Model 1 (97OLS)		Model 2 (06OLS)	
	Estimate	VIF	Estimate	VIF
Constant	9.806 *** (125.815)	0.000	10.702*** (46.92)	0.000
L_FRONT	0.001*** (6.976)	1.385	0.0005*** (2.93)	1.527
BASESQFT	0.00003** (2.376)	1.757	0.00001 (0.66)	1.579
BEDROOMS	0.012** (2.030)	2.127	0.015* *(1.99)	2.184
LIVATOT	0.0003*** (25.785)	3.956	0.00026*** (20.35)	4.067
BATHS	0.084*** (9.822)	2.442	0.105*** (9.70)	2.434
FIREPL	0.040*** (5.411)	1.418	0.039*** (4.49)	1.407
AGE	-0.0001 (-1.148)	1.077	-0.002*** (-5.54)	1.760
D_SPRING	-0.014 (-1.290)	1.315	-0.005 (-0.41)	1.348
D_FALL	0.004 (0.336)	1.314	-0.036*** (-2.660)	1.322
D_WINTER	-0.033*** (-2.653)	1.257	-0.039** (-2.95)	1.281
D_DOUBLE	0.343*** (16.819)	1.485	0.265*** (10.28)	1.565
P_PUBLIC	-0.018*** (-10.186)	3.540	-0.006*** (-2.90)	4.426
P_PRIVATE	-0.019*** (-8.249)	3.009	-0.013*** (-4.12)	2.775
P_WHITE	0.001*** (3.219)	3.934	0.002*** (4.70)	6.510
P_HIGH	0.001 (0.990)	3.256	-0.007*** (-5.52)	3.676
INCOME	0.000005*** (15.018)	4.244	0.000002*** (4.04)	3.980
D_LEBANON	-0.084* (-1.822)	1.043	-0.202*** (-3.46)	1.019
D_THAGRIN	0.016 (0.198)	1.029	-0.07 (-0.963)	1.032
D_FLARMAN	-0.045 (-0.941)	1.047	-0.059 (-0.981)	1.033
D_SMITH	-0.211*** (-3.630)	1.030	-0.108** (-2.275)	1.041
D_LOGJAM	-0.216*** (-3.079)	1.034	0.085 (1.288)	1.032
D_LEE	-0.201* (-1.931)	1.014	-0.389*** (-3.751)	1.032
D_MAYFIELD	-0.194** (-2.087)	1.014	-0.27** (-1.996)	1.009
D_RICHMAN	-0.181*** (-3.440)	1.041	-0.136 (-1.183)	1.081
D_SLACKER	-0.042 (-0.981)	1.056	0.021 (0.337)	1.078

(*Continued*…)

(*Table2 Continued*)

Variables	Model 1 (97OLS)		Model 2 (06OLS)	
	Estimate	**VIF**	**Estimate**	**VIF**
D_WARRENS	-0.130 (-1.496)	1.057	-0.155* (-1.764)	1.023
EXPENDITURE	0.00003*** (4.606)	3.481	0.000016*** (3.436)	3.791
TEST	0.006*** (5.844)	3.897	0.003*** (4.611)	4.420
D_1_ELM	0.137* (2.387)	1.355	0.156* (1.843)	1.197
D_1_PH	-0.059 (-1.319)	1.134	-0.111* (-1.928)	1.109
D_075_ELM	0.083 (1.171)	1.238	0.163** (2.199)	1.183
D_075_PH	0.049 (1.186)	1.088	-0.030 (-0.583)	1.103
D_05_ELM	-0.019 (-0.394)	1.737	0.043 (0.716)	1.305
D_05_PH	-0.009 (-0.233)	1.134	-0.096** (-2.080)	1.160
D_025_ELM	0.009 (0.138)	1.310	0.205*** (3.412)	1.312
D_025_PH	0.016 (0.341)	1.082	-0.012 (-0.175)	1.075
R square	79.91%		69.58 %	
Adj. R square	79.61%		69.13%	
F-value	271.54		155.44	

Note: Numbers in parentheses are t-values. * = $\alpha \geq .10$, ** = $\alpha \geq .05$, *** = $\alpha \geq .01$

The statistical significance, sign, and magnitude of the coefficient for structural housing and neighborhood characteristics are as expected and consistent with the theory. As expected, the signs of the basement, bedrooms, and size of the living area are positive, while the age variable negatively impacts on prices in both models. With regards to the seasonal effect, in a comparison of sales in the summer with those in other seasons, the dummy variables for sales in spring and winter are negative. The dummy variables for sales in fall are positive in the 2006 model and negative in the 1997 model, relative to the summer sales season.

This study includes dummy variables for houses on main arterial roads as control variables. Most of the coefficients for traffic dummy variables are negative and statistically significant, except for Logjam Road and Slacker Avenue, which is a street with considerable name recognition, served by a commuter rail line. Findings relative to traffic dummies are consistent with it as Hughes and Sirmans (1992) who find that traffic volumes have negative effects on residential property values.

School expenditure per pupil and 4^{th} grade math scores and above proficient level were used as school quality variables. As expected, the coefficients of the school quality variables are positive and statistically significant.

With respect to neighborhood characteristics, the signs and magnitudes of the variables are as expected. The percentage of white population and the median income have a positive relationship with housing prices, while the percentage of high school graduation has a negative effect. Interestingly, the signs of the percentages of public and private school students have negative signs for both years, and are statistically significant.[9]

The positive externality price premiums, net of the baseline price trend over time, in Elmhurst, within one mile of the Orthodox campus are as follows: 20.5% within a ¼ mile of the campus, 0% between a ¼ and a ½ mile, 16.3% between a ½ and a ¾ mile, and 1.9% between ¾ and one mile.[10]

Table 3 Comparison of Price Differences Before And After Orthodox Campus Construction (OLS model)

	1997	2006	Difference between 1997 and 2006
	Discount or Premium	Discount or Premium	Sales Price (%)
Elmhurst within 1/4 mile	0.000	0.205	20.5
Elmhurst within 1/2 mile	0.000	0.000	0.0
Elmhurst within 3/4 mile	0.000	0.163	16.3
Elmhurst within 1 mile	0.137	0.156	1.9

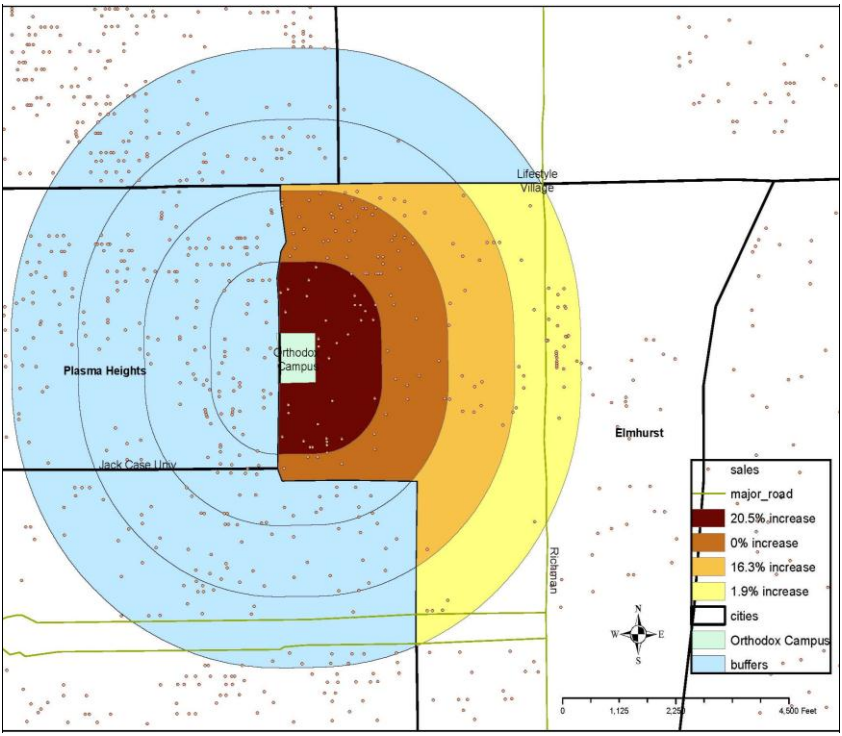
Note: Results which are not statistically significant from zero at the 90% confidence interval ($\alpha \geq .10$) are shown as 0.

Thus, our OLS findings support the notion that the campus has increased property values within close walking distance, and that the premium appears to decrease with distance. The results of this analysis are mapped, and changes in house prices within buffer rings are highlighted in Figure 1. This map indicates the location of houses sold in 2006 and the distance for each buffer ring. Also notable are the Jack Case campus and Lifestyle Village Shopping Center.

[9] The generally accepted VIF cutoff is 10,but it is noteworthy that P_PUBLIC(VIF at 4.4) and P_WHITE(6.5) may be structurally linked, which could explain their apparent instability between Models1and 2.

[10] In a similar linear OLS model run with similar or slightly higher R squared values, and school quality variables included, the effects of the proximity to the Orthodox campus are smoother;19% within a ¼ mile,12% between a ¼ and a ½ mile,8% between a ½ and a ¾ mile,and 1% between a ¾ and one mile.Plasma Heights houses within a ¼ mile also show positive at around 9%. However, these results do not explicitly adjust for price appreciation between the time periods. Furthermore, because they have a confidence level of only around 85%, they should be considered less reliable than those presented above.

Figure 1 Jewish Orthodox Campus in Elmhurst, Ohio: Sales Within And Beyond Walking Distance, And Substantial Housing Rehabs



As discussed above in the model specification section, testing for the presence of spatial autocorrelation (SA) suggests that the issue needs to be handled by using a spatial lag model (Basu and Thibodeau, 1998). The highly significant coefficient obtained with the second set of models confirms that SA is present in the model. Applying a spatial lag procedure is appropriate for correcting SA. The magnitude and significance of the ρ coefficient in the second set of models set forth in Table 4 clearly indicate the existence of SA and that the spatial-lag dependent variable thereby introduced most probably captures the effect of omitted neighborhood attributes or of some latent spatial structure. The overall explanatory power also shows an improvement over the OLS model. The statistical results of spatial lag models shown in Table 4 indicates that the R^2 statistics are 84.0% for the 1997 spatial lag model and 72.3% for the 2006 spatial lag model, as opposed to 79% and 69%, respectively for the OLS specifications. Coefficient signs and statistical significance relative to housing attributes, neighborhood, seasonal, school quality descriptors and seasonal and arterial street dummies are similar to those obtained with the OLS model.

Table 4 Results of Spatial Lag Models (Dep. Variable = Log of Sales Price)

Variables	Model 3 (1997 Spatial Lag)	Model 4 (2006 Spatial Lag)
CONSTANT	5.668*** (29.124)	7.438*** (28.113)
L_FRONT	0.001*** (5.117)	0.00034 ** (2.184)
BASESQFT	0.00003*** (2.743)	0.00002 (1.238)
BEDROOMS	0.010* (1.842)	0.014** (1.927)
LIVATOT	0.0002*** (23.075)	0.00022*** (16.956)
BATHS	0.055*** (7.152)	0.083*** (7.956)
FIREPL	0.028*** (4.151)	0.037*** (4.388)
AGE	-0.0001 (-0.991)	-0.002*** (-5.956)
D_SPRING	-0.013 (-1.334)	-0.006 (-0.528)
D_FALL	0.003 (0.319)	-0.039*** (-3.063)
D_WINTER	-0.030*** (-2.787)	-0.033* (-2.347)
D_USECODE	0.253*** (13.807)	0.213*** (8.649)
P_PUBLIC	-0.010*** (-5.987)	-0.004** (-2.233)
P_PRI	-0.010*** (-4.683)	-0.007** (-2.350)
P_W	0.001*** (2.840)	0.001*** (3.445)
P_HIGH	0.002*** (2.807)	-0.002** (-2.250)
INCOME	0.000002*** (7.337)	0.000* (1.707)
D_LEBANON	-0.067* (-1.640)	-0.200*** (-3.620)
D_THAGRIN	-0.016 (-0.226)	-0.073 (-0.816)
D_FLARMAN	-0.109*** (-2.604)	-0.087 (-1.464)
D_SMITH	-0.175*** (-3.380)	-0.098** (-2.296)
D_LOGJAM	-0.182*** (-2.926)	0.078 (1.102)
D_LEE	-0.198** (-2.142)	-0.397*** (-4.125)
D_MAYFIELD	-0.238*** (-2.884)	-0.249* (-1.848)
D_RICHMAN	-0.187*** (-4.009)	-0.151 (-1.537)
D_SLACKER	-0.039 (-1.033)	0.02 (0.363)
D_WARRENS	-0.209*** (-2.718)	-0.141* (-1.693)
EXPENDITUR	0.00001** (2.105)	0.00001** (2.309)
TEST	0.003*** (3.547)	0.001** (2.117)
D_1_ELM	0.056 (1.107)	0.089 (1.106)
D_1_PH	-0.023 (-0.566)	-0.073 (-1.334)
D_075_ELM	0.010 (0.157)	0.118* (1.689)
D_075_PH	0.044 (1.181)	-0.005 (-0.093)
D_05_ELM	0.004 (0.086)	0.033 (0.587)
D_05_PH	-0.008 (-0.238)	-0.083* (-1.894)
D_025_ELM	0.029 (0.514)	0.174*** (3.068)
D_025_PH	0.006 (0.137)	-0.022 (-0.337)
ρ	0.408 *** (22.801)	0.304 *** (13.902)
R square	84.00%	72.31%
Log likelihood	656.40	85.42

Note: Numbers in parentheses are t-values. *= $\alpha \geq .10$, **= $\alpha \geq .05$, ***= $\alpha \geq .01$

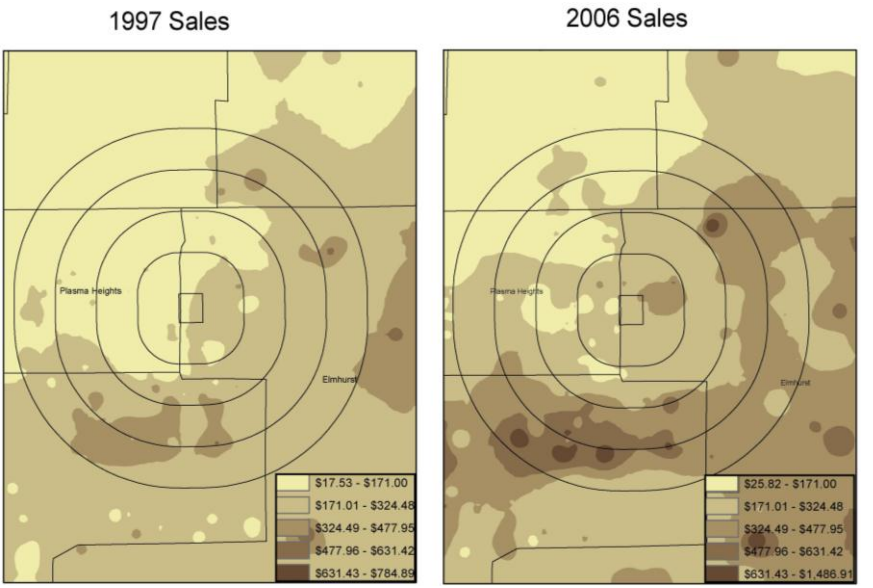
With respect to the distance to the Orthodox campus, the results of the spatial lag model are slightly different from those of the OLS model. The walking premiums from the Orthodox campus are: 17.4% within a ¼ mile, 0% within a ½ mile, 11.8% within ¾ , and 0 percent within one mile (see Table 5).

Table 5 Comparison of Price Differences Before and After Orthodox Campus Construction (Spatial Lag Model, Log Results in Percent)

	1997	2006	Difference / Adjusted for Average Prices and Appreciation
	Discount or Premium	Discount or Premium	Net Change in Sales Price (%)
Elmhurst within 1/4 mile	0.000	0.173	17.4
Elmhurst within 1/2 mile	0.000	0.000	0.0
Elmhurst within 3/4 mile	0.000	0.117	11.8
Elmhurst within 1 mile	0.000	0.000	0.0

Note: Results which are not statistically significant from zero at the 90% confidence interval ($\alpha \geq$**.10,**) are shown as 0.

Figure 2 Maps for Visualizing Housing Price Changes in the Study Area.



Note: House values in $1,000s, organized into quintiles. Orthodox campus is rectangle in the center of the map.

These results are mapped in Figure 2 by using the inverse distance weight (IDW) function. Maps in Figure 2 were drawn based on the predicted unit sales price ($/sq. ft) after controlling for all variables. As shown in the maps, higher price houses (the darker areas based on quintile ranks) are concentrated in the middle of Elmhurst City in 1997. In 2006, the dark spots had moved to within the ¼ and 1 mile buffer rings that surround the Orthodox campus. One also can observe darker areas around the Lifestyle Village at the northeastern edge of the ringed area.

7. Analysis of New Residential Building Permits

Because the Orthodox campus may affect not only existing property, but also induce new construction around it, we investigated the location of substantial residential building permits (over $250,000) in Elmhurst for the period from 2000 to 2006.[11] We calculated the ratio of building permits in Elmhurst both inside and outside the one mile ring. Inside the walking zone, 20 building permits were issued, which accounted for 1.5% of the total 1,311 housing units. In the rest of Elmhurst, 22 building permits were issued out among 4,136 housing units, or 0.5%. The percentage of permits issued within the walking zone is more than three times as high, and this is statistically significant at the 5% confidence level[12].

8. Conclusion

This study has examined positive price impact on surrounding properties that result from the expansion of an Orthodox Jewish religious campus in Elmhurst, a suburb of a large Midwestern US city. The findings suggest that the Orthodox campus has strong, local, and positive effects on surrounding residential property values because there is a strong demand for living within easy walking distance from the campus. The results of the two before-and-after model sets suggest that positive effects of 17% to 20% are exerted on residential property values within a ¼ mile of the Orthodox campus. This finding is consistent with the literature on churches. While other positive price impacts are found for the third (½ to ¾ mile) and fourth (¾ to 1 mile) buffers, they may be not solely associated with the Orthodox campus. These are discussed in more detail below.

[11] This was selected based upon the natural break point for house rehabs in this area. The price of a buildable housing lot in the area is about $150,000 and higher.

[12] We acknowledge that acquisition of cheaper, tear down houses within the one mile ring to make housing sites may partially confound the study's results, by transacting less expensive houses close to the Orthodox campus. This could serve to understate the magnitude of the results.

However, there are no consistent positive effects for properties adjacent to Plasma Heights, even within a ¼ mile and the coefficient signs on some distance bands are negative. Although this research has also found some modest positive results in Plasma Heights within a ¼ mile (e.g., footnote 10), these are not supported in the strongest models. Furthermore, persistent negative signs are found in most Plasma Heights rings; these can be attributed to the presence of the Jack Case University[13], and overall declining values in the local public school district (which is different from those of Elmhurst). According to a local realtor familiar with both the Elmhurst and Plasma Heights residential markets, "no change in Plasma Heights can be viewed as an increase when the general trend in the overall market and school district are down. Also, the Plasma Heights starter homes beginning about ½ mile from the Orthodox campus are smaller, do not have attached garages, and are less attractive to Orthodox families[14]".

While some positive signs are also significant for other Elmhurst distance rings, the ½ mile band is consistently not statistically significant. One explanation is that the housing stock in this distance ring is generally smaller (more typically 3 bedrooms, 1½ baths, compared with 4 bedrooms, 2½ baths or larger) than in the other Elmhurst rings. Thus, this housing stock may not be attractive to large Orthodox families. Findings of positive impacts of 12% to 16% in the ¾ mile ring is therefore somewhat suspicious, since there has been a discontinuity at the ½ mile ring from the Orthodox campus, and the magnitude of the effect seems high relative to its distance from the Orthodox campus.

Because of the timing of its development and size, we also examined the effect of the Lifestyle Village Shopping Center on the surrounding residential market. Lifestyle Village was built and opened in 2004, and located about a mile from the Orthodox Campus. DesRosiers, Lagana, Theriault, and Beaudoin (1996) find some positive effects from shopping centers which may extend up to ½ mile in Quebec City in Canada. Thus, to rule out the validity threat that the Lifestyle Village affects property values within part of its potential influence area where it overlaps with the influence area from the Orthodox campus, we ran a regression analysis on the Lifestyle Village project. The results of the models both before and after the development of the Lifestyle Village Shopping Center are set forth in the Appendix. The R-squared of the model is .72 or better, and shows that the Lifestyle Village center has no

[13] Some earlier computer runs yielded a negative but not statistically significant sign for properties within the ¼ and ½ mile rings of the Jack Case University. Jack Case was there before the creation of the Orthodox campus; its presence is a constant, not variable. Earlier linear runs indicate the parameter estimates on within ½ mile of the Jack Case University are not significant (t value is -.624).

[14] Susan Zucker (not her real name) with REALMIX, telephone interview December 29, 2008.

statistically significant relationship on nearby housing prices after completion. Thus, we can conclude that the Orthodox campus has a positive local effect within a ¼ mile. Beyond that, there may be an effect, but we hesitate to attribute it to the Orthodox campus because of the discontinuity in some models from a ¼ to ½ mile.

Policy implications are that, for local government, religious campuses of this type may have a positive externality that extends beyond city boundaries depending where the facility is sited. Increased property values have a positive effect on public school property tax revenues. This effect is enhanced because most orthodox children attend private schools (typically at least through 8th grade) which indicates a limited increase in public school students. Of course, it is acknowledged that many of these families moved from elsewhere in the metropolitan area. The critical mass also supports specialty retail, such as kosher restaurants.

A caveat: many houses within the Orthodox community sell by word of mouth or for sale by owner (FSBO). In tight up-markets such as the one experienced in 2006, this percentage is much higher, and in poor markets, most homes sell through realtors. It is possible that the savings these sellers and buyers experience may have yielded slightly lower sales prices. Thus our results may understate home sales prices, as well as the effects of the Orthodox campus on residential property values.

In addition, more housing construction appears to be generated within walking distance from the Orthodox campus. An explanation for this is that people buy houses just to tear them down in order to build new larger homes.

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Appendix

Effect of Local Shopping Center on Nearby Residential Property Values

Variables	Lifestyle Village Model 2001	Lifestyle Village Model 2007
CONSTANT	5.737**(7.016)	5.558**(4.973)
Legal_frontage	0.001**(4.093)	0.000001 (0.15)
Year built	0.002**(6.135)	0.002**(4.629)
Basement sqft	0.00001 (1.044)	0.00007**(3.986)
Bedrooms	0.039**(4.98)	0.018 (1.642)
Baths	0.07**(6.76)	0.11**(7.524)
Fireplace	0.074**(8.673)	0.042**(3.735)
Garage size	0.00012**(2.752)	0.00007 (1.054)
Liv area total	0.00022**(18.912)	0.00025**(16.089)
d_spring sale	-0.031*(-2.441)	-0.007 (-0.429)
d_fall sale	-0.019 (-1.559)	-0.107**(-5.701)
d_winter sale	-0.046**(-3.322)	-0.07**(-3.459)
d_double	0.187**(7.627)	0.568**(10.493)
Income	0.066 (1.819)	0.021 (0.419)
Percent white in tract	0.004**(7.487)	0.007**(8.14)
Public school students	0.001 (0.594)	0.004*(2.149)
High school graduation %	-0.005**(-3.183)	-0.01**(-5.033)
D_Lebanon Road	-0.032 (-0.664)	-0.047 (-0.407)
D_Thagrin Blvd.	-0.117 (-1.467)	-0.016 (-0.136)
D_Flarman Blvd.	-0.195**(-3.087)	-0.208*(-2.401)
D_Smith Road	-0.29**(-3.87)	-0.016 (-0.124)
D_Logjam Road	0.02 (0.318)	0.15 (1.871)
D_Lee Road	-0.155 (-1.208)	-0.051 (-0.18)
D_Richman Road	-0.093 (-1.571)	-0.016 (-0.234)
D_Slacker Blvd.	0.058 (1.221)	-0.041 (-0.541)
D_Warrens. Road	-0.082 (-0.817)	-0.039 (-0.296)
D_Interstate	0.045 (1.544)	0.003 (0.063)
City A	-0.176**(-4.971)	-0.005 (-0.091)
City B	-0.242**(-7.726)	-0.199**(-4.449)
City C	-0.196**(-5.194)	-0.061 (-1.135)
City D	-0.127**(-3.149)	-0.042 (-0.772)
City E	-0.221**(-6.466)	-0.173**(-3.406)
City F	-0.063*(-2.041)	-0.083 (-1.85)
City G	-0.34**(-11.663)	-0.344**(-8.222)
City H	-0.227**(-5.432)	-0.136*(-2.371)

(*Continue...*)

(*Table 6 Continued*)

Variables	Lifestyle Village Model 2001	Lifestyle Village Model 2007
Distance from LV is up to .125 mile	0.175 (1.525)	No sales this year
Dist from LV up to .25 mile	-0.069 (-0.851)	-0.167 (-1.409)
Dist from LV up to .375	-0.098 (-1.416)	-0.089 (-0.911)
Dist from LV is .5	0.021 (0.465)	0.054 (0.758)
Dist from LV is .625	0.028 (0.728)	0.055 (1.096)
Dist from LV is .75	-0.001 (-0.043)	0.039 (0.67)
Dist from LV is .875	0.015 (0.478)	0.055 (1.229)
Dist from LV is up to one mile	0.015 (0.543)	0.055 (0.627)
R square	77.69%	73.15%
Adj. R square	77.26%	72.52%

Notes: The numbers in parenthesis are t statistics. *= statistically significant at >95%, **= is stat. significant at >99%.