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Adaptive Reuse of Religious Buildings and Schools in the US: Determinants of Project Outcomes

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This study addresses factors that affect the outcomes of adaptive reuse of empty religious buildings and schools in the United States. Literature-driven observable factors expected to have an impact on project outcomes include both supply side and demand side factors (building characteristics, neighborhood demographics, micro-location characteristics, macro-economic factors, etc.) are used as explanatory variables. This study uses the multinomial logit model with the outcome of adaptive reuse projects (e.g., apartments, condominiums, retail, office and cultural uses) as the dependent variable. This study has found that many supply side and demand side factors are associated with certain outcomes. It is expected that the results of this study can offer valuable basic information about associations between factors and development outcomes for adaptive reuse.

Keywords

Adaptive reuse; Multinomial logit model; Religious buildings and schools

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1. Introduction

Adaptive reuse projects often maximize the hidden value of real property and provide a process for the reemployment of properties (Burchell and Listokin, 1981). Adaptive reuse projects can be used as a tool to revitalize neighborhoods and renew distressed urban areas because they tend to increase the value of the reused property, generate jobs and augment revenues for state and local governments through returning underused structures to the tax roll (Latham, 2000). Moreover, reused properties would provide shelter for new businesses or new residents whose money might stimulate the local economy. In other words, the adaptive reuse process brings in new residents and commercial tenants, generating additional economic activity. This results in either renovation or development of the surrounding infrastructure (Zielenbach, 2000).

Adaptive reuse projects of religious buildings and schools are initiated when they are no longer viable in their original function and purpose, but retain their architectural integrity (Tyler, 2000). These buildings may be attractive to developers who seek adaptive reuse projects because many religious buildings and schools have retained features that are linked with the history of a neighborhood, and it is expected that those historic features might produce more financial benefits to developers and the general public. Therefore, developers have increasingly sought to convert old, underused religious buildings and schools into residential housing, retail centers, and office space, particularly if it is believed that the style of the building has an advantage in producing profit and other benefits. Also, in a down economy, these deals are often less expensive than new construction.

To date, however, there has been minimal empirical research to associate project outcomes of adaptive reuse projects in the United States. The purpose of this study is to determine the factors that are related to adaptive reuse outcomes of religious buildings and schools. To determine the factors that affect project outcomes, this study uses outcomes of adaptive reuse projects (e.g., apartments, condominiums, retail, office and cultural uses) as the dependent variable, which indicates that a multinomial logit model is appropriate. Literature-driven observable factors expected to have an impact on project outcomes are both supply side and demand side factors, including: building characteristics, neighborhood demographics, micro-location characteristics, macro-economic factors and characteristics of property sellers. These are used as explanatory variables.

2. Literature Review

Decisions for selecting project outcomes have never been academically investigated by empirical research, but conceptualized by several explanatory

pieces of work. Adaptive reuse literature has tried to answer why certain buildings are adapted for new uses, but not other buildings, and also tried to answer which factors affect the selection of project outcomes, which is the theme of this study.

Physical building characteristics have been frequently pointed out as the most important factors that affect the selection of project outcomes of old building reuse projects. Physical characteristics of a building tell the historic sense of the property that is linked to the history of the community, and are proxies of unique utilization of building space that might be attractive to potential investors who seek their development to be special. Burchell and Listokin (1981) posit that the conditions of the property and building features should be considered in the decision making process of selecting a reuse outcome. According to them, residential conversion is the best option for good structure conditions under both weakening and strengthening markets, but is not a good option for poor structure conditions under either a weakening or strengthening market. In the case of poor structure conditions, they recommend public spaces as a good redevelopment option. Mallach (2006) mentions that if a building is attractive, of high quality, or has architectural or historic value, the building is worthy of preservation and conversion into new uses. Focusing on residential conversion, Mallach (2006) argues that the size of a building always matters for selecting a reuse outcome, and the architectural or historic quality of the building, character of the building relative to potential market demand, and presence of environmental concerns are important factors to be considered when developers decide on project outcomes. Similarly, Lion (1982) states that before any decisions are finalized on the extent of the nature of the building reuse, or general design aspects, it is essential to perform a complete and thorough building inspection because it will indicate the state of health or deterioration and any repairs that have to be effected apart from other alterations or adaption of other uses. Bullen (2007) approaches adaptive reuse as a tool for sustainable development. From this point of view, his survey results show that environmental sustainability, heritage significance, and effectiveness in meeting sustainability benchmarks of the building are the most important factors that should be considered during the decision-making process for moving forward with adaptive reuse projects. Langston et al. (2008) describe the conceptual framework of an approach to identify and rank an adaptive reuse potential model. Their model requires an estimate of the expected physical life of the building and its current age, both reported in years. Where the current building age is close to and less than the useful life of the building, the model identities that redevelopment should commence. Garrod et al. (1996) focus on the non-priced benefits of renovating historic buildings. They point out that the non-priced benefits[1] arise from a building's

[1] Non-priced benefits arise when people get enjoyment and satisfaction from a restored building, and do not have to pay for access (Garrod et al., 1996). Non-priced benefits, which are essentially private, and externalities, which may be public or private, justify public subsidy investments for encouraging adaptive reuse.

historical and architectural significance, role in the community development of a sense of identity, and role in encouraging tourism and investment. In short, the authors consider the architectural and historic value of buildings as an important determinant that affects an owner's decision to renovate.

In addition to building characteristics as an important factor that affect the selection of reuse project outcomes, other external factors have been pointed out by adaptive reuse literature: macro-economic conditions, micro-location characteristics, and neighborhood demographics. These factors are proxies of the market and niches. In a market-driven economy, the market drives key decisions that determine the future of reused buildings (Mallach, 2006). Burchell and Listokin (1981) point out that macro-economic conditions, such as employment and income decline, affect adaptation of underused buildings and the reuse outcome because if the economy of a neighborhood continues to change rapidly, the neighborhood requires different types of industries and public services. Langston et al. (2008) state that the location of a building is an important factor that affects adaptation and reuse outcome because if the location is negatively affected by nuisances generated by urban disamenities, such as brownfields and railroads, the changing function of the building is often the best way to preserve the historic and architectural sense of the property. Neighborhood demographic conditions are also an important factor. Burchell and Listokin (1981), Mallach (2006) and Mian (2009) strongly argue that the redevelopment activities of underused properties are caused by demographic changes of neighborhoods.

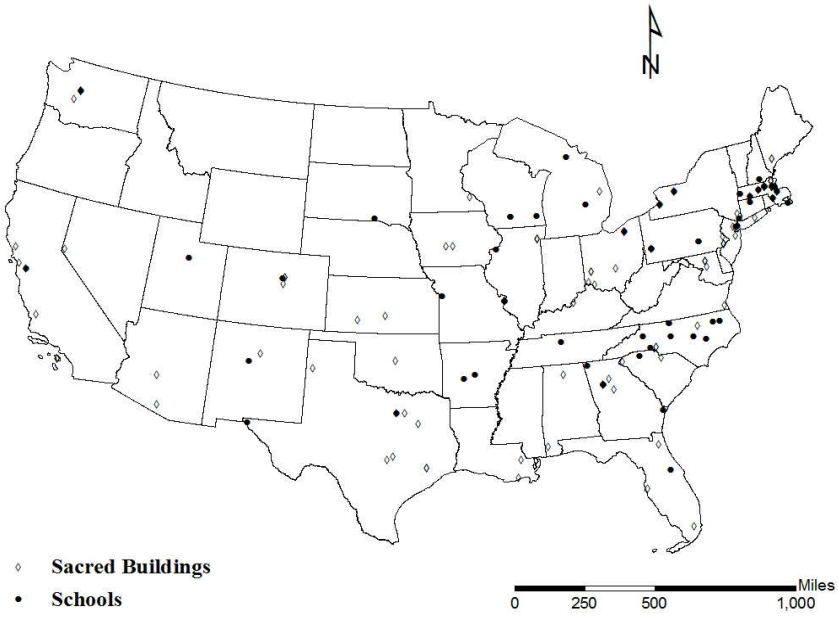
3. Model and Data

We used a primary database of religious buildings (primarily churches) and schools that have been redeveloped for different purposes in the United States, as the unit of analysis. To obtain the list of religious buildings and schools, various sources, such as journals, new articles, academic papers, related books and commercial real estate websites, were reviewed. The database of the study, however, represents a non-random subset of the actual cases of this type in the United States.

It is expected that old religious buildings and schools, unlike other old structures, retain their architectural identity and integrity. One hundred and twenty-six religious buildings and 83 schools that are currently reused for another purpose are included in the sample for this study. Religious buildings and schools in the sample were redeveloped between 1984 and 2009. Figure 1 shows the distribution of religious buildings and schools used in the study. Massachusetts, New York, Washington, D. C. and North Carolina are the top four states where adaptive reuse projects of religious buildings and schools were initiated: 54 church and school reuse projects were initiated in

Massachusetts; 16 projects in New York; and 12 projects in both D.C. and in North Carolina.

Figure 1 The Distribution of Religious Buildings and Schools Adaptively Reused



In order to obtain religious building and school listings, and their basic information, such as addresses and project outcomes, all available sources, including newspapers, journals, and commercial real estate websites, were reviewed. Around 30% of the total cases were gathered from CoStar Group's database system (www.costar.com).

We conducted a multinomial logit analysis by using five categories of new uses, including 'apartment,' 'condominium,' 'cultural use,' 'office' and, 'retail purpose' as dependent variables. Residential apartments as a project outcome include all kinds of rental housing, including market rate rentals, senior housing, affordable low income housing, and various mixes of these uses[2]. Residential condominiums as a project outcome include market rate condominiums, such as loft style condos. It is expected that for church

[2] Frequently, developers involved with residential rentals use low income tax credits and/or historic reservation tax credits, but this study does not explicitly consider the use of these tax credits.

projects, condominiums are the dominant reuse because of the attractive architectural features. Cultural uses as a project outcome include various cultural purposes, such as museums, art centers and concert halls that are used both for profit and by not-for-profit space uses. Offices as an outcome include religious buildings and schools that are currently reused as office spaces. This category includes both offices that are owner-occupied space and leased space. Retail purposes as a project outcome include small strip centers, large scale super centers, restaurants, drug stores, themed centers, commercial parking lots and so forth.

Independent variables were gleaned from the literature, and include building characteristics which are proxies of historic and architectural values of religious buildings and schools, and neighborhood demographics, location characteristics and macro economic conditions, which are proxies of market conditions. In addition to these factors, this study includes characteristics of the property seller, such as whether the property sellers were churches or schools, and hierarchical sellers or non-hierarchical sellers. As the Catholic church has a hierarchical decision making process, for example, their policies, such as promulgating the merger or relocation plans for their parishes, may have driven a larger, but more controlled and economically efficient, net loss of churches, compared with denominations which do not follow a centralized hierarchical process.

The study uses nominal data as the dependent variable, and thus the multinomial logit model for this study is expressed as:

$$P_i^j = f(B_i, D_i, L_i, M_i, S_i) \tag{1}$$

where P_i^j = a property *i* selecting *j* as an reuse project outcome,

B_i = a vector indicating building characteristics of a property *i*,

D_i = a vector indicating demographic conditions of a property *i*,

L_i = a vector indicating location characteristics of a property *i*,

M_i = a vector indicating macro-economic conditions of a property *i*

and S_i = a vector indicating seller characteristics of a property *i*

This model is formed under the assumption that for the probability of a decision maker who will select outcome *j* as an appropriate outcome for an individual property (a church or school), *i* is dependent upon the characteristics of the property *i*. The independent variables and their descriptions are presented in Table 1.

Descriptive statistics are presented in Tables 2, 3 and 4. Table 2 contains brief statistics that tell how many churches and schools are converted into

different purposes. We found that adaptive reuse project outcomes can be broadly divided into 7 uses: residential rental housing, residential condominiums, cultural, offices, retail, schools, and industrial. For our multinomial logit model, however, we excluded industrial reuses since we found a very small number of projects, and also excluded "schools as an outcome" since these outcomes mean that the original function for school buildings are kept, which does not really qualify as an adaptive reuse. Table 2 shows the descriptive statistics of categorical explanatory variables, including seller, historic value and street type dummies. Table 3 shows the descriptive statistics of continuous variables, including building structures and demographics.

4. Empirical Results

We conducted the multinomial logit model using the previously mentioned outcomes as the dependent variable, with 'condominium' as the reference category[3]. This method allows a direct comparison of the other adaptive reuse outcomes with this reference category. We will present the results of one model using the sample, including religious buildings and schools, and also present the results of the other model using the sample that excludes schools.

Table 5 shows the results of likelihood ratio tests for both models. The likelihood ratio tests show that the null hypothesis that the effects on all log odds-ratios of the dependent variable are simultaneously equal to zero can be rejected for independent variables. The findings show that building characteristics, such as the number of stories and year built, significantly matter when developers decide on project outcomes. In addition, the presence of a hierarchical decision making process is statistically significant at 99%, meaning that the hierarchical faith is highly related to the selection of project outcomes.

[3] When categories are multiple and unordered, multinomial logit regression is usually used. If there are 5 categories as in this study, this analysis tool requires the calculation of 4 (5-1) equations, one for each category to the reference category, in order to describe the relationship between dependent and independent variables.

Table 1 Explanatory Variables

Conceptual Definition	Explanatory Variables	Description
Building Characteristics	LNBLDSIZE	Building size in square feet is in natural log form
	STORY	Number of stories
	AGE	Age of property
	[BLDM=STONE]	A dummy variable indicating whether the building material is stone
	[BLDM=WOOD]	A dummy variable indicating whether the building material is wood
	[BLDM=BRICK]	A dummy variable indicating whether the building material is brick; used as a reference category
Demographic	YOUNG	Young population: 22~34 in % by census tract
	LNINCOME	The natural logarithm of the median household income in dollars by census tract
	OWNER	Owner occupied housing in % by census tract
	VACANCY	Vacancy rate in % by census tract
	LNRENT	The natural logarithm of the median gross rent in $ by census tract
Location Characteristics	LNPARK	The natural logarithm of the distance from the nearest park in miles
	LNLAKE	The natural logarithm of the distance from the nearest lake in miles
	LNHIGHWAY	The natural logarithm of the distance from the nearest highway in miles
	[STREETTYPE=LOCAL]	A dummy variable indicating whether a property is located on the local road
	[STREETTYPE=MAIN]	A dummy variable indicating whether a property is located on the main road
	[STREETTYPE=COLLECTOR]	A dummy variable indicating whether a property is located on the collector road; used as a reference category
	[CORNER=Y]	A dummy variable indicating whether a property is located on the corner or not
	[INNERCITY=Y]	A dummy variable indicating whether a property is located in the inner city or not

(*Continued*…)

(*Table 1 Continued*)

Conceptual Definition	Explanatory Variables	Description
Macro Economic	[D_MA=Y]	A dummy variable indicating whether a property is located in the State of Massachusetts or not
	[D_NY=Y]	A dummy variable indicating whether a property is located in the State of New York or not
	[D_DC=Y]	A dummy variable indicating whether a property is located in the District of Columbia or not
	[D_NC=Y]	A dummy variable indicating whether a property is located in the State of North Carolina or not
	[D_PA=Y]	A dummy variable indicating whether a property is located in the State of Pennsylvania or not
	[D_TX=Y]	A dummy variable indicating whether a property is located in the State of Texas or not
	[D_GA=Y]	A dummy variable indicating whether a property is located in the State of Georgia or not
	[D_OH=Y]	A dummy variable indicating whether a property is located in the State of Ohio or not
	YRDEVELOPED	A year when a property was rehabbed
Sellers' Characteristics	[D_CHURCH=Y]	A dummy variable indicating whether a seller is a church owner or a school owner
	[D_HIFAITH=Y]	A dummy variable indicating whether a church has a hierarchical decision making process or not

Notes:
Source for Demographics: 2000 US Census
Street Type: We have defined main roads as roads that collect traffic from collector roads and distribute it to highways; collector roads as roads that collect traffic local roads and distribute it to major roads; and local roads as roads that have the lowest speed limit and carry low volumes of traffic.

Table 2 Project Outcomes

Type	Apt		Condo		Cultural		Office		Retail		School		Industry	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Churches	15	10.4%	34	23.6%	35	24.3%	12	8.3%	30	20.8%	17	11.8%	1	0.7%
Schools	52	61.2%	21	24.7%	3	3.5%	6	7.1%	1	1.2%	NA	NA	2	2.4%
Total	67	29.3%	55	24.0%	38	16.6%	18	7.9%	31	13.5%	17	7.4%	3	1.3%

Note:
Church: 144
School: 85
Total N: 229

Table 3 Descriptive Statistics (1): Dummy Variables

Variables	OUTCOMES					Total	%
	Apartments	Condos	Cultural	Office	Retail		
[BLDM=STONE]	3	10	10	1	4	28	13.4%
[BLDM=WOOD]	7	6	3	4	6	26	12.4%
[BLDM=BRICK]	57	39	25	13	21	155	74.2%
[STREETTYPE=LOCAL]	11	7	6	3	3	30	14.4%
[STREETTYPE=MAIN]	29	12	13	7	18	79	37.8%
[STREETTYPE=COLLECTOR]	27	36	19	8	10	100	47.8%
[CORNER=Y]	11	17	10	5	9	52	24.9%
[INNERCITY=Y]	21	29	21	7	13	91	43.5%
[D_MA=Y]	25	14	9	3	3	54	25.8%
[D_NY=Y]	3	6	3	2	2	16	7.7%
[D_DC=Y]	2	10	0	0	0	12	5.7%
[D_NC=Y]	9	0	3	0	0	12	5.7%
[D_PA=Y]	3	3	1	2	1	10	4.8%
[D_TX=Y]	1	3	3	1	2	10	4.8%
[D_GA=Y]	3	2	3	0	1	9	4.3%
[D_OH=Y]	1	2	1	0	5	9	4.3%
[D_CHURCH=Y]	15	34	35	12	30	126	60.3%
[D_HIFAITH=Y]	7	11	11	5	4	38	18.2%

Note:
Church: 126
School: 83
Total N: 209

Table 4 Descriptive Statistics (2): Continuous Variables

Variables	Apartment		Condo		Cultural		Office		Retail	
	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D	Mean	S.D
BLDSIZE (SF)	81,102.86	72,172.90	44,388.53	38,049.27	44,544.27	70,967.73	19,429.44	16,247.57	16,837.68	13,280.10
STORY	2.78	.86	2.60	1.27	2.26	0.90	1.72	0.89	1.53	0.87
AGE	86.22	31.75	121.04	27.26	122.64	62.82	67.86	33.74	94.92	44.36
YOUNG (%)	22.60%	11.08%	27.79%	11.49%	27.54%	12.82%	20.14%	9.24%	20.93%	9.62%
INCOME ($)	40,457.93	25,672.30	43,458.29	20,721.85	35,578.74	17,578.14	45,312.00	20,575.18	38,349.35	25,499.23
OWNER (%)	44.49%	24.37%	40.73%	23.44%	36.54%	25.09%	58.38%	26.31%	46.67%	32.23%
VACANCY (%)	9.78%	10.69%	8.51%	7.37%	10.25%	7.25%	7.96%	6.24%	7.71%	5.00%
RENT ($)	630.87	251.06	714.13	242.76	629.03	228.12	664.76	239.01	573.32	237.52
PARK (mile)	0.63	0.60	0.46	0.49	0.52	0.60	0.73	1.33	3.66	16.80
LAKE (mile)	1.49	2.12	1.74	4.66	3.15	5.89	1.85	2.14	1.93	2.33
HIGHWAY (mile)	1.99	2.96	3.73	10.25	1.67	1.85	1.11	.70	1.52	2.33
AIRPORT (mile)	5.68	3.41	6.33	8.91	6.56	7.77	5.32	4.18	6.08	6.33
YRDEVELOPED	2001.06	8.52	2002.77	6.85	1998.96	6.51	2005.35	4.09	2004.12	5.69

Note:
Church: 126
School: 83
Total N: 209

Table 5 Results of Likelihood Ratio Tests: Variables that Affect Project Outcomes

Effects	-2 Log Likelihood of Reduced Model	Chi-Square	Sig.	-2 Log Likelihood of Reduced Model	Chi-Square	Sig.
LNBLDSIZE	371.851	3.353	.501	237.278	4.948	.293
STORY	376.349	7.851	.097**	239.200	6.869	.143*
AGE	384.587	16.089	.003****	246.882	14.552	.006****
[BLDM]	374.162	5.664	.685	242.575	10.244	.248
YOUNG	370.705	2.206	.698	233.785	1.454	.835
LNINCOME	371.034	2.535	.638	234.895	2.564	.633
OWNER	370.557	2.058	.725	235.465	3.134	.536
VACANCY	373.434	4.936	.294	235.581	3.251	.517
LNRENT	372.255	3.757	.440	238.941	6.610	.158
LNPARK	370.314	1.816	.770	236.345	4.015	.404
LNLAKE	369.762	1.263	.868	236.900	4.570	.334
LNHIGHWAY	374.733	6.235	.182	241.070	8.740	.068**
LNAIRPORT	374.294	5.796	.215	236.732	4.401	.354
[D_STREETTYPE]	379.552	11.054	.199	244.228	11.898	.156
[CORNER=Y]	372.523	4.025	.403	233.340	1.010	.908
[INNERCITY=Y]	374.375	5.877	.209	245.628	13.297	.010****
[D_MA=Y]	372.705	4.207	.379	238.194	5.864	.210
[D_NY=Y]	371.761	3.263	.515	234.908	2.578	.631
[D_DC=Y]	380.871	12.372	.015***	235.661	3.330	.504
[D_NC=Y]	378.191	9.693	.046***	239.236	6.905	.141*
[D_PA=Y]	372.933	4.435	.350	243.531	11.200	.024***
[D_TX=Y]	373.292	4.793	.309	236.475	4.145	.387
[D_GA=Y]	371.322	2.823	.588	237.599	5.269	.261
[D_OH=Y]	377.703	9.205	.056**	243.498	11.167	.025***
YRDEVELOPED	373.015	4.516	.341	237.135	4.805	.308
[D_CHURCH=Y]	420.029	51.530	.000****			
[D_HIFAITH=Y]	381.887	13.389	.010****	245.682	13.352	.010****
The Unit of Analysis	Religious Building and Schools			Religious Buildings		
N	209			126		

Note:*, **, ***, **** denote statistical significance at the 85%, 90%, 95% and 99% levels of confidence, respectively

Tables 6 through 9 show the results of the multinomial logit analysis of the study. Each table compares each outcome category to the reference category which is 'condominium.' Our model explains over 70% of the variation in the dependent variable since the Cox and Snell R-squared and Nagelkerke R-squared show over 0.7. In addition, because the dependent variable for our model is categorical, the equal variance assumption underlying a linear multiple regression is not appropriate. Therefore, heteroscedasticity is not an issue in our study.

4.1 Apartments Compared to Condominiums

LNBLDSIZE is statistically significant at the 90% level of confidence with a positive sign, meaning that larger religious buildings and schools are more likely reused for apartments. AGE is statistically significant at the 99% level of confidence with a negative sign, meaning that younger religious buildings and schools are more likely reused for apartments. [BLDM=STONE] is statistically significant at the 99% level of confidence with a negative sign, meaning that if the exterior building material is brick, religious buildings and schools are more likely reused for apartments. VACANCY is statistically significant at the 95% level of confidence with a positive sign, meaning that if religious buildings and schools are located in neighborhoods with higher vacancy rates, these properties are more likely to be reused for apartments. LNAIRPORT is statistically significant at the 85% level of confidence with a positive sign, meaning religious buildings and schools located farther from the airport are more likely reused for apartments. [STREETTYPE=MAIN] is statistically significant at the 99% level of confidence with a positive sign, meaning that religious buildings and schools located on the main street are more likely reused for apartments. [CORNER=Y] is statistically significant at the 99% level of confidence with a negative sign, meaning that religious buildings and schools which are not located on the corner are more likely reused for apartments. [D_NY=Y] is statistically significant at the 85% level of confidence with a negative sign, meaning that religious buildings and schools which are not located in the state of New York are more likely reused for apartments. [D_DC=Y] is statistically significant at the 99% level of confidence with a negative sign, meaning that religious buildings and schools which are not located in the District of Columbia are more likely reused for apartments. [D_TX=Y] is statistically significant at the 90% level of confidence with a negative sign, meaning that religious buildings and schools which are not located in the State of Texas are more likely reused for apartments. YRDEVELOPED is statistically significant at the 90% level of confidence with a negative sign, meaning that earlier redeveloped religious buildings and schools are more likely reused for apartments. [D_CHURCH=Y] is statistically significant at the 99% level of confidence with a negative sign, meaning that schools are more likely reused for

apartments. Finally, [D_HIFAITH=Y] is statistically significant at the 95% level of confidence with a positive sign, meaning that religious buildings and schools sold by hierarchical organizations are more likely reused for apartments.

As shown in Table 6, LNBLDSIZE, LNAIRPORT, [D_NY=Y] and [D_TX=Y], which are statistically significant at the 85%, 90%, 95% or 99% level of confidence for the estimation of the sample that include both religious buildings and schools, are not statistically supported by the estimation of the sample, which excludes schools. This means that these variables may considerably affect the outcomes of school reuse projects. On the other hand, STORY, OWNER, LNPARK, LNHIGHWAY, [D_PA=Y], which are not statistically supported by the estimation of the sample that includes religious buildings and schools, are statistically significant at the 85%, 90%, 95% or 99% level of confidence for the estimation of the sample, which excludes schools. This means that these variables may considerably affect the outcomes of church reuse projects.

4.2 Cultural Uses Compared to Condominiums

STORY is statistically significant at the 95% level of confidence with a negative sign, meaning that religious buildings and schools with fewer stories are more likely reused for cultural purposes. LNAIRPORT is statistically significant at the 85% level of confidence with a negative sign, meaning that religious buildings and schools which are located closer to the airport are more likely reused for cultural purposes. [STREETTYPE=MAIN] is statistically significant at the 85% level of confidence with a positive sign, meaning that religious buildings and schools located on the main street are more likely reused for cultural purposes. [INNERCITY=Y] is statistically significant at the 85% level of confidence with a positive sign, meaning that religious buildings and schools located in the inner city are more likely reused for cultural purposes. [D_NY=Y] is statistically significant at the 90% level of confidence with a negative sign, meaning that religious buildings and schools which are not located in the State of New York are more likely reused for cultural purposes. [D_PA=Y] is statistically significant at the 95% level of confidence with a negative sign, meaning that religious buildings and schools which are not located in the State of Pennsylvania are more likely reused for cultural purposes. YRDEVELOPED is statistically significant at the 90% level of confidence with a negative sign, meaning that earlier redeveloped religious buildings and schools are more likely reused for cultural purposes. Finally, [D_CHURCH=Y] is statistically significant at the 99% level of confidence with a positive sign, meaning that religious buildings are more likely reused for cultural purposes.

As shown in Table 7, [STREETTYPE=MAIN], which is statistically significant at the 85% level of confidence for the estimation of the sample that includes both religious buildings and schools, is not supported by the estimation of the sample, which excludes schools. Consequently, [STREETTYPE=MAIN] may considerably affect the outcomes of school reuse projects. On the other hand, LNBLDSIZE and [STREETTYPE=LOCAL], which are not statistically supported by the estimation of the sample that includes religious buildings and schools, are statistically significant at the 95% and 85% levels of confidence, respectively, for the estimation of the sample, which excludes schools, indicating that these variables may considerably affect the outcomes of church reuse projects.

4.3 Offices Compared to Condominiums

STORY is statistically significant at the 95% level of confidence with a negative sign, meaning that religious buildings and schools with fewer stories are more likely reused for offices. AGE is statistically significant at the 99% level of confidence with a negative sign, meaning that younger religious buildings and schools are more likely reused for offices. [STREETTYPE=LOCAL] is statistically significant at the 99% level of confidence with a positive sign, meaning that religious buildings and schools located on the main street are more likely reused for offices. [INNERCITY=Y] is statistically significant at the 99% level of confidence with a positive sign, meaning that religious buildings and schools located in the inner city are more likely reused for offices. [D_MA=Y] is statistically significant at the 85% level of confidence with a negative sign, meaning that religious buildings and schools which are not located in the State of Massachusetts are more likely reused for offices. [D_TX=Y] is statistically significant at the 95% level of confidence with a negative sign, meaning that religious buildings and schools which are not located in the State of Texas are more likely reused for offices. Finally, [D_CHURCH] is statistically significant at the 95% level of confidence with a negative sign, meaning that schools are more likely reused for offices.

As shown in Table 8, STORY, [STREETTYPE=MAIN] and [D_TX=Y], which are statistically supported by the estimation of the sample that includes both religious buildings and schools, are not statistically supported by the estimation of the sample which excludes schools, indicating that these variables may considerably affect the outcomes of school reuse projects. On the other hand, [BLDM=WOOD], LNRENT and LNLAKE, which are not statistically supported by the estimation of the sample that includes religious buildings and schools, are statistically significant at the 95%, 90% and 95% levels of confidence, respectively, for the estimation of the sample which excludes schools, meaning that these variables may considerably affect the outcomes of church reuse projects.

Table 6 Apartment ('Condominium' as a Reference Category)

Variables	B	Std. Error	Wald	Sig.	B	Std. Error	Wald	Sig.
LNBLDSIZE	0.469	0.268	3.068	0.080**	0.256	0.437	0.343	0.558
STORY	0.014	0.275	0.002	0.961	-1.265	0.564	5.039	0.025***
AGE	-0.045	0.011	16.590	0.000****	-0.038	0.013	7.945	0.005****
[BLDM=STONE]	-2.079	0.745	7.777	0.005****	-4.311	1.961	4.834	0.028***
[BLDM=WOOD]	-0.362	0.598	0.367	0.545	-0.578	1.097	0.278	0.598
[BLDM=BRICK]	Reference Category				Reference Category			
YOUNG	-0.274	2.862	0.009	0.924	-3.419	5.854	0.341	0.559
LNINCOME	-0.215	1.001	0.046	0.830	2.532	1.975	1.642	0.200
OWNER	-1.297	1.927	0.453	0.501	-7.386	3.887	3.611	0.057**
VACANCY	7.541	3.258	5.358	0.021***	10.118	5.913	2.928	0.087**
LNRENT	0.349	1.169	0.089	0.765	0.192	1.972	0.009	0.923
LNPARK	0.089	0.205	0.190	0.663	0.735	0.448	2.686	0.101*
LNLAKE	-0.062	0.190	0.107	0.744	0.211	0.441	0.230	0.631
LNHIGHWAY	-0.178	0.219	0.665	0.415	-0.883	0.425	4.316	0.038***
LNAIRPORT	0.397	0.264	2.267	0.132*	0.010	0.579	0.000	0.986
[STREETTYPE=LOCAL]	0.730	0.592	1.519	0.218	-15.156	923.495	0.000	0.987
[STREETTYPE=MAIN]	1.854	0.491	14.287	0.000****	1.821	0.777	5.489	0.019***

(*Continued…*)

96 Simons and Choi

(*Table 6 Continued*)

Variables	B	Std. Error	Wald	Sig.	B	Std. Error	Wald	Sig.
[STREETTYPE=COLLECTOR]	Reference Category				Reference Category			
[CORNER=Y]	-1.293	0.485	7.122	0.008****	-0.120	0.876	0.019	0.891
[INNERCITY=Y]	0.024	0.509	0.002	0.962	0.307	0.949	0.105	0.746
[D_MA=Y]	0.572	0.552	1.075	0.300	0.612	1.022	0.359	0.549
[D_NY=Y]	-1.360	0.857	2.520	0.112*	-0.873	1.287	0.460	0.498
[D_DC=Y]	-2.477	0.832	8.854	0.003****				
[D_NC=Y]	19.358	4244.797	0.000	0.996	0.517	4391.724	0.000	1.000
[D_PA=Y]	0.479	0.831	0.331	0.565	4.679	2.454	3.635	0.057**
[D_TX=Y]	-1.847	1.059	3.044	0.081**	-1.640	1.524	1.158	0.282
[D_GA=Y]	-1.262	0.989	1.630	0.202	3.040	2759.252	0.000	0.999
[D_OH=Y]	-0.268	1.238	0.047	0.829	-18.418	1248.832	0.000	0.988
YRDEVELOPED	-0.080	0.046	3.004	0.083**	-0.132	0.069	3.634	0.057**
[D_CHURCH=Y]	-2.904	0.592	24.032	0.000****				
[D_HIFAITH=Y]	1.330	0.626	4.516	0.034***	1.466	0.818	3.207	0.073**
The Unit of Analysis	Religious Buildings and Schools				Religious Buildings			
N	209				126			
Cox and Snell R-Squared	0.721				0.703			
Nagelkerke R-Squared	0.757				0.737			

Note: *, **, ***, **** denote statistical significance at the 85%, 90%, 95% and 99% levels of confidence, respectively

Table 7 Cultural Use ('Condominium' as a Reference Category)

Variables	B	Std. Error	Wald	Sig.	B	Std. Error	Wald	Sig.
LNBLDSIZE	0.372	0.262	2.006	0.157	0.687	0.343	4.018	0.045***
STORY	-0.610	0.304	4.030	0.045***	-0.912	0.434	4.414	0.036***
AGE	0.002	0.006	0.081	0.775	0.001	0.007	0.007	0.934
[BLDM=STONE]	-0.328	0.543	0.364	0.546	-0.063	0.738	0.007	0.932
[BLDM=WOOD]	-0.105	0.641	0.027	0.869	1.019	0.869	1.375	0.241
[BLDM=BRICK]	Reference Category				Reference Category			
YOUNG	1.192	2.703	0.195	0.659	2.353	3.572	0.434	0.510
LNINCOME	-1.467	1.077	1.857	0.173	-0.546	1.370	0.159	0.690
OWNER	1.435	1.991	0.520	0.471	-0.823	2.494	0.109	0.741
VACANCY	3.058	3.182	0.923	0.337	3.647	4.353	0.702	0.402
LNRENT	0.399	1.192	0.112	0.738	-0.953	1.476	0.416	0.519
LNPARK	-0.202	0.205	0.967	0.325	-0.161	0.255	0.399	0.528
LNLAKE	-0.075	0.183	0.166	0.684	-0.262	0.249	1.109	0.292
LNHIGHWAY	0.186	0.190	0.957	0.328	0.303	0.244	1.547	0.214
LNAIRPORT	-0.349	0.232	2.256	0.133*	-0.469	0.314	2.229	0.135*
[STREETTYPE=LOCAL]	0.722	0.561	1.658	0.198	1.247	0.804	2.406	0.121*
[STREETTYPE=MAIN]	0.718	0.486	2.182	0.140*	0.625	0.607	1.060	0.303

(*Continued…*)

(***Table 7 Continued***)

Variables	B	Std. Error	Wald	Sig.	B	Std. Error	Wald	Sig.
[STREETTYPE=COLLECTOR]	Reference Category				Reference Category			
[CORNER=Y]	-0.433	0.456	0.901	0.343	-0.712	0.595	1.434	0.231
[INNERCITY=Y]	0.704	0.475	2.196	0.138*	1.204	0.629	3.661	0.056**
[D_MA=Y]	-0.492	0.579	0.722	0.396	-0.732	0.745	0.964	0.326
[D_NY=Y]	-1.214	0.723	2.820	0.093**	-1.720	0.936	3.377	0.066**
[D_DC=Y]	-19.345	6357.686	0.000	0.998	-18.379	5615.086	0.000	0.997
[D_NC=Y]	18.565	4244.797	0.000	0.997	17.408	2257.828	0.000	0.994
[D_PA=Y]	-2.405	1.181	4.147	0.042***	-3.060	1.469	4.337	0.037***
[D_TX=Y]	-0.222	0.833	0.071	0.790	0.215	1.038	0.043	0.836
[D_GA=Y]	0.907	0.877	1.069	0.301	17.663	1823.598	0.000	0.992
[D_OH=Y]	-0.747	1.157	0.416	0.519	-1.069	1.420	0.566	0.452
YRDEVELOPED	-0.073	0.039	3.563	0.059**	-0.088	0.050	3.090	0.079**
[D_CHURCH=Y]	1.837	0.664	7.642	0.006****				
[D_HIFAITH=Y]	0.178	0.474	0.142	0.706	0.202	0.577	0.123	0.726
The Unit of Analysis	Religious Buildings and Schools				Religious Buildings			
N	209				126			
Cox and Snell R-Squared	0.721				0.703			
Nagelkerke R-Squared	0.757				0.737			

Note: *, **, ***, **** denote statistical significance at the 85%, 90%, 95% and 99% levels of confidence, respectively

Table 8 Office ('Condominium' as a Reference Category)

Variables	B	Std. Error	Wald	Sig.	B	Std. Error	Wald	Sig.
LNBLDSIZE	-0.246	0.360	0.467	0.495	-0.635	0.578	1.209	0.272
STORY	-0.954	0.420	5.167	0.023***	-0.061	0.675	0.008	0.928
AGE	-0.031	0.011	8.162	0.004*****	-0.051	0.016	10.656	0.001****
[BLDM=STONE]	-1.144	1.026	1.244	0.265	-0.636	1.368	0.216	0.642
[BLDM=WOOD]	0.438	0.738	0.352	0.553	3.156	1.289	5.994	0.014***
[BLDM=BRICK]	Reference Category				Reference Category			
YOUNG	-1.185	4.686	0.064	0.800	1.570	7.637	0.042	0.837
LNINCOME	0.450	1.361	0.109	0.741	0.407	2.762	0.022	0.883
OWNER	1.879	2.802	0.450	0.502	2.496	5.209	0.230	0.632
VACANCY	-0.529	4.378	0.015	0.904	-2.234	8.095	0.076	0.783
LNRENT	-0.947	1.480	0.409	0.522	-4.853	2.553	3.615	0.057**
LNPARK	-0.376	0.297	1.603	0.205	-0.610	0.479	1.624	0.203
LNLAKE	-0.109	0.265	0.170	0.680	-1.053	0.467	5.088	0.024***
LNHIGHWAY	-0.407	0.299	1.854	0.173	0.031	0.444	0.005	0.945
LNAIRPORT	-0.451	0.323	1.949	0.163	-0.413	0.645	0.411	0.521
[STREETTYPE=LOCAL]	-0.060	0.780	0.006	0.939	0.673	1.220	0.304	0.581
[STREETTYPE=MAIN]	1.632	0.623	6.872	0.009****	1.087	0.954	1.298	0.255

(*Continued…*)

(***Table 8 Continued***)

Variables	B	Std. Error	Wald	Sig.	B	Std. Error	Wald	Sig.
[STREETTYPE=COLLECTOR]	Reference Category				Reference Category			
[CORNER=Y]	-0.245	0.609	0.163	0.687	0.063	1.036	0.004	0.952
[INNERCITY=Y]	1.938	0.676	8.220	0.004****	4.218	1.166	13.076	0.000****
[D_MA=Y]	-1.162	0.794	2.139	0.144*	-1.795	1.145	2.458	0.117*
[D_NY=Y]	0.302	0.882	0.117	0.733	-1.558	1.626	0.917	0.338
[D_DC=Y]	-21.465	0.000			-18.196	0.000		
[D_NC=Y]	-0.233	0.000			2.020	5450.109	0.000	1.000
[D_PA=Y]	-0.795	1.021	0.607	0.436	-20.672	1908.104	0.000	0.991
[D_TX=Y]	-2.814	1.166	5.829	0.016***	-17.202	1252.054	0.000	0.989
[D_GA=Y]	-17.325	6151.243	0.000	0.998	2.926	2818.793	0.000	0.999
[D_OH=Y]	-18.763	0.000			-15.397	1897.740	0.000	0.994
YRDEVELOPED	0.030	0.066	0.210	0.647	0.038	0.094	0.169	0.681
[D_CHURCH=Y]	-1.511	0.717	4.438	0.035***				
[D_HIFAITH=Y]	0.642	0.691	0.864	0.353	0.900	0.875	1.057	0.304
The Unit of Analysis	Religious Buildings and Schools				Religious Buildings			
N	209				126			
Cox and Snell R-Squared	0.721				0.703			
Nagelkerke R-Squared	0.757				0.737			

Note: *, **, ***, **** denote statistical significance at the 85%, 90%, 95% and 99% levels of confidence, respectively

4.4 Retail Uses Compared to Condominiums

STORY is statistically significant at the 99% level of confidence with a negative sign, meaning that religious buildings and schools with fewer stories are more likely reused for retail purposes. YOUNG is statistically significant at the 90% level of confidence with a negative sign, meaning that religious buildings and schools located in neighborhoods with a smaller young population are more likely reused for retail purposes. LNRENT is statistically significant at the 95% level of confidence with a negative sign, meaning that religious buildings and schools located in neighborhoods with lower residential gross rents are more likely reused for retail purposes. LNHIGHWAY is statistically significant at the 95% level of confidence with a negative sign, meaning that religious buildings and schools closer to the highway are more likely reused for retail purposes. LNAIRPORT is statistically significant at the 90% level of confidence with a negative sign, meaning that religious buildings and schools closer to the airport are more likely reused for retail purposes. [STREETTYPE=MAIN] is statistically significant at the 95% level of confidence with a positive sign, meaning that religious buildings and schools located on the main street are more likely reused for retail purposes. [INNERCITY=Y] is statistically significant at the 95% level of confidence with a positive sign, meaning that religious buildings and schools located in the inner city are more likely reused for retail purposes. [D_MA=Y] is statistically significant at the 90% level of confidence with a negative sign, meaning that religious buildings and schools which are not located in the State of Massachusetts are more likely reused for retail purposes. [D_TX=Y] is statistically significant at the 85% level of confidence with a negative sign, meaning that religious buildings and schools located in the State of Texas are more likely reused for retail purposes. [D_OH=Y] is statistically significant at the 95% level of confidence with a positive sign, meaning that religious buildings and schools located in the State of Ohio are more likely reused for retail purposes. [D_CHURCH=Y] is statistically significant at the 99% level of confidence with a positive sign, meaning that churches are more likely reused for retail purposes. Finally, [D_HIFAITH=Y] is statistically significant at the 99% level of confidence with a negative sign, meaning that religious buildings and schools sold by hierarchical organizations are more likely reused for retail purposes.

As shown in Table 9, for the estimation of the sample that includes both religious buildings and schools, YOUNG and [D_TX=Y], which are statistically significant at the 90% and 85% levels of confidence, respectively, are not supported by the estimation of the sample which excludes schools. This indicates that these variables may considerably affect the outcomes of school reuse projects. All variables that are supported by the estimation of the sample which excludes schools are statistically significant at the 85%, 90%, 95% or 99% level of confidence for the estimation of the sample, which includes both religious buildings and schools.

Table 9 Retail ('Condominium' as a Reference Category)

Variables	B	Std. Error	Wald	Sig.	B	Std. Error	Wald	Sig.
LNBLDSIZE	-0.012	0.311	0.001	0.969	0.125	0.386	0.104	0.747
STORY	-1.300	0.450	8.348	0.004****	-1.315	0.579	5.156	0.023***
AGE	0.003	0.008	0.097	0.756	-0.001	0.009	0.025	0.874
[BLDM=STONE]	-1.111	0.840	1.752	0.186	-1.141	1.117	1.042	0.307
[BLDM=WOOD]	0.016	0.763	0.000	0.983	1.213	1.001	1.468	0.226
[BLDM=BRICK]	Reference Category				Reference Category			
YOUNG	-6.632	3.843	2.978	0.084**	-3.971	4.446	0.797	0.372
LNINCOME	1.553	1.389	1.250	0.264	2.242	1.736	1.667	0.197
OWNER	-2.573	2.571	1.001	0.317	-3.161	3.151	1.006	0.316
VACANCY	-4.908	5.317	0.852	0.356	-5.464	7.054	0.600	0.439
LNRENT	-3.158	1.432	4.863	0.027***	-5.251	1.843	8.116	0.004****
LNPARK	-0.172	0.247	0.482	0.488	-0.253	0.303	0.695	0.404
LNLAKE	0.309	0.271	1.302	0.254	0.057	0.327	0.031	0.861
LNHIGHWAY	-0.580	0.242	5.740	0.017***	-0.654	0.310	4.448	0.035***
LNAIRPORT	-0.556	0.297	3.499	0.061**	-0.997	0.400	6.221	0.013***
[STREETTYPE=LOCAL]	-0.373	0.841	0.197	0.657	0.558	1.024	0.297	0.585
[STREETTYPE=MAIN]	1.115	0.566	3.879	0.049***	1.504	0.690	4.754	0.029***

(*Continued…*)

(*Table 9 Continued*)

Variables	B	Std. Error	Wald	Sig.	B	Std. Error	Wald	Sig.
[STREETTYPE=COLLECTOR]	Reference Category				Reference Category			
[CORNER=Y]	-0.303	0.559	0.295	0.587	-0.098	0.650	0.023	0.880
[INNERCITY=Y]	1.137	0.581	3.827	0.050***	1.926	0.752	6.570	0.010****
[D_MA=Y]	-1.460	0.787	3.440	0.064**	-2.413	0.948	6.475	0.011***
[D_NY=Y]	-1.120	0.859	1.700	0.192	-1.691	1.027	2.713	0.100
[D_DC=Y]	-18.683	5677.157	0.000	0.997	-19.670	6064.986	0.000	0.997
[D_NC=Y]	-1.322	6320.818	0.000	1.000	-3.057	3926.886	0.000	0.999
[D_PA=Y]	0.861	1.300	0.439	0.508	-15.473	2018.444	0.000	0.994
[D_TX=Y]	-1.554	1.074	2.092	0.148*	-1.349	1.322	1.041	0.307
[D_GA=Y]	-0.001	1.362	0.000	0.999	16.411	1823.598	0.000	0.993
[D_OH=Y]	2.994	1.217	6.055	0.014***	2.641	1.546	2.918	0.088**
YRDEVELOPED	0.035	0.060	0.348	0.555	0.012	0.070	0.031	0.860
[D_CHURCH=Y]	3.755	1.136	10.933	0.001****				
[D_HIFAITH=Y]	-2.133	0.679	9.874	0.002****	-2.327	0.837	7.731	0.005****
The Unit of Analysis	Religious Buildings and Schools				Religious Buildings			
N	209				126			
Cox and Snell R-Squared	0.721				0.703			
Nagelkerke R-Squared	0.757				0.737			

Note: *, **, ***, **** denote statistical significance at the 85%, 90%, 95% and 99% levels of confidence, respectively

5. Conclusion

The main goal of this study is to identify the factors that affect decisions to adapt religious buildings and schools for particular uses. We have separated 209 project outcomes into 5 categories, including apartments, condominiums, cultural purposes, offices, and retail uses. Previous literature is taken into consideration in order to derive our conceptual model for this study. With literature-driven variables, we have implemented the multinomial logit model to determine which variables are associated with which outcome.

Our findings on building characteristics, demographic conditions, micro-location characteristics, macro-economic factors and seller characteristics associated with redevelopment outcomes are summarized below. In comparison with 'condominium' as a project outcome, which is typically located in non-hierarchical churches, redevelopers should look for the attributes present in Table 10.

According to the estimation results, the number of stories is one of the most important factors among building characteristics that affects that outcomes of religious buildings and school reuse projects. More stories are preferred by apartment conversions, but the other outcomes prefer fewer stories. The age of the property matters. Younger religious buildings and schools are more likely reused for apartments. It seems that this result is due to the sample's characteristics. Old religious buildings and schools may generate more benefits when their historic features can be utilized. If religious buildings and schools do not have historic features, they tend to be converted into low income housing which are not benefit generators for developers. Therefore, it seems reasonable that younger religious buildings and schools are more likely to be reused for apartments.

This study supports previous literature that has empirically proven the negative impacts of the proximity of highways and airports on residential projects (Boyce and Mattsson, 1999; Espey and Lopez, 2000; Harris, 2000; Black, Black, Issarayangyun and Samuels, 2007; Klaeboe, 2007). These location features, however, provide advantages to retail shops, as they generate high traffic volume (Davies and Baxter, 1997).

The findings from this study can have important implications for churches who are contemplating selling their property, developers who would like to initiate an adaptive reuse project, and public agencies who want to augment their tax bases through this type of project. When the adaptive reuse of an empty religious building or a school is needed, the results of this study could offer valuable insights on the factors that play a significant role in determining outcomes for the new use of old property.

Table 10 Summary of the Logit Regression Results (Reference Category: 'Condominium')

Variable	Apartment	Cultural	Office	Retail
Building Characteristics				
LNBLDSIZE	Larger**			
STORY		Fewer***	Fewer***	Fewer****
YRBLT	Younger****		Younger****	
[BLDM=STONE]				
[BLDM=WOOD]				
[BLDM=BRICK]	More Likely****			
Demographics				
YOUNG				Lower**
LNINCOME				
OWNER				
VACANCY	Higher***			
LNRENT				Lower***
Micro-Location Characteristics				
LNPARK				
LNLAKE				
LNHIGHWAY				Closer***
LNAIRPORT	Farther*	Closer*		Closer**

(*Continued…*)

(***Table 10 Continued***)

Variable	Apartment	Cultural	Office	Retail
[STREETTYPE=LOCAL]				
[STREETTYPE=MAIN]	More Likely****	More Likely*	More Likely****	More Likely***
[STREETTYPE=COLLECTOR]				
[CORNER=Y]	Less Likely****			
[INNERCITY=Y]		More Likely*	More Likely****	More Likely***
Macro-Economic Characteristics				
[D_MA=Y]			Less Likely*	More Likely**
[D_NY=Y]	Less Likely*	Less Likely**		
[D_DC=Y]	Less Likely****			
[D_NC=Y]				
[D_PA=Y]		Less Likely***		
[D_TX=Y]	Less Likely**		Less Likely***	Less Likely*
[D_GA=Y]				
[D_OH=Y]				More Likely***
YRDEVELOPED	Earlier**	Earlier**		
Sellers' Characteristics				
[D_CHURCH=Y]	Less Likely****	More Likely****	Less Likely***	More Likely****
[D_HIFAITH=Y]	More Likely***			Less Likely****

Note: *, **, ***, **** denote statistical significance at the 85%, 90%, 95% and 99% levels of confidence, respectively. Blanks denote the statistical significance below an 85% level of confidence.

Reference

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