The Location of Nonprofit Organizations Influences Residential Housing Prices: A Study in Marion County, Indiana

School of Public and Environmental Affairs
Indiana University–Purdue University Indianapolis
342 North Senate Avenue • Indianapolis, Indiana 46204-1708

Paper presented at the annual meeting of the Association for Research on Nonprofit Organizations and Voluntary Action, November 20–22, 2003, Denver, Colorado.

Indiana's Future:
Identifying Choices and Supporting Action to Improve Communities

Indiana's Future: Identifying Choices and Supporting Action to Improve Communities, funded by an award of general support from Lilly Endowment, Inc., is a research project that seeks to increase understanding of Indiana and to inform decision-makers about options for improving quality of life in Indiana communities.

Researchers and staff at the Center for Urban Policy and the Environment have an ongoing interest in activities that promote vital communities and a strong democracy. This report on the effects of nonprofit organizations on housing prices is one of the results of continuous research on these topics.

The Center for Urban Policy and the Environment is part of the School of Public and Environmental Affairs at Indiana University–Purdue University Indianapolis. For more information about the Indiana's Future Project or the research reported here, contact the Center at 317-261-3000 or visit the Center's Web site (www.urbancenter.iupui.edu).

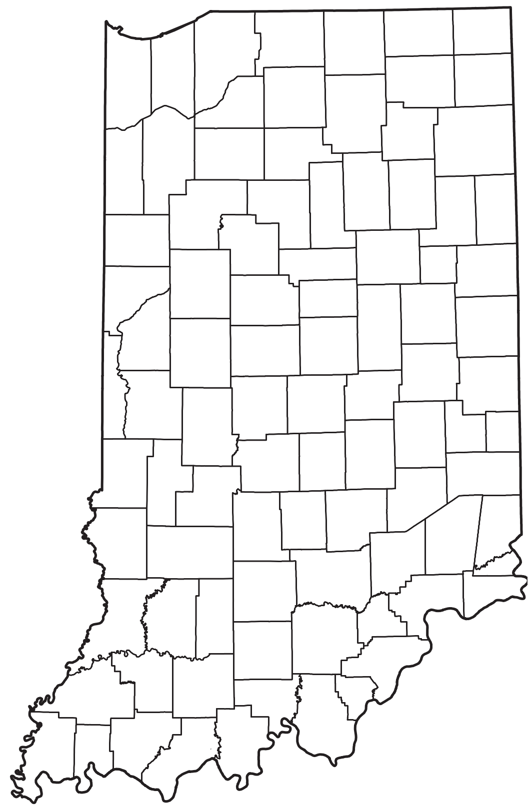


TABLE OF CONTENTS

Page

Authors

Wolfgang Bielefeld
Faculty Fellow, Center for Urban Policy and the Environment
Professor, Public and Environmental Affairs
Adjunct Professor, Center on Philanthropy, and
Adjunct Professor, Sociology
Indiana University–Purdue University Indianapolis

Seth Payton
Senior Policy Analyst
Center for Urban Policy and the Environment

John Ottensmann
Director of Urban Policy and Planning
Center for Urban Policy and the Environment
Professor, Public and Environmental Affairs
Indiana University–Purdue University Indianapolis

Wendy McLaughlin
Program Analyst
National Cancer Institute

Joyce Man
Faculty Fellow, Center for Urban Policy and the Environment
Associate Professor of Economics and Public Policy
Public and Environmental Affairs
Indiana University, Bloomington

EXECUTIVE SUMMARY

Researchers have long assumed that when a nonprofit organization locates in a community, individuals and the community benefit. Some of these benefits are obvious, such as employment and services. However, in recent years, some have suggested that certain types of nonprofit organizations bring costs and negative effects to the neighborhood. Obviously, nonprofit organizations are exempted from property taxes, and this is a cost to government. But beyond that, the NIMBY ("not in my backyard") phenomena indicates that some people object to certain types of nonprofit activities in close proximity to their own homes.

This report describes an analysis of the effect of nonprofit organizations on residential property values. Researchers at the Center for Urban Policy and the Environment conducted this study in Indianapolis, Indiana, during 2005 and 2006. To conduct the study we used geographic information systems (GIS) to integrate the locations of nonprofit organizations in Indianapolis into a dataset of house sales prices. The data for the nonprofit organizations included information about the type of services for each organization, and the dataset for residential property values included individual and neighborhood characteristics for each house sold.

Using GIS technology, we tallied the number and type of nonprofits within a one-mile radius of each house sold and built a *hedonic price model* to calculate the effect on housing sale prices. (More detailed definitions for all technical terms are included in a glossary on page 31.)

Our results suggest that if one or more nonprofit organizations is located in a community, there is an effect on nearby residential property values. This effect varies according to the type of nonprofit organization and the number of nonprofit organizations in the vicinity. Overall, considering all types of nonprofits together, the presence of nonprofits increases house sales prices within a one-mile radius.

Our results show that the contribution of nearby nonprofit organizations to the prices of houses sold is significant. In the Indianapolis/Marion County area, it amounted to more than $40 million between 1998 and 2000. If the effect were applied to all houses in this area, the contribution would have been over $800 million.

In addition, our study shows that certain types of nonprofits may have negative consequences on house sales prices within a one-mile radius. However, this analysis did not consider the value of the goods, services, and employment that these nonprofits provided, benefits that may well be larger than the detrimental effects of reduced house sales prices.

Policymakers and community leaders should be aware of this contribution when assessing the value of nonprofit organizations in their communities.

INTRODUCTION

From the very inception of the study of nonprofit organizations, researchers have assumed that the nonprofit sector provides numerous benefits to individuals, communities, and society. Writings by major nonprofit theorists (e.g., Salamon, 1999; Smith, 1973; VanTil, 2000, 1988) discuss many positive contributions that the nonprofit sector makes, either singly or in combination with the public or for-profit sector. These contributions include services; advocacy; solidarity, integration, and social capital; self-expression; and personal fulfillment. They include both tangible and intangible contributions as well as both financial benefits (such as the value of goods and services produced) and nonfinancial benefits (such as the quality of life and the social capital of communities).

On the other hand, some suggest that not all nonprofit contributions are positive. The NIMBY ("not in my backyard") phenomena implies that some people might object to some types of nonprofit activities taking place near them. In addition, some types of social capital (for example, "bonding" as opposed to "bridging" social capital), while providing benefits to a group, may potentially have negative consequences for inter-group relations (Musso, Weare, Oztas & Loges, 2006; Putnam, 2000).

Evaluation of the impact of the nonprofit sector is currently a major issue among practitioners, policymakers, and academics in the United States. A number of major efforts have been launched, including the United Way's evaluation initiative, performance-based contracting by government agencies, and INDEPENDENT SECTOR's Measures Project. Nonprofit researchers have also published a number of books on this topic recently (e.g., Flynn & Hodgkinson, 2001; Foster, Mourato, Pearce, & Ozdemiroglu, 2001).

In this study, we use geographic information systems (GIS) and hedonic modeling to test the hypothesis that the presence of nonprofit organizations in neighborhoods affects property values. We assumed that the positive or negative consequences of nonprofit activity are reflected in the value of nearby property.

Positive nonprofit impacts could be caused by services that are made available to neighborhood residents, increased social capital, or positive spillover effects on other organizations or the community through, for example, well-kept and/or highly visible facilities or even just by the presence of a prestigious or respected organization.

Negative nonprofit effects may be caused by the presence of clients whom residents perceive as unpleasant or dangerous; the provision of services not favored by residents; or facilities that are unsightly or that generate traffic, noise, or pollution.

The degree to which these positive or negative factors exist and the measurement of their impacts on property values has not been systematically examined in the nonprofit literature. A search of *Nonprofit and Voluntary Sector Quarterly, Nonprofit Management and Leadership, VOLUNTAS, ARNOVA News, ARNOVA Research Abstracts,* and *ARNOVA Occasional Papers* found no citations related to property value, house value, or neighborhood quality.

Other literatures, however, such as urban studies, public policy, economics, housing and real estate, or taxation, are concerned with this issue (for example, Bogart & Cromwell, 1997; Carroll, Clauretie, & Jensen, 1996; Man & Bell, 1996; Ottensmann, 2000; Rothenberger, Galster, Butler, & Pitkin, 1991). Some researchers have suggested that nonprofit organizations in neighborhoods may increase social capital (Musso, Kitsuse, & Cooper, 2002) and that social capital may affect property values positively (Temkin & Rohe, 1998). The literature also suggests that different types of nonprofit organizations may have different types of effects, and that there may be complex interactions among types of facilities and different neighborhoods (Ellen & Voicu, 2006).

There are, in addition, significant public policy issues associated with nonprofit location. Public goods and welfare rationales are the basis of nonprofit exemptions from municipal property taxes (Seley, Wolpert & Motta-Moss, 2002: 5). This raises several important questions: What is the value of the welfare and spillover benefits (or detriments) resulting from nonprofit activities? Moreover, is it important to determine where these positive or negative impacts are located? And finally, how are these values related to the value of the foregone property tax revenues associated with nonprofit facilities?

Previous research has shown that public choices about municipal factors such as capital investments or public services affect property values. For example, a study similar in approach to ours (Lindsey, Payton, Man, & Ottensmann, 2003; Lindsey, Man, Payton, & Dickson, 2004) found that greenways in Indianapolis had an overall positive affect on nearby property values. Greenways, therefore, are a public policy issue because government decisions about parks and other public facilities will directly affect where they (and their positive impacts) are located. Government, of course, has a much less direct influence on where nonprofits may locate and, consequently, where their locational impacts on house prices might be felt. For example, while government funding may seek to lead nonprofits to locate in a particular area, these organizations are private actors and the final choice is in their hands.

In addition, however, there are taxation implications to consider. These will be relevant to nonprofit location. As Lindsey et al. (2003) point out:

- higher property taxes are associated with lower property prices, and
- the presence of quality public goods is associated with higher property prices.

If public goods are financed by increased property taxes, the policy question becomes the balance of the relative decreases (tax effects) and increases (public goods effects) in property prices resulting from the public goods provision.

In terms of nonprofit organizations, their exemption from property taxes is a cost to government, placing an increased burden on community residents or for-profit organizations. If the consequence is an increase in property taxes on homes or businesses, this would depress property prices. To the extent, however, that nonprofits provide employment or services, they are providing benefits to the community that could increase property prices. In addition, to the extent that their presence is valued by residents, their nearby location would increase property prices. The policy question becomes the relative values of these decreases and increases.

This has become a contentious issue (Brody, 2002), and some municipalities have sought to acquire a "payment in lieu of taxes" (PILOT) from some nonprofits in their communities, especially large hospitals and educational organizations. According to a recent report (Schiller, 2004), Boston has a PILOT program involving 40 nonprofits that brings in $12 million a year. Also, Pittsburgh nonprofits pay $6 million a year in PILOT payments. In public policy debates about the possible imposition of PILOT payments, however, decision-makers need information about the costs of their choices as well as the benefits.

The goal of our analysis is to shed light on the factors relevant to the calculation of the costs and benefits of nonprofit activity. We will examine one aspect of public benefit, specifically the neighborhood effects of nonprofit location. In order to determine to what degree government is compensated for the nonprofit property taxes it has foregone, one must measure the degree to which nonprofits contribute or detract from the neighborhoods in which they are located. In this paper we will not consider the value and distribution of the goods and services that nonprofits provide. Rather, we will focus on the degree to which a nonprofit facility has an impact on the price of nearby residential property. While this is only part of the nonprofit costs and benefits story, the determination of the impact of nonprofits on nearby property values is still far from an easy task.

Using a spatial econometric approach (see the Glossary on page 31), this analysis builds upon several previous studies. Seley et al. (2002) conducted a study of the locational pattern of nonprofits in ZIP codes within New York City. While the researchers did not directly assess the impact of nonprofits on office property assessments or the market price of residential property, they found that:

- Most of the facilities in the "high amenity" category (performing arts centers, museums, etc.) that were expected to have significant positive effects on surrounding property were located in only a few areas of Manhattan.
- NIMBY types of facilities (food kitchens, shelters, substance abuse treatment centers) that were expected to have negative spillover effects on their surrounding communities were found to be located in downtown commercial areas and affluent neighborhoods as well as in poor neighborhoods outside Manhattan.

Ottensmann (2000) completed a study of the effect that the presence of the facilities of the Catholic Diocese of Cleveland had on housing values. The driving force for his analysis was the fact that:

> "The presence of facilities of the Catholic Diocese of Cleveland and the accompanying activities may play an important role in contributing to the stability of neighborhoods, especially in those older neighborhoods with less affluent populations. While the value of increased neighborhood stability is far greater than just the economic consequences, greater neighborhood stability resulting from the activities and presence of the Diocese might be expected to have significant, positive economic benefits." (Ottensmann, 2000: 11).

Ottensmann found that proximity of church facilities has a positive impact on both the value of owner-occupied property and the rent of renter-occupied housing in Cleveland (2000: 14-18). Ottensmann cites two previous studies of the impact of church facilities on house sales prices. Their findings were contradictory. Do, Wilbur, and Short (1994) found that the presence of churches has a negative effect on housing prices. On the other hand, Carroll, Clauretie, and Jensen (1996) report that the presence of churches has a positive effect.

Finally, Ellen and Voicu (2006) examined the neighborhood spillover effects of city-sponsored rental housing rehabilitation undertaken by both nonprofit and for-profit developers in New York City. They found that the projects of both types of developers had a significant, positive effect on the sales prices of nearby houses. Evidence suggests, however, that nonprofit projects were in more disadvantaged neighborhoods as well as in more distressed pockets of those neighborhoods. In addition, the impact of redevelopment by nonprofits remained stable over time while the impact of for-profit redevelopment declined. This led Ellen and Voicu to conclude (2006: 49): "Consistent with theoretical predictions, this finding may reflect the fact that in the presence of information asymmetries, nonprofits are likely to invest more in developing and maintaining features that benefit the broader community than their for-profit counterparts."

The studies cited here that measured the direct impact of nonprofit location used only a single type of nonprofit. In our analysis, we will consider a wide variety of nonprofit types and will, therefore, contribute to the understanding of the impact on house price of both the nonprofit sector as a whole and its major subsectors.

In this analysis, we will use a regression model predicting house sales prices. Independent variables will include the structural characteristics of the house, neighborhood characteristics, the availability of public goods, and the proximity of nonprofit organizations. We expect that the effects of the first three types of variables will be consistent with previous work. For example, newer and larger houses with more desirable features will sell for more. Conversely, houses in distressed neighborhoods or areas with fewer or lower quality public goods (such as poorer schools) will sell for less. In terms of nonprofit proximity, we expect the findings to be mixed. We speculate that nonprofits that provide more services to neighborhood residents or that have positive neighborhood spillover effects will contribute to increased housing prices. And those that do the opposite will have negative effects on nearby housing prices.

METHODS AND DATA

The analytic method employed in this analysis is hedonic price modeling (see Glossary). In this technique, analysts build a model to predict the price of a good, and assume that the price is the result of multiple factors (Dowling, 1984). Researchers have used this approach in housing studies (Rothenberg et al., 1991), urban economics (Man & Bell, 1996; Muth & Goodman, 1989), and environmental economics (Markandya & Richardson, 1993).

When applied to house prices, Goodman (1989, pp. 59-60) observed:

> "The most direct linkage of housing and neighborhood effects can be traced to the development of hedonic price models of housing markets… These models recognize that goods can be considered as bundles of attributes, or components. Goods that are not explicitly valued in the market, such as clean air, could be valued implicitly by comparing parcels or dwelling units with different air qualities. Housing demand could be decomposed into demand for the various components of the housing bundle, including neighborhood."

In this way, through incorporating variables that could influence the sale price, hedonic modeling lets us derive a value for those things that are tangible and easily observable, such as the characteristic of the house itself, as well as the value (shadow price) of those things that are not, such as neighborhood quality (Young & Steinberg, 1995: 217-219).

The most common operationalization of hedonic models is through ordinary least squares (OLS) regression (see Glossary). Formally, the specification of the OLS model is shown in equation 1 below:

$$(1)\ P = \beta_0 + \beta_k S_k + \beta_j L_j + u$$

Where:
P= a vector of housing prices (log Sales Price)
S_k= a matrix of housing unit characteristics
L_j= a matrix of locational characteristics
β_0 = constant
β_k, and β_j = corresponding parameters
u= vector of errors

Recent progress in spatial analysis allows us to take into account the many spatial complexities of the housing market. Spatial autocorrelation (see Glossary) is one of the most troubling complexities in modeling spatial data such as those used in this analysis. Spatial autocorrelation can affect a model in several ways. One is through the fact that the value of the dependent variable of each observation is influenced by the simultaneous effect of the values of the dependent variables of surrounding observations. That is, the sales price of each house is influenced by the sales price of nearby houses. The other troubling spatial dependence problem is caused by the spatial autocorrelation of the errors. Surrounding observations explain the same phenomenon, and therefore present geographic clusters in the error. This violates the assumption of zero correlation in the errors, and suggests that there is omitted variable bias.

Several techniques have been developed for satisfying the independence assumptions for "nearby" variables (Fotheringham, Brunsdon, & Charlton, 2000; Anselin & Getis, 1992; Can, 1990; Odland, 1988). We used a spatial lag (see Glossary) of the dependent variable here based on the nature of the housing market. The spatial lag model takes into account the influence of the dependent variable (price) of neighboring properties through the addition of a weight matrix (see Glossary) to the equation (Anselin & Getis, 1992). This approach is desirable because prices of nearby housing inherently influence the purchase decisions of potential home buyers. Since a lagged measure of the dependent variable is now included as an independent variable, a standard OLS approach is no longer appropriate. Instead, the model is estimated using maximum likelihood estimation.

Equation 2 on the next page shows the maximum likelihood model that we use in this analysis (see Glossary).

$$(2)\ P = \beta_0 + \rho Wp + \beta_k S_k + \beta_j L_j + \beta_e (NP)_e + u$$

Where:
P= a vector of housing prices (log Sales Price)
Wp= a spatially lagged dependent variable for weight matrix W
S_k= a matrix of housing unit characteristics
L_j= a matrix of locational characteristics
$(NP)_e$= a matrix of nonprofit variables
β_0 = constant
ρ, β_k, β_j, and β_e = corresponding parameters
u= vector of errors

The study area for this analysis is Indianapolis/Marion County, Indiana. The data in this analysis were collected between 1998 and 2000. All data were spatially referenced through GIS. The housing characteristic data used for the analysis were collected from 1999 sales entered into the Multiple Listing Service (MLS) database of the Metropolitan Indianapolis Board of Realtors (MIBOR). MIBOR is a professional association representing central Indiana realtors. MIBOR maintains a MLS for a 12-county service area. We used only the Marion County portion of that database. These proprietary data were acquired by the Center for Urban Policy and the Environment (CUPE) at the School of Public and Environmental Affairs at Indiana University–Purdue University Indianapolis through a cooperative agreement with MIBOR. MIBOR estimates that its MLS database contains 80 percent of all housing sales in their service area.

The dependent variable for the analysis is house sales price. A semi-log model was computed to compensate for the skewness of the house sales price data. A dependent variable lag weight matrix was computed for a one-mile radius surrounding each sold house. Effectively, a matrix was constructed with a dummy variable equaling 1.0 for each other sold house within a one-mile radius of a given sold house. That distance is somewhat arbitrary. However, it matches the specification for the distance from a sold house to the surrounding nonprofits. This produces a variable that for each house sale is the mean of all other house sales within one mile of that house.

The independent variables in this analysis include housing characteristics, the proximity of various types of nonprofits, and a number of neighborhood and public goods factors. For housing variables, we selected housing characteristic (S_k in the equation) that corresponded to the housing characteristic variables typically found in standard hedonic models. Our independent housing variables included: total number of rooms, number of bedrooms, total square footage, garage type, porch type, size of lot (acres), cooling system, exterior type, number of stories, and semi-annual property tax amount. We eliminated some observations (house sales) because they either did not pass the test of an arms-length sales transaction (see Glossary) or lacked some important information such as total square footage. Additionally, observations that could not be geocoded were eliminated. The final dataset for the model contains 9,346 observations.

The data used to identify the locations and types of nonprofit organizations ($(NP)_e$ in the equation) were collected during 1998-1999 by the Internal Revenue Service. Nonprofits were classified into service types by the National Center for Charitable Statistics (NCCS) at the Urban Institute and by the Center for Urban Policy and the Environment. Nonprofits were coded using the categories of the National Taxonomy of Exempt Entities (NTEE). This classification scheme was developed by the NCCS and is becoming the standard system for classifying nonprofits by the types of services they provide. It is currently being used by major institutional actors, such as the IRS and the Foundation Center. It divides the universe of nonprofit organizations into 10 broad service categories, which can then be further broken down into more detailed activity areas (http://nccsdataweb.urban.org/FAQ/index.php?category=73).

Table 1 (page 9) shows the distribution of the nonprofits in our data set into nine of the broad service categories of the NTEE (nonprofits in the "Unknown, Unclassified" service category have been omitted). The street addresses of these nonprofits were subsequently geocoded. The nonprofit dataset contained 5,108 organizations after geocoding. Distribution of those nonprofits by NTEE type is shown in Table 1.

Table 1. **Nonprofit organizations included in dataset, Marion County, Indiana, 1998–1999**

TYPE OF NONPROFIT	NUMBER OF GEOCODED ORGANIZATIONS
ALL NONPROFITS (Total)	5,108
ARTS & CULTURE	225
EDUCATION	821
ENVIRONMENT & ANIMAL	80
HEALTH	291
HUMAN SERVICES	1,066
INTERNATIONAL	41
PUBLIC BENEFIT	1,487
RELIGION	531
MUTUAL BENEFIT	566

Source: Center for Urban Policy and the Environment

The arts and culture, education, health, and religion categories are comprised of the range of nonprofits that provide these relatively well-defined services. The environmental nonprofits could be involved in pollution abatement or control; natural resources conservation or protection; botanical, horticultural, or landscape services; environmental beautification; or environmental education. Animal-related nonprofits could be involved with animal protection or welfare, wildlife preservation or protection, veterinary services, or zoos and aquariums. Human services nonprofits could provide crime or legal-related services; employment; food or nutrition; housing or shelter; public safety or disaster response; recreation or sports; youth development; family or personal services; residential care; or services for special or vulnerable groups. Nonprofits in the international category promote international understanding, development, or peace and security. Public benefit nonprofits could be involved in civil rights, social action, or advocacy; community improvement or capacity building; philanthropy; science or technology; or public or societal benefit. Mutual benefit nonprofits include insurance providers, pensions or retirement funds, fraternal societies, or cemeteries.

A number of neighborhood and public good factors were included in this analysis (L_j in the equation). Several variables were collected from the U.S. Bureau of the Census (2003) at the block group level. Those variables are household income, percentage African American, and percentage vacant housing. Center Township (the central city township) location, neighborhoods in the Meridian-Broad Ripple area and the west side location (two areas where initial models indicated clusters of error). Accessibility to employment and standardized school test scores (ISTEP and SAT) for school districts were also included in the model.

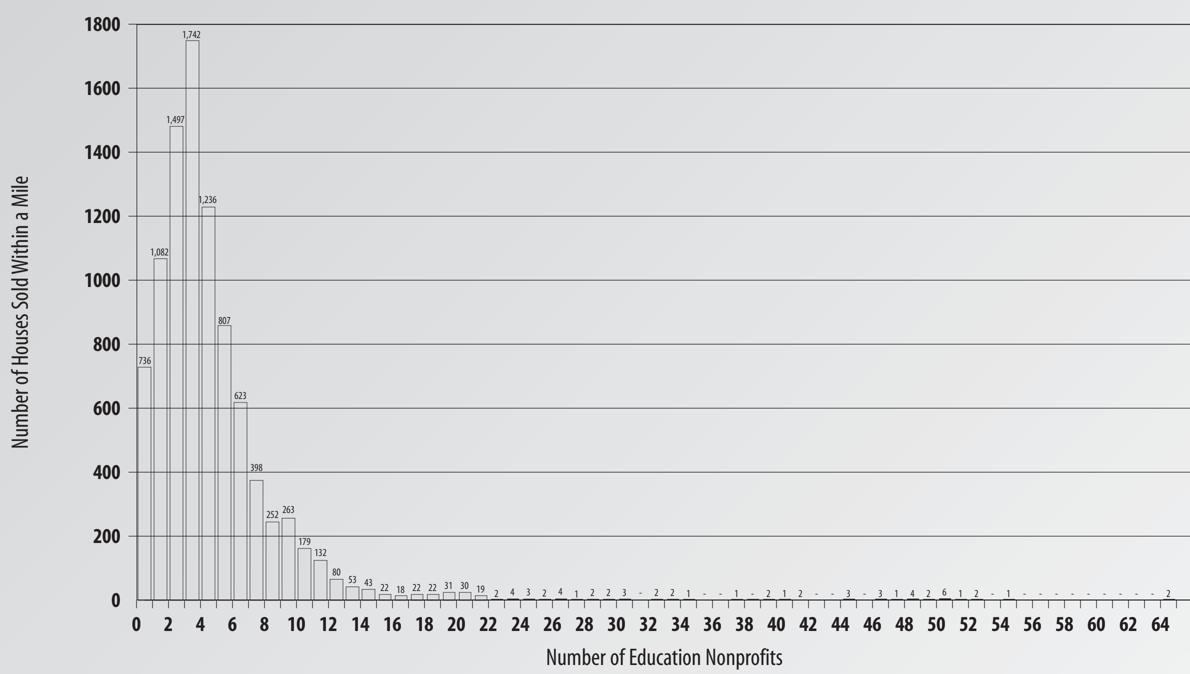
In GIS, all census variables were averaged across one-mile radial intervals. Essentially, the data were converted into a grid of 30-meter by 30-meter pixels. The value of a variable (for example, percent African American) for each grid represents the average of that variable over all pixels within one mile. The grid data were then spatially joined to the housing data. The use of grids in this way was done for a number of reasons: First, it provides us with a way of obtaining the values of census variables within one mile of each house sale. Second, since block groups vary widely in area, it gives us a consistent and comparable sized area in which to measure the values of the census variables.

In addition, our procedure takes boundary effects into account. Without this, all property in a block group would be assigned the same block group demographic value. This would mean that it is possible that a property near a block group boundary could be assigned a value that is much higher or lower than if it had been just on the other side of that boundary. If the boundary of block groups served as actual barriers to other effects beyond those boundaries, this would not be a problem. However, it is just as likely that properties near the boundary of a block group are affected by portions of nearby block groups. By smoothing the data, the effect of neighboring block groups is included and taken into account. The one-mile radius is consistent with other distances used in this analysis.

We began our preliminary examination of the datasets with an exploration of the distance and distribution of nonprofits around the housing units. A number of options exist for defining and measuring the distance of relevance between a nonprofit and a house, such as the straight-line distance between the two or a weighted inverse distance between them. Our examination of the data and the exploratory nature of this analysis led us to a distance specification of a one-mile radius around each housing unit. We conducted an exploratory analysis to assess the impacts of the various types of nonprofits located at increasing distances from sold houses. In general, the nonprofit impacts dropped to very small and insignificant levels at distances over a mile (results available upon request). With our specification, therefore, we are thereby assuming that nonprofits more than one mile from a house have no influence on that house's sales price. Using this specification, the number of nonprofits within a one-mile radius of each house sold was tallied by nonprofit type. That measurement allows for the consideration of the influence of not only one nonprofit, but multiple nonprofits. Specifically, it allows for an examination of the average marginal effect of each additional nonprofit organization, by type, within one mile of each property.

The nonprofit distance specification used in this analysis does not come without complexities, however. First, we

Figure 1. **Distribution of Education nonprofits within one mile of houses sold, Marion County, Indiana, 1999**

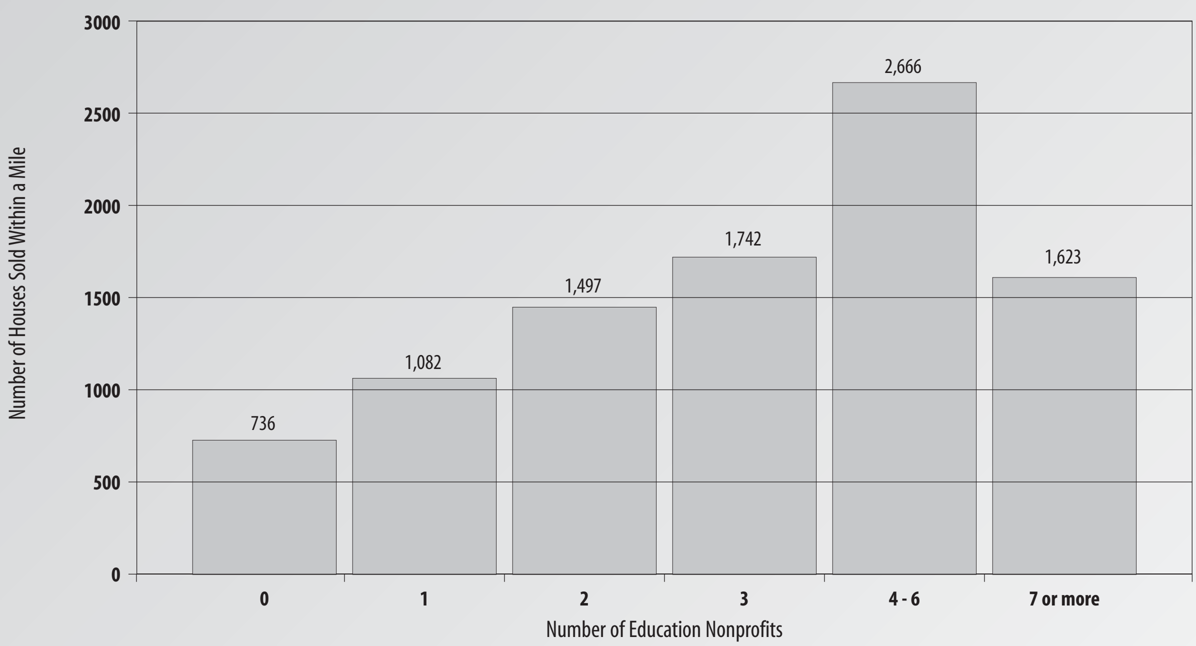


Source: Center for Urban Policy and the Environment

cannot assume that the relationship between the number of nearby nonprofits and house sales price is linear. We cannot, therefore, simply use the number of nonprofits near a house as an independent variable. To allow for nonlinearity in the relationship, multiple variables (dummies) are used to measure the effect of different numbers of nonprofits of a given type on house sales price. And second, nonprofit organizations in the dataset tend to be clustered spatially. That clustering results in skewed distributions of some of the nonprofit variables included in the model. To account for this, sections of the distribution of nonprofits were grouped for education, human service, and public benefit nonprofits. For example, Figure 1 (page 10) shows the distribution of nonprofit education organizations within one mile of sold houses. It shows that 1,082 sold houses had one nonprofit education organization within a mile; 1,497 had two education nonprofits within a mile; 1,742 had three education nonprofits within a mile, etc.

To measure the effects of education nonprofits on house sales prices with a reasonable number of variables, a set of dummy variables were constructed based on a recoded distribution shown in Figure 2 below. The recoded distribution shows that 2,666 sold houses had between four and six education nonprofits located within one mile and 1,623 had seven or more nonprofits within a mile. This is the grouping we imposed on the distribution. To measure the effects of various numbers of education nonprofits on house sales prices, we constructed the set of dummy variables

Figure 2. **Distribution of recoded Education nonprofits within one mile of houses sold, Marion County, Indiana, 1999**

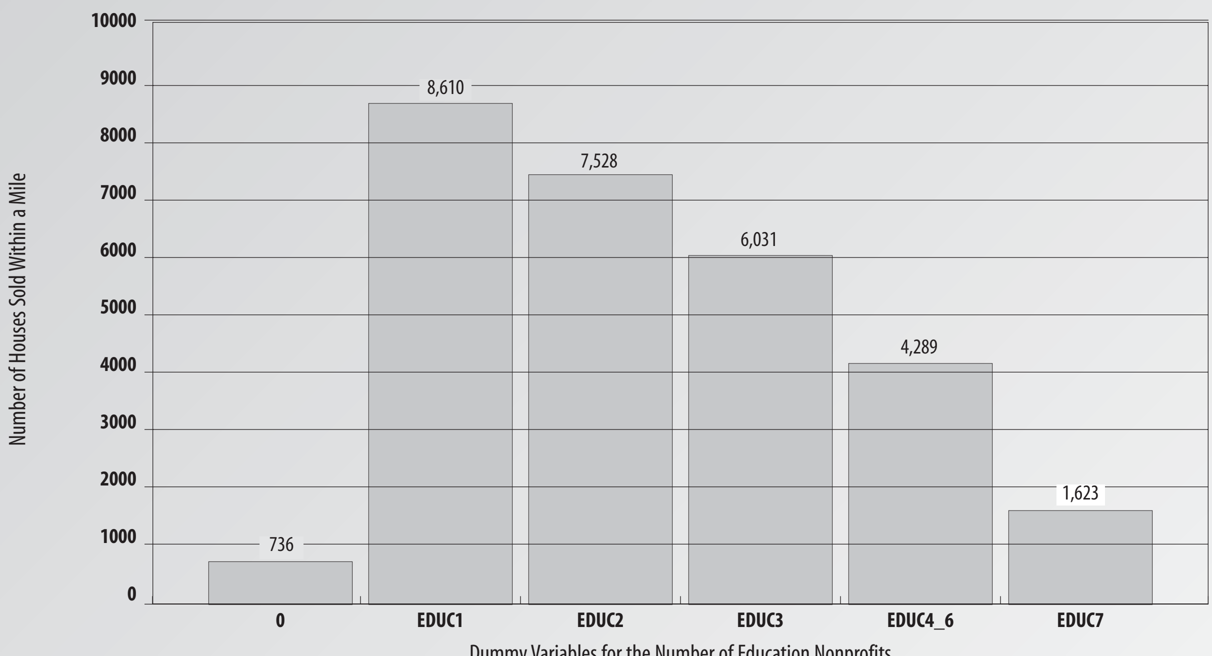


Source: Center for Urban Policy and the Environment

shown in Figure 3 below. EDUC1 measures the effect of one or more education nonprofit located within one mile of a house. ECUC2 measures the effect of two or more education nonprofit located within one mile of a house, EDUC3 measures the effect of three or more education nonprofit within a mile of a house, EDUC4_6 measures the effect of four or more education nonprofits within a mile of a house, and EDUC7 measures the effect of seven or more education nonprofits within one mile of a house. The effect of not having any education nonprofit within a mile of a house is the omitted category for this set of dummy variables. Since the entire set of dummy variables is included in the regression equation, each dummy will, in effect, assess the impact of a specific number of nonprofits. For example, EDUC1 will measure the impact of one nearby nonprofit on house sales price. This is because the effects of more than one nonprofit will be controlled for by the inclusion of the other dummy variables.

Table 2 (on pages 13 and 14) provides the mean, the description, the source, and year collected for each variable.

Figure 3. **Distribution of dummy variables for Education nonprofits within one mile of houses sold, Marion County, Indiana, 1999**



Source: Center for Urban Policy and the Environment

Table 2. **Variables in the Analysis**

VARIABLE	MEAN	DESCRIPTION (SOURCE)
Log PRICE	11.44	Independent Variable: Log of Sales Price (MIBOR, 1999)
Structural Variables (MIBOR, 1999)		
Square Feet	16.45	Square feet in structure (in 100s)
Number of bathrooms	2.04	Number of bathrooms in house
No air conditioning	.15	Dummy variable: 1 if no air conditioning, 0 if air conditioning
Age	36.21	House age in years
Number of garage bays	1.63	Number of car bays in garage
Basement	.41	Dummy variable: 1 if basement, o if no basement
Number of rooms	7.09	Number of rooms in house
Brick facing	.60	Dummy variable: 1 if brick facing, 0 if no brick facing
Front porch	.55	Dummy variable: 1 if porch, 0 if no porch
Number of stories	1.44	Number of stories in house
Lot less than one-half acre	.85	Dummy variable: 1 if lot less than one-half acre, 0 otherwise
Lot more than 1 acre	.03	Dummy variable: 1 if lot greater than 1 acre, 0 otherwise
Public Goods and Neighborhood Variables		
Effective tax rate	1.13	Semi-annual taxes divided by sales price (MIBOR, 1999)
Median neighborhood household income	50,980	Median household income in census block group (U.S. Census, 2000)
Center Township location	.13	Dummy variable: 1 if in Center Township, 0 if not in Center Township (CUPE, 1999)
Percentage African Americans in neighborhood	20.62	Percentage African American in census block group (U.S. Census, 2000)
Accessibility to employment	99080	Employment accessibility index: sum of ZIP code employment weighted by the negative exponential of distance to the ZIP code (CUPE, 1999)
Household vacancy rate	7.51	Percentage of vacant households in census block group (U.S. Census, 2000)
ISTEP scores	57.26	Mean Indiana standardized school test scores in school district. Indicator of neighborhood school quality (Indiana Dept. of Education, 1999)
SAT scores	988.79	Mean Scholastic Aptitude Test score in school district. Indicator of school quality and neighborhood socioeconomic class (Indiana Dept. of Education, 1999)
Meridian-Broad Ripple Area	0.02	Dummy Variable: 1 if in designated Meridian-Broad Ripple Area, 0 otherwise (CUPE, 1999)
WESCO	0.004	Dummy Variable: 1 if in designated WESCO area, 0 otherwise (CUPE, 1999)
Nonprofit Variables (NCCS, 1998-1999)		
		ARTS & CULTURE
ART1	0.59	Dummy variable: 1 if one or more Arts and Culture nonprofit facility within a 1-mile radius of a house; 0 otherwise
ART2	0.30	Dummy variable: 1 if two or more Arts and Culture nonprofit facilities within a 1-mile radius of a house; 0 otherwise
ART3	0.17	Dummy variable: 1 if three or more Arts and Culture nonprofit facilities within a 1-mile radius of a house; 0 otherwise
		EDUCATION
EDUC1	0.92	Dummy variable: 1 if one or more Education nonprofit facility within a 1-mile radius; 0 otherwise
EDUC2	0.81	Dummy variable: 1 if two or more Education nonprofit facilities within a 1-mile radius; 0 otherwise
EDUC3	0.65	Dummy variable: 1 if three or more Education nonprofit facilities within a 1-mile radius; 0 otherwise
EDUC4_6	0.46	Dummy variable: 1 if four or more Education nonprofit facilities within a 1-mile radius; 0 otherwise
EDUC7	0.17	Dummy variable: 1 if seven or more Education nonprofit facilities within a 1-mile radius; 0 otherwise

ENVIRONMENT & ANIMAL		
ENVIR1	0.35	Dummy variable: 1 if one or more Environment and Animal nonprofit facility within a 1-mile radius; 0 otherwise
ENVIR2	0.056	Dummy variable: 1 if two or more Environment and Animal nonprofit facilities within a 1-mile radius; 0 otherwise
HEALTH		
HLTH1	0.58	Dummy variable: 1 if one or more Health nonprofit facility within a 1-mile radius; 0 otherwise
HLTH2	0.37	Dummy variable: 1 if two or more Health nonprofit facilities within a 1-mile radius; 0 otherwise
HLTH3	0.19	Dummy variable: 1 if three or more Health nonprofit facilities within a 1-mile radius; 0 otherwise
HUMAN SERVICES		
HUMSERV1	.96	Dummy variable: 1 if one or more Human Service nonprofit facility within a 1-mile radius; 0 otherwise
HUMSERV2	0.88	Dummy variable: 1 if two or more Human Service nonprofit facilities within a 1-mile radius; 0 otherwise
HUMSERV3	0.74	Dummy variable: 1 if three or more Human Service nonprofit facilities within a 1-mile radius; 0 otherwise
HUMSERV4	0.60	Dummy variable: 1 if four or more Human Service nonprofit facility within a 1-mile radius; 0 otherwise
HUMSERV5_9	0.47	Dummy variable: 1 if five or more Human Service nonprofit facilities within a 1-mile radius; 0 otherwise
HUMSERV10	0.16	Dummy variable: 1 if ten or more Human Service nonprofit facilities within a 1-mile radius; 0 otherwise
MUTUAL BENEFIT		
MUTLBEN1	0.78	Dummy variable: 1 if one or more Mutual Benefit nonprofit facility within a 1-mile radius; 0 otherwise
MUTLBEN2	0.58	Dummy variable: 1 if two or more Mutual Benefit nonprofit facilities within a 1-mile radius; 0 otherwise
MUTLBEN3	0.38	Dummy variable: 1 if three or more Mutual Benefit nonprofit facilities within a 1-mile radius; 0 otherwise
MUTLBEN4	0.23	Dummy variable: 1 if four or more Mutual Benefit nonprofit facilities within a 1-mile radius; 0 otherwise
PUBLIC BENEFIT		
PUBBEN1	0.95	Dummy variable: 1 if one or more Public Benefit nonprofit facility within a 1-mile radius; 0 otherwise
PUBBEN2	0.88	Dummy variable: 1 if two or more Public Benefit nonprofit facilities within a 1-mile radius; 0 otherwise
PUBBEN3	0.79	Dummy variable: 1 if three or more Public Benefit nonprofit facilities within a 1 mile radius; 0 otherwise
PUBBEN4	0.68	Dummy variable: 1 if four or more Public Benefit nonprofit facility within a 1-mile radius; 0 otherwise
PUBBEN5_9	0.58	Dummy variable: 1 if five or more Public Benefit nonprofit facilities within a 1-mile radius; 0 otherwise
PUBBEN10	0.23	Dummy variable: 1 if ten or more Public Benefit nonprofit facilities within a 1-mile radius; 0 otherwise
RELIGION		
RELIG1	0.88	Dummy variable: 1 if one or more Religion nonprofit facility within a 1-mile radius; 0 otherwise
RELIG2	0.72	Dummy variable: 1 if two or more Religion nonprofit facilities within a 1-mile radius; 0 otherwise
RELIG3	0.52	Dummy variable: 1 if three or more Religion nonprofit facilities within a 1-mile radius; 0 otherwise
RELIG4	0.36	Dummy variable: 1 if four or more Religion nonprofit facilities within a 1-mile radius; 0 otherwise
RELIG5	0.25	Dummy variable: 1 if five or more Religion nonprofit facilities within a 1-mile radius; 0 otherwise
INTERNATIONAL		
INTNTL1	0.19	Dummy variable: 1 if one or more International nonprofit facility within a 1-mile radius; 0 otherwise
INTNTL2	0.04	Dummy variable: 1 if two or more International nonprofit facilities within a 1-mile radius; 0 otherwise

RESULTS AND INTERPRETATION

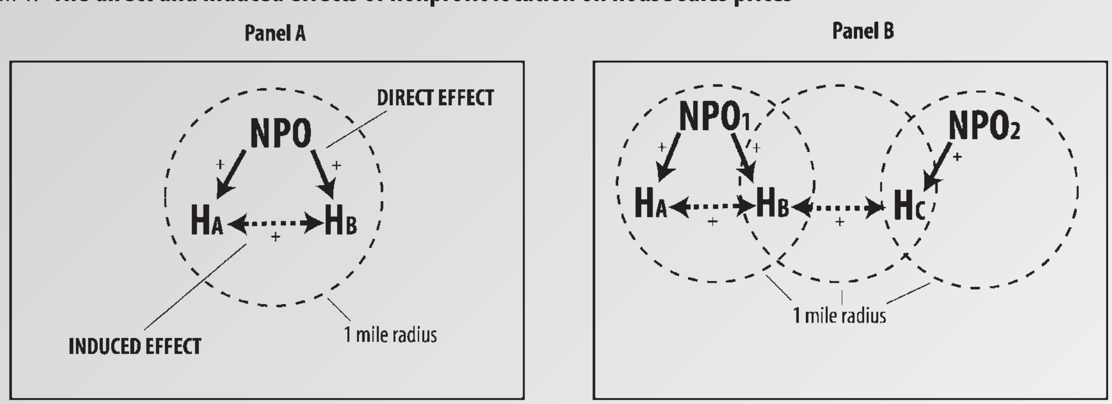
Initially, we computed both an OLS model and the spatial lag model and compared the diagnostics for these models. The log-likelihood, Akaike Criterion, and Schwartz Criterion (see Glossary) indicated that the spatial lag model was a better fit than the OLS model. The combination of findings for these measures justifies the more complex spatial lag approach (Anselin, 1998, 2005).

The Appendix (pages 35 and 36) contains the maximum likelihood regression results of spatial lag model for all variables. The model shows that the neighborhood income variable and ISTEP standardized test score is not significant at the $p < 0.10$ level. The SAT standardized test score variable is significant at $p<0.095$. All other control variables are significant at $p<0.01$. The significant results show that the effects of the housing, neighborhood, and control variables were as expected. Higher prices were obtained for houses that were larger; newer; on larger lots; had air conditioning, basements, brick facing, and front porches; had more rooms, bathrooms, and garage bays; and had fewer stories. In terms of neighborhood factors, the results show that house prices were positively affected by accessibility to employment, lower taxes and household vacancy rates, a lower percentage African Americans in the neighborhood, location in the Meridian-Broad Ripple area, and location outside Center Township and the westside location.

The spatial lag coefficient in this model (W_LSPRICE in the Appendix) does not have an intuitive meaning like the other coefficients. That variable is best described as a "multiplier" (Anselin, 2002; Anselin, 2003). A spatial lag model incorporates a simultaneity factor. That is, the impact of a phenomenon (for us, the location of a nonprofit within a mile) on the price of a given property (say, property A) also affects the prices of neighboring properties (properties B, C, D, etc). At the same time, the price of property A will be impacted by the change in the price of neighboring properties (B, C, D, etc.) because of the presence of nonprofits near these other properties. These effects ripple throughout the system as the value of each property is affected by its "neighbors" (for this analysis, "neighbors" are defined as houses within a one-mile radius), which in turn are affected by their "neighbors," and so on. We can label these simultaneous and reciprocal influences "induced effects."

The diagram below illustrates the relationship between the direct and induced effects on house prices due to nonprofit proximity. In this diagram we are assuming that the impact of a given type of nonprofit on house price is positive. The solid lines in Panel A represent the direct positive effect that the proximity of the nonprofit has on the price of each house (H_A and H_B) within a mile of the nonprofit. The dashed line, on the other hand, indicates that, in addition, the price of each house is positively influenced by the increased price of its neighbor (the induced effects). Panel B shows that the impacts of induced effects can extend further. In this case, house H_C is located more than a mile from the nonprofit NPO_1. Therefore, that nonprofit does not have a direct impact on the price of H_C. However, since H_C is within a mile of H_B, the sales price of H_C will be positively influenced by the increased price of H_B. In

Diagram 1. **The direct and induced effects of nonprofit location on house sales prices**



addition, H_C will be positively influenced by NPO_2. Likewise, H_B will be positively influenced by the increase in the price of H_C due to its proximity to NPO_2.

Technically, the spatial lag model involves the estimation of both direct and induced effects. The multiplier is included in the effect of nonprofits by multiplying the nonprofit coefficient by 1/(1-ρ(W_LSPRICE)); where ρ(W_LSPRICE) is the parameter of the lag variable. The Appendix shows that the lag variable parameter is 0.359, and this results in a multiplier of 1.56. This means that the induced effect of neighboring properties increases each coefficient by 56 percent. The interpretation of coefficients in the spatial lag model necessitates the use of this multiplier (Anselin, 2003).

Tables 3 through 10 (pages 17 to 24) show the results of the spatial lag model for each of the nonprofit types. Each is merely the portion of the large table in the Appendix for that particular nonprofit type. Mutual benefit nonprofits have no significant effect on housing values according to the model and therefore are not included in the tables. The marginal effects of the other different types of nonprofit organizations vary.

In these tables, the β with Multiplier coefficients are interpreted as the marginal percentage increase in house sales prices due to the locations of one or more nonprofit organizations (by type) within a one-mile radius. The cumulative effect is calculated by summing the significant marginal coefficients (those significant at $p<0.05$).

Figures 4 through 11 (pages 17 to 24) illustrate the marginal effect and the cumulative effect in dollars on the average home value. Those values are based on multiplying the significant coefficient by the exponent of the average log sale prices, in this way converting the log of average home value to dollars ($exp^{11.443}$ = $93,280).

In the analysis, we found that some marginal effects were not statistically significant. There is debate in the academic community about how such statistically non-significant effects should be handled (Morrison & Henkel, 1970). On one hand, lack of significance could be interpreted as a reflection of a random relationship between the two variables in the population. This suggests that the effects should not be considered in the sample results. On the other hand, the effects could be interpreted as valid for the given dataset and included in the overall evaluation of the model. We present our results in both ways and consider the calculations including only significant effects, as a more conservative estimate of the impact of nonprofits on house sales price.

Arts and Culture Nonprofits

An examination of the findings for the impacts of arts and culture nonprofits illustrates these calculations. Table 3 shows that there is no significant effect on house sales price due to the presence of only one nonprofit arts and culture nonprofit within a mile. When two arts and culture nonprofits are located within a mile, however, the effect is significant and negative by 2.8 percent according to the model (β with Multiplier). Moreover, the presence of additional arts and culture nonprofits results in a significant marginal increase on housing values of 7.6 percent.

Table 3. **Effect on residential housing sale prices of Arts and Culture nonprofits within a mile, Marion County, Indiana, 1999**

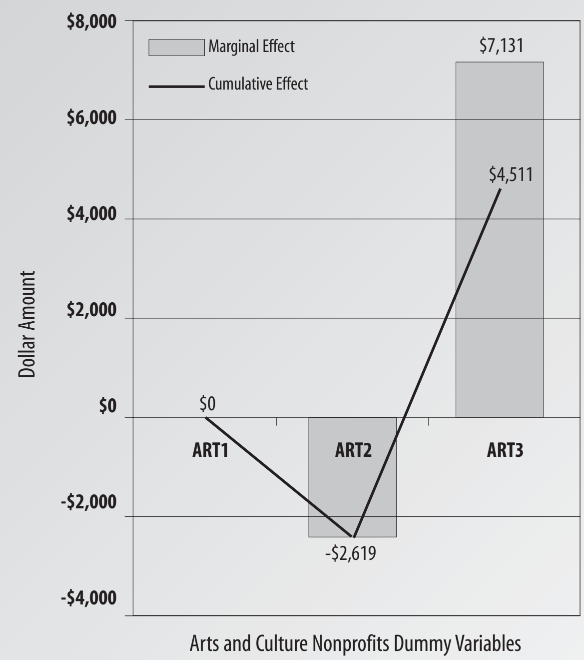
	β	β with Multiplier	Significance
ART1	0.009	0.014	0.145
ART2	-0.018	-0.028	0.027
ART3	0.049	0.076	0.000

Source: Center for Urban Policy and the Environment

Figure 4 converts these significant effects into changes in house sales prices. The cumulative effect of three or more nonprofit arts and culture nonprofits is equal to 7.6 percent less the negative marginal effect of the second arts and culture nonprofit (–2.8 percent) and the zero marginal effect of the first arts and culture nonprofit. The cumulative effect in this case is, therefore, 4.8 percent. The application of these effects to the average home value shows that the marginal effect on the price of a home due to two arts and culture nonprofits within a one-mile radius is –$2,619 and that the difference in price due to three or more nonprofits within one mile is $7,131. The figure also shows that the cumulative effect of three or more nonprofits results in a price difference of over $4,500 ($7,131 – $2,619).

If we include the impacts of non-significant marginal effects in our interpretation of the data, we see from Table 3 that the presence of one nonprofit arts and culture nonprofit increases the house sales price by 1.4 percent, or $1,306. Adding this to the cumulative effect computed above results in a new cumulative effect (now due to the presence of any number of nonprofits) of $5,817.

Figure 4. **Dollar effect on residential housing sale prices of Arts and Culture nonprofits within a mile, Marion County, Indiana, 1999**



Source: Center for Urban Policy and the Environment

Education Nonprofits

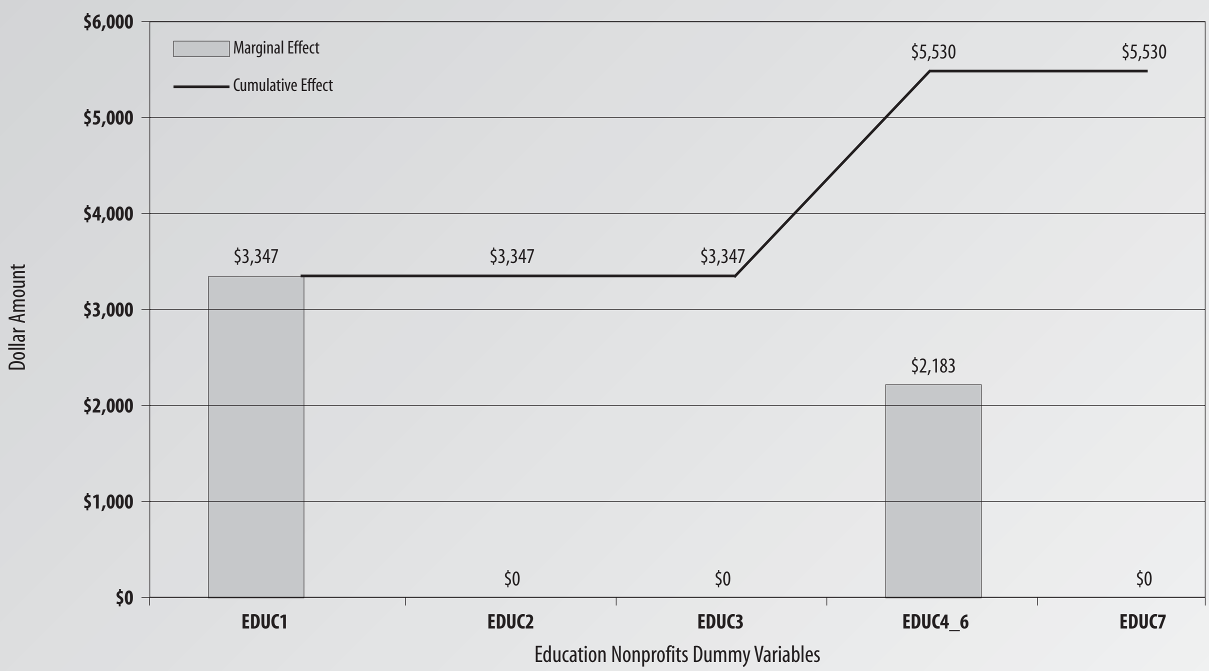
Table 4 shows that the significant marginal effect of one education nonprofit within a one-mile radius results in a 3.6 percent increase in the value of a property if all other factors are held constant. There is no significant effect of additional educational nonprofits within a mile until between four to six nonprofits are present within a one-mile radius. The marginal increase due to the four to six education nonprofits is 2.3 percent. There is no significant additive effect of more education nonprofits. The cumulative increase due to four or more educational nonprofits is 5.9 percent. In dollars, the effect of the first education nonprofit on the average sample sales price is $3,347. The fourth to sixth education nonprofit within one mile increases the value of a property by an additional $2,183. Therefore, the cumulative value of four or more education nonprofits is $5,530. When we include the non-significant marginal effects in the calculation (negative for two and three nonprofits, and positive for seven or more nonprofits), the cumulative effect is reduced to $4,317.

Table 4. **Effect on residential housing sales prices of Education nonprofits within a mile, Marion County, Indiana, 1999**

	β	β with Multiplier	Significance
EDUC1	0.023	0.036	0.035
EDUC2	-0.005	-0.008	0.578
EDUC3	-0.007	-0.011	0.413
EDUC4_6	0.015	0.023	0.039
EDUC7	0.004	0.006	0.612

Source: Center for Urban Policy and the Environment

Figure 5. **Dollar effect on residential housing sales prices of Education nonprofits within a mile, Marion County, Indiana, 1999**



Source: Center for Urban Policy and the Environment

Environment and Animal Nonprofits

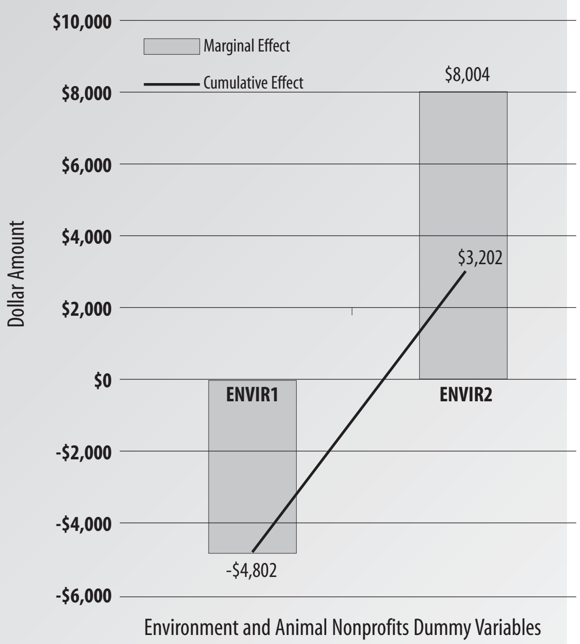
Table 5 shows the marginal effects of environment and animal nonprofits within a one-mile radius. The effect of the first environmental nonprofit is significant and negative (–5.1 percent) and the second is significant and positive (8.6 percent). Each of these marginal effects is significant. The cumulative effect of two or more environmental nonprofits is a 3.4 percent increase in housing values, holding all other factors constant. Applying the coefficients to the average sample home value indicates a $4,802 loss for the first environment and animal nonprofit and an increase of $8,004 for two or more. The cumulative effect of two or more is equal to $3,202.

Table 5. **Effect on residential housing sales prices of Environment and Animal nonprofits within a mile, Marion County, Indiana, 1999**

	β	β with Multiplier	Significance
ENVIR1	-0.033	-0.051	0.000
ENVIR2	0.055	0.086	0.000

Source: Center for Urban Policy and the Environment

Figure 6. **Dollar effect on residential housing sales prices of Environment and Animal nonprofits within a mile, Marion County, Indiana, 1999**



Source: Center for Urban Policy and the Environment

Health Nonprofits

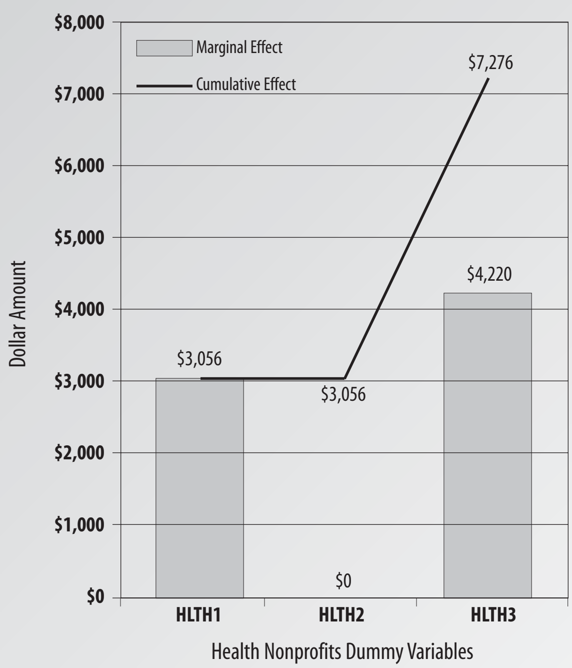
Table 6 shows the marginal effects of health-related nonprofits. Generally, the presence of one health nonprofit within a mile increases the house value by 3.3 percent, holding everything else constant. There is no significant effect due to a second health nonprofit within a mile, but if there are three or more, they add 4.5 percent. The cumulative effect of more than two nonprofits is, therefore, 7.8 percent. In dollars, as applied to the average home value, the first health nonprofit adds $3,056 to the price of a home. Three or more health nonprofits result in an additional $4,220, for a total $7,276 effect. If the non-significant negative effect of two nonprofits is included in the calculation, the cumulative effect is reduced to $5,690.

Table 6. **Effect on residential housing sales prices of Health nonprofits within a mile, Marion County, Indiana, 1999**

	β	β with Multiplier	Significance
HLTH1	0.021	0.033	0.001
HLTH2	-0.011	-0.017	0.138
HLTH3	0.029	0.045	0.001

Source: Center for Urban Policy and the Environment

Figure 7. **Dollar effect on residential housing sales prices of Health nonprofits within a mile, Marion County, Indiana, 1999**



Source: Center for Urban Policy and the Environment

Human Services Nonprofits

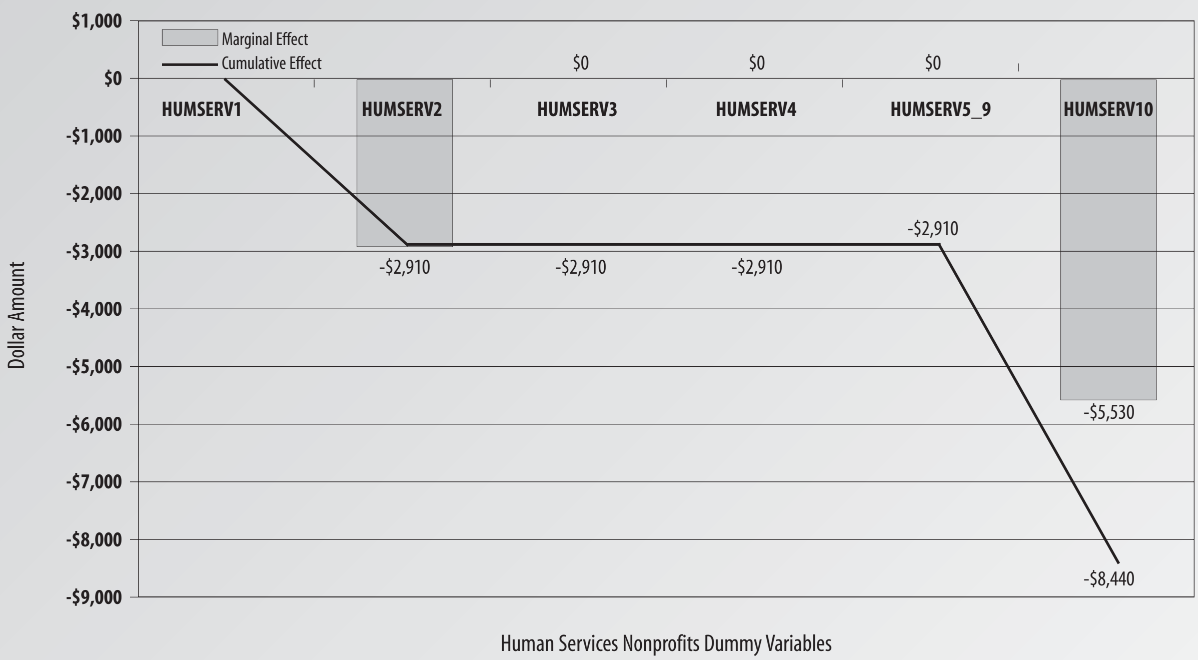
Table 7 shows that one human services nonprofit within a mile does not have a significant effect on housing price. The marginal effect of two human services nonprofits is negative and leads to a decrease in price of 3.1 percent. Additional marginal changes due to more human services nonprofits within a mile do not significantly affect the price of houses until these nonprofits are densely clustered within a mile of the property. Specifically, the model indicates that the average effect of ten or more human services nonprofits leads to an additional negative effect of nearly 6 percent. The cumulative effect of those dense clusters leads to a 9.1 percent decrease in the value of a house. The effects of those coefficients applied to the average housing price of the sample is a marginal negative effect of $2,910 for two human services nonprofit and an additional loss of $5,530 with ten or more human service nonprofits, totaling a loss of $8,440 in those areas where human services nonprofits are densely concentrated. If we include the non-significant marginal effects in the calculation (positive for one, three, and from five to nine nonprofits and negative for four nonprofits), the cumulative effect is a loss of $9,559.

Table 7. **Effect on residential housing sales prices of Human Services nonprofits within a mile, Marion County, Indiana, 1999**

	β	β with Multiplier	Significance
HUMSERV1	0.000	0.000	0.987
HUMSERV2	-0.020	-0.031	0.053
HUMSERV3	0.004	0.006	0.627
HUMSERV4	-0.013	-0.020	0.161
HUMSERV5_9	0.001	0.002	0.907
HUMSERV10	-0.038	-0.059	0.000

Source: Center for Urban Policy and the Environment

Figure 8. **Dollar effect on residential housing sales prices of Human Services nonprofits within a mile, Marion County, Indiana, 1999**



Source: Center for Urban Policy and the Environment

Public Benefit Nonprofits

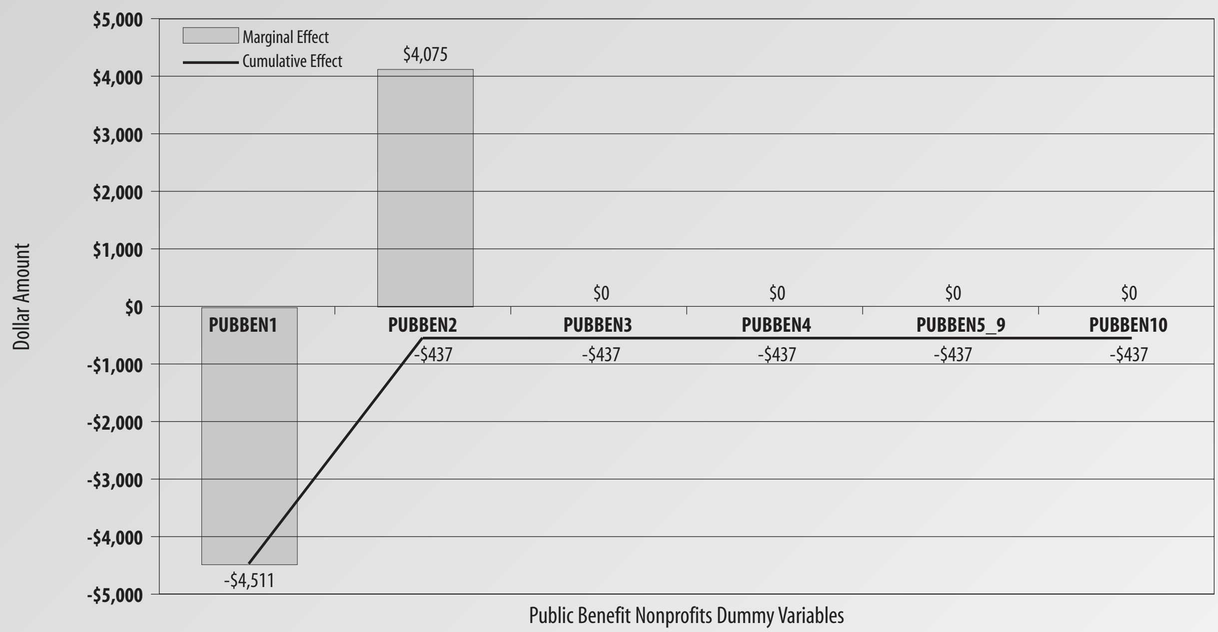
Table 8 shows that the presence of one public benefit nonprofit within a mile has a negative effect on house sales prices, and that the presence of two public benefit nonprofits has a positive effect on sales price. The presence of more than two public benefit nonprofits has no additional effects. According to the model, there is a 4.8 percent loss of house sales prices for the first nonprofit and a 4.4 percent increase for the second nonprofit. The cumulative effect, therefore, is a negative 0.4 percent for more than one. For the average home in the sample, the effect of the first nonprofit is a loss of $4,511, and the addition of two or more is a gain of $4,075. The cumulative effect of two or more nonprofits, consequently, is a loss of $437. All of the non-significant marginal effects are positive. Including them in the calculation raises the cumulative effect to a gain of $2,921.

Table 8. **Effect on residential housing sales prices of Public Benefit nonprofits within a mile, Marion County, Indiana, 1999**

	β	β with Multiplier	Significance
PUBBEN1	-0.031	-0.048	0.029
PUBBEN2	0.028	0.044	0.020
PUBBEN3	0.001	0.002	0.918
PUBBEN4	0.013	0.020	0.195
PUBBEN5_9	0.006	0.009	0.465
PUBBEN10	0.003	0.005	0.766

Source: Center for Urban Policy and the Environment

Figure 9. **Dollar effect on residential housing sales prices of Public Benefit nonprofits within a mile, Marion County, Indiana, 1999**



Source: Center for Urban Policy and the Environment

Religion Nonprofits

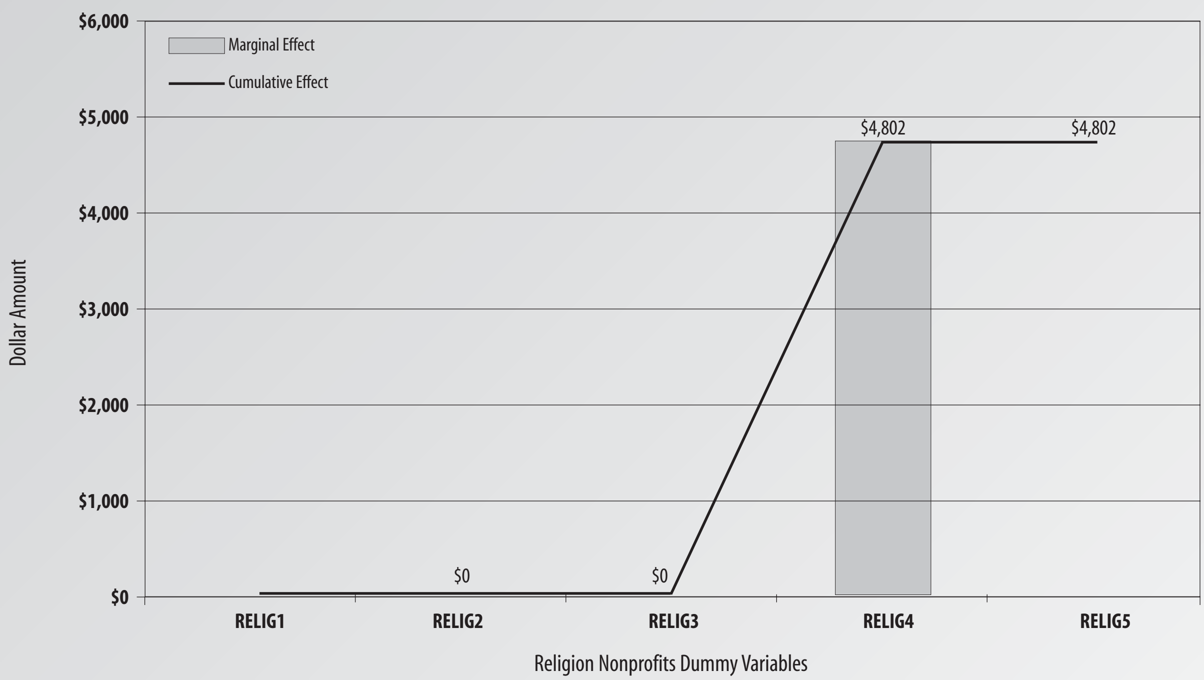
Religion nonprofits have no significant effect on housing price until four or more are located within a one-mile radius. Table 9 shows that the effect at that point is an increase of 5.1 percent. The effect when applied to the average housing price in the sample is $4,802. Including the non-significant marginal effects (positive for one and three nonprofits and negative for two and five or more nonprofit), results in a slightly lower cumulative effect of $4,709.

Table 9. **Effect on residential housing sales prices of Religion nonprofits within a mile, Marion County, Indiana, 1999**

	β	β with Multiplier	Significance
RELIG1	0.003	0.005	0.709
RELIG2	-0.003	-0.005	0.667
RELIG3	0.001	0.002	0.879
RELIG4	0.033	0.051	0.000
RELIG5	-0.002	-0.003	0.868

Source: Center for Urban Policy and the Environment

Figure 10. **Dollar effect on residential housing sales prices of Religion nonprofits within a mile, Marion County, Indiana, 1999**



Source: Center for Urban Policy and the Environment

International Nonprofits

Table 10 shows that the presence of one international nonprofit located within one mile has a negative effect of 2.3 percent on home values. However, the presence of two or more within a mile has a relatively large positive effect on housing values. Both of these effects are significant. The percentage increase is about 16 percent. Applied to the average housing value, the presence of more than two international nonprofits adds $14,843 to the sales price of a house. The cumulative effect of two or more international nonprofits is $12,661, after netting out the $2,183 loss from the first nonprofit.

Mutual Benefit Nonprofits

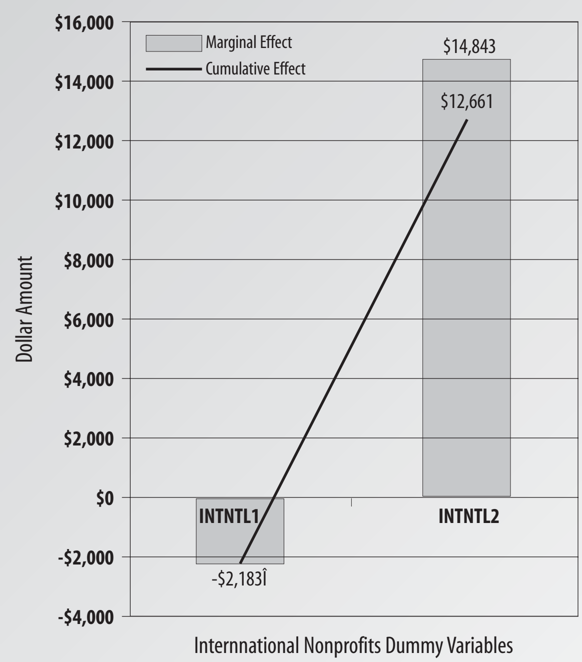
Finally, as noted before, none of the marginal effects for mutual benefit nonprofits were significant. The cumulative impact based on these non-significant marginal effects (negative for one or two nonprofits and positive for more than two) is a loss of $187.

Table 10. **Effect on residential housing sales prices of International nonprofits within a mile, Marion County, Indiana, 1999**

	β	β with Multiplier	Significance
INTNTL1	-0.015	-0.023	0.053
INTNTL2	0.102	0.159	0.000

Source: Center for Urban Policy and the Environment

Figure 11. **Dollar effect on residential housing sales prices of International nonprofits within a mile, Marion County, Indiana, 1999**



Source: Center for Urban Policy and the Environment

Overall Impacts of Nonprofits

Understanding the marginal effects of each type of nonprofit is important. That is why each type of nonprofit was explored in detail in the previous tables. The model and variable construction used in this analysis recognize the inherent spatial perspective of the question, "What is the effect of certain types of nonprofits?" The answer is complex. Our results show that the effect of nonprofit proximity on house sales prices varies:

- from positive to negative,
- among types of nonprofits, and
- by concentrations of nonprofits within nonprofit types.

These observations are true while controlling for the presence and concentrations of other nonprofit types.

For some nonprofit types, the effect is not significant unless multiple nonprofits are present (i.e., arts and culture, human services, religious, and international). In addition, for some types, their influence on house price is straightforward and consistent. Education, health, and religion nonprofits have a positive effect on housing prices, and any significant marginal effect is also positive. Likewise, the interpretation associated with the effect of human services (negative) and mutual benefit (not significant) is consistent.

On the other hand, the results from the model for arts and culture, environment and animal, public benefit, and international are not as easy to interpret. Each of those has marginal effects which shift between negative and positive based on the concentrations of those types of nonprofits within a one-mile radius. The search for the reasons for these findings is beyond the scope of this paper. Future exploration of the data and their geographic context may shed light on the intricacies of those relationships.

Even though the effects are complicated for some nonprofit types, our analysis allows us to make an assessment of the total housing sales price premium or discount that results from the locations and spatial configurations of various types of nonprofits. This is carried out in two ways. One way is to apply the coefficient estimates to only the sample housing units. This gives us the total effect of nonprofit proximity on the prices of houses that were sold. Table 11 shows these results. A second way is to apply the coefficients to the total number of owner-occupied housing units estimated from the 2000 census (U.S. Census Bureau, 2003). This gives us the total effect of nonprofit proximity on the value all the houses located in Indianapolis/Marion County. These results are shown in Table 12 (page 26).

Table 11. **Impact of nonprofits on houses sold, Marion County, Indiana, 1999**

Type of NPO	Number of Houses Sold within a Mile of Nonprofit Type (sample)	Impacts of Nonprofits on Houses Sold (all coefficients)	Impacts of Nonprofits on Houses Sold (significant coefficients)
Arts and Culture	5,549	$ 13,578,363	$ 4,757,310
Education	8,610	33,055,037	46,093,164
Environment/Animal	3,239	(12,744,445)	(12,744,445)
Health	5,375	21,081,371	27,300,350
Human Services	8,963	(41,847,905)	(35,618,188)
Mutual Benefit	7,307	(4,233,128)	------
Public Benefit	8,866	13,872,199	(7,283,210)
Religion	8,250	16,157,149	14,866,234
International	1,770	4,051,025	4,051,025
Grand Total		42,969,665	41,422,241

Source: Center for Urban Policy and the Environment

The aggregate effect of nonprofits on the price of homes sold in 1999 (through the MIBOR MLS) was calculated in a straightforward manner. Since we know the prices of the houses sold, the numbers of various types of nonprofits within a mile of them, and the effects of these nonprofits on house sales prices (the coefficients in Tables 3 through 10), we can easily calculate the portion of the houses' sales prices that can be attributed to nonprofit proximity. For each house sold, we first determined how many nonprofits of each type were located within a mile of the house. The house sales price was then multiplied by the coefficients (all coefficients in the first case and only significant ones in the second case) corresponding to the type and number of any nearby nonprofits. The results of these multiplications were summed across all houses to give us the total effect of nonprofits of various types on house sales prices.

For an example, assume that a house which sold for $100,000 had three arts and culture nonprofits located within a mile of it. From Table 3 (page 17) we see that the coefficient for the effect of three nearby arts and culture nonprofits is significant and .076. Multiplying this coefficient by the house sales price shows that the three arts and culture nonprofits contributed $7,600 to this house's sales price. If the house had other types of nonprofits located within a mile, similar calculations were made to measure their effect. Finally, the dollar values we obtained were summed across all properties by each nonprofit type.

The aggregate effect of all nonprofits on the price of all owner-occupied units was more complicated to compute. We computed it by combining the coefficients from our model, the presence of nonprofits, and the aggregate values of owner-occupied units by block group. First, the block group areas were converted to 30-meter x 30-meter pixels (900 square meters). Then, the total value of all owner-occupied houses in each block group was obtained from the census. Within each block group, this aggregate house value was divided by the number of 900-square-meter pixels in the block group. For example, if the land area of a block group was 9,000 square meters, it would consist of 10 pixels. If we

Table 12. **Impact of nonprofits on total housing in Marion County, Indiana, 2000**

Type of NPO	Number of Houses Sold within a mile of Nonprofit Type (2000 Census)	Impacts of Nonprofits on Total Houses (all coefficients)	Impacts of Nonprofits on Total Houses (significant coefficients)
Arts and Culture	23,763	$ 246,290,400	$ 53,978,840
Education	36,083	803,256,550	1,089,281,100
Environment/Animal	14,672	(330,194,650)	(330,194,650)
Health	24,866	491,847,480	625,350,180
Human Services	37,599	(1,021,546,000)	(871,514,620)
Mutual Benefit	32,472	(115,011,952)	------
Public Benefit	37,179	213,433,430	(272,737,600)
Religion	35,591	463,477,980	424,293,990
International	8,767	85,295,291	85,295,291
Grand Total		836,848,529	803,752,531

Source: Center for Urban Policy and the Environment

assume that the aggregate value of all owner-occupied houses in that block group is $1 million, each of the 10 pixels would be assigned a value of $100,000 dollars. The underlying assumption is that property values are spread evenly across the block group. Finally, the number of nonprofits of various types within a one-mile distance of each pixel was computed.

The calculation of the impacts of nonprofits was done at the pixel level. The aggregate house value in each pixel was multiplied by the coefficients (from Tables 3 to 10, pages 17 to 24) of the number of each type of nonprofit located within one mile of the pixel. These results were summed and represent the portion of the aggregate house value in that pixel which can be attributed to nonprofit proximity. Our final step was to sum the results for all pixels in Marion County. This gives us the total effect of all nonprofits on house values over the entire area. For example, assume that the aggregate house value of a given pixel is $100,000 and that this pixel had three arts and culture nonprofits located within a mile. From Table 3 (page 17) we can see that .076 is the coefficient for three arts and culture nonprofits. Multiplying this by the aggregate house value would result in the conclusion that $7,600 of the $100,000 aggregate house value in that pixel is due to the proximity of the arts and culture nonprofits. Similar calculations would be done for any other types of nonprofits within a mile of the pixel and the results summed. Finally, results over all pixels would be summed.

The results of the aggregated effects of nonprofits on the housing market in Marion County are shown in Tables 11 and 12 (pages 25 and 26). Table 11 shows that the total effect of the configuration of the nonprofits in the county on the houses sold (from our sample data) is an increase in sales price of $42,969,665 when all coefficients are included, and $41,422,241 when only statistically significant coefficients are included. Table 12 shows that when the effect of nearby nonprofits is applied to all owner-occupied units, there is an aggregate net increase of $836,848,529 when all coefficients are included, and $803,752,531 when only statistically significant coefficients are included.

In all cases, the presence of education nonprofits in the county results in the greatest aggregate positive effect, followed by health nonprofits and then religious nonprofits. In most of the calculations, arts and culture nonprofits are next in order, but in some, public benefit and international nonprofits also have large effects. It should also be noted that there are many more religious organizations in the community than those listed in the IRS data because religious organizations are not required to register as nonprofits with the IRS. Our analysis, therefore, has likely underestimated the impact of all of the religious organizations in the community. The presence of human service nonprofits results in the greatest negative effect, followed by environment and animal and public benefit nonprofits.

CONCLUSION

In this analysis we set out to examine the general idea that nonprofit activity can provide benefits to local communities as well as entail costs. We sought to assess the degree to which these, in part, result in the increases or decreases in the sales prices of nearby houses. This would be one factor in the overall equation to calculate the costs and benefits of the nonprofit sector; other factors are (1) the value of nonprofit goods, services, and employment, and (2) the cost to local governments of foregone property taxes.

We find our results encouraging and intriguing. They demonstrate that the proximity of nonprofits influences house sales price over and above structural, public goods, and neighborhood variables. We find that the contribution of nonprofit proximity to the prices of houses sold is significant. In the Indianapolis/Marion County area, it amounted to over $40 million between 1998 and 2000. If the effect were applied to all houses in this area, the contribution would have been over $800 million. Policymakers and community leaders should be aware of this contribution when assessing the role of and support for nonprofit organizations in their communities.

In addition, our results show that some types of nonprofits provide positive benefits to their neighborhoods in terms of increased house sales prices, while other types may have negative consequences on house sales prices. This confirms the results of previous work. It must be remembered, however, that this analysis did not consider the value of the goods, services, and employment that these nonprofits provided, benefits that may well be larger than the detrimental effects of reduced house sales prices.

What is also important is that our analysis tested a methodology for measuring the nonprofit contribution to house sales price. This methodology used some of the most contemporary quantitative geographic methods. While complex, we believe that they provide a degree of accuracy not seen in previous work. As such, our results contribute to the ongoing discussion about how best to measure the value of the nonprofit sector.

In sum, nonprofit contributions to individuals and communities are clearly important for the people and organizations involved. In addition, they have policy implications. Our results show that the nonprofit sector, overall, has a positive impact on house sales price–an expression of the value that they add to communities. Communities, in this way, are paid back for the public investment that is made in the nonprofit sector via its tax exemption. This is tempered, of course, by the finding that some types of nonprofits have negative impacts on sales prices. In either case, the results can be used in calculations of the "return on investment" that the public receives for its tax exemption investment. Contributions to sales prices can be combined with other contributions made by nonprofits. These include the value of goods and services produced, expenditures made, and salaries and benefits provided.

Further analysis should consider additional factors that may influence the relationships we have uncovered. First, it is clearly important to examine the findings within the broad service areas we used. Are there types of arts and culture nonprofits that do not have the positive benefits we found for that category as a whole? More importantly, perhaps, would be the identification of which types of nonprofits have positive and negative impacts within the categories where negative effects were found overall. Second, the situations where the direction of effects changed (that is, positive to negative or vice versa) as the number of nonprofits increased should be examined more closely. Why might the proximity of two arts and culture nonprofits have a negative effect but the proximity of more than two have a positive impact? This might lead to the identification and specification of "threshold" effects, where relationships are different on either side.

A number of extensions to our model should also be examined. Future models should evaluate other measures of proximity and include other neighborhood characteristics. Enhanced models should be used to examine theoretically relevant questions. For example, when is there a benefit to nonprofit "fit" in a community (for example by providing amenity services in wealthy communities or welfare services in poor ones)? In addition, do factors such as community growth, decline, or turbulence make a difference? The answers to these and other questions will shed further light on the nature of nonprofit contributions to their communities.

GLOSSARY

Arm's Length Transaction: According to the *Dictionary of Small Business* (http://www.small-business-dictionary.org/default.asp?term=ARM'S+LENGTH+TRANSACTION, retrieved 5/15/2006): "A transaction in which the parties are dealing from equal bargaining positions, neither party is subject to the other's control or dominant influence, and the transaction is treated with fairness, integrity and legality."

Hedonic Price Modeling: A statistical method for estimating the price of a property by using both individual housing and neighborhood characteristics. It involves estimating regression equations in which property price is estimated as a function of each variable in a bundle of characteristics believed to affect price.

Regression: *Multiple regression* is used to account for (predict) the variance in a variable of interest (the dependent variable) based on linear combinations of other variables thought to influence it (a set of independent variables). *Ordinary Least Squares* (OLS) multiple regression can establish that a set of independent variables explains a proportion of the variance in a dependent variable at a significant level by means of a significance test of R^2. In addition, R^2 can be used to compare the goodness-of-fit between OLS models. *Goodness-of-fit* is a determination of how well the model predictions match the sample observations. *Maximum likelihood regression* is used in cases where particular assumptions underlying OLS regression do not hold (for more information, see Eliason, 1993). This is the case for the spatial lag model we are using in this analysis. Like R^2, the *Akaike Information Criterion* (AIC), *Schwartz Criterion*, and *log-likelihood measures* are used in maximum likelihood regression as goodness-of-fit measures between various statistical models (for more information, see Anselin, 1998).

Spatial autocorrelation: *Autocorrelation* is the correlation of a variable with itself over successive time intervals. *Spatial autocorrelation* is the correlation of a variable with itself over space. *Positive spatial autocorrelation* is exhibited when neighboring locations are similar or the same. *Negative spatial autocorrelation* is exhibited when neighborhood locations are dissimilar. Many times, it is necessary to account for the similarities between neighboring points in spatial econometric models.

Spatial Econometrics: Econometric methods that explicitly consider spatial interactions and spatial structure as part of a statistical analysis. Econometric methods are mathematical and statistical techniques which are used in the empirical examination of economic phenomena and theories (for more information, see Anselin, 1998).

Spatial Lag: A spatial lag is a measure of the dependent variables (sales price for our analysis) of surrounding cases (e.g., homes sold) using a *weight matrix* (see definition below).

Spatial Lag Weight Matrix: A matrix that specifies how surrounding cases affect each other. It is normally assumed that the further apart cases are, the less they will affect each other. In our analysis, we assumed that for any given house sold, the prices of houses more than a mile distant from it will not affect the sales price. In the analysis, the matrix will assign a zero to the price of all sold houses which were more than a mile from any given sold house.

REFERENCES

Anselin, L. (2005). *Exploring spatial data with GeoDa:* A workbook. Spatial Analysis Laboratory, Department of Geography & Center for Spatially Integrated Social Sciences. Urbana-Champaign: IL: University of Illinois.

Anselin, L. (2003). Spatial externalities, spatial multipliers and spatial econometrics. *International Regional Science Review, 26*, 2: 153–166.

Anselin L. (2002). Under the hood: Issues in the specification and interpretation of spatial regression models. *Agricultural Economics, 17*, 3: 247–267.

Anselin, L. (1998). *Spatial econometrics: Methods and models.* Dordrecht: Kluwer Academic Publishers.

Anselin, L., & Gettis, A. (1992). Spatial statistical analysis and geographic information systems. *Annals of Regional Science, 26*, 19–33.

Bogart, William T., & Cromwell, Brian A. (1997, June). How much more is a good school district worth? *National Tax Journal, 50*(2), 215–232.

Brody, Evelyn (ed.). (2002). *Property-tax exemptions for charities: Mapping the battlefield.* Washington, DC: Urban Institute Press.

Can, Ayse. (1990). The measurement of neighborhood dynamics in urban house prices. *Economic Geography, 66*, 254–72

Carroll, Thomas M., Clauretie, Terrence M., & Jensen, Jeff. (1996). Living next to godliness: Residential property values and churches. *Journal of Real Estate Finance and Economics, 12*(3, May), 319–330.

Do, A. Quang, Wilbur, Robert W., & Short, James L. (1994). An empirical examination of the externalities of neighborhood churches on housing values. *Journal of Real Estate Finance and Economics, 9*(2), 127–136.

Dowling, Paul B. (1984). *Environmental economics and policy.* Boston, MA: Little Brown.

Eliason, Scott R. (1993). *Maximum likelihood estimation: Logic and practice.* Thousand Oaks, CA: Sage.

Ellen, Ingrid Gould, and Voicu, Ioan. (2006). Nonprofit housing and neighborhood spillovers. *Journal of Policy Analysis and Management, 25*(1), 31–52.

Flynn, Patrice, and Hodgkinson, Virginia A. (2001). *Measuring the impact of the nonprofit sector.* NY: Kluwer Academic/Plenum Publishers.

Foster, Vivian, Mourato, Susana, Pearce, David, & Ozdemiroglu, Ece. (2001). The price of virtue: *The economic value of the nonprofit sector.* Northampton, MA: Edward Elgar.

Fotheringham, A., Stewart, Brunsdon,Chris., & Charlton, Martin. (2000). *Quantitative geography: Perspectives on spatial data analysis.* Thousand Oaks, CA: Sage Publication.

Goodman, Allen C. (1989). Topics in empirical urban housing research. In Richard F. Muth and Allen C. Goodman (eds.), *The economics of housing markets.* NY: Harwood Academic Publishers.

Lindsey, Greg, Payton, Seth, Man, Joyce, & Ottensmann, John. (2003). *Public choices and property values: Evidence from greenways in Indianapolis.* Indianapolis, IN: Center for Urban Policy and the Environment, School of Public and Environmental Affairs, Indiana University–Purdue University Indianapolis.

Lindsey, Greg, Man, Joyce, Payton, Seth, & Dickson, Kelly. (2004). Property values, recreation values, and urban greenways. *Journal of Park and Recreation Administration, 22*(3), 69–90.

Man, Joyce F, & Bell, Michael E. (1996). The impact of local sales tax on the value of owner-occupied housing. *Journal of Urban Economics, 39*, 114–130.

Markandya, Anil, & Richardson, Julie. (1993). *Environmental economics: A reader.* NY: St. Martin's Press.

Morrison, Denton, & Henkel, Ramon. (1970). *The Significance Test controversy.* Chicago: Aldine Publishing Company.

Musso, Juliet A., Kitsuse, Alicia, & Cooper, Terry L. (2002). Faith organizations and neighborhood councils in Los Angeles. *Public Administration and Development, 22*, 83–94.

Musso, Juliet A., Weare, Christopher, Oztas, Nail, & Loges, William E. (2006). Neighborhood governance reform and networks of community power in Los Angeles. *American Review of Public Administration, 36*, 79–97.

Muth, Richard F, & Goodman, Allen C. (1989). *The economics of housing markets.* NY: Harwood Academic Publishers.

Odland, John. (1988). *Spatial autocorrelation.* California: Sage

Ottensmann, John R. (2000). *Catholic Diocese of Cleveland: Economic value of selected activities.* Indianapolis, IN: Indiana University–Purdue University Indianapolis, School of Public and Environmental Affairs, Center for Urban Policy and the Environment.

Putnam, Robert D. (2000). *Bowling alone: The collapse and revival of American community.* New York: Simon & Schuster.

Rothenberg, Jerome, Galster, George C., Butler, Richard V., & Pitkin, John. (1991). *The maze of urban housing markets: Theory, evidence, and policy.* Chicago: The University of Chicago Press.

Salamon, Lester. (1999). *America's nonprofit sector: A primer, 2nd edition.* NY: The Foundation Center.

Schiller, Zach. (2004). *PILOTs – Tax Values.* Memorandum, December 17, 2004. Cleveland, OH: Policy Matters Ohio. Retrieved January 8, 2006 from http://www.policymattersohio.org/pdf/PILOTs_ExecSumm_2004_1230.pdf

Seley, John E., Wolpert, J., & Motta-Moss, Ana. (2002). *The locations of nonprofit facilities in New York City.* Discussion Paper 2, The New York City Nonprofits Project. NY: The Graduate Center of the City University of New York

Smith, David Horten. (1973). The impact of the voluntary sector on society. In D.H. Smith (Ed.) *Voluntary action research.* London: Lexington Books.

Temkin, Kenneth, & Rohe, William M. (1998). Social capital and neighborhood stability: An empirical investigation. *Housing Policy Debate, 9*(1), 61–88.

U.S. Bureau of the Census. (2003). *United States Census 2000.* Data April 7, 2005 from http://www.census.gov/main/www/cen2000.html.

Van Til, John. (2000). *Growing civil society: From third sector to third space.* Bloomington, IN: Indiana University Press.

Van Til, John. (1988). *Mapping the third sector: Voluntarism in a changing social economy.* NY: The Foundation Center.

Young, Dennis R., & Steinberg, Richard. (1995). *Economics for nonprofit managers.* NY: The Foundation Center.

APPENDIX

Table A. **Maximum likelihood regression model of residential property prices in Marion County in 1999—testing for effects of nonprofit distances (dependent variable = log of sales price)**

Independent Variables — Structure, Public Goods, Neighborhood, Nonprofit Distance	β	Z-Value	Significance
W_LSPRICE	0.359	25.75	0.000
CONSTANT	6.944	43.45	0.000
Structural Variables			
Square Feet	0.021	37.98	0.000
Number of bathrooms	0.088	18.32	0.000
No air conditioning	-0.211	-27.63	0.000
Age	-0.004	-21.83	0.000
Number of garage bays	0.078	19.75	0.000
Basement	0.105	17.41	0.000
Number of rooms	0.011	7.27	0.000
Brick facing	0.047	8.41	0.000
Front porch	0.043	8.59	0.000
Number of stories	-0.023	-4.86	0.000
Lot less than one-half acre	-0.031	-4.18	0.000
Lot more than one acre	0.139	9.44	0.000
Public Goods and Neighborhood Variables			
Effective tax rate	-0.160	-66.79	0.000
Median neighborhood household income	0.000	1.55	0.122
Center Township location	-0.116	-10.44	0.000
Percentage African Americans in neighborhood	-0.002	-11.26	0.000
Accessibility to employment	0.000	6.25	0.000
Household vacancy rate	-0.008	-6.78	0.000
ISTEP scores	0.001	0.97	0.331
SAT scores	0.000	-1.67	0.095
Meridian-Broad Ripple Area	0.25	11.7	0.000
WESCO	-0.408	-10.72	0.000
Nonprofit Variables – number of nonprofits within given distances of house			
ART1	0.009	1.46	0.145
ART2	-0.018	-2.2	0.027
ART3	0.049	4.61	0.000
EDUC1	0.023	2.11	0.035
EDUC2	-0.005	-0.56	0.578
EDUC3	-0.007	-0.82	0.413
EDUC4_6	0.015	2.06	0.039
EDUC7	0.004	0.51	0.612
ENVIR1	-0.033	-5.93	0.000
ENVIR2	0.055	4.83	0.000

Independent Variables — Structure, Public Goods, Neighborhood, Nonprofit Distance	β	Z-Value	Significance
HLTH1	0.021	3.21	0.001
HLTH2	-0.011	-1.48	0.138
HLTH3	0.029	3.42	0.001
HUMSERV1	0	-0.02	0.987
HUMSERV2	-0.02	-1.94	0.053
HUMSERV3	0.004	0.49	0.627
HUMSERV4	-0.013	-1.4	0.161
HUMSERV5_9	0.001	0.12	0.907
HUMSERV10	-0.038	-4.03	0.000
MUTLBEN1	-0.003	-0.42	0.676
MUTLBEN2	-0.003	-0.34	0.735
MUTLBEN3	0.001	0.11	0.909
MUTLBEN4	0.004	0.49	0.624
PUBBEN1	-0.031	-2.18	0.029
PUBBEN2	0.028	2.33	0.020
PUBBEN3	0.001	0.1	0.918
PUBBEN4	0.013	1.3	0.195
PUBBEN5_9	0.006	0.73	0.465
PUBBEN10	0.003	0.3	0.766
RELIG1	0.003	0.37	0.709
RELIG2	-0.003	-0.43	0.667
RELIG3	0.001	0.15	0.879
RELIG4	0.033	3.49	0.000
RELIG5	-0.002	-0.17	0.868
INTNTL1	-0.015	-1.93	0.053
INTNTL2	0.102	6.27	0.000

Log Likelihood: 842.013