The Effect of Low Income Housing Tax Credit Units on Residential Property Values in Dallas County
Editorial Summary

Overview

Cities throughout the United States grapple with the challenge of providing adequate, fit, and affordable housing for people near the bottom of the economic ladder. Even when resources are available to fund low-income housing initiatives, it is often difficult to implement them because of objections from people who own property near the proposed sites. This phenomenon is so pervasive it has given rise to an acronym: NIMBY, short for "not in my backyard."

Property owners often couch their objections in terms of property values. That is, they argue that putting housing targeted to low-income residents in their neighborhood will rob their properties of value. If that is true, their objections are rational. But is it true, or is it merely a truism—repeated so often that it has become accepted as fact, regardless of what evidence might show?

This study attempts to shed light on that question by examining 20 years' worth of sales records for single-family homes in Dallas County, Texas. The data cover the period from 1985 to 2004—before and after the implementation of the Low-Income Housing Tax Credit (LIHTC) program, a strategy to increase low-income housing supply. The authors analyzed sales data for homes within 1.5 miles of housing built or rehabilitated with LIHTCs to determine whether nearer homes (within 0.5 miles) were sold for less than comparable properties in the 0.5-to-1.5-mile zone. In fact, the opposite was true: Homes closer to LIHTC properties were sold for slightly higher prices than those farther away.

Background

In 1986, federal law authorized states to issue LIHTCs to developers who built or rehabilitated housing and rented it at rates affordable to people with gross incomes equal to or less than 60% of the median for the metropolitan area. From 1987 to 2003, nearly 21,000 units of low-income housing in 133 projects were created in Dallas County using LIHTCs. The vast majority (94%) involved rehabilitating existing properties rather than new construction.

Economic theory proposes that when purchasing or renting housing, consumers place positive or negative values on a wide range of neighborhood characteristics, and those values are reflected in the prices they are willing to pay. Thus, between two comparable houses, one situated in a high-performing school district will cost more than one in a low-performing district, and one

that sits next to a landfill will cost less than one next to a public park. Proximity to low-income housing is widely assumed to be among the factors that can influence property values.

However, previous studies have found no clear relationship between several varieties of low-income housing—public housing, Section 8 vouchers, subsidized housing, and LIHTC properties—and prices of nearby homes. Some studies have found proximity to low-income housing had a negative impact, yet others have found a positive impact. In any case, most researchers focused on just a few properties, and some failed to control for all the other variables known to affect property values, such as neighborhood amenities. Collectively, findings of earlier studies suggested low-income housing was more likely to have a negative impact on surrounding values if it was poor quality and/or poorly maintained, if it was located in already distressed neighborhoods, or if large numbers of low-income units were clustered together.

Methodology and Findings

The present study is, as far as the authors know, unique in that it draws from comprehensive sales data for houses in Dallas County from 1985 to 2004, as well as comprehensive data on the creation of LIHTC projects throughout the county from 1987 to 2003.

The study incorporates data on all single-family homes sold within 1.5 miles of the sites chosen for LIHTC units, beginning 2 years before the first LIHTC units were placed in service. A statistical analysis of sales before the program began found that prices were consistent throughout the study area, once both the characteristics of each house and its surrounding neighborhood were factored in. Site-specific variables incorporated in the analysis were house size, number of bathrooms and fireplaces, home condition, and the existence of central air conditioning, a second story, an attached garage, and/or a swimming pool. Neighborhood variables were age distribution, proximity to employment centers, low-income neighborhoods, and rate of owner occupancy.

Having ascertained that prices were uniform before the introduction of LIHTC properties, the authors turned their attention to sales data for the period from 1987 to 2004. The question was: Would differences in values emerge between homes close to the LIHTC units (that is, within 0.5 miles) and those farther away that were not explained by changes in any other neighborhood or site-specific variables?

The answer was that prices were slightly higher (2.1%) among homes sold within 0.5 miles of the LIHTC units than among those farther away. Although modest, the difference is statistically significant. Again, it is important to

understand that all other changes that would be expected to affect a home's selling price (for example, the addition of another bathroom or a major employer's decision to settle nearby) were already accounted for in the model—meaning they were not responsible for the divergence in prices between the two groups (close to LIHTC units vs. farther away).

This suggests, but does not prove, that the introduction of the LIHTC units had a small positive impact on nearby values. This finding is not necessarily as counterintuitive as it may seem. Given that most LIHTC projects involved existing units, it may be that the developers who received the credits undertook significant renovations, thus improving the character of the neighborhood.

Conclusions

The effect low-income housing has on surrounding property values (if any) is too complex to determine with a single study. Existing literature already suggests effects will vary according to the characteristics of the low-income housing itself and the neighborhood in which it is located. However, this study makes a unique contribution in terms of its geographic breadth, the number of low-income units included, the richness of the home sales data, and the statistical methodology. Future studies should attempt to replicate its findings and expand the analysis to include properties other than single-family homes.

If future research confirms that introducing LIHTC or other types of low-income housing into a neighborhood does not generally depress property values, it is vital that this be communicated to government officials, developers, policymakers, and the public at large. Providing appropriate housing for low-income residents is difficult enough; opposition founded on misperception makes it even more so.

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The Effect of Low-Income Housing Tax Credit Units on Residential Property Values in Dallas County

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ABSTRACT

This paper examines the effect Low-Income Housing Tax Credit (LIHTC) projects have on neighboring sales prices of single-family homes in Dallas County. The results suggest LIHTC projects that went into place between 1986 and 2003 have a small, positive significant effect on single-family home prices located within 0.5 miles of the low-income units. In particular, homes located within 0.5 miles of an LIHTC project sold for 2.1% more than homes located between 0.5 and 1.5 miles from an LIHTC project.

Keywords

housing, affordable housing, subsidized housing, community development

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Introduction

The availability of affordable housing seems to be a pressing issue in most metropolitan areas in the United States. Many communities struggle to provide housing options to low- and moderate-income residents. Often, few housing options exist for professionals such as teachers and police officers to reside in the communities where they work. Even more challenging is housing very-low-income residents, such as persons working for minimum wage. Federal and state governments have attempted to enact policies and programs to house low- and moderate-income residents. Public housing, housing vouchers and certificates, inclusionary zoning, and local affordable housing mandates are just some of the approaches used in the recent past to narrow the gap between residents in need of low-income housing and the availability of such housing within communities.

Local municipalities often find siting of low-income housing to be particularly challenging. One of these struggles comes from local residents resistant to low-income housing units being built in their neighborhoods. Of particular concern is low-income, multifamily housing. Residents frequently voice concerns with school overcrowding, increased crime rates, and the effect on neighboring property values that may be associated with low-income housing. Are these fears warranted? Does low-income housing affect property values? Does low-income housing built through the Low-Income Housing Tax Credit program impact the values of neighboring property?

For this paper, we used data from the Low-Income Housing Tax Credit (LIHTC) program in Dallas County, combined with information on sales of single-family homes, to address these questions. In particular, we consider the relationship between property value and proximity to LIHTC units for the period of 1985 through 2004. Because the LIHTC units were placed in service between 1987 and 2003, the sales data give observations before, during, and after the opening of LIHTC units.

Background

Communities have residents with different incomes, housing preferences, and needs. A challenge for planners and public leaders in most major cities, including Dallas, is the provision of quality housing for low-income residents. There is wide discussion on the topic, yet one finds there is overlapping while often distinct terminology in the literature: affordable housing, low-income housing, public housing, and subsidized housing. Each of these terms may be used synonymously or in distinct ways. The term *affordable housing* may

include housing for the elderly or disabled, housing for persons on some form of public assistance, federal housing programs (e.g., Moving to Opportunity, Housing Choice Voucher Programs, Hope VI), subsidized housing for low- or moderate-income residents, or even market-rate housing targeting low-income households. Further still, there is a generally accepted definition of housing affordability referring to households not needing to spend more than 30% of their income on housing. As a result of varying definitions and criteria, clarifying what is meant by *low-income*, as it relates to housing, proves problematic. In this paper, we use the *low-income housing* terminology to capture public housing, subsidized housing, federal housing programs, housing generated from production subsidies or the Low-Income Housing Tax Credit, or housing where persons receiving consumption subsidies reside. Hence, we use *low-income housing*, as we review the literature, to refer to various housing projects and programs targeting low- and moderate-income households.

Many residents are opposed to siting of low-income housing in their communities and exhibit a "not in my backyard" (NIMBY) attitude. Community opposition may be rooted in concerns surrounding building design or quality, impact on neighborhood character, decline in open space, fear of a decrease in public service quality, fear of an increase in crime, or the perceived negative effect on property values (Downs, 1992; Finkel et al., 1996; Nguyen, 2005; Pendall, 1999; Turner, Popkin, & Cunningham, 2000). Such NIMBY sentiments may work to deter low-income housing construction from certain neighborhoods, insofar as residents may actively oppose local government's attempts to create new housing units or restore older buildings. The government has tried constructing low-income housing (i.e., public housing) as well as using production subsidies (e.g., tax abatements, tax incentives, provisions of infrastructure) and consumption subsidies (e.g., Section 8 vouchers or certificates) as a way to provide housing to low-income residents.

The Tax Reform Act of 1986 created the Low-Income Housing Tax Credit (LIHTC) to encourage investment in low-income housing. The LIHTC gives states the authority to "issue tax credits for the acquisition, rehabilitation, or new construction of rental housing" targeting low-income households (U.S. Department of Housing and Urban Development, n.d.). Housing units constructed or rehabilitated using the LIHTC are subsequently rented to qualified tenants whose incomes are at or below 60% of the median area gross income (Texas Department of Housing and Community Affairs, 2006). However, few studies have used LIHTC data, in part because comprehensive data were made available only recently. Even fewer studies use LIHTC data, to determine the LIHTC's effect on property values.

Recent research by Cummings and DiPasquale (1999) suggests during the first 10 years the LIHTC was in place, it was used more frequently to provide improved housing in low-income neighborhoods, rather than to increase housing opportunities for low-income persons in higher-income communities. Their findings also suggest that while LIHTC units serve low- and moderate-income households, the program does not tend to serve the poorest households (Cummings & DiPasquale). This may imply that the LIHTC is not sufficient to provide builders or renovators with substantial enough profits to create housing that serves the lowest income households.

The Effect of Amenities on Land Markets

Extensive research has examined capitalization of amenities into local wages and land rents. Amenities refer to location-specific characteristics that may attract or deter residents from an area and might be reflected in housing prices. Amenities might be exogenous and include such characteristics as climate or proximity to the ocean. Alternatively, they may include endogenous characteristics, such as population densities, crime and poverty rates, local tax rates, housing vacancy rates, local public services, public school quality, nearby land uses, or proximity to transportation and employment, among other factors.

Empirical research suggests amenities are priced out in local labor and/or land markets, such that community characteristics affect the desirability of the location and the willingness to live and work in a specific neighborhood (Beeson & Eberts, 1989; Blomquist, Berger, & Hoehn, 1988; Ezzet-Lofstrom, 2004; Herzog & Schlottmann, 1993; Hoehn, Berger, & Blomquist, 1987; Izraeli, 1987; Potepan, 1994; Roback, 1982; Rosen, 1979). Researchers have shown that location-specific amenities or urban characteristics are capitalized into land and, thus, housing prices (Cheshire & Sheppard, 1995; Ezzet-Lofstrom, 2004; Knapp & Graves, 1989; Shultz & King, 2001). Low housing prices are more desirable to households than are high prices, holding everything else constant. In theory, individuals prefer high-amenity areas to low-amenity ones. Because land is a limited resource, if demand to reside in high-amenity communities increases, one expects the price of land to increase as well. Similarly, demand for land in undesirable, low-amenity neighborhoods would cause land prices to fall relative to land prices in higher-amenity neighborhoods. Housing markets respond accordingly, and prices rise in desirable neighborhoods relative to prices in undesirable neighborhoods.

Effects of Low-Income Housing on Property Values

Research has sufficiently documented how local land uses can affect neighboring properties in positive or negative directions. Nguyen (2005) recently reviewed empirical studies that attempted to determine the effect of affordable housing on local property values. She divided the studies up into first and second wave studies distinguished by the level of statistical sophistication used by the researchers. The most recent studies tend to use hedonic pricing techniques to ascertain the effect of low-income housing on neighboring property values, controlling for other community factors. Research findings suggest the relationship between low-income housing and neighboring property values is complex. Studies analyzing the effect of affordable housing include Section 8 housing, public housing, below-market interest rate (BMIR) properties, and various types of subsidized housing, as well as one study including LIHTC properties. However, one is not able to definitively state the effect of low-income housing on neighboring property values based on previous studies. Some scholars have found a negative effect, while others have found a positive effect; moreover, not all findings have been statistically significant or of large magnitude.

Early research by Nourse (1963) examined the effect of urban renewal projects on eight public housing projects in St. Louis as well as their effects on real estate prices from 1937 to 1959. Nourse did not find any support that these public housing projects increased values of surrounding property. De Salvo (1974) researched the effect of subsidized housing projects in New York City. He found that property values in middle-income neighborhoods increased by 9.89% per year, compared with a 4.64% annual increase in control neighborhoods. De Salvo's findings suggested this upgrading effect was more prominent in medium-quality neighborhoods, as opposed to either the highest- or lowest-rent neighborhoods. Babb, Pol, and Guy (1984) studied the impact of federally assisted housing on single-family housing sales volume and prices in Memphis from 1970 to 1980. The authors found no evidence to conclude public housing had a negative effect on single-family housing sales. However, their study was limited to 11 neighborhood sites, and they employed very basic statistical tools in the analysis.

Guy, Hysom, and Ruth (1985) analyzed the effect of subsidized housing on neighboring middle-income townhouse prices in Fairfax County, Virginia, and found a negative effect. While the average value of neighboring properties increased over time, those closest to the subsidized units tended to increase less than those farther away. Galster, Tatian, and Smith (1999) investigated the effect of Section 8 sites in Baltimore County. They found a positive effect if only a

few Section 8 sites were located in predominately White, higher-valued census tracts. This tendency may be caused by interior and exterior renovations to rental units in otherwise strong neighborhoods. However, in low- and moderate-valued census tracts, Section 8 sites exhibited a negative effect on properties within 2,000 feet of the units. The negative effect might partially be caused by the clustering of low-income households in already vulnerable neighborhoods. The authors concluded that the negative effect stemmed, in part, from poorly managed and maintained properties (Galster et al., 1999).

One of the only studies to date that examined the effect of LIHTC units on neighboring property values was conducted by Lee, Culhane, and Wachter (1999). The authors investigated the effects of many different types of assisted housing on housing sales prices in the Philadelphia area from 1989 through 1991 in a cross-sectional study. They hypothesized that LIHTC units were not likely to have significant effects on neighboring property values because these complexes were not generally "associated with improved (or worsened) neighborhood characteristics" (Lee, Culhane, & Wachter, 1999, p. 81). However, their empirical results showed a small negative but significant effect of LIHTC units on sales in two of the four estimated models.

In another study, dispersed public housing sites which were acquired by the public housing authority and rehabilitated in Denver had a positive effect on neighboring single-family housing prices, though in some cases, slower growth in sales prices was noted in vulnerable neighborhoods (Santiago, Galster, & Tatian, 2001). Findings from Cummings and Landis (1993) suggest a building's quality and design is more likely to affect property value than proximity to a low-income structure. Thus, in blighted communities, a well-maintained low-income housing development might have a positive effect on neighboring housing values (Nguyen, 2005).

Nguyen (2005) concluded that there appear to be three key mitigating factors that may affect the impact low-income housing has on a neighborhood. First, the design and management of units may affect property values. In particular, poor management, design, and quality increase the likelihood that low-income properties will have negative effects on surrounding properties. Where management is responsive to concerns and problems, and the structure is compatible with neighborhood quality, low-income housing has not seemed to have an effect on property values (Nguyen, 2005). Second, locating low-income housing in neighborhoods that are already dilapidated and contain disadvantaged populations may exacerbate these existing problems and further pull down property values. However, siting affordable housing units in healthy, vibrant neighborhoods appears to have a neutral effect on nearby

housing prices. Finally, whether low-income housing units are concentrated or dispersed in the community can similarly affect housing values. Clustering of low-income residents is likely to have a negative effect on neighboring properties, while dispersing low-income properties has not appeared to place stress on local property values (Nguyen, 2005). Additionally, if the low-income housing is rehabilitated, new construction can affect surrounding property values. Rehabilitating existing, dilapidated housing can have a positive effect by improving the condition of the local housing stock.

Empirical Strategy and Data

Model

The goal of the empirical analysis is to attempt to determine if property values in close proximity to LIHTC projects change over time differently from values of properties not as close to the projects. If the values change in a different manner, then the question is whether or not the LIHTC projects harm nearby property values.

Let $Price_{ijt}$ denote the selling price of home *i* in neighborhood *j* in year *t*. From hedonic pricing theory[1] (Rosen, 1974), we know that:

$$Price_{ijt} = f(S_{it}, N_{jt}), \quad (1)$$

where S_{it} denotes the site-specific characteristics of home *i* at time *t*, and N_{jt} denotes the characteristics of neighborhood *j* at time *t.* The site-specific characteristics generally include measures of the size of the home, number of bathrooms, existence of a pool, and similar characteristics. These vary by home and will also vary by time in cases where the home is renovated or otherwise changed. The neighborhood characteristics usually include measures of school quality, accessibility to employment centers, and the neighborhood population demographics (percentage of population that is elderly, percentage that is minority, etc.), which also vary over time. Within a neighborhood, each house

[1] Hedonic pricing theory portrays housing prices and the desirability of housing as the complex interplay of housing and neighborhood characteristics. Thus, how much individuals are willing to pay for housing is based not only on the contents of the housing unit (number of bedrooms, square footage, etc.), but also on physical neighborhood characteristics and other exogenous and endogenous amenities offered by the community.

will have the same value of the neighborhood measures.[2] The idea is that these measures vary spatially over a county such as Dallas, but not from house to house; hence, there is no *i* subscript.

Equation 1 is a reduced form that describes the equilibrium price of homes; that is, it simultaneously captures the influences of demand and supply for the site-specific and neighborhood characteristics.[3] The reduced form is informative to our problem insofar as it facilitates, through partial differentiation, an estimate of how the market values the various site-specific and neighborhood characteristics. We use this model to estimate what value the market places on close proximity to an LIHTC unit at two points in time—first, before the existence of LIHTC projects and, second, after the introduction of the projects into the market. Then, we compare these values in order to assess the influence of the LIHTC projects.[4]

More specifically, let equation 2 be specified as:

$$(2) \quad \text{LOG}(Price_{ijt}) = \alpha_t + \beta_t \bullet S_{it} + \gamma_t \bullet N_{jt} + \delta_t Proximity_i + error_{ijt}$$

Equation 2 is a statistical model—a parameterized version of equation 1. The new variable, *Proximity,* is a dummy variable. It takes on the value of 1 if the house is close to a LIHTC location and the value of 0 if it is not. The new variable, *error,* is an unobserved random variable that is initially assumed to be independent and identically distributed.

Equation 2 actually denotes two statistical models. The first is for $t = 1$, the time period before the opening of LIHTC projects, while the second is for $t = 2$, the period after the introduction of LIHTC projects into Dallas County. As we illustrate below, we can assess how the market values proximity before and after the opening of a project by looking at the estimates on δ over time.

Data

The LIHTC database provides geographically referenced data from 1987 through 2003 for all housing projects in the United States (U.S. Department

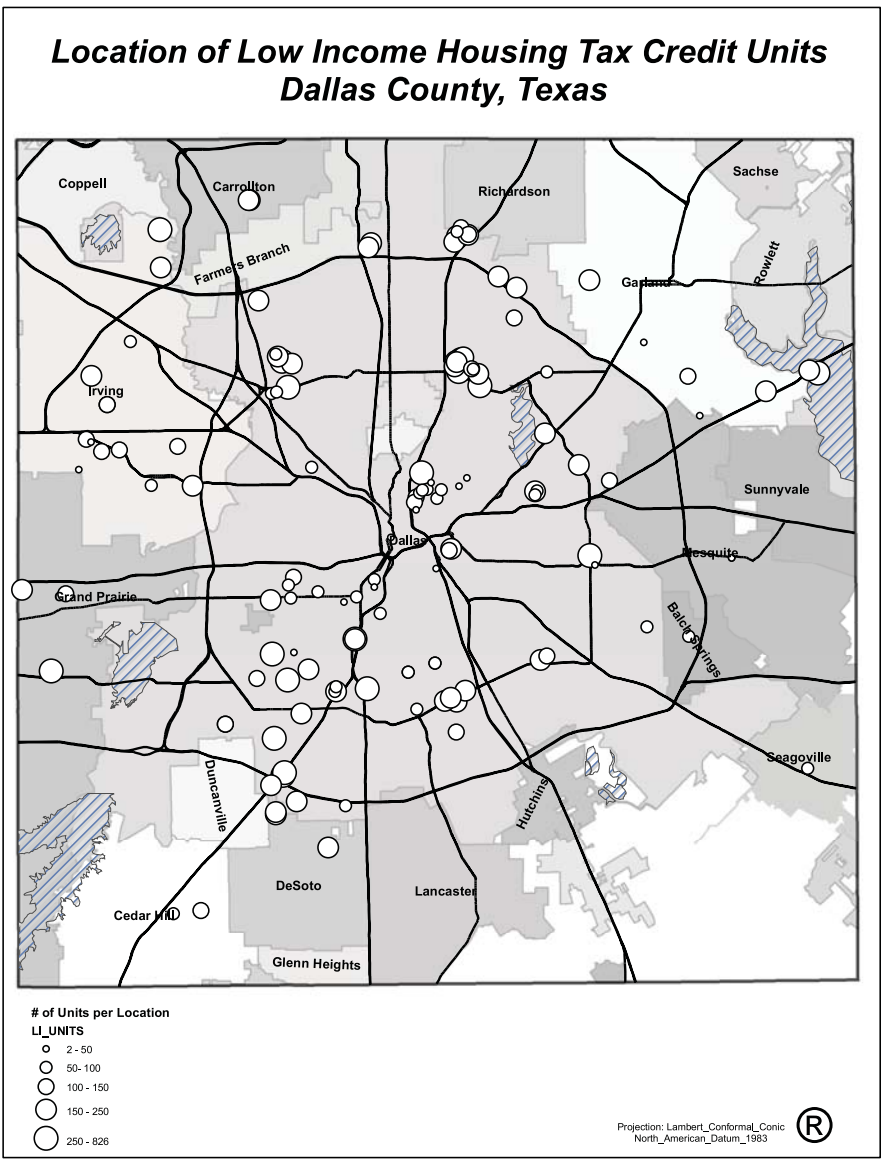
[2] This is a simple model wherein "the neighborhood" has meaning, insofar as all houses located in the area share the same community level characteristics (school quality, parks and recreational amenities, etc.). In many applications, there will be several geographic scales (census block group, census tract, school district) that capture the neighborhood effects.

[3] It is difficult to disentangle the specific forces of demand and supply, and we do not attempt it here. See Rosen (1974).

[4] This estimation strategy is sometimes called the difference of differences estimator. The first difference is between selling prices close to LIHTC locations and those that are deemed not close. The second is the difference in these before and after the opening of the project.

of Housing and Urban Development, n.d.). From this database, we extracted the projects placed in service in Dallas County, Texas during this time period. There were 133 projects in Dallas County, accounting for 21,548 units of which 20,699 (96%) are designated as Low-Income units.[5] Figure 1 shows the location of each project along with a visual description of the relative sizes of the projects in terms of number of units.

Figure 1.



[5] The database contains 142 projects in Dallas County, but 9 of them had missing data in fields that were crucial for our analysis. These 9 projects accounted for fewer than 100 units.

Table 1 displays the characteristics of the Dallas County LIHTC projects.

Table 1
Characteristics of LIHTC Projects in Dallas County

Projects (*n*)	133
Units (*n*)	21548
Zero bedroom units (*n*)	745
One bedroom units (*n*)	7789
Two bedroom units (*n*)	8071
Three bedroom units (*n*)	2345
Four bedroom units (*n*)	462
Projects (Units)—New construction (*n*)	3 (201)
Projects (Units)—Acquisition & rehab (*n*)	39 (6412)
Projects (Units)—Both New construction and Acquisition & rehab (*n*)	87 (14562)
Projects (Units)—Existing structure (*n*)	4 (373)
Projects (Units) with a nonprofit sponsor (*n*)	10 (1807)

It is interesting to note that the vast majority of projects (more than 94%) included acquisition and rehabilitation of existing housing structures. Thus, following Nguyen (2005), we expect the LIHTC projects in Dallas County would not have a negative effect on surrounding property values.

The basic neighborhood characteristics of the areas containing LIHTC projects are presented in Table 2. Note that the *neighborhood* designation is the census block group.

Table 2
Average Census 2000 Measures of Block Groups With and Without Low-Income Housing Tax Credit Projects in Dallas County

Description	Non-LIHTC	LIHTC
% of population under 18 years old	27	30
% of population with at least some college education	53	37
Average travel time to work in minutes	29	31
Median household income	50,972	30,889
% of households with income less than $25,000	25	42
% of population non-Hispanic African American	19	31
% of population non-Hispanic White	49	23
% of population Hispanic (all races)	27	42
% of population non-Hispanic Asian	3	3
% of population non-Hispanic Other	2	2
Race/ethnicity diversity	0.42	0.44
Population per square mile	6,020	10,191
% of households that are female-headed with children	12	21
% of housing units that are owner occupied	58	26

Note. In Dallas County, there are 1,683 census block groups—105 of them have at least one LIHTC unit. Race/ethnicity diversity is the measure used by Alesina and La Farara (2005).

We see that the block groups containing LIHTC projects are generally poorer, older, and substantially denser. Block groups with LIHTC units have residents with lower levels of educational attainment and higher proportions of African American and Hispanic individuals. They also tend to have more female-headed households and fewer owner-occupied housing units. On the surface, it would seem LIHTC projects are associated with neighborhood characteristics leading to lower property values. However, as we discuss below, this association can be misleading when trying to understand if LIHTC projects really do impact property values.

The property value database contains information on single-family homes that were sold in Dallas County from 1985 through 2004. The observations are also geo-referenced, facilitating calculation of the distance to each LIHTC project. We focused on homes sold within 1.5 miles of LIHTC projects. Table 3 shows summary statistics of the sales for three subsamples of homes: within 0.5 miles, between 0.5 and 1.0 miles, and between 1.0 and 1.5 miles from a project.

Table 3
Mean Values for Some Characteristics of Homes Sold Between 1985 and 2004 by Proximity to LIHTC Projects

Characteristic	Within 0.5 Miles (inclusive)			> 0.5 Miles and < 1.0 Miles (inclusive)			> 1.0 Miles and < 1.5 Miles (inclusive)		
	Mean	Min.	Max.	Mean	Min.	Max.	Mean	Min.	Max.
Living area (sq. ft.)	1545.8	358	7054	1653.6	320	10093	1778.1	450	12269
Bathrooms (*n*)	1.75	1.0	7.0	1.88	0.5	9.5	2.01	0.5	8.5
Age of house	33.1	0	100	30.47	0	100	27.12	0	98
Pool	0.05	0	1	0.08	0	1	0.10	0	1
Fireplaces (*n*)	0.54	0	4	0.62	0	6	0.68	0	7
Central air	0.76	0	1	0.81	0	1	0.87	0	1
Attached garage	0.63	0	1	0.68	0	1	0.73	0	1

Note. Subsample 1 has 17,588 observations, subsample 2 has 45,839, and subsample 3 has 44,221.

Note that the homes closest (within either 0.5 miles or within 1.0 mile) tend to have fewer bathrooms, fewer square feet, and are older than those beyond 1 mile in proximity. Once again, there seems to be an association between LIHTC projects and low property values.

Results

For this paper, we performed a broad test of the impact of LIHTC projects on real estate prices of single-family homes in Dallas County. Consider the first column of estimates presented in Table 4, where the dependent variable is the natural logarithm of selling price.

Table 4
Estimates of the Hedonic Model Pre- and Post-LIHTC Projects in Dallas County

Variable	Pre-LIHTC	Post-LIHTC
Constant	10.9947	11.5303
Site-Specific Characteristics		
Sq. ft. living area (00)	0.0455	0.0409
Number of bathrooms	0.0511	0.0454
Age in years of the house	0.0012	0.0019
Number of fireplaces	0.0867	0.0677
Condition dummy (1 if poor)	-0.0338*	0.0650
Condition dummy (1 if fair)	0.0979	0.2319
Condition dummy (1 if average)	0.1948	0.3733
Condition dummy (1 if good)	0.2315	0.3825
Condition dummy (1 if very good)	0.3166	0.4396
Condition dummy (1 if excellent)	0.3719	0.5091
Pool dummy (1 if pool)	0.0848	0.0526
Stories dummy (1 if multiple story)	-0.0103*	-0.0264
Central AC dummy (1 if central AC)	0.1034	0.1679
Attached garage dummy (1 if attached garage)	-0.0161	0.0032*
Neighborhood Characteristics		
% of population under 18 years old	-0.7201	-0.6147
Average travel time to work	-0.0161	-0.0233
% of households with income less than $25,000	-0.5785	-1.1762
% Owner-occupied Homes	-0.1389	-0.2600
Proximity to LIHTC Characteristics		
Proximity_0.5	0.0014*	0.0209
R-Squared	0.8200	0.7300
Number of Observations (N)	13162	8013

Note. The dependent variable is the natural logarithm of selling price.
* Estimate is not significantly different from zero at the 0.05 level.

The site-specific characteristics are the square feet of living area, age of the home, number of bathrooms, number of fireplaces, condition of the home,[6] existence of a pool, whether the house is more than one story, existence of central air conditioning, and existence of an attached garage. The neighborhood-specific variables are all measured at the census block group level and include an age distribution measure, travel time as a measure to capture location in relation to employment centers, median household income (low-income neighborhoods), and rates of owner occupancy.

[6] The excluded category is *unacceptable.* All of the condition dummies are in relation to the excluded category.

The proximity to LIHTC projects is modeled as "close" if the home is within 0.5 miles of a project. Recall that all the observations fall within 1.5 miles of at least one LIHTC site so Proximity_0.5 takes on the value of 1 for homes within 0.5 miles of a project. It is important to use regression for the analysis because we need to control for the differences in site-specific and neighborhood characteristics noted in Tables 2 and 3. The idea is to imagine that the exact same home is sold both within 0.5 miles and outside of the 0.5 mile boundary. Thus, any difference in selling price is attributable to proximity.

The pre-LIHTC results are based on sales data from 1985 through 1986—that is, before the introduction of LIHTC projects in Dallas County. They are generally consistent with other hedonic applications in the literature. For example, an extra 100 square feet of living area adds approximately 4.5% to the selling price, while a pool yields approximately 8.5%, all else being equal. The estimate on Proximity_0.5 is 0.0014. Not only was this a small effect (less than 0.1%), but it was also insignificant. Hence, these results suggest there was no difference in the values of properties within 1.5 miles of future LIHTC sites before their introduction into the market. This is the "first difference" and serves as a benchmark for comparing the post-LIHTC difference. That the estimate was insignificant is not surprising. After all, before the introduction of the LIHTC projects, there was no reason to suspect any relationship between property values and the projects' locations.

Now consider the second set of results as displayed under the post-LIHTC column of Table 4. The results are similar, with the most notable differences appearing on the estimates of the condition dummy variables, the percentage of households with incomes less than $25,000 variable, and the proximity variable. Of particular interest here is the striking difference in the estimate on Proximity_0.5. In the post-LIHTC sample, it is approximately *positive* 2.1%. Thus, homes within the 0.5-mile radius of LIHTC projects that were sold are actually valued higher than homes outside of this radius. This suggests LIHTC projects in Dallas County have a positive influence on nearby property values.

It is important to keep in mind the design of our model. The area before the existence of LIHTC projects is the same as the area afterwards. So, the result cannot be explained by differences in spatial sampling. Also, both the 0.5-mile radius area (the "treatment" area) and the 0.5- to 1.5-mile area (the "control" area) are the same in both periods. The only difference is that by 2003, there were 133 LIHTC projects with more than 20,000 units (the "dose") inserted into the treatment area. Thus, our test gives a fairly strong suggestion that the LIHTC projects are responsible for the increase in property values. It is not perfect, however; we do not know if similar types of "doses" were

correspondingly applied to the control group. It seems unlikely, but we have no way of being certain of this.[7]

Conclusions and Policy Implications

In this article, we examined the effect LIHTC projects have on neighboring sales prices of single-family homes in Dallas County. This study is unique in many ways. First, we attempted to analyze the effect of LIHTC projects across an entire county. Second, we studied the effect of a large number of low-income housing sites. In this study, we analyzed data from 133 LIHTC projects including more than 20,000 low-income housing units. Most other studies examining affordable housing projects' impact on real estate prices adopt a case study approach or study the effect of a small number of projects within a city. Third, we have real estate sales data spanning nearly 20 years. This richness in the data is quite unique in the affordable housing literature and gives us the opportunity for future research to build on the work here. Finally, for our methodology, we used a difference in differences approach, examining the difference between the property value growth rates for those homes within 0.5 miles compared with those of homes 0.5 to 1.5 miles away from the LIHTC properties. To our knowledge, this study is the first analysis to date which employs such a technique in the affordable housing hedonic pricing model literature.

Our results suggest LIHTC projects that went into service between 1986 and 2003 have a small, positive significant effect on single-family home prices located within 0.5 miles of the low-income units. In particular, homes located within 0.5 miles of an LIHTC project were sold for 2.1% more than homes located between 0.5 and 1.5 miles from an LIHTC project. This finding is consistent with other affordable housing studies, though as we noted earlier, conclusive findings from this literature have often been ambiguous. Given that 94% of the Dallas County LIHTC projects included acquisition and rehabilitation of existing housing, our results are consistent with recent empirical studies examining various affordable housing projects. As Nguyen (2005) noted in her review article, affordable housing projects may have a positive effect on neighboring property values, especially when dilapidated existing structures are improved through rehabilitation. Our results suggest that Dallas County might have experienced just such a phenomenon.

This study also adds important findings to the discussion about the effect of low-income housing on surrounding property values. As Pendall (1999) observed, residents are often opposed to housing developments, and not just low-income housing. Rather, residents, particularly homeowners, exhibit a

[7] One could think of the prevalence of Section 8 units or public housing units, for example.

NIMBY attitude on any project perceived to have a negative effect on property values. As such, homeowners are rational actors seeking to protect a prized asset. However, residents might also be acting with imperfect information. Thus, it is plausible for a neighborhood to resist siting of a low-income housing project based on its perceived effect (decline in property value) rather than its actual effect (neutral or positive). It is important then for scholars to investigate in greater detail how LIHTC projects affect community development. What is the effect of LIHTC properties on neighboring home values? In this study, it appeared to have a small, positive effect for single-family homes in close proximity. Does this effect hold true for other land uses? Future research should examine the effect on other types of property, such as townhomes, condominiums, and even commercial properties. As researchers in this field come to a general consensus of low-income housing's effect on property values, this information should be conveyed to key stakeholders. Planners, local city officials, policymakers, developers, and the general public need this type of information to improve decision-making on community development issues.

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