Nonprofit Housing Investment and Local Area Home Values

By Kelly D. Edmiston

In the wake of the recent mortgage crisis, interest in neighborhood stabilization and redevelopment has shown renewed vigor. Decaying neighborhoods have been part of the urban landscape for decades, but their problems recently have been exacerbated by foreclosed and vacated properties, especially in low- and moderate-income (LMI) areas.

Efforts to revitalize troubled neighborhoods have depended largely on investments in housing. Typically, these investments have involved the rehabilitation of single-family, owner-occupied housing, but some have involved new construction or the rehabilitation of rental housing. Much of the funding for these investments comes from foundations, private donations, or government sources, such as Community Development Block Grants. Generally, these funds are channeled into projects through community development corporations (CDCs) or other nonprofit entities.

While the impetus for these investments is partly to provide suitable and affordable housing, neighborhood revitalization is equally important for most CDCs. Despite long interest and experience in affordable housing investments in LMI neighborhoods, there is little research

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to inform funders, developers, and others about the spillover effects to surrounding neighborhoods. This article explores the impact of CDC housing investments in LMI neighborhoods on neighborhood quality by estimating the effect of that investment on the value of nearby houses. Property values are a good measure of overall neighborhood impacts because they show the willingness of homeowners (or investors) to pay for neighborhood attributes. This article provides evidence that CDC housing investments in LMI neighborhoods generally increase the values of nearby homes, which in turn suggests that the investments engender quality improvements in the neighborhood. Section I examines the motivation behind housing investments in LMI communities and highlights potential neighborhood spillovers. Section II discusses the data used in the analysis and the analytical method. Section III provides results from the analysis.

I. HOUSING INVESTMENT AND NEIGHBORHOOD SPILLOVERS

Although the primary beneficiaries of housing investments are the homes' occupants, housing is thought to have substantial spillover benefits on the surrounding neighborhood and community. In this way, housing investments may help stabilize declining neighborhoods, an important motivation for CDCs to invest in housing in LMI areas.[1] Neighborhood spillovers provide the conceptual basis for the analysis in this article. By examining the patterns of house prices around housing construction and rehab projects, the article evaluates the idea that housing investments by CDCs improve neighborhood quality. To the extent that new or rehabilitated housing positively affects neighborhood quality, it would be expected to raise nearby home values relative to overall price trends.

Types of spillovers

A number of potential beneficial spillovers arise from housing investment, whether the investment is in new construction or rehabilitation. The most obvious benefit is that new or rehabilitated homes often replace homes that are in disrepair or are vacant, or are built on unsightly empty lots.

The durability and immobility of housing mean it must be maintained to continue to provide a consistent quality of services. Thus, much of the housing investments by CDCs involve eradicating blight, often by rehabilitating existing homes. In other cases, new homes are constructed. Surveys have shown that the physical appearance of the neighborhood is a critical component of neighborhood satisfaction (Hur and Morrow-Jones). A recent study of homes in Columbus, Ohio, found a direct relationship between the physical appearance of neighborhoods and home values. Graffiti, dilapidated yards and exteriors, trash, electric poles, or nearby abandoned structures all negatively impact the values of the homes (Seo and Rabenau). To the extent that new or rehabilitated homes eradicate these conditions, higher home values are the likely result. Complementary efforts to improve the physical appearance of neighborhoods, such as the development of community gardens on vacant lots, also increase property values (Voicu and Been).

Blighted properties not only reduce the physical attractiveness of the neighborhood, but also are known to cause a variety of social problems.

Housing investments in LMI areas, by improving the physical condition of homes in the neighborhood, have the potential to reduce crime as well. A well-accepted theory in criminology is the "broken windows" phenomenon, which asserts that minor problems in a neighborhood, such as vandalism and the accumulation of trash (or broken windows,) can lead to increased levels of more serious crimes (Wilson and Kelling). Studies have documented this phenomenon in cities such as Baltimore, Chicago, and Philadelphia (Brown and others). This theory likely explains, at least in part, the observed relationship between crime and declining housing conditions across many communities. "Incivilities" like trashed homes also are known to increase the *fear* of crime, even in the absence of a measured increase in crime (LaGrange and others). Some studies suggest crime is the most significant obstacle in attracting or retaining residents in LMI neighborhoods (Downs).

Vacant and abandoned homes, which account for the bulk of blighted properties, are particularly problematic for neighborhood residents and their city governments. First, they often are in disrepair and unattractive, and as such, they share the problems of blighted properties more generally. This problem can be magnified in vacant properties

as they become targets of vandals and thieves. For example, vacant homes often are quickly robbed of copper and other resalable materials.

Vacant properties raise additional concerns that do not arise as often or as severely with occupied properties, however blighted. The most critical, perhaps, is the potential for a more pronounced increase in crime. The relationship between vacant properties and crime goes beyond the "broken windows" phenomenon. Vacant properties often are taken over by squatters and can become breeding grounds for crime, particularly drug dealing and prostitution. More serious, violent crimes often follow these lesser crimes (Spelman).

Another common problem associated with vacant properties is fire. According to the National Fire Protection Association, more than 30,000 fires in vacant structures are reported each year in the United States (Ahrens). Finally, many public nuisances and health concerns are commonly associated with vacant properties, such as illegal dumping and rodent infestations (National Vacant Properties Campaign).

When homes are vacant and/or in serious disrepair, a common alternative to rehabilitation is demolition. Although demolition often is less costly than significant repairs, it carries with it social problems that are less likely to arise with a rehab. Like vacant buildings, vacant lots are more prone to crime. Further, public nuisances and health concerns often are more severe on empty lots due to illegal dumping. Rehabilitation as an alternative can produce a number of benefits, including retention of community infrastructure and reduced landfill disposal (Power). Further, rehabilitation may help to maintain the existing stock of homes when there is a great need for affordable housing.

Most nonprofit housing efforts focus on homeownership, which itself may have implications for neighborhood quality. While the consequences of homeownership for individual well-being can be positive or negative, depending on individual circumstances, the potential effects on neighborhoods are largely positive.[2] For example, homeowners typically have longer tenure in neighborhoods and better maintain their homes (Rohe and Stewart; Ioannides). Further, higher rates of homeownership have been linked to lower levels of crime (Alba and others) and greater levels of community involvement (Perkins and others). Any housing investment that results in greater rates of homeownership in the neighborhood may therefore generate spillovers, which in turn could increase housing values.

Finally, housing investments by CDCs, or even publicly financed housing, may increase surrounding property values through a demonstration effect. At least one study has documented that housing investment can lead to additional investment in nearby properties (Goetz and others).

On the other hand, significant costs also can arise from housing investment in the neighborhood. Most critical is that large-scale investments, such as may occur with neighborhood gentrification efforts, may drive existing residents from their homes (Slater). The result is the same, in that home values increase, but the outcomes may be very different for the affected households. Additionally, the resources used to construct or rehabilitate homes in LMI neighborhoods could be used in alternative ways to assist LMI households.

Existing evidence

The literature on the impact of housing investment by CDCs on neighborhoods is limited. Most studies use changes in neighboring home values to measure spillovers. Because houses are largely immovable, their price reflects the willingness to pay for the physical structure and the willingness to live in the neighborhood in which the house is located. To the extent that housing investment has external benefits to the neighborhood, such benefits should be reflected in higher values of nearby homes. Likewise, any negative spillovers would be expected to reduce nearby home values. Indeed, the capitalization of neighborhood quality into home values is well documented in the literature (Malpezzi; Herath and Maier).

Much of the literature that uses home values to measure the spillover benefits of housing investment was produced by a handful of researchers using data from New York City's Ten Year Plan, which started in 1987.[3] One of these studies explored two large-scale efforts by nonprofits to construct new affordable housing in New York City. It found that, following completion of the developments, property values within defined boundaries around the developments rose faster than property values within the same ZIP codes, but outside of the boundaries (Ellen and others). The study was limited to two very large-scale projects. One project built about 3,000 homes over the study period in tracts of 500 to 1,000 single-family, owner-occupied homes. The other

project built mostly two- and three-family homes, one unit of which was typically owner-occupied. These multifamily units were also placed in relatively large tracts of up to 100 homes.

In contrast to these large-tract projects, most nonprofit home construction or rehabilitation efforts by CDCs involve homes on traditional residential lots and blocks. A similar study, also based on data from New York City's Ten Year Plan, compared the values of properties close to smaller scale rental housing rehab projects with the values of similar properties further away, but still within the same neighborhoods (Ellen and Voicu). That analysis showed that both nonprofit and for-profit rehab projects generated significant benefits to surrounding properties.

Another study using data from New York City's Ten Year Plan focused on new housing, which was defined as new construction or "gut rehabilitation of vacant uninhabitable buildings" (Schwartz and others). The projects largely involved the production of single-family homes or small (walk-up) apartments. Again, the research found significant external benefits to the neighborhoods in which the investment was placed. The magnitude of the effects was shown to increase with project size and to decrease with distance.

A limited number of additional studies use data from other cities. Two of these analyzed a broader neighborhood revitalization program in Richmond, Virginia, which included significant housing investment. The "Neighborhoods in Bloom" program was found to have significant spillover benefits on land and home values (Galster and others; Rossi-Hansberg and others). A 2003 study in Cleveland found higher home values in ZIP codes where there were more cumulative investments in housing (Ding and Knaap). That study dealt with new construction. A third study used data from Indianapolis to explore the impact of housing investment by CDCs and found higher overall home value appreciation in areas served by the CDCs (Smith).

A more limited body of research examines neighborhood effects of housing investment beyond its impact on proximal house values. One study found little effect of publicly funded home rehabilitation efforts on neighborhood demographic, economic, or property stability (Margulis and Sheets). Estimated fiscal benefits of rehab housing investment nationally ranged from 54 cents to 56 cents per municipal dollar invested (Simons and others). Other studies have found a gener-

ally positive influence of affordable housing on surrounding property conditions (Edmiston; Guhathakurta and Mushkatel).

The present study differs from the previous literature in four respects. First, previous studies have been limited to a small number of cities. The specific types of housing investments, the political and business environment in which these investments are made, and the economic and social structure of neighborhoods can vary substantially across cities, so there is a need for additional cases. This article explores the effects of affordable housing investment in previously unexamined Kansas City, Missouri.[4] Second, a two-stage estimation approach is used to account for the possibility that the relationship between housing investment and home prices operates in both directions. Third, house price changes are estimated with a repeat sales approach. Finally, this article considers housing investments by CDCs in concert with affordable housing financed by low-income housing tax credits (LIHTC).

Investments in publicly subsidized housing developments

An essential component of affordable housing investment in LMI neighborhoods is the development of publicly subsidized housing. While the focus of this article is investment in single-family, owner-occupied homes by CDCs, subsidized multifamily rental developments are perhaps even more likely to have neighborhood spillovers and therefore should be included in the analysis. Moreover, because of the nature of assisted housing, the effect of spillovers on home prices could be very different. Although funds for these developments often are channeled through CDCs, they have their own specific requirements and face some issues unique to subsidized housing.

The literature overall suggests some relationship between subsidized housing and the location of criminal activity (McNulty and Holloway). Another factor is the "putative character defects" of tenants in public housing (Freeman and Botein, p. 362). If these supposed character defects are in some way more severe than those of residents in the neighborhood more generally, neighborhood quality would be diminished. Such a result would not require that public housing tenants have character defects, but merely for that to be the perception.

Subsidized housing may also change the status of, and attachment to the neighborhood. The presence of assisted housing is perceived by

many to diminish the exclusivity and status of a neighborhood (Schively). By its nature, assisted housing allows residents into the neighborhood who otherwise would not be able to afford it.

Since the 1980s, the primary means of constructing publicly subsidized housing has been the LIHTC Program. The program authorizes selected state and local agencies to issue federal tax credits for the construction, acquisition, or rehabilitation of affordable rental housing. The credits are obtained by outside investors, who provide developers with initial development funds in return.

A large body of research has examined the influence of assisted housing on neighborhoods. Results from LIHTC developments have been mixed across a large number of studies, and thus no consensus has emerged (Freeman and Botein; Nguyen). Of the most recent studies, one found slower growth in home values near new low-rise LIHTC developments, but no measurable impact near new high-rise developments (Funderberg and MacDonald). Another found a positive impact on nearby home values, at least in declining areas (Baum-Snow and Marion). Including proximity to assisted housing in the present analysis may shed additional light on the influence of assisted housing on neighborhood quality.[5]

II. ANALYTICAL METHOD AND DATA

The analysis employs a repeat sales method to estimate the impact of proximity to CDC housing investments on neighboring home values. A two-stage approach is used to account for the possibility that home prices may also affect the likelihood of investing in specific locations. The primary data used in the analysis are home sales records from Jackson County, Missouri.

Repeat sales analysis

A common method for analyzing neighborhood impacts based on home values is hedonic regression. This approach uses statistical methods to decompose the value of a home into its component features, such as an additional bedroom or bathroom. One might find, for example, that an additional bedroom adds $17,000 to the value of a home, on average. This method can also determine the value of attributes of the neighborhood surrounding the home. An example might be the pres-

ence of a nearby park. Such an analysis compares the values of homes near a park with those further away. After controlling for other characteristics of the home and neighborhood, any remaining differences would be attributed to the value of proximity to a park. In a similar fashion, the difference in values between homes with housing investments nearby and those without can be estimated.

While the traditional hedonic approach to measuring the value of neighborhood attributes is widely employed and well accepted in the scholarly literature, it suffers from potentially significant problems. First, the approach requires a substantial amount of data on the individual characteristics of homes, which may not be readily available. Second, even if a large amount of data on home characteristics is available, the quality of the analysis depends heavily on how well the characteristics capture the quality of the homes. Finally, because hedonic models typically capture a single point in time, they may miss important dynamics that must be included to get a full appraisal of the value of specific features that may or may not be present and that may vary in quality over time.

To mitigate these problems, the analysis here employs a repeat sales method (Case and Shiller).[6] This method, which is a variant of traditional hedonic regression, measures appreciation of individual homes directly by examining the difference in transaction prices between two sales of the same home.

The price of a home at any point in time (P_t), is explained by a number of factors and can be summarized with a simple equation:

$$P_t = \alpha + bX + cZ_t + dD_t + e_t$$

Some of the factors are fixed over time, and are represented by X. These fixed factors typically are physical characteristics of the home or neighborhood, such as the number of bedrooms or bathrooms, or geographic location.[7] Other factors affecting home prices can vary over time, however, such as the amount of mortgage lending that occurs in the neighborhood. These factors are represented by Z and are indexed by t to reflect that they differ depending on the year. The key factor analyzed in this paper, the presence of a CDC housing project nearby, is a part of Z. The last set of factors in the equation, represented by D_t, is used to create an index of house prices over time (see Appendix). The

term e_t represents the part of the price that is determined by factors not otherwise included in the equation.

The key question is how the presence of CDC housing projects contributes to the change in home prices over time. The change in home prices is computed by subtracting the logarithm of the price in one period (t) from the logarithm of the price in the earlier period (t-s):[8]

$$\log P_t - \log P_{t-s} = \alpha + \gamma(Z_t - Z_{t-s}) + \delta(D_t - D_{t-s}) + \varepsilon_t - \varepsilon_{t-s}$$

The factors that are fixed in time drop out of the equation, and hence do not need to be considered in the analysis. In addition to the presence of nearby CDC housing projects, three other factors are included in Z to explain the change in house prices. Aggregate mortgage lending in the census tract is included to indicate the degree of interest in the neighborhood by homebuyers and investors. It is expected to be positively related to home values. The serious mortgage delinquency rate is included to capture downward pressure on prices that may arise from homeowner financial stresses.[9] Finally, a variable is included to indicate the presence or absence of new LIHTC developments. These developments may affect home values by altering the socioeconomic makeup or status of the neighborhood.

The analytics of the repeat sales methodology, which is discussed in more detail in the Appendix, typically would exclude CDC housing investments that occurred prior to the first sale. These investments are included in the present analysis, however, because prior housing investments are expected to affect the *rate of appreciation* (or depreciation) between the two sales, in addition to the absolute price level.

A potential problem with this approach is that if housing investment decisions are determined in part by home price trends, the estimates will be biased. For example, if investments are more likely to go to neighborhoods where home values are increasing, an estimate of the impact of housing investment on home price appreciation would be biased upward. A positive relationship between housing investment and home price appreciation would be expected, not because housing investment causes home values to appreciate more, but because investors put their resources where home prices have been appreciating at a faster rate.

This problem is partially mitigated by ensuring that the housing investments that are analyzed precede the last sale of the nearby homes.

Some potential for bias remains, however, because home values are likely to be correlated over time. These bidirectional effects between housing investment and house price appreciation can be further disentangled using an instrumental variables estimation method, which is performed in two stages. In the first stage, the probability that each home will be near homes receiving investment is estimated. In the second stage, the resulting probability replaces the indicators for the presence of homes receiving investments.

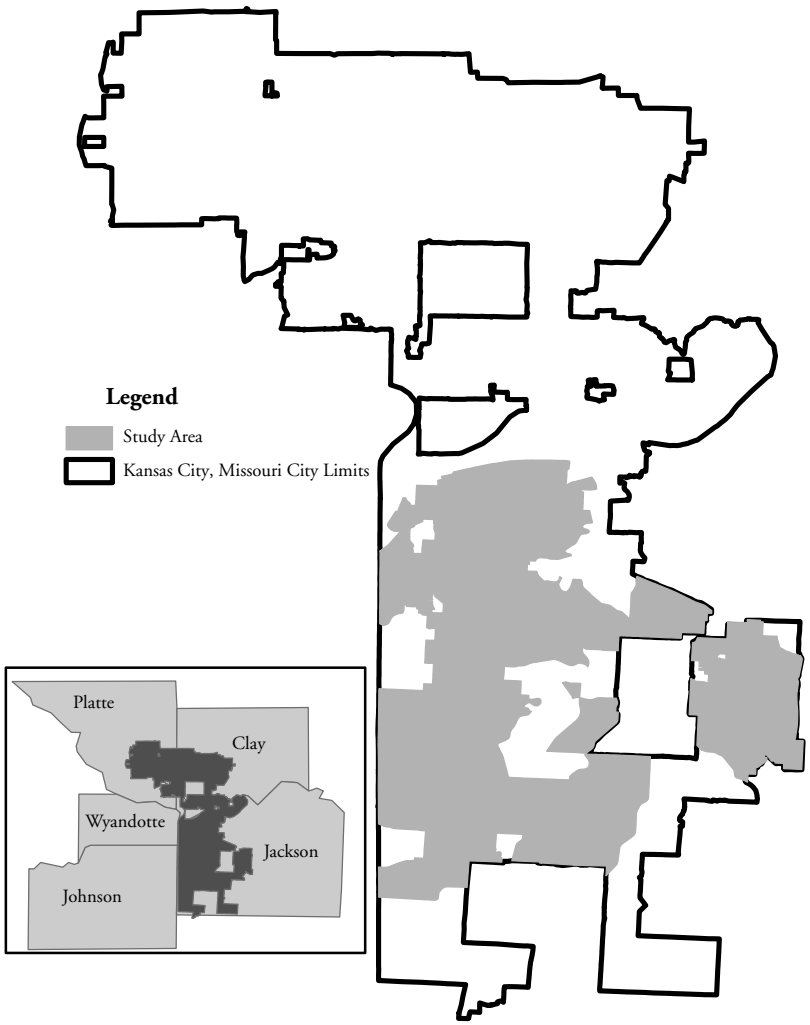
Model data

Data on 167,000 home transactions from January 2004 through August 2011 in Jackson County, Missouri, were obtained from the Geographic Information Systems Department in Jackson County. Records for homes that sold twice in that period were extracted from the dataset, and all non-arms-length transactions were removed. These values were further limited to those occurring in LMI census tracts in the City of Kansas City, Missouri (Figure 1), leaving 7,365 transaction pairs, representing nearly 15,000 home sales.[10]

Data on housing investments by CDCs in the study area were collected directly from the CDCs or their funders, resulting in about 421 identified projects completed between 2001 and 2010. These investments represented larger rehab projects, or in limited cases, new construction. Several hundred additional projects were identified that were either interior projects (such as plumbing) or small-scale exterior projects (such as roofing, gutters, or porch repair). These projects would not be expected to impact nearby housing values and therefore were excluded from the analysis.[11] Of the larger projects, most were undertaken earlier in the decade, with 2004 being the peak year at 111 projects (Chart 1). Only 26 projects were identified in 2009-10.

Using Geographic Information Systems (GIS), 500-foot rings were drawn around each project, and houses within those boundaries were identified (Figure 2). A similar methodology was employed to associate homes with LIHTC units developed during the period of analysis, of which there were 60 in the study area. Data on LIHTC developments were retrieved from the U.S. Department of Housing and Urban Development's LIHTC database and the Missouri Department of Housing and Economic Development. The goal of the analysis is to see how

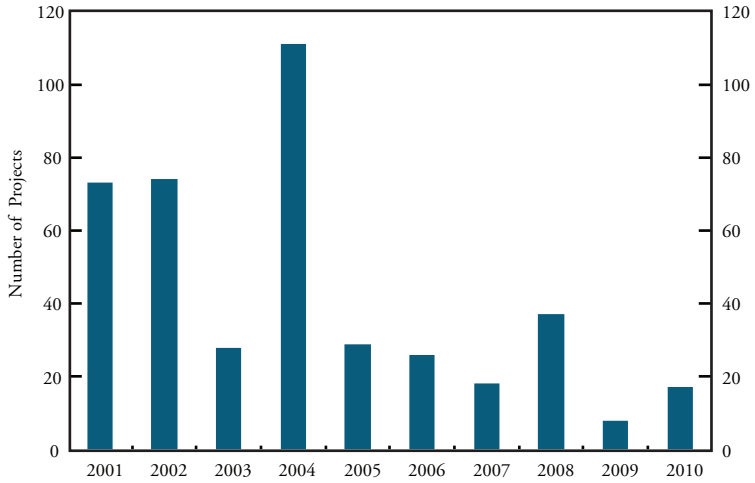
Figure 1
STUDY AREA



Source: Created by author using ESRI ArcGIS

Chart 1

HOUSING INVESTMENTS BY CDCs IN KANSAS CITY



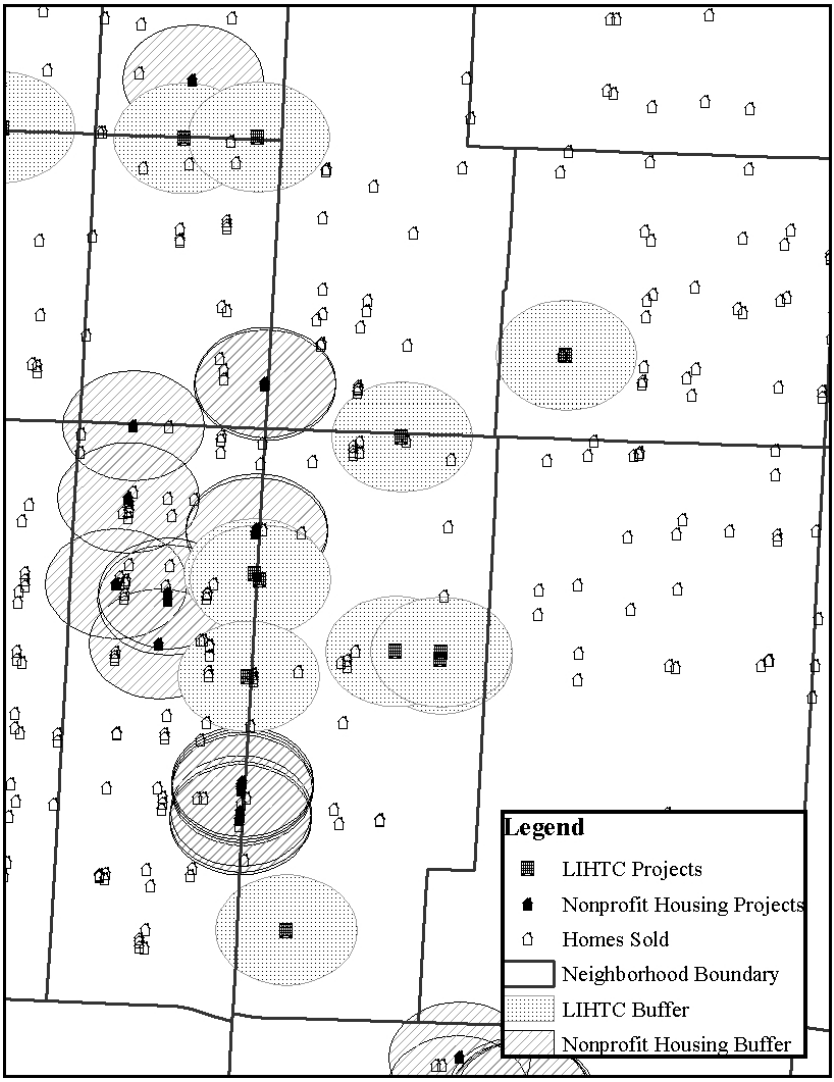
Source: Various CDCs and funding organizations

home values differ inside and outside the boundaries of these projects, holding all other determinants of home prices equal.

The nature of the data present a number of challenges, which limit the analysis. The ideal approach would be to measure the change in the value of the home following the project date and determine the degree to which any effect decays over time. For example, for a CDC project dated 2004, the ideal approach would be to examine the appreciation of nearby homes that sold first in 2004 and again in subsequent years. The value of the homes would then be compared with the value of identical homes sold in the same time period but away from the CDC project. While such an analysis is theoretically possible, it would be difficult to find a sufficient number of nearby home sales with which to conduct the analysis, even in the largest and most densely populated cities. The eight-year time horizon results in 512 possible combinations of project year, first sale year, and second sale year. Given that the home sales database consists of less than 8,000 sales pairs and that proximity is defined as 500 feet, analysis at that level of detail is not a practical possibility. The problem is exacerbated because a substantial number of homes in the database are located inside the 500-foot boundaries of multiple projects started in different years.[12]

Figure 2

SELECTION OF NEARBY HOME SALES IN KANSAS CITY, MISSOURI



Notes: The figure highlights Ivanhoe and surrounding neighborhoods in Kansas City. "Homes sold" are homes that sold twice between 2004 and 2011 that are included in the analysis. Each buffer represents areas within 500-foot rings around nonprofit (CDC) housing investments or new LIHTC developments. Homes within these buffers are identified as being "nearby" these investments or housing developments.

Given data limitations, the analysis proceeds by examining the effect of proximity to any project dated before the year of the second sale. A large majority of the projects occurred before the first sale or shortly thereafter, which partly mitigates this concern. The analysis can answer whether CDC housing investments affected nearby home values, but caution should be used if the estimate, which is an average effect, is employed to project the likely effects of a single future project.

III. NEIGHBORHOOD IMPACT OF CDC HOUSING INVESTMENTS

As an initial approach, a typical one-stage model was estimated. The results suggested that CDC housing investments have a modest effect on the appreciation of nearby home values (Table 1, column 1). Specifically, the nominal appreciation rate between the first and second sale was 3.6 percentage points higher, on average, for homes within 500 feet of a CDC investment project. Because the average time between first and second sales in the data is about 2.5 years, the increase in the annual appreciation rate was about 1.4 percentage points (compound annual rate).

A potential problem with this result is that CDCs may seek neighborhoods with specific prior price trends. Private investors often seek neighborhoods where homes are appreciating at a relatively high rate, expecting that their investments will offer greater returns. If CDCs follow a similar strategy, the results described above would be biased upward, overestimating the impact of proximity to their housing projects. Alternatively, CDCs may seek to invest in neighborhoods where there is the greatest need, and where prices likely would have appreciated at a lower rate (or depreciated at a greater rate). Thus, the results would be biased downward, underestimating the impact of proximity to their housing projects. Fortunately, statistical procedures exist to mitigate this bias.

The first step in this modified approach is to estimate the probability that any given location is chosen for a CDC housing investment (stage 1). Although there are sophisticated planning models to help an organization choose an optimal location for housing development, nonprofit developers of affordable housing typically perform relatively informal analyses to select potential sites and then determine the site

Table 1

THE IMPACT OF CDC HOUSING INVESTMENTS ON NEARBY HOME PRICES IN KANSAS CITY

Bootstrap Regression Results†

Variable/Model	One-Stage	Two-Stage
	1	2
Intercept	0.363*** (0.010)	0.357*** (0.011)
Investment Within 500 feet	0.036 (0.025)	0.118*** (0.046)
Investment Within 1,000 feet	0.022 (0.019)	0.013 (0.020)
LIHTC Within 500 feet	0.030 (0.046)	0.019 (0.045)
HMDA Volume (Census Tract)	4.1×10^{-11} (1.2×10^{-9})	6.2×10^{-10} (1.7×10^{-9})
Mortgage Delinquencies (ZIP Code)	0.005* (0.003)	0.006** (0.003)
Year 2005	- 0.029** (0.011)	- 0.031*** (0.012)
Year 2006	- 0.137*** (0.016)	- 0.139*** (0.015)
Year 2007	- 0.249*** (0.017)	- 0.248*** (0.018)
Year 2008	- 0.418*** (0.020)	- 0.416*** (0.020)
Year 2009	- 0.541*** (0.027)	- 0.538*** (0.027)
Year 2010	- 0.565*** (0.030)	- 0.564*** (0.030)
Year 2011	- 0.574*** (0.035)	- 0.568*** (0.034)
Adjusted R^2	0.129	0.130
Sample Size	6,619	6,549

Notes: Standard errors in parentheses.
*, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively.
The regression estimates the probability that any given home in the database is within 500 feet of a CDC housing project.
Source: Author's calculations

that is most viable (Johnson). Therefore, the choice of variables used to estimate this probability was based largely on personal interviews with CDCs and their funders. Need was a deciding factor, as was the motivation and support of the neighborhood.

Measuring the need for CDC intervention in housing is straightforward. Among the variables utilized were poverty rates; demographics, such as race, ethnicity, and age; the percentage of households headed by females; the median age of homes; median rents; and the level of mortgage lending, as reported under the Home Mortgage Disclosure Act (HMDA). These data were collected from the Census Bureau's American Community Survey, other census products, and HMDA reports. Other factors in selection included the supply of homes to rehab, which was measured by vacancy rates, homeownership rates, and the motivation of existing residents to improve the neighborhood.

The motivation of individual neighborhoods for progress and their abilities and willingness to support community development efforts is difficult to measure. One proxy measure was the percentage of the voting age population casting votes. Precinct-level voting data were acquired from the Kansas City Board of Election Commissioners and associated with homes sales using GIS. Another measure was a set of variables designed to identify each neighborhood, based on geographic boundaries. Specifically, a variable was created to represent each neighborhood in the study area. For every observation (paired sale) in the dataset, the variable corresponding to the neighborhood in which the home was located was given a value of one, while all other variables representing neighborhoods were given a value of zero. The set of these neighborhood variables could account for the relative strengths of the neighborhood associations, among other factors. Neighborhood boundaries were acquired from the Neighborhood and Community Services Department for the City of Kansas City, Missouri.

A number of the factors in the first stage of the model were found to be important (Table 2).[13] Among the factors reflecting needs for housing were demographics, the poverty rate, median rents, and the amount of private mortgage lending. Demographic results show that CDCs are more likely to invest in neighborhoods with more minorities. A negative value for median rents and mortgage lending indicates that CDCs typically have targeted low-rent neighborhoods with little mortgage lending

for investments. Low rents and low lending activity are characteristic of declining neighborhoods.

Results also suggest that investments are more likely on blocks with low vacancy rates and higher ownership rates. Both attributes would indicate a greater number of homes suitable for renovation by CDCs. They also may reflect the willingness on the block to maintain properties and to be active in the community. A positive association with project site location and property crimes is surprising. However, higher property crime rates on the block could be correlated with other, unobservable indications of decline and, therefore, reflect a greater need for intervention. The share of the voting-age population that cast ballots in recent elections was not a relevant factor in determining project location, but the set of neighborhood identifiers, as a whole, were significant.[14]

The effect of CDC housing investments on nearby property values was found to be substantially higher in the two-stage model. Specifically, the average appreciation between the first and second sales was 11.8 percentage points higher, on average, for homes within 500 feet of a CDC investment project (Table 1, column 2). Because the average time between first and second sales in the database is about 2.5 years, the increase in the nominal appreciation rate was about 4.6 percent annually, on average (compound annual rate). The difference in results between the two models suggests that the simpler one-stage model underestimates the impact of CDC housing projects on nearby housing values.

As an example of how the estimates might influence house prices in practice, it is helpful to consider the average home in Kansas City that was bought in 2005 and sold in 2008. In that period, prices in LMI neighborhoods fell 1.5 percent (Chart 2), while the price of homes within 500 feet of a CDC housing investment increased 10.8 percent.[15] This difference is a 4.0 percent greater annual rate of appreciation (compound annual rate).

The results also show that CDC housing projects have no measurable impact on the prices of homes 500 feet to 1,000 feet away. The stronger result for 500-foot proximity relative to 1,000-foot proximity was expected. Typically, the effects of any kind of neighborhood attribute or intervention decline with distance. Studies that have measured the geographic scope of affordable housing investments typically have found limits to these spillovers. Generally, the research has shown that spillover benefits dissipate (some quite sharply) with distance from the

Table 2

THE IMPACT OF CDC HOUSING INVESTMENTS ON NEARBY HOME PRICES IN KANSAS CITY

First Stage Results

Variable	Estimate	Variable	Estimate
Intercept	- 0.409 (0.748)	Personal Offenses (Block)	-4.3×10^{-5} (3.1×10^{-5})
Black/African American (Block)	0.024* (0.014)	Property Offenses (Block)	5.2×10^{-5}*** (1.4×10^{-5})
Hispanic (Block)	0.054* (0.033)	Percent Voting (Precinct)	-1.1×10^{-4} (6.7×10^{-5})
Age 65+ (Block)	0.032 (0.033)	HMDA Loan Volume (Tract)	-1.4×10^{-9}*** (4.6×10^{-10})
Female-Headed Household (Block)	0.009 (0.039)	Foreclosure Rate (ZIP Code)	- 0.001 (0.003)
Vacancy Rate (Block)	- 0.088** (0.037)	Poverty Rate (Tract)	- 0.146*** (0.036)
Ownership Rate (Block)	0.028* (0.016)	School Within 500 Feet	0.001 (0.014)
Median Year Built (Tract)	2.4×10^{-4} (3.8×10^{-4})	Church Within 500 Feet	0.018** (0.008)
Median Rent (tract)	-6.3×10^{-5}*** (2.0×10^{-5})	Neighborhood Boundaries	32 of 160 Significant
Adjusted R^2	0.266	F	14.7***

Notes: Standard errors in parentheses.
*, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively.
The regression estimates the probability that any given home in the database is within 500 feet of a CDC housing project.
Source: Author's calculations

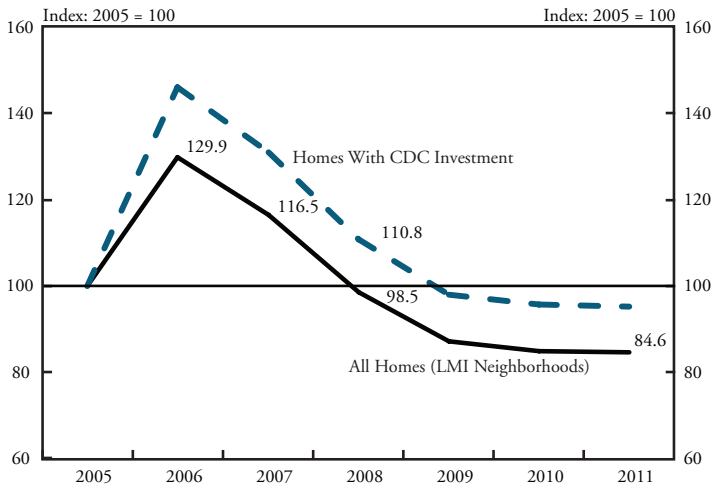
project. One found that spillover benefits of housing investment rarely extend beyond one block (Ding and others). City blocks typically do not exceed 500 feet.

The primary goal of the model is to judge whether CDC housing investments in LMI neighborhoods affect nearby home values. The results suggest the investments contribute to higher prices of nearby homes. While an example was provided of how this might affect a home bought in 2005 and sold in 2008, the model is not intended to generate precise estimates of house prices. As noted in Section II, such a model would require many more thousands of observations in each year.

Additional variables included in the model yielded interesting results. Higher levels of mortgage lending in the neighborhood led to higher growth in home prices, which was expected. Greater mortgage

Chart 2

ESTIMATED HOUSE PRICE INDEX, LMI NEIGHBORHOODS IN KANSAS CITY, MISSOURI, WITHIN JACKSON COUNTY



Notes: The index is computed for homes purchased in 2005, based on results in column 1 of Table 2. The model provides a measure for the logarithm of the ratio of prices in any two years. For 2005, the index receives a value of 100. If the home sold in 2006, its value would be computed as,

$$V_{2006} = V_{2005} \exp\left[(0.357 - 0.031 + (-0.139) + 0.013) - 1\right] = 100\left[\exp(0.262) - 1\right] = 129.9,$$

where 0.013 is the effect of HMDA volume and the serious mortgage delinquency rate. In 2007, the value would be

$$V_{2007} = V_{2005} \exp\left[(0.357 - 0.031 + (-0.248) + 0.013) - 1\right] = 100\left[\exp(0.153) - 1\right] = 116.5.$$

Since the average home had a value of 129.9 in 2006 and 116.5 in 2007, the change in value over that period was about -10.3 percent.

Source: Author's calculations

lending reflects greater interest in the neighborhood. Higher mortgage delinquency rates in the ZIP code were associated with higher growth in prices, which was surprising. Because few ZIP codes were represented in the study area, there was little variation in mortgage delinquency rates across neighborhoods. And, the size of the effect was quite small, suggesting a negligible impact.

Proximity to new LIHTC developments was not found to influence home appreciation. This relationship suggests that the benefits of proximity, such as removal of nearby blight or utilization of nearby vacant lots, may be offset by the potential costs often associated with

subsidized housing—neighborhood detachment, congestion, crime, and diminished status.

The last set of variables in the model were used to construct a house price index for the study area. The variables were incorporated in the model to control for overall house price trends during the period of the analysis (Chart 2). The index showed a considerable increase in housing values for this part of the city from 2005 to 2006, steep declines through 2009, and stable prices thereafter. For 2006 to 2009, the index also shows much steeper losses in home values in LMI neighborhoods in Kansas City than for the entire metropolitan area, as measured by the Federal Housing Finance Agency, which also uses a repeat sales index. The value of an average home purchased in a Kansas City LMI neighborhood in 2004 fell 13.4 percent by 2011. By comparison, home prices in the Kansas City Metropolitan Area fell 1.4 percent, on average.

IV. CONCLUSIONS

CDCs focus a substantial portion of their resources on housing, largely through rehabilitation. This focus is partly motivated by a critical need for housing assistance in many LMI neighborhoods, but also by the perception that housing investment generates positive spillovers to the neighborhood.

Exploiting data on homes that sold more than once between 2004 and 2011 in Jackson County, Missouri, the findings show that housing investments by CDC substantially increased the appreciation of homes nearby. On average, homes within 500 feet of the development projects appreciated at an 11.8 percent greater rate than homes further away from the projects between the first and second sales of the homes. The analysis further shows that these effects dissipate beyond 500 feet.

The results suggest investments in affordable housing projects in LMI neighborhoods may achieve benefits beyond those that may accrue to individual homeowners. Thus, the current level of affordable housing development may be inefficiently low to the extent that returns on investment are underestimated.

The analysis was limited to LMI neighborhoods in Kansas City, which are the typical targets of CDC investments in housing. The effects

of these housing investments in middle and higher income neighborhoods could be very different. The home price index measured as an artifact of the analysis shows large losses in home values in LMI neighborhoods after 2006. Prices likely followed a very different pattern in other parts of Kansas City, Missouri, and in the entire metropolitan area.

APPENDIX

Empirical methodology

Consider the value of a home i in neighborhood n at time t, given by $P_{i,n,t}$. The hedonic equation is given by

$$(1)\quad \log P_{i,n,t} = \alpha + \sum_{j=1}^{J} \beta^j X_{i,n}^j + \sum_{k=1}^{K} \gamma^k Z_n^k + \sum_{m=1}^{M} \lambda^m G_{n,t}^m + \sum_{r=1}^{R} \delta^r D_{i,n,t} + \varepsilon_{i,n,t}$$

Which for notational simplicity can be written as

$$(1')\quad \log P_{i,n,t} = \alpha + \mathbf{X}\,\mathbf{B} + \mathbf{Z}\Gamma + \mathbf{G}_t\Lambda + \mathbf{D}_t\Delta + \varepsilon_{i,n,t}$$

where **X** is a vector of N characteristics of the house, which are time-invariant; **Z** is a vector of K time-invariant neighborhood attributes; **G** is a vector of M neighborhood attributes, which may vary over time; and **D** is a vector of T binary variables, each of which takes on a value of one in periods in which home i is sold and zero otherwise. The set of parameters in vector Δ $(\delta^1,\ldots,\delta^T)$ represent communitywide trends in home prices, which can be interpreted as a home price index.

The repeat sales method requires the use of matched pairs of transaction prices on homes. Based on (1), the change in log-price of any home between time t-s and time t can be written as

$$(2)\quad \log P_{i,n,t} - \log P_{i,n,t-s} = (\mathbf{G}_t - \mathbf{G}_{t-s})\Lambda + (\mathbf{D}_t - \mathbf{D}_{t-s})\Delta + \nu_t,$$

where $\nu_t = \varepsilon_{i,n,t} - \varepsilon_{i,n,t-s}$.

In equation (2), all time-invariant characteristics of the house and neighborhood drop out. The goal of the empirical analysis is to measure the effect of **G**, in particular, affordable housing investment ($H \in \mathbf{G}$), on the change in log price, which will be shown as the value of $\lambda(H)$.

Consistent estimation of (2) requires that the residual ε_i be uncorrelated with the explanatory variables. If (2) is estimated directly, this condition is likely to be violated. The concern arises because trends in home prices may influence the initial location decision for the affordable housing investments. To account for this endogeneity, H first is estimated with a linear probability model[16]

$$(3)\quad H_i = \Pi' \mathbf{W} + u_i,$$

where **W** is a vector of predetermined variables, at least one of which is independent of log P_i, and Π is a vector of parameters. Operationally, the analysis proceeds as an estimate of the probability that an affordable housing investment is within a 500-foot ring around any given house that was sold twice in 2004-11. Then, the predicted values of H ($\hat{H}$) is employed as the regressor in (2).

The empirical strategy requires the inclusion of a variable(s) in the first stage that is uncorrelated with price trends in neighborhood n but is correlated with the probability of an CDC housing project being located within 500 feet of home i. The primary instruments employed are a set of binary variables representing neighborhood boundaries. In subsequent tests, these were found to be largely uncorrelated with the residual of equation (2). A number of additional predetermined variables also were included in (3), some of which were uncorrelated with the residual of equation (2). Results are presented in Table 2 and discussed in Section III of the text.

The two-stage estimator will provide a consistent estimate of Λ, but ν_t is likely biased due to the use of a generated regressor in the first stage of the model. To ensure an efficient estimate, (2) is estimated with bootstrap regression. This methodology involves using the sample data as a population from which repeated samples are drawn. Given the original sample of size n, Q = 500 bootstrap samples are created, each time selecting n values with replacement from among the observations in the original sample. The regression estimator is then computed for each bootstrap sample $q \in Q$. Reported parameter estimates are the bootstrap means, and the bootstrap standard errors are used to generate confidence intervals for the parameters. Asymptotic efficiency in the case of this two-stage estimator does not require that the equations be jointly estimated (Pagan 1984).

ENDNOTES

[1]CDCs make housing investments in LMI neighborhoods for a number of reasons, many of which focus on individual households. Most fundamentally, shelter is a basic need, and in many LMI neighborhoods, CDCs are the only entities making significant investments in housing. Further, housing is the largest regular expenditure for most households and, for most owner-occupants, their most significant asset. Research suggests that quality housing also can provide stability and security to residents and positively affect health outcomes (Bratt; Thomson and others). Added stability and better health outcomes not only could significantly improve quality of life but also are associated with less absenteeism and higher levels of productivity while at work (Boles and others).

[2]See Haurin and others. Homeownership is often perceived to be a critical path for building personal assets, but recent experience suggests that homeownership may not be an effective way to build wealth for many families. A recent article in this *Review* shows that for 10-year occupancies that began during the 1980s, households were likely to build greater wealth by renting and investing than by investing in a home (Rappaport). The article suggests that this outcome is likely for occupancies begun in 2000-09 as well.

[3]The Ten Year Plan was an effort promoted by Mayor Edward Koch to build or rehabilitate affordable housing in New York City. The plan resulted in the rehabilitation or construction of over 182,000 properties costing more than $5 billion (see Schill and others).

[4]Little formal analysis of the neighborhood effects of housing investment has been completed for Kansas City, Missouri. One somewhat related Kansas City Fed study identified a substantial increase in the flow of private home financing to LMI neighborhoods in Kansas City during the 1990s (Harvey and Spong). The effects of this increased lending included a rise in median house values equivalent to the rise elsewhere in the Kansas City area, despite a net outflow of households. Further, greater improvement in home values occurred in LMI neighborhoods with higher levels of lending. While that study examined effects on housing values that were averages for census tracts, the present analysis examines individual house values. A census tract generally represents 4,000-10,000 people.

[5]The HOPE VI program, administered by the U.S. Department of Housing and Urban Development, has produced more consistent results. This article does not consider Hope VI developments because none were constructed in the study area during the period of analysis.

[6] For recent examples of this approach, see Billings and Thibodeau; Gamper-Rabindran and others; and Ries and Somerville.

[7]Home renovations may include the addition or removal of bedrooms and bathrooms, but for the purpose of this analysis, the physical attributes of the home are assumed to be fixed. Substantial renovations of this type are unlikely

to have occurred in a significant number of homes in the short time window of the analysis, especially in these neighborhoods where average incomes and home values are low.

[8]By taking the logarithm of the prices, the resulting calculation results in a rate of change rather than an absolute change.

[9]A mortgage is considered to be seriously delinquent if it is 90 or more days past due or in foreclosure.

[10]Very few homes were sold more than twice.

[11]Their inclusion in the analysis did not reveal them to have a measurable impact on home values.

[12]This problem would be present even if the ideal analysis were possible. An informal analysis of average home price appreciation on city blocks suggests that home prices grew faster on blocks with the greatest number of CDC projects. The results are not included in the article because the number of city blocks that could be used in the analysis was relatively small and therefore made the analysis less reliable.

[13]A subsequent analysis revealed that the first stage of the model was sufficient to isolate the opposing effects between the location of nonprofit housing projects and their effect on nearby home prices. Specifically, the procedure estimated correlations between the variables in the second stage and the unexplained variation in the first stage and revealed those correlations to be weak.

[14]As determined by the appropriate F-test.

[15]The home price index was 100.0 in 2005 and 98.5 in 2008. The home price index in 2008 for homes near CDC investments was 110.8. This assumes the CDC housing project was completed at the time of sale. The price index is an exponential function of the growth rate predicted by the model, and thus the difference in appreciation is greater than 11.8 percent.

[16]Although many researchers would argue that a probit or logit model is more appropriate in the first stage in this approach, the linear probability model is best (Angrist and Krueger 2001). Consistency of the second-stage estimates does not depend on correct specification of the functional form in the first stage, and estimates from a linear first-stage regression generate consistent estimates in the second stage even with a binary endogenous variable. Indeed, "using a nonlinear first stage to generate fitted values that are plugged directly into the second-stage equation does not generate consistent estimates unless the nonlinear model happens to be *exactly* right, a result which makes the dangers of misspecification high" (p. 80).

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