JOINT CENTER FOR HOUSING STUDIES
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Do Homeownership Programs Increase Property Value in Low Income Neighborhoods?

LIHO-01.13

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This paper, along with others prepared for the Symposium, will be published as a forthcoming book by the Brookings Institution and its Center for Urban and Metropolitan Policy.

Abstract

In this paper, we look at the impact of two New York City homeownership programs on surrounding property values. Both of these programs—the Nehemiah Plan and the New Homes Program of the New York City Housing Partnership—develop affordable, owner-occupied homes in distressed urban neighborhoods.

Our analysis uses a hedonic model to compare the sales prices of properties in small rings surrounding homeownership sites to the prices of comparable properties in the same community districts, but outside the rings. We then compare the magnitude of this difference before and after the completion of homeownership units. Based on an analysis of 300,000 property sales, we find that prices of homes near to homeownership sites rose significantly relative to prices in their community districts between 1974 and 1999. Part of this increase appears associated with the construction of city-sponsored, affordable homeownership units.

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I. Introduction

Promoting homeownership has always been a central aim of housing policy in the United States. The federal tax code delivers generous tax benefits to homeowners, the Federal Housing Administration (FHA) provides insurance on high loan-to-value mortgages, a variety of other FHA programs have offered below-market interest rates, and the Community Reinvestment Act of 1977 provides incentives for financial institutions to make mortgage loans in low- and moderate-income communities. As cities have become more centrally involved in implementing housing policy, local officials have also begun to sponsor a large number of homeownership programs in distressed communities, such as homeownership counseling, outreach, and efforts to subsidize production.

Although these efforts typically do not reach the poorest households, they are justified in large part by the positive spillovers that many argue will result from the development of new homes and from homeownership itself.[1] To date, there is little empirical evidence about the impact of homeownership efforts on local communities. In this paper, we investigate the impact of two of New York City's major homeownership programs on property values in surrounding communities. Both of these programs, the Nehemiah Plan and the New Homes Program of the New York City Housing Partnership, subsidize the development of affordable, owner-occupied homes in distressed urban neighborhoods.

Spillover Effects of Homeownership and Housing Redevelopment

There are several reasons that the Nehemiah and Partnership New Homes programs might be expected to raise the value of surrounding properties. First, both programs replace blighted or vacant properties with new homes. Unlike most commodities, housing is fixed in space, and the value of a home is therefore influenced not only by its structural features and quality but also by its surroundings. The appearance of neighboring homes, the level of noise and disorder in a community, and the quality of local public services should all contribute to the value of a particular home. Thus, housing investments in blighted areas should theoretically generate spillover benefits for the local community, benefits that should be capitalized into the value of surrounding properties.

Second, beyond adding new structures where there was previously blight, these

[1]Some cities may also support homeownership programs as an attempt to retain the middle-class.

two New York housing programs also bolstered the number of homeowners in their communities, which may, in itself, lead to higher property values if their greater financial stake leads homeowners to take better care of their homes than renters. Similarly, there is some evidence that homeowners are more involved in local organizations and activities (both because of their financial stake and because homeowners simply tend to remain in their homes for a longer period of time); this factor may improve the quality of life in a community and thereby raise property values (DiPasquale and Glaeser 1999; Rohe, Van Zandt, and McCarthy 2000).

Finally, these two programs also lead to an increase in the population of their neighborhoods, which may, in turn, have invited new commercial activity, a greater sense of safety, and general economic growth.

There are, to date, few reliable studies examining the impact of privately sponsored new construction on surrounding property values, largely due to the difficulty of addressing endogeneity problems. (Private developers aim to develop sites where they believe property values are likely to appreciate, and thus new construction itself depends on property values.) Simons, Quercia, and Maric (1998) use cross-sectional data for Cleveland to examine the effect of one- to three-family home construction on the sales prices of nearby housing. They find that the existence of a newly constructed unit nearby has a small, but positive effect on sales price. Although the authors attempt to treat construction as endogenous using two-stage least squares, the poor performance of the first-stage model (explaining new construction in a census tract) leads them ultimately to use actual levels of new construction in their regression models.

Most studies of the relationship between investments in housing and neighborhood property values focus instead on the impact of proximity to publicly-subsidized housing, and in particular, proximity to federally-subsidized rental programs. So far, few studies suggest much of an effect. Nourse (1963) and Rabiega, Lin, and Robinson (1984), for example, examine the effect of newly developed public housing on neighboring property values and both find modest, positive impacts, but only in limited cases. More recently, Chandler, Benson and Klein (1993) find that the siting of scattered-site public housing in Cleveland was associated with increases in sales prices in 8 of 12 census tracts, but these authors do not control for the effects of neighborhood conditions. In a more thorough analysis, Briggs, Darden, and Aidala (1999) undertake a pre/post analysis of home sales in the vicinity of seven scattered-site public housing developments in Yonkers, New York, and report no impact on sales prices.

Several recent and careful studies find that proximity to subsidized rental housing may in fact depress property values. Lyons and Loveridge (1993), Goetz, Lam, and Heitlinger (1996), and Lee, Culhane, and Wachter (1999) all find small statistically significant negative effects on housing value associated with the presence of subsidized housing in a neighborhood.

In short, there is no consensus about the effects of subsidized housing on surrounding property values. Moreover, in all of these studies (as in those of private housing), data limitations make it difficult to pinpoint the direction of causality. Are subsidized sites systematically located in weak neighborhoods or do subsidized sites lead to neighborhood decline? Most of these prior studies utilize cross-sectional data and thus cannot determine whether neighborhoods with subsidized housing are systematically different from those without.[2] One recent study utilizes a research design that far more persuasively sorts out causality to study the impact of neighbors who use Section 8 certificates and vouchers (Galster, Tatian, and Smith 1999). We borrow from their methodology, adapting it to study the development of new owner-occupied homes.

Virtually all of these earlier studies focus on rental housing; only two examine the impact of publicly assisted homeownership programs. Lee, Culhane, and Wachter (1999) find that FHA-insured units and units developed through the Philadelphia Housing Authority's homeownership program both seem to have positive impacts on surrounding house prices. This is precisely the opposite of the study's conclusions concerning rental housing (discussed above)—the Section 8 New Construction Program is the only rental housing program that appears to have a positive effect on property values. Although these results seem to suggest that homeownership and new construction have uniquely positive effects on surrounding property values, a more recent study raises doubts. In their study of Nehemiah housing developments in Philadelphia, Cummings, DiPasquale, and Kahn (2000) find no evidence of spillover effects of these new owner-occupied homes on surrounding property values.[3]

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[2]Briggs, Darden, and Aidala (1999) utilize longitudinal data but they do not control for before and after price trends in the neighborhoods surrounding the public housing sites.

[3]As discussed above, many argue that an increase in the proportion of homeowners should in itself bolster

New York City Housing Programs

In 1986, New York City launched an unprecedented initiative to rebuild its housing stock that was devastated in the 1970s. Since then, the city's housing agency has invested close to $five billion in the construction of over 22,000 homes, the gut rehabilitation of more than 43,000 units of formerly vacant housing, and the moderate rehabilitation of over 97,000 units of occupied housing.[4] Most of these efforts have focused on low- and moderate-income rental housing, but a few programs sponsor ownership housing.

The Nehemiah Program

The Nehemiah Program was launched in the early 1980s by East Brooklyn Churches, a group of 36 churches in Brooklyn. The first house was completed in 1984; in total, nearly 3,000 homes have been built through the program. About 80 percent of these homes have been built in Brooklyn, with the remaining homes built in the South Bronx by another group of churches (Stuart 1997). The Nehemiah program has typically built projects of 500 to 1,000 units each on large tracts of donated city-owned land. The units are very modest, 18-foot-wide homes, built in identical, block-long rows of single-family homes.

The high-volume, mass-production approach has allowed the Nehemiah program to deliver units at a very low cost. The Brooklyn units cost about $60,000 to build and sold for approximately $50,000, as a result of a $10,000 city subsidy that must be repaid upon resale (Orlebeke 1997). For the later units built in the South Bronx, the typical cost of a unit was approximately $71,000, and the purchase price was lowered to $56,000 through a non-interest bearing, $15,000 second mortgage from the city, due only upon resale (Donovan 1994).

The Partnership New Homes Program

The New York City Housing Partnership is a not-for-profit intermediary that was organized in 1982 to help create and manage an affordable homeownership production program in the city (Wylde 1999). Its core program—the New Homes Program—was

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property values. Is the value of a property higher (or does it appreciate more rapidly) when it is located in a community with a greater share of homeowners? Few studies tackle this question, again perhaps because of concerns about endogeneity. But in an analysis of 2,600, non-affluent urban census tracts between 1980 and 1990, Rohe and Stewart (1996) suggest the answer is yes. Their results imply that for each percentage point increase in a census tract's 1980 homeownership rate, the value of its typical single-family home increased by roughly $1,600 more between 1980 and 1990.

[4]Estimates of activity beginning in fiscal year 1987 and ending in fiscal year 1998.

launched soon after. Like the Nehemiah Program, the New Homes Program also developed new, affordable, owner-occupied homes in distressed communities. Typically, these homes are built by private, profit-motivated developers selected by the city and the Housing Partnership. But unlike Nehemiah, the Partnership has not typically built on large contiguous lots. More than three-quarters of the Partnership projects are less than 100 units, many of them packages of small, infill sites grouped together to make up a project (Orlebeke 1997). What is more, the Partnership has typically developed two- and three-family homes that include an owner's unit plus one or two rental units.

In part because of this different approach to design and construction, the Partnership projects have tended to be more costly. According to one 1988 study of 10 Partnership projects, per-unit costs during the 1980s ranged from $57,000 to $137,000 (Orlebeke 1997). The projects were sold in turn to slightly higher income households than the Nehemiah Program homes. In all Partnership projects, the city has provided the land at a nominal cost ($500 per lot) and has given a $10,000 subsidy per home; the State Affordable Housing Corporation has provided an additional $15,000 per home (Donovan 1994).

By June of 1999, the Partnership New Homes program had added 12,590 new homes to New York City's boroughs. Like the Nehemiah Program, the construction has been concentrated in Brooklyn and the Bronx, but roughly one-quarter of the homes have been built in New York's other three boroughs.

Choosing Locations

In testing the impact of new housing on surrounding areas, there is always some concern about site selection. In this case, for instance, the city may have aimed to select "strong" sites for these programs, where they believed property values were beginning to increase (or at least had some hope of doing so). However, even if the city had wanted to choose promising sites, there were considerable constraints in doing so. First, the site had to be owned by the city, which meant it would have had to be abandoned by its previous owner and vested in an *in rem* proceeding for delinquent property taxes. The city's stock of abandoned properties was overwhelmingly concentrated in its poorest neighborhoods (Scafidi, Schill, Wachter, and Culhane 1998). Second, in the case of the Nehemiah Program, the land had to be a large, mostly vacant, contiguous parcel of land.

In any case, interviews with city officials suggest that the city did not give its best vacant sites to the Partnership and Nehemiah sponsors. In many instances, the city was also interested in realizing a high return from its land holdings. As Anthony Gliedman, a former Commissioner of New York City's Department of Housing Preservation and Development put it, "Why would we do market rate sites with the Partnership?" (Orlebeke 1997). In other words, the process of selecting individual sites, while perhaps not fully random, was certainly far from one that sought to systematically pick winners. Nonetheless, our research design (as outlined below) should help to control for systematic selection issues.

II. Methodology

The centerpiece of this research utilizes a hedonic price function. In hedonic price analysis, housing is viewed as a composite good or a bundle of services. Observed house prices are the product of the quantity of housing services attached to the property and the price of these housing services, summed over all structural and locational characteristics of the property. The basic model takes the following form:

$$P_{it} = \alpha + \beta X_{it} + \gamma Z_{it} + \delta I + \epsilon_{it}$$

where P_{it} is the sales price of property i at time t, X is a vector of property-related characteristics, including age and structural characteristics, Z is a vector of locational attributes, such as local public services and neighborhood conditions, and I is a vector of dummy variables indicating the year of the sale. The derivative of the housing price function with respect to an individual attribute may then be interpreted as the implicit price of that attribute (Rosen 1974). In many cases, housing prices are entered as logs (as we do below), so the coefficients are then interpreted as the percentage change in price that results from an additional unit of the independent variable.

As suggested above, the price of housing is affected by a broad array of structural and neighborhood characteristics and estimating equation (1) therefore requires a great deal of detailed data. Unfortunately, if some relevant variables cannot be included, either because they are unmeasured or because data are unavailable, the coefficients on the included variables may be biased. Thus, in trying to identify the independent effect of proximity to Partnership and Nehemiah homes, our challenge is to control for a sufficient number of neighborhood attributes so that our results do not suffer from omitted variable bias.

Our basic approach is to compare prices of properties in the micro-neighborhoods (or rings) surrounding Nehemiah and Partnership sites to prices of comparable properties that are outside the ring, but still located in the same general neighborhood. Then we examine whether this magnitude of this difference has changed over time, and if so, if the change is associated with the completion of a Partnership or Nehemiah project. This approach weeds out any systematic differences between the general neighborhoods chosen for these homeownership projects and other locations around the city, differences that have little to do with the impact of the actual projects and that could otherwise confound our results. Thus, our approach should yield an unbiased measure of impact, as long as we have sufficient data on the structural characteristics of the homes that sell and as long as there are few other neighborhood influences that shape the value of properties very near to the Partnership and Nehemiah sites around the time of project completion but that do not also color property values in the general neighborhood.

More specifically, we estimate the following specifications:

(2) LnP = a + bX + cCD*Year + dRing500*Years from sale + ϵ

(3) LnP = a + bX + cCD*Year + dRing1000*Years from sale + ϵ

(4) LnP = a + bX + cCD*Year + dRing2000*Years from sale + ϵ

where *X* is a vector of structural characteristics and *CD*Year* is a vector of year-specific neighborhood dummy variables indicating the year of sale and the neighborhood in which the property is located (measured by community district). These *CD*Year* dummy variables control for community-specific trends in prices. New York City is divided into 59 community districts, each of which has an average population of 125,000 residents. Although a smaller geographic area may be more appealing as a proxy for a neighborhood, these 59 community districts serve as the city's main administrative units for services and other amenities and are widely recognized by residents as distinct neighborhoods and housing markets.[5]

In addition to these *CD*Year* fixed effects, we control for differences in both price levels and trends for properties near to Nehemiah and Partnership sites by using a set of 20 dummy variables that indicate whether a sale is within a given distance of a

[5] The high density of New York City makes using census tracts undesirable. In many instances, the 2,000-foot rings around developments included multiple census tracts and that would have significantly complicated the interpretation of the results.

project site and the number of years it is prior to or after project completion.[6] The first model, for instance, includes a dummy variable indicating if the property sold is located within 500 feet of a future Nehemiah or Partnership site and sold 10 years prior to project completion, another indicating if it is within 500 feet and sold nine years prior to project completion, and so on. Similarly, the model includes a dummy variable noting if the property is located within 500 feet of a Nehemiah or Partnership site and sold within one year after completion, another indicating if it is within 500 feet and sold between one and two years after completion, and so on. The second model includes the analogous 20 dummy variables that correspond to the ring of properties within 1,000 feet of a homeownership site.

The coefficients on these dummy variables can be interpreted as the percentage difference between the prices of properties in the rings surrounding the homeownership project and the prices of properties that are outside that ring but inside the community district. We track how the gap between the ring and the community district was changing prior to the completion of the homeownership project, how it changed after project completion, and whether there was any discontinuous shift in the magnitude of the gap after completion.

It is important to stress that it is not clear what single measure of project impact is most appropriate. A simple comparison of the gap one year prior to project completion and the magnitude of the gap one year after completion is likely to be inadequate because it may take a while for the full impact of the project to be felt. Moreover, it is also possible that, once a project is announced or started, property values may begin to rise in anticipation of the effect the project will have on the surrounding community. (According to HPD staff, community residents were involved in the planning process and often knew about these projects years before the start of construction.) If so, then prices would already be rising prior to completion and using one year prior to completion as a benchmark is conservative.

Another issue is that the gap between home prices in the rings and the larger community districts might have been shrinking (or expanding) even before the advent of these projects, in which case a simple pre/post comparison will overstate (or understate)

[6]In cases where a sale was within 500 feet of more than one Nehemiah or Partnership project, we use the date for completion of the first project.

the magnitude of the impact. While the methodology above allows us to see these pre- and post-completion trends, it does not provide an easy way to measure the degree to which the change in the gap after development exceeded what would have occurred, given prior trends. To arrive at a summary measure of impact that controls for these prior trends (that is, a summary measure that controls for how the gap between prices in the rings and prices in their community districts has been changing over time), we use a methodology similar to Galster, Tatian, and Smith (1999) and estimate the following three equations:[7]

(5) LnP = a + bX + cCD*Year + dRing500 + ePostring500 + fspline(T500) + gTPost500 + ϵ

(6) LnP = a + bX + cCD*Year + dRing1000 + ePostring1000 + fspline(T1000) + gTPost1000 + ϵ

(7) LnP = a + bX + cCD*Year + dRing2000 + ePostring2000 + fspline(T2000) +gTPost2000 + ϵ

where *X* is a vector of structural characteristics, such as building age or size, and *CD*Year* is again a vector of year-specific neighborhood dummy variables indicating the year of sale and the community district in which the property is located. We then include a set of variables that capture whether a sale is within a given distance of a project site. The first model, for instance, includes Ring500, a dummy variable indicating if the property is located within 500 feet of a Nehemiah or Partnership site regardless of whether development has been completed. The second model includes Ring1000, indicating if the property is located within 1,000 feet of one of the sites, and the third model includes Ring2000, which indicates if the property is located within 2,000 feet of one of the sites.

Each model also includes a variable to measure whether a sale takes place after a project is completed. PostRing500 is a dummy variable that equals 1 if the property sale occurs within 500 feet of a *completed* Nehemiah or Partnership development. Similarly,

[7]The key difference with Galster, Tatian, and Smith (1999) is that we include *CD*Year* fixed effects that allow for community district-specific trends in prices. They use tract-fixed effects instead, which use a finer level of geography but assume that neighborhood-fixed effects are constant over time. As mentioned above, the high density of New York City makes using census tract*year-fixed effects impractical. Another difference is that we use splines for the time trends to capture a non-linear pattern.

PostRing1000 and PostRing2000 are dummy variables indicating if the sale occurs within 1,000 or 2,000 feet, respectively of a completed project. The coefficients on these PostRing variables are critical. They indicate the extent to which, after the completion of a homeownership development, sales prices rise in the vicinity, relative to the average increase in the larger community district.

T500, T1000, and T2000 are time trends, specific to each of the three rings. The time trends are equal to "1" in 1975, "2" in 1976 and so on. They are modeled as five-segment linear splines, which allows them to capture a much more flexible pattern than a simple linear trend. These time splines help to mitigate concerns about selection bias (ie. the possibility that the city sought to place projects in locations where prices were going to increase even without city investment) by controlling for overall trends in housing prices in these micro-neighborhoods surrounding the development. The danger of including the trends, however, is that they may also pick up some of the effects of the developments themselves, since, as explained above, property values may begin to rise once a project is announced or started, in anticipation of the effect the project will have on the surrounding community. If so, then including these splines means that we simply measure the added effect that a project's completion has on property values, above and beyond the effect of its announcement or start, and that we understate the full impact.

TPost500, TPost1000, and TPost2000 are post-occupancy trend variables for the 500, 1,000, and 2,000 feet rings respectively. TPost500, for instance, equals 1 if sale is located within 500 feet of a site and occurs within the first year after the project is completed. If prices appreciate more rapidly in the rings after a project is completed, then these coefficients will be positive.

III. Summary of Data

To undertake the analysis outlined above, we have obtained detailed data from a number of unique city data sources. First, through an arrangement with the New York City Department of Finance, we obtained a confidential database containing sales transaction prices for all apartment buildings, condominium apartments, and single-family homes from 1975 to 1998.[8] Limiting the analysis to properties that are located within the 34

[8] Because sales of cooperative apartments are not considered to be sales of real property, they are not recorded and are thus not included in this analysis. This is unlikely to have a major impact on our results

community districts where Nehemiah or Partnership New Homes projects were developed, our sample includes 300,890 sales.[9] Because of the long time span of the data and New York City's size, the sample size is large compared too much of the literature.

Second, we have supplemented these transactions data with building characteristics from an administrative data set gathered for the purpose of assessing property taxes (the RPAD file). The RPAD data contain information about buildings and do not contain much information about the characteristics of individual units in apartment buildings (except in the case of condominiums).[10] Nonetheless, these building characteristics explain variations in prices surprisingly well (perhaps because over 70 percent of buildings are either single-family or two-family homes). Using all transactions in 1998, a regression of the log price per unit on building age and its square, log square feet per unit, the number of buildings on a lot, and dummies for the presence of a garage, abandonment, major alterations, the presence of commercial units, and location on a block corner yields an R^2 of 0.46. When a set of 18 building classifications is added to the regression (for example, "single-family detached," "single-family attached," "two-family home"), the R^2 rises to 0.68. Finally, when community district dummy variables are added as well, the R^2 rises to 0.78.

Figure 1 shows summary statistics from the RPAD data. The first column shows characteristics of our full sample; the second shows the characteristics of sales located within 500 feet of a Nehemiah or Partnership site, whether completed or not. As shown, nearly three-quarters of all buildings sold were either one- or two-family homes, and over 92 percent were either one-family homes, two-family homes, or small apartments. Most sales were located in Brooklyn and Queens, both because of the location of the

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because cooperative apartments tend to be under-represented in the 34 community districts which have Nehemiah or Partnership New Homes developments.

[9] This includes three community districts in Manhattan, nine in the Bronx, 12 in Brooklyn, nine in Queens, and one in Staten Island.

[10] It is important to note that most of the RPAD data in this study were collected in 1999; it is conceivable that some building characteristics changed between the time of sale and 1999. However, most of the characteristics used in the hedonic regressions are fairly immutable (e.g., corner location, square feet, presence of garage). Furthermore, to examine whether the building characteristics tend to remain constant over time, we merged RPAD data from 1990 and 1999 and found that for eight of the 10 variables, the characteristic remained unchanged in 97 percent or more of the cases. "Year Built" and "Number of Units" remained unchanged in only 87 and 93 percent of the cases respectively. We suspect that the majority of these changes are corrections, rather than true changes, since these characteristics may change very rarely. Thus, the 1999 RPAD file may actually be a better estimate of 1990 characteristics than the 1990 file. The abandonment variable was collected in 1980.

Figure 1: Characteristics of Properties Sold

(Universe=all sales in community districts with at least one Nehemiah or partnership unit)

	Percentage of All Property Sales	Percentage of Sales Within 500 Feet of Nehemiah or Partnership Site
Borough		
Manhattan	1.3	3.1
Bronx	6.8	19.2
Brooklyn	37.3	43.1
Queens	47.0	30.5
Staten Island	7.5	4.1
Building Class		
Single-family detached	25.3	15.2
Single-family attached	13.2	6.6
Two-family	34.8	36.2
Walk-up apartments	19.1	28.6
Elevator apartments	0.8	0.6
Loft buildings	0.0	0.0
Condominiums	2.9	7.1
Mixed-use (includes store or office plus residential units)	3.8	5.6
Built pre-war	80.0	90.8
Vandalized	0.0	0.2
Other abandoned	0.2	0.6
Garage	37.0	17.1
Corner location	7.9	7.7
Major alteration prior to sale	1.7	2.9
Within 500 ft of homeownership project	4.4	100
Within 1000 ft of homeownership project	10.6	100
Within 2000 ft of homeownership project	24.5	100
	300,890	13,162

community districts with Nehemiah or Partnership developments and because those boroughs include a large share of smaller properties which sell more frequently than apartment buildings (more common in Manhattan and the Bronx). The figure also shows that over a third of the transacting properties had garages and 80 percent were built before World War II. Only a handful of buildings were vandalized or otherwise abandoned. Finally, the figure also shows that 4.1 percent of the properties in our sample are located within 500 feet of a Partnership or Nehemiah site (whether completed or not), 10.6 percent are located within 1,000 feet, and 24.5 percent are located within 2,000 feet of one of the homeownership developments.

The second column reveals some systematic differences between properties located close to Nehemiah or Partnership sites and those that are not. Due to the location and concentration of Partnership and Nehemiah developments, properties located within the 500-foot ring are much more likely to be in Brooklyn, Manhattan, or the Bronx. Properties in the ring are also much older, much less likely to be single-family homes, more likely to be walk-up apartments, and consistent with these differences, much less likely to have garages.

Third, the New York City Department of Housing Preservation and Development has provided us with data on the precise location (down to the block level) of all housing built through the Nehemiah and Partnership programs. Figure 2 shows the location of these projects in the city. As shown, most of the projects have been built in Brooklyn and the Bronx. Figure 3 indicates that 12,468 of the 15,528 units (80 percent) are in Brooklyn or the Bronx and that over 13,000 (85 percent) were completed during the 1990s. As for building type, 90 percent of the Nehemiah units are single-family homes, as compared to just 12 percent of the Partnership units. Partnership units are instead more typically two- and three-family homes.

Figure 4 compares the average 1990 characteristics of census tracts that include Nehemiah and Partnership units in 1998 to those that do not.[11] The 2,938 Nehemiah units have been built across 25 census tracts in the city (118 units per tract on average). The Partnership units have been more dispersed, with each of the Partnership census tracts housing an average 70 Partnership homes.

[11] The census tract data is taken from the 1990 Census. Tracts are characterized as including Nehemiah or Partnership projects, even if these projects were not built until later in the decade.

Figure 2: Characteristics of Units Built Through Nehemiah and Partnership New Homes

	Nehemiah	Partnership New Homes	Total
Borough			
Bronx	544	5,426	5,970
Manhattan	0	948	948
Brooklyn	2,394	4,104	6,498
Queens	0	1,226	1,226
Staten Island	0	886	886
Building Type			
One-family	2,632	1,572	4,204
Two-family	18	7,020	7,038
Three-family	0	1,659	1,659
Condominium	288	2,112	2,300
Cooperative	0	227	227
Year Completed			
1984	194	0	194
1985	170	18	188
1986	235	232	467
1987	284	263	547
1988	240	260	500
1989	317	226	543
1990	460	1,918	2,378
1991	218	867	1,134
1992	140	1,555	1,695
1993	108	1,104	1,252
1994	120	1,567	1,687
1995	138	1,183	1,321
1996	30	1,018	1,048
1997	44	1,119	1,163
1998	126	664	790
1999	114	596	710
Total	2,938	12,590	15,528

Figure 3: Location of Partnership and Nehemiah Developments

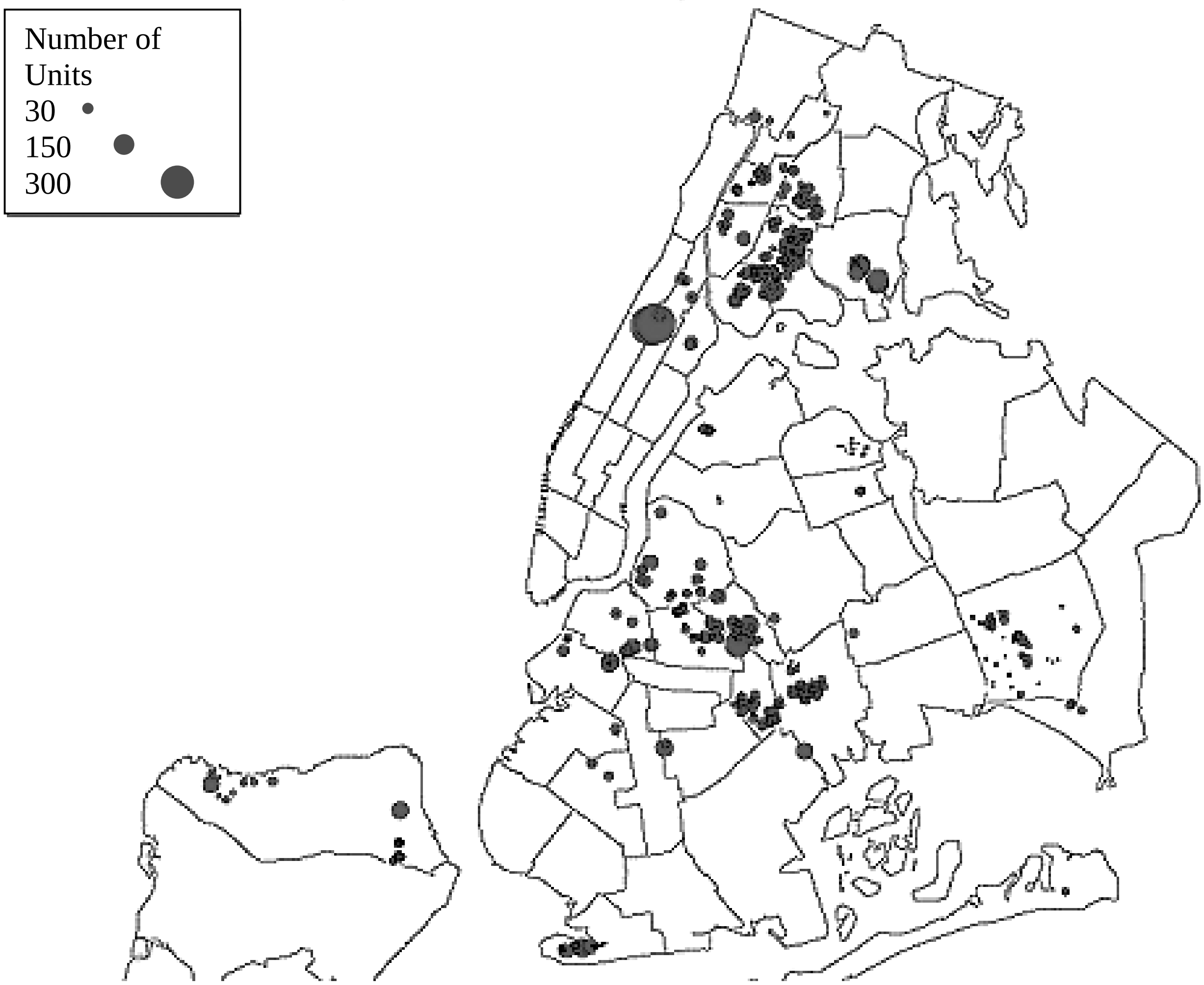

Figure 4: 1990 Characteristics of Census Tracts in which Partnership and Nehemiah Projects Are Located

	Percent Tracts with Nehemiah Units	Percent Tracts with Partnership Units	Percent All Tracts in New York City
Mean Poverty rate	40.1	32.5	18.4
Percent of tracts with poverty rate >= 20%	96.0	71.0	33.6
Percent of tracts with poverty rate >= 40%	48.0	37.4	12.5
Mean percentage of households on public assistance	33.0	27.3	13.8
Mean family income	$24,579	$29,342	$46,665
Mean unemployment rate	18.5	14.8	9.7
Mean percentage of adult residents with some college education	23.4	27.0	39.7
Mean percentage black	72.0	51.5	28.9
Mean percentage Hispanic	32.3	39.3	21.9
Mean homeownership rate	20.1	24.2	34.8
N	25	179	2,131

This figure also confirms that these projects were located in distressed neighborhoods and suggests that the neighborhoods in which Nehemiah units have been located are somewhat more disadvantaged. For example, the average poverty rate in a tract with Nehemiah and Partnership units was 40.1 and 32.5 percent respectively, as compared to just 18.4 percent for tracts citywide. Similarly, while just 12.5 percent of census tracts in New York had poverty rates of at least 40 percent, 37 percent of those with Partnership units and 48 percent of those with Nehemiah units had poverty rates this high.

The other socioeconomic variables tell the same story. Mean family income was $24,579 in Nehemiah tracts, compared to $29,342 for Partnership tracts and $46,665 in all tracts citywide. The unemployment rate was twice as high in census tracts with Nehemiah units than it was in the average city neighborhood. As for racial and ethnic composition, the Nehemiah and Partnership tracts housed a greater share of Hispanic residents and a much larger share of Black residents than the average tract in the city. Finally, the neighborhoods where Partnership and Nehemiah projects were located have exceptionally low rates of homeownership. Less than one-fourth of households on average own their homes in these communities, as compared to an average of 35 percent in census tracts citywide.

As mentioned above, we used GIS techniques to measure the distance from each sale in our database to all Nehemiah and Partnership sites.[12] Then we effectively created rings around each project to determine whether the prices of properties in the rings surrounding the developments were affected by their proximity to these new homeownership developments. To give a sense of these rings, Figure 5 shows an example of a Partnership development located on the Brooklyn/Queens border and its surrounding rings. The innermost ring extends 500 feet (usually one to two blocks) from the project; the second ring extends 1,000 feet (one to four blocks), and the outermost ring extends 2,000 feet (three to eight blocks).

Figure 5

Partnership Development on Brooklyn/Queens Border

[12] Since all buildings in New York City have been geocoded by the New York City Department of City Planning, we used a "cross-walk" (the "Geosupport File") which associates each tax lot with an *x,y* coordinate (i.e., latitude, longitude, using the U.S. State Plane 1927 projection), police precinct, community district, and census tract. A tax lot is usually a building and is an identifier available to the homes sales and RPAD data. We are able to assign *x,y* coordinates and other geographic variables to over 98 percent of the repeat sales using this method. For the Nehemiah and Partnership data, only the tax block on which the property is located (which corresponds to a physical block) is available. After collapsing the Geosupport file to the tax block level (i.e., calculating the center of each block), we were able to assign an *x,y* coordinate to 99.7 percent of these projects.

The RPAD and homes sales data do not identify whether a particular property received city subsidies. In order to insure that we analyze only the sales prices of buildings neighboring Partnership and Nehemiah developments, and not the sales prices of the developments themselves, we exclude any sales that could potentially be part of a development. Specifically, we excluded 2,248 sales that occurred on the same block as a Nehemiah or Partnership development if the sale was of a building that was constructed after the Nehemiah or Partnership building had been completed.[13]

IV. Results

As discussed above, our central empirical strategy is to test whether and how sales prices in the rings surrounding homeownership projects change relative to prices in their community districts, after the completion of those projects. Before presenting regression results, it is useful to show how average prices within 500 feet of a homeownership site compare to average prices in our sample, both before and after the completion. Figure 6 shows that during our time period, per unit sales prices for buildings located within 500 feet of a Nehemiah or Partnership site were on average 60 percent lower than the prices of all buildings located in the 34 community districts. These projects, in other words, have clearly been located in neighborhoods with depressed housing prices.[14] Again, given that these projects were developed on vacant city-owned land that the city was willing to provide at nominal prices, it is not surprising that prices are relatively low in the surrounding area.

Yet, the figure also shows that one year after the completion of the actual projects, per unit sales prices for buildings located within 500 feet of a Nehemiah or Partnership site were on average only 28 percent lower than prices of all buildings in the 34 community districts. One year after the completion of the average Nehemiah or Partnership project,

[13] To provide a margin of error with respect to the recording of construction dates in RPAD, we also excluded sales of buildings on the same block as a Partnership and Nehemiah development that were built up to five years before the Partnership or Nehemiah building. These exclusions are included in the total 2,248 figure.

[14] Given the evidence shown in Figure 5 that the census tracts surrounding Nehemiah and Partnership sites are notably less affluent than the city at large, it is no doubt true that prices in the rings surrounding these sites are even lower in comparison to average prices in all community districts.

that is, the differential between property values in the 500-foot ring and property values for all buildings shrunk by 32 percentage points. Property values were still below those overall, but the differential appears to shrink considerably after the construction of these homeownership projects. As shown, the differential between property values in the ring and those in the 34 community districts actually rises in year 3, but still remains 23 percentage points lower than it was prior to the completion of a development.

Figure 6: Differences in Differences
Percentage Difference Between Price in 500-Foot Ring and Average Annual Price, by Time from Development

	Ring Price Relative to Average Price	Diff-in-Diff (Relative to Diff Before Completion)	Standard Error (Dff-in-Dff)	T-statistic (Diff-in-Diff)
Before completion of development	-0.605			
After completion				
1 year	-0.290	0.315	0.026	12.3
2 years	-0.293	0.312	0.027	11.6
3 years	-0.366	0.239	0.028	8.7
4years	-0.337	0.269	0.025	10.6
5 years	-0.354	0.251	0.029	8.5

The real question, of course, is whether this same story persists after we control for property characteristics and changes in local neighborhoods. To isolate the influence of proximity to a completed homeownership project, we estimate the regressions discussed above, in which the dependent variable is the log of the sales price per unit, and which control for building and local neighborhood characteristics and include a full complement of community district and year interaction effects (*CD*Year* fixed effects).[15] This controls for a community district-specific trend in housing prices and thus allows us to test whether any shift in housing prices (either level or trend) that occurs after the homeownership properties are constructed is distinct from the pattern of prices in the surrounding community district.

[15] We effectively include 25 dummy variables (a different dummy for each year from 1975–1999) for *each* of the 34 community districts in the sample, for a total of 850 dummy variables.

Figure 7: Selected Coefficients from Regression Results with Year* Ring Dummy Variables
Dependent Variable = Log of Price Per Unit

	Model 1 (500-ft. Ring)	Model 2 (1000-ft. Ring)	Model 3 (2000-ft. Ring)
>=10yr_pre_ring	-0.2265	-0.2004	-0.1660
	(0.0056)	(0.0037)	(0.0027)
9yr_pre_ring	-0.2463	-0.2086	-0.1770
	(0.0143)	(0.0095)	(0.0065)
8yr_pre_ring	-0.2350	-0.2095	-0.1721
	(0.0150)	(0.0095)	(0.0064)
7yr_pre_ring	-0.1293	-0.1663	-0.1670
	(0.0146)	(0.0093)	(0.0063)
6yr_pre_ring	-0.1693	-0.1726	-0.1661
	(0.0145)	(0.0094)	(0.0063)
5yr_pre_ring	-0.1360	-0.1544	-0.1554
	(0.0143)	(0.0093)	(0.0063)
4yr_pre_ring	-0.1433	-0.1283	-0.1384
	(0.0147)	(0.0097)	(0.0064)
3yr_pre_ring	-0.1142	-0.1280	-0.1472
	(0.0154)	(0.0099)	(0.0068)
2yr_pre_ring	-0.0864	-0.1086	-0.1117
	(0.0145)	(0.0095)	(0.0067)
1yr_pre_ring	-0.1036	-0.1046	-0.1164
	(0.0134)	(0.0091)	(0.0065)
1yr_post_ring	-0.0374	-0.0921	-0.0903
	(0.0130)	(0.0091)	(0.0067)
2yr_post_ring	-0.0299	-0.0497	-0.0845
	(0.0152)	(0.0101)	(0.0069)
3yr_post_ring	-0.0529	-0.0454	-0.0610
	(0.0162)	(0.0103)	(0.0073)
4yr_post_ring	-0.0289	-0.0487	-0.0665
	(0.0150)	(0.0107)	(0.0074)
5yr_post_ring	-0.0436	-0.0824	-0.0863
	(0.0167)	(0.0110)	(0.0076)
6yr_post_ring	-0.0609	-0.0949	-0.0868
	(0.0191)	(0.0120)	(0.0080)
7yr_post_ring	-0.0514	-0.0809	-0.0829
	(0.0200)	(0.0124)	(0.0081)
8yr_post_ring	-0.0999	-0.1032	-0.0771
	(0.0229)	(0.0137)	(0.0089)
9yr_post_ring	-0.0389	-0.0723	-0.0733
	(0.0255)	(0.0163)	(0.0101)
>=10yr_post_ring	-0.0837	-0.0752	-0.0559
	(0.0208)	(0.0115)	(0.0070)
Adjusted R^2	0.801	0.802	0.804
N	300,890	300,890	300,890

Note: Standard errors in parentheses. See Appendix A for full results.

The estimated coefficients for the ring variables and their standard errors are shown in Figure 7. The complete model specification with the coefficients for the structural variables is included in Appendix A. These structural variables have the expected signs.[16] The per unit sales price is higher if a building is larger or newer, located on a corner, or includes a garage. The price is lower if the building is vandalized or abandoned. The building class dummies are also consistent with expectations. Sales prices for most of the building types are lower than those for single-family attached homes (the omitted category). One result, perhaps counter-intuitive, is that the estimated impact of the dummy variable indicating that the building has undergone a major alteration prior to sale is statistically insignificant. This result may reflect the fact that buildings that have undergone such major alterations are generally in worse shape and lower-priced prior to renovation in ways that are not captured by our data.[17]

The key coefficients, those on the ring dummy variables, are presented in Figure 7. Again, each of these coefficients may be interpreted as the percentage difference between the price of properties within the rings and comparable properties located outside the rings but within the same community district. (The coefficient on Ring500, one year before completion, for instance suggests that properties located within 500 feet of a future Partnership or Nehemiah project one year prior to completion sold for 10.4 percent less than comparable properties beyond 500 feet but in the same community district.)

The first point to note is that all the coefficients are negative and virtually all are statistically significant. Consistent with the uncontrolled results set forth in Figure 6, that is, prices of properties located in the rings are significantly lower than the prices of comparable properties located in their community district, both before and after project completion. The second point to note is that the coefficients generally get smaller over time. Prices in the rings, that is, rise over time relative to prices in the larger community

[16]The odd-shape and extension variable are included to capture any irregularities in the calculation of square footage.

[17]It is worth mentioning the statistically significant coefficients on the dummy variables indicating if the age or size of a building is missing. In general, these suggest that the buildings for which age is missing are older than others and the buildings for which square footage is missing are larger. The condominiums for which square footage is missing (90 percent of sales missing square feet) are also larger, but somewhat less so. In total, just over one percent of property sales did not indicate square footage and three percent did not indicate age.

district both before and after completion. However, there does appear to be a significant reduction in the gap around the time of completion. Finally, it is interesting to note that, while the gap between prices in the ring and the community district falls immediately after completion in the 500-foot ring, it appears to take longer for the effects to be felt in the more distant rings. The major decline in the 1,000-foot ring occurs between one and two years after the completion of the homeownership project. In the 2,000-foot ring, the decline continues through year three. One plausible explanation is that the homeownership projects have a more sudden impact on their immediate surroundings, but that, over time, they may bring benefits to more distant areas as well. (This is also consistent with the fact—discussed below—that after 10 years the impact in the 500-foot ring appears to dissipate—while the effects are persistent in the 2,000-foot ring.)

Figure 8

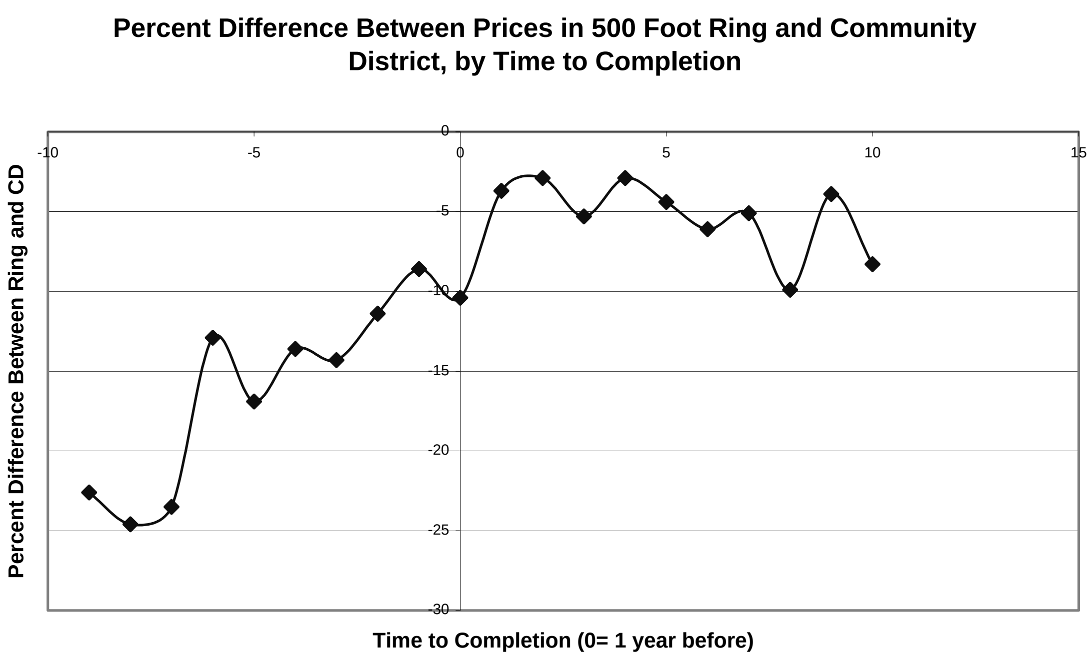

Figure 8 graphs these percentage differentials by the year relative to project completion and clearly shows that the gap has declined over time. One year before the completion of a homeownership project (marked by zero on the graph), the sales price of a building within 500 feet of a future site is on average 10.4 percent lower than the price of a comparable home sold in the same year in the same community district. In the years after completion, the gap shrinks by an average of 5.6 percentage points to only 4.8 percent lower than the price of a comparable property in the community district.

As this picture also shows, however, the average price differential between the rings and their community districts was already declining prior to project completion. Even without the homeownership development, perhaps, it might have continued to decline. On the other hand, some of the decline that occurred prior to project completion might in fact have been due to the construction or announcement of the new owner-occupied homes.

Figure 9: Selected Coefficients from Regression Results with Ring-Specific, Time-Trend

Dependent Variable = Log of Price Per Unit

	Model 1	Model 2	Model 3
Ring500	-0.195		
	(0.019)		
Ring1000		-0.158	
		(0.012)	
Ring2000			-0.125
			(0.009)
PostRing500	0.039		
	(0.012)		
PostRing1000		0.019	
		(0.008)	
PostRing2000			0.017
			(0.005)
TPost500	-0.008		
	(0.002)		
TPost1000		-0.005	
		(0.001)	
TPost2000			-0.001
			(0.001)
Adjusted R-squared	0.801	0.802	0.804
N	300,890	300,890	300,890

Note: All regressions include ring-specific time trends, modeled as a five-segment linear spline. See Appendix B for full results, including time spline. Standard errors in parentheses.

Thus, as mentioned above, this specification does not provide a clear summary measure of impact. To arrive at such a measure, we estimate an alternative specification that offers an estimate of impact above and beyond what would have been predicted given prior trends in prices in the ring. To control for these trends, these specifications model time for the ring properties as a linear spline with five segments (see equations 5 through 7 above). Figure 9 summarizes these coefficients, and the full set of coefficients, including the time spline, may be found in Appendix B. Consistent with the results above, the coefficients on the first set of ring dummies (Ring500, Ring1000, Ring2000) indicate that prices in the rings surrounding these properties are significantly lower than prices elsewhere in the city—or more precisely, they are lower than the prices of comparable properties elsewhere in their community district. (These dummy variables indicate whether or not a property is located within a certain distance of one of the homeownership sites, whether completed or not.) The results suggest that per unit sales prices of properties that are located within 500 feet of an eventual homeownership site are 19.5 percent lower than those for comparable properties that are beyond 500 feet but still within the same community district. Sales prices are 15.8 percent lower for properties located within 1,000 feet of an eventual site, compared to those that fall beyond this distance, and 12.8 percent lower for properties located within 2,000 feet of an eventual site.

Once the homeownership projects are built, however, these differentials diminish significantly. While before the development of a Partnership or Nehemiah project prices within 500 feet of the development were 19.5 percent less, on average, than prices for comparable homes more than 500 feet from the project (but within the community district), upon the development of the project, this disparity declines by 3.8 percentage points to 15.6 percent. Even as distance from the Partnership or Nehemiah project increases, the relative sales prices of homes continue to show an increase, albeit a more modest one. For example, the differential between sales prices for homes within 1,000 feet of a project and those beyond decreases by 1.9 percentage points after the completion of a project, while for homes within a 2,000 foot radius, the differential declines by 1.8 percentage points.

Interestingly, there is some evidence here that over time the impact on properties within 500 feet of the project declines. As measured by the variable Tpost500, the 3.8 percentage point differential attributable to being within 500 feet of a project declines by 0.8 percentage points per year. The reasons for this decline are not immediately apparent. It is conceivable that homes within the development are maintained less well than other properties in the community district and thus that the positive externality generated by the development declines over time. It seems more likely, however, that the positive externalities created by the project spread outward over time, thereby reducing the disparity between prices within 500 feet and those outside the 500-foot radius. Indeed, Figure 9 also shows that for sales within the 2,000-foot range, the coefficient on the time trend variable is insignificant. There is no reduction, that is, in the relative price increase for properties within 2,000 feet of a project. A third possibility is that the larger neighborhoods (the community districts) in which the projects were located were also improving around the same time as a result of HPD-sponsored rental housing development and other community development efforts. If so, then the price differential between the rings and the larger community districts might begin to expand.

V. Conclusion

The results set forth in this paper are preliminary and exploratory. Much more work needs to be done before final estimates of the impacts of these homeownership programs are identified. In particular, we intend to compare price changes in the rings to price changes in geographic areas that are smaller than community districts, such as zip codes. (Again, census tracts are not feasible in New York City, since they span such a small geographic area.) In addition, we will examine whether each of the two programs examined in this paper—the Nehemiah Plan and the Partnership New Homes Program—generates different impacts. In a related vein, we will examine whether the scale or quantity of housing produced has an effect upon the magnitude of the externality we have measured. Finally, we will also test whether the programs had similar impacts in different locations. Do the new affordable homes appear to have a greater impact on surrounding property values in certain types of communities?

Still, we believe that we have learned a great deal in this paper. With far more precise data than have been employed in prior studies, we are able to provide a much more detailed portrait of what happens to property values following the development of affordable owner-occupied housing. We clearly show that prices of properties in the rings surrounding the homeownership projects have risen relative to their community districts over the last two decades, and our results also suggest that part of this rise is attributable to affordable homeownership programs such as those administered in New York City by the New York City Housing Partnership, South Bronx Churches, and East Brooklyn Churches. These efforts, in other words, appear to have had a positive impact on property values within their immediate neighborhoods.

The source of this positive externality is not clear. It may be attributable to the transformation of vacant or derelict eyesores into pleasant well-maintained homes. It may also be caused by the immigration of relatively higher income residents to the neighborhoods. Finally, homeownership itself may generate positive impacts for the community, ranging from greater neighborhood stability and better upkeep to more community activism.

In future work, we hope to shed more light on the roots of the positive effect. In particular, we will compare the effects that the city's rental housing programs have on surrounding property values to the effects of homeownership programs. To the extent that owner-occupied housing appears to have larger effects, it might suggest that owner-occupied housing yields unique benefits, above and beyond the effects of removing blight and producing pleasant and attractive homes.

As for policy implications, the paper suggests that owners of properties in the relevant communities will enjoy an increase in wealth that appears to be generated by the new housing. In addition, to the extent that the city reassesses properties in these communities, additional tax revenues will be generated. Of course, higher property values may not benefit everyone. Rents may also increase in these areas to reflect the increase in value attributable to the homeownership programs. For low-and moderate-income households already facing difficulties in paying rent, an increase in homeownership in their community may therefore be a mixed blessing.[18] And as was shown in Figure 4, less than one-quarter of households in the communities surrounding Partnership and Nehemiah projects own their homes. In addition, although existing homeowners will likely enjoy an increase in their wealth, to the extent property taxes also increase, financial hardships might arise.

[18] In 1999, almost one-quarter of all renters in New York City paid more than half of their incomes in rent (Center For Real Estate and Urban Policy, forthcoming 2001).

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Appendix A

Full Regression Results, Year-Specific Dummy Variables
Dependent Variable = Log of Price Per Unit

	Model 1 (500 ft. Ring)	Model 2 (1000 ft. Ring)	Model 3 (2000 ft. Ring)
+10yr_ pre_ring	-0.2265	-0.2004	-0.1660
	(0.0056)	(0.0037)	(0.0027)
9yr_ pre_ring	-0.2463	-0.2086	-0.1770
	(0.0143)	(0.0095)	(0.0065)
8yr_ pre_ring	-0.2350	-0.2095	-0.1721
	(0.0150)	(0.0095)	(0.0064)
7yr_ pre_ring	-0.1293	-0.1663	-0.1670
	(0.0146)	(0.0093)	(0.0063)
6yr_ pre_ring	-0.1693	-0.1726	-0.1661
	(0.0145)	(0.0094)	(0.0063)
5yr_ pre_ring	-0.1360	-0.1544	-0.1554
	(0.0143)	(0.0093)	(0.0063)
4yr_ pre_ring	-0.1433	-0.1283	-0.1384
	(0.0147)	(0.0097)	(0.0064)
3yr_ pre_ring	-0.1142	-0.1280	-0.1472
	(0.0154)	(0.0099)	(0.0068)
2yr_ pre_ring	-0.0864	-0.1086	-0.1117
	(0.0145)	(0.0095)	(0.0067)
1yr_ pre_ring	-0.1036	-0.1046	-0.1164
	(0.0134)	(0.0091)	(0.0065)
1yr_ post_ring	-0.0374	-0.0921	-0.0903
	(0.0130)	(0.0091)	(0.0067)
2yr_ post_ring	-0.0299	-0.0497	-0.0845
	(0.0152)	(0.0101)	(0.0069)
3yr_ post_ring	-0.0529	-0.0454	-0.0610
	(0.0162)	(0.0103)	(0.0073)
4yr_ post_ring	-0.0289	-0.0487	-0.0665
	(0.0150)	(0.0107)	(0.0074)
5yr_ post_ring	-0.0436	-0.0824	-0.0863
	(0.0167)	(0.0110)	(0.0076)
6yr_ post_ring	-0.0609	-0.0949	-0.0868
	(0.0191)	(0.0120)	(0.0080)
7yr_ post_ring	-0.0514	-0.0809	-0.0829
	(0.0200)	(0.0124)	(0.0081)
8yr_ post_ring	-0.0999	-0.1032	-0.0771
	(0.0229)	(0.0137)	(0.0089)
9yr_ post_ring	-0.0389	-0.0723	-0.0733
	(0.0255)	(0.0163)	(0.0101)
+10yr_ post_ring	-0.0837	-0.0752	-0.0559
	(0.0208)	(0.0115)	(0.0070)
Vandalized	-0.1942	-0.1890	-0.1983
	(0.0320)	(0.0318)	(0.0317)
Other abandoned	-0.1709	-0.1665	-0.1604
	(0.0153)	(0.0152)	(0.0152)

Odd shape	0.0108	0.0121	0.0151
	(0.0023)	(0.0023)	(0.0023)
Garage	0.0803	0.0778	0.0777
	(0.0015)	(0.0015)	(0.0015)
Extension	0.0557	0.0544	0.0566
	(0.0021)	(0.0021)	(0.0021)
Corner	0.0417	0.0417	0.0402
	(0.0024)	(0.0024)	(0.0024)
Major alteration prior to sale	-0.0031	-0.0051	-0.0038
	(0.0052)	(0.0052)	(0.0051)
Age of unit	-0.0103	-0.0102	-0.0103
	(0.0001)	(0.0001)	(0.0001)
(Age of unit)2	0.0001	0.0001	0.0001
	(0.0000)	(0.0000)	(0.0000)
Age of unit missing	-0.3875	-0.3813	-0.3710
	(0.0166)	(0.0166)	(0.0165)
Log square feet per unit	0.4694	0.4672	0.4657
	(0.0021)	(0.0021)	(0.0021)
Number of buildings on same lot	-0.0004	0.0003	-0.0020
	(0.0045)	(0.0045)	(0.0045)
Includes commercial space	0.0116	0.0134	0.0157
	(0.0056)	(0.0056)	(0.0056)
Square feet missing	3.3348	3.3157	3.3039
	(0.0264)	(0.0263)	(0.0262)
Condo and square feet missing	-0.3201	-0.3186	-0.3136
	(0.0231)	(0.0230)	(0.0230)
Single-family detached	0.0853	0.0859	0.0877
	(0.0022)	(0.0022)	(0.0022)
Two-family home	-0.3451	-0.3442	-0.3412
	(0.0021)	(0.0021)	(0.0021)
Three-family home	-0.5844	-0.5835	-0.5803
	(0.0029)	(0.0029)	(0.0028)
Four-family home	-0.8059	-0.8010	-0.7885
	(0.0044)	(0.0043)	(0.0043)
Five/six-family home	-1.1236	-1.1256	-1.1150
	(0.0044)	(0.0043)	(0.0043)
More than six families, no elevator	-1.4111	-1.4113	-1.4058
	(0.0051)	(0.0051)	(0.0051)
Walkup, units not specified	-0.9524	-0.9516	-0.9470
	(0.0064)	(0.0064)	(0.0064)
Elevator apartment building, cooperatives	-1.1739	-1.1819	-1.1875
	(0.0189)	(0.0189)	(0.0188)
Elevator apartment building, not cooperatives	-1.3724	-1.3731	-1.3698
	(0.0086)	(0.0086)	(0.0085)
Loft building	-0.7249	-0.7228	-0.7337
	(0.0972)	(0.0968)	(0.0965)
Condominium, single-family attached	0.4541	0.4397	0.4144
	(0.0224)	(0.0223)	(0.0222)
Condominium, walk-up apartments	0.0273	0.0213	0.0041
	(0.0182)	(0.0182)	(0.0181)
Condominium, elevator building	-0.2376	-0.2470	-0.2782

	(0.0185)	(0.0184)	(0.0183)
Condominium, miscellaneous	-0.2727	-0.2804	-0.2896
	(0.0213)	(0.0212)	(0.0211)
Multi-use, single family with store	-0.1564	-0.1567	-0.1560
	(0.0093)	(0.0092)	(0.0092)
Multi-use, two-family with store	-0.5955	-0.5948	-0.5912
	(0.0075)	(0.0074)	(0.0074)
Multi-use, three-family with store	-0.8074	-0.8018	-0.7975
	(0.0113)	(0.0112)	(0.0112)
Multi-use, four or more family with store	-0.9892	-0.9923	-0.9844
	(0.0085)	(0.0084)	(0.0084)
Constant	8.7249	8.7479	8.7737
	(0.0168)	(0.0168)	(0.0167)
Adjusted R^2	0.801	0.802	0.804
N	300,890	300,890	300,890

Note: Standard errors in parentheses.

Appendix B

Full Regression Results, Time Trend Specification
Dependent Variable = Log of Price Per Unit

	Model 1	Model 2	Model 3
Ring500	-0.195		
	(0.019)		
Ring1000		-0.158	
		(0.012)	
Ring2000			-0.125
			(0.009)
Postring500	0.039		
	(0.012)		
Postring1000		0.019	
		(0.008)	
Postring2000			0.018
			(0.005)
TPost500	-0.008		
	(0.002)		
TPost1000		-0.005	
		(0.001)	
TPost2000			-0.001
			(0.001)
TRing500, 1-5 year segment	-0.000		
	(0.005)		
TRing500, 6-10 year segment	-0.007		
	(0.003)		
TRing500, 11-15 year segment	0.025		
	(0.003)		
TRing500, 16-20 year segment	0.026		
	(0.003)		
TRing500, 21-25 year segment	-0.009		
	(0.004)		
TRing1000, 1-5 year segment		-0.010	
		(0.003)	
TRing1000, 6-10 year segment		-0.008	
		(0.002)	
TRing1000, 11-15 year segment		0.025	
		(0.002)	
TRing1000, 16-20 year segment		0.016	
		(0.002)	
TRing1000, 21-25 year segment		-0.004	
		(0.003)	
TRing2000, 1-5 year segment			-0.007
			(0.002)
TRing2000, 6-10 year segment			-0.011
			(0.001)
TRing2000, 11-15 year segment			0.019
			(0.002)
TRing2000, 16-20 year segment			0.015
			(0.002)
TRing2000, 21-25 year segment			-0.007

			(0.002)
Vandalized	-0.194	-0.188	-0.199
	(0.032)	(0.032)	(0.032)
Other abandoned	-0.170	-0.166	-0.160
	(0.015)	(0.015)	(0.015)
Odd shape	0.010	0.012	0.015
	(0.002)	(0.002)	(0.002)
Garage	0.080	0.078	0.078
	(0.001)	(0.002)	(0.002)
Extension	0.056	0.055	0.057
	(0.002)	(0.002)	(0.002)
Corner	0.042	0.042	0.040
	(0.002)	(0.002)	(0.002)
Major alteration prior to sale	-0.003	-0.006	-0.004
	(0.005)	(0.005)	(0.005)
Age of unit	-0.010	-0.010	-0.010
	(0.000)	(0.000)	(0.000)
(Age of unit)2	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)
Age of unit missing	-0.387	-0.380	-0.370
	(0.017)	(0.016)	(0.017)
Log square feet per unit	0.469	0.467	0.466
	(0.002)	(0.002)	(0.002)
Number of buildings on same lot	0.000	0.001	-0.002
	(0.005)	(0.004)	(0.004)
Includes commercial space	0.011	0.012	0.016
	(0.006)	(0.005)	(0.006)
Square feet missing	3.333	3.313	3.300
	(0.026)	(0.026)	(0.026)
Condo and square feet missing	-0.321	-0.318	-0.312
	(0.023)	(0.023)	(0.023)
Single-family detached	0.085	0.086	0.087
	(0.002)	(0.002)	(0.002)
Two-family home	-0.345	-0.344	-0.342
	(0.002)	(0.002)	(0.002)
Three-family home	-0.585	-0.584	-0.581
	(0.002)	(0.003)	(0.003)
Four-family home	-0.806	-0.801	-0.788
	(0.004)	(0.004)	(0.004)
Five/six-family home	-1.123	-1.126	-1.115
	(0.004)	(0.004)	(0.004)
More than six families, no elevator	-1.411	-1.411	-1.407
	(0.005)	(0.005)	(0.005)
Walkup, units not specified	-0.953	-0.953	-0.946
	(0.006)	(0.006)	(0.006)
Elevator apartment building, cooperatives	-1.174	-1.182	-1.889
	(0.019)	(0.019)	(0.019)
Elevator apartment building, not cooperatives	-1.370	-1.373	-1.370
	(0.009)	(0.008)	(0.009)
Loft building	-0.724	-0.727	-0.738
	(0.097)	(0.097)	(0.096)

Condominium, single-family attached	0.453	0.438	0.410
	(0.022)	(0.022)	(0.022)
Condominium, walk-up apartments	0.027	0.022	0.004
	(0.018)	(0.018)	(0.018)
Condominium, elevator building	-0.237	-0.245	-0.276
	(0.018)	(0.018)	(0.018)
Condominium, miscellaneous	-0.273	-0.280	-0.293
	(0.021)	(0.021)	(0.021)
Multi-use, single family with store	-0.156	-0.156	-0.158
	(0.009)	(0.009)	(0.009)
Multi-use, two-family with store	-0.595	-0.594	-0.593
	(0.007)	(0.007)	(0.007)
Multi-use, three-family with store	-0.807	-0.802	-0.799
	(0.011)	(0.011)	(0.011)
Multi-use, four or more family with store	-0.988	-0.991	-0.985
	(0.008)	(0.008)	(0.008)
Constant	8.725	8.747	8.774
	(0.017)	(0.017)	(0.017)
Adjusted R^2	0.801	0.803	0.804
N	300,890	300,890	300,890

Note: All regressions include ring specific time trends, modeled as a five-segment linear spline. Standard errors in parentheses.