FURMAN CENTER FOR REAL ESTATE & URBAN POLICY
NEW YORK UNIVERSITY SCHOOL OF LAW • WAGNER SCHOOL OF PUBLIC SERVICE
40 Washington Square South, Suite 314, New York, NY 10012 · Tel: (212) 998 6713 · Fax: (212) 995 4341 · furmancenter.nyu.edu

The Impact of Low Income Housing Tax Credit Housing on Surrounding Neighborhoods: Evidence from New York City

WORKING PAPER 07–02

Ingrid Gould Ellen Ioan Voicu

The Impact of Low Income Housing Tax Credit Housing on Surrounding Neighborhoods: Evidence from New York City

Ingrid Gould Ellen
Ioan Voicu

Furman Center for Real Estate and Urban Policy
New York University

May 17, 2007

Created by the Tax Reform Act of 1986 as a way to fund affordable housing for low- and moderate-income households, the Low Income Housing Tax Credit (LIHTC) Program has become the key source of public funding for affordable rental housing production. Yet little is known about the program and its impacts. In this report, we measure the neighborhood spillover effects of LIHTC developments. Specifically, does the completion of an LIHTC project lead to changes in the value of the surrounding homes? This question is critical. The current assumption is that the production of subsidized, rental housing, if anything, accelerates neighborhood decline – "there goes the neighborhood" is the common refrain. And partially as a result, we've seen the policy pendulum swing away from place-based housing investment towards demand-side housing programs, such as housing vouchers.

Yet when the federal public housing program was first established in the late 1930s, a key justification was that these housing investments would produce benefits for the surrounding neighborhoods. Moreover, many of the local developers and nonprofits who build and manage subsidized rental housing, including housing supported by tax credits, continue to believe that their efforts not only provide shelter but help to revitalize communities as well.

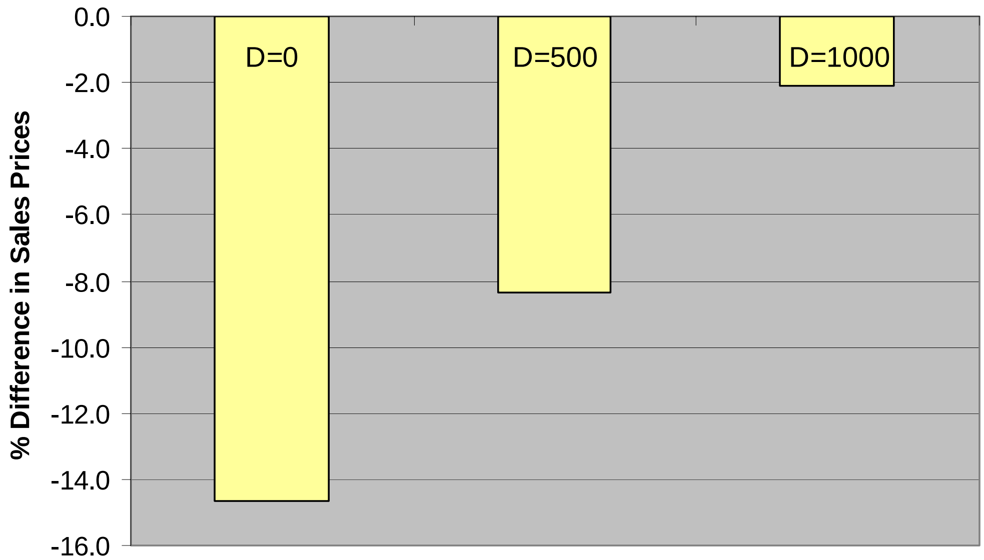
In this report, we examine the neighborhood impact of low income housing tax credit developments in New York City, where 42,077 units of LIHTC housing were newly constructed or rehabilitated between 1987 and 2003.

<u>Siting</u>

LIHTC developments in New York City have typically been built on highly distressed sites within lower income areas. In most cases, the tax credits have been used to support new construction or the rehabilitation of vacant buildings on sites that the city government had taken ownership of through tax foreclosure during the late 1970s. Not surprisingly then, before LIHTC projects are built, we find that properties located within 1,000 feet of a LIHTC housing site sell for significantly less than comparable properties located outside the 1,000-foot ring.

As shown in Figure 1, the price discount diminishes with distance from the site. Estimated sales prices right next to a site that will ultimately hold an average-sized LIHTC project (64 units) are initially 14.6 percent lower than those in the surrounding neighborhood. At a distance of 1,000 feet from such a site, baseline prices are about 2.1 percent lower than those in the surrounding area.

Figure 1
Baseline Differences in Prices Between Properties Located Close to LIHTC Sites and Surrounding Neighborhood*
in New York City



* Estimates are for the "average" site, defined as one that will host an average-sized project (64 units).

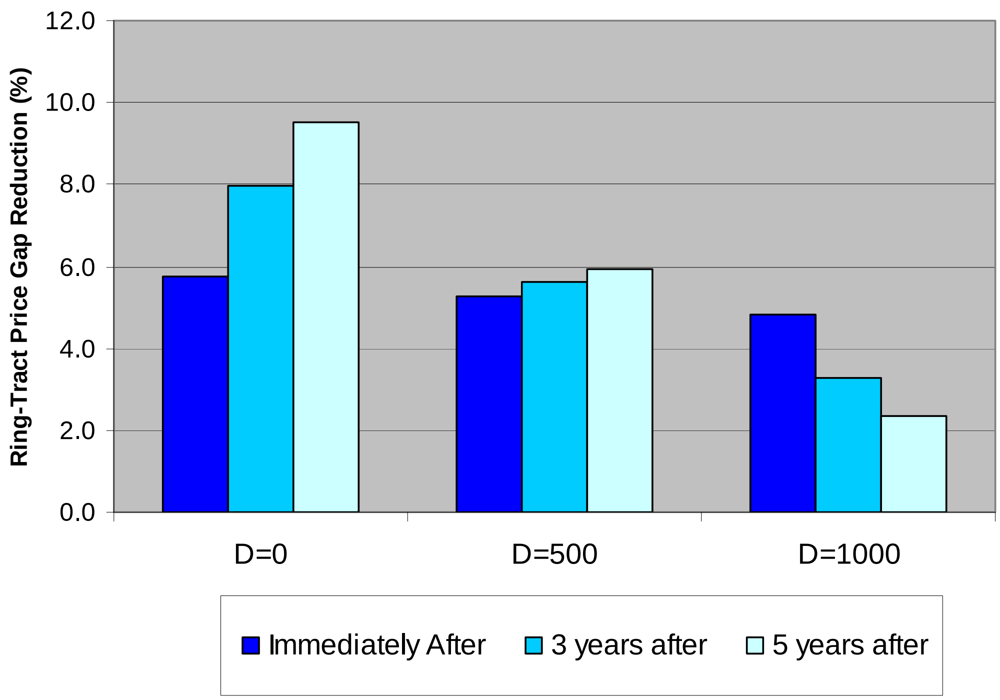
The price discount is typically larger for larger sites. For example, for property sales adjacent to a site that will ultimately house a very small project, estimated prices are initially 12.8 percent lower than those in the surrounding neighborhood. At a distance of 1,000 feet from the very small site, prices are only about 1.7 percent lower.

<u>Impacts</u>

On average, the construction of LIHTC housing units in New York City generated positive and statistically significant external benefits to the surrounding neighborhood. Specifically, the construction or rehabilitation of LIHTC developments appears to increase the value of nearby properties, presumably because these key housing investments have made their neighborhoods safer and more desirable places to live. Moreover, the impacts appear to grow over time. Full regression results are included in Appendix B.

As for the magnitude of the impacts, we estimate that the completion of an average-sized project in our sample (64 units) increases the relative value of adjacent properties by 5.7 percentage points (see Figure 2). In other words, after the completion of a LIHTC development of average size, the gap between prices of homes next to the project site and prices of homes in the same neighborhood but more than 1,000 feet away from the development shrinks from 14.6 percent to 8.9 percent. Five years after completion, the gap falls further to 5.1 percent. The impact of a project five years after completion, in other words, is estimated to be 9.5 percentage points (i.e., 14.6 – 5.1).

Figure 2
Impact of an Average-Sized LIHTC Housing Development
in New York City



As expected, impacts are slightly smaller for properties located 500 feet away from the site, varying from 5.3 percentage points immediately after completion to 6 percentage points five years after completion.

Building more units appears to bring a greater benefit, though this marginal effect declines as the number of units and distance from the project site increase. For example, the estimated impact of a 100-unit project, right next to the project site and immediately after completion, is 6.2 percentage points (as compared to 5.7 percentage points for a 64-unit development).

Sensitivity Tests of Baseline Estimates

We undertook several sensitivity tests of the above results. Most importantly, we included controls for price trends in the micro-neighborhood surrounding the LIHTC sites prior to project completion. As discussed further in the Appendix, it is possible that the locations of LIHTC developments were related in some systematic way to pre-existing *trends* in house prices. In choosing sites for new housing, for instance, developers might have simply picked winners (neighborhoods with growth potential). If so, then what we interpret as positive LIHTC impacts might simply be a continuation of these prior trends.

To help mitigate concerns about such selection bias, we also estimated a specification that includes controls for trends in the relative price of housing in the vicinity of subsidized housing sites prior to the construction of the housing. This specification provides an impact estimate in which the counterfactual is that the price gap between properties in the vicinity of subsidized housing sites and properties in the larger neighborhood would have continued to shrink (or grow) at the pre-completion rate, had no subsidized housing been built. Controlling for these prior trends lowers the magnitude of estimated impacts slightly, but the main findings are not affected.

Does Project Density Matter? (Should we cluster units into fewer developments?)

We find that impacts decline with increased project density – i.e., the number of units per project. In other words, given a specified number of tax credit units, their impact on the neighborhood will be larger if these units are spread across a few developments, rather than being concentrated in a single site.[1]

Do Newly Constructed Buildings Have Greater Impacts than Rehabilitated Buildings?

We find that both new construction and rehabilitation projects generate significant, positive impacts on the surrounding neighborhood. For projects of average size, the impacts of rehabilitation and new construction projects immediately after completion are identical (7.8 percentage points).[2] However, impacts of new construction projects decline as scale increases, whereas impacts of rehabilitation projects increase with scale.[3] As a result, small new construction projects have larger impacts than small rehabilitation projects, however large new construction projects have smaller impacts than large

[1] We tested for non-linearity here since we expected that increased project density might lead to increases in property values at some levels of density. However, we found that the negative impact of project density persists for the full range of project densities found in our sample. We found that the degree of clustering (units per project) has a positive association with impacts only when the number of units per project reaches a level far higher than observed in any project in our sample.

[2] This impact estimate differs from the overall impact estimate noted above because the model used to compare effects of rehabilitation and new construction projects differs slightly (for instance, it includes variables to control for tax status of developer).

[3] We again tested for non-linearity, or threshold effects, and found that the negative relationship between the number of units newly constructed in the ring of a property sale and neighborhood impacts holds across a relatively wide range of unit counts, covering most of the property sales in our sample that are within 1,000 feet of LIHTC units.

rehabilitation projects, perhaps because rehabilitating a large, dilapidated building, or set of buildings, removes a substantial source of blight in a community than removing a large vacant lot.

Do Projects Yield Greater Impacts in Lower Income or Higher Income Neighborhoods?

We find that LIHTC projects have positive and significant effects in both lower-income and higher-income submarkets. We find no difference in the impact of smaller projects across the two types of neighborhoods. However, our results suggest that larger projects have larger impacts in lower income areas.

Do Projects Yield Greater Impacts in Lower Density or Higher Density Neighborhoods?

Once again, we find that LIHTC projects have positive and significant effects in both types of submarkets. In general, however, impacts appear to be somewhat larger in lower density areas. This finding is important for generalizing these results beyond New York City, since it shows that our results are not driven by the very high density levels of New York City neighborhoods.

APPENDIX A
DATA AND METHODOLOGY

A. Methodology

Our analysis centers on a hedonic regression model that explains the sales price of a property as a function of its structural characteristics (such as lot size and age of the building) and its neighborhood surroundings. We use this hedonic analysis to compare the prices of properties that are within 1,000 feet of Low Income Housing Tax Credit (LIHTC) sites to prices of comparable properties that are outside this 1,000-foot ring, but still located in the same neighborhood. Then we examine whether the magnitude of this difference has changed over time, and if so, if the change is associated with the completion of a new housing unit. This approach helps to control for systematic differences between the neighborhoods chosen for these housing investments and other areas around the city and to distinguish the specific effects of the housing investments from the many other changes occurring in the same neighborhoods.

Baseline Model

To be concrete, the centerpiece of our empirical work is a hedonic model of the price of property:

$$(1)\ \ln P_{icdt} = \alpha + \beta X_{it} + \delta_c W_c + \gamma^{LIHTC} R_{it}^{LIHTC} + \theta R_{it}^{LIHTC} D_i + \gamma^{O} R_{it}^{O} + \rho_{dt} I_{dt} + \varepsilon_{it},$$

where $\ln P_{icdt}$ is the log of the sales price per unit of property i in census tract c, in community district d, and in quarter t, X_{it} is a vector of property-related characteristics, including age and structural characteristics, W_c are a series of census tract fixed effects, R_{it} are vectors of ring variables (described below), and I_{dt} are a series of dummy variables indicating the quarter and community district of the sale. The coefficients to be estimated are α, β, δ, γ, θ and ρ, and ε is an error term.[4] Since housing prices are entered as logarithms, the coefficients are interpreted as the percentage change in price resulting from an additional unit of the independent variable. In the case of a dummy variable, the coefficient can be understood as the percentage difference in price between properties that have the attribute and those that do not.[5]

The property related characteristics, X_{it}, include structural characteristics of the properties, including building age, square footage, the number of buildings on the lot, and a set of dummy variables distinguishing eighteen different building classifications such as 'single-family detached' or 'two family home,' and so on. To control for unobserved, time-invariant features of different neighborhoods, we include Census tract fixed effects (W_c). To control for trends in neighborhoods, we include a series of neighborhood-specific, time dummies, I_{dt}, one for each quarter in each year of the study period) for each of the 52 community districts used in the analysis.[6] (A joint test of significance of census tract specific time dummies indicated that they contributed little explanatory power over the community district time dummy variables.)

---

[4] Note that there might be spatial autocorrelation in the errors. Unfortunately, the large sample size makes the use of more rigorous methods of addressing possible spatial correlation computationally prohibitively demanding. Indeed, to our knowledge, there is no publicly-available statistical software that can effectively perform tests and corrections for spatial autocorrelation for sample sizes as large as ours. However, our use of census tract fixed effects alleviates this problem, by removing potential spatial correlation between properties located in different tracts.

[5] The coefficient on a dummy variable should in fact be interpreted as the difference in log price between properties that have the attribute and those that do not. The difference in log price, however, closely approximates the percentage difference in price when the differences are small, as they are in this paper.

[6] New York City is divided into a total of 59 community districts, each of which has a Community Board whose members are appointed by the Borough President and by the City Council members who represent the district.

The ring variables (R_{it}^{LIHTC}) capture the impact of proximity to LIHTC housing units.[7] To be specific, "In Ring" is a dummy variable that takes a value of one if the property is located within 1,000 feet of a site on which there is or will be at least one subsidized housing unit.[8] Thus, "In Ring" captures baseline differences in sales prices between properties located within a 1,000-foot ring of subsidized housing sites and those outside. Because baseline property values may also be associated with the size of the site,[9] we also include number of subsidized units to be built within 1000 feet of the sold property, and its square.

A "Post Ring" dummy variable takes a value of one if the sale is within the ring of some number of *completed* LIHTC units; its coefficient provides the simplest impact estimate.[10] We also include the number of completed units within the ring of the sale (and its square), to estimate the marginal effects of additional subsidized units. Finally, we include a "Tpost" variable (and its square) that equals the number of years between the date of sale and the project completion date for properties in the 1,000-foot ring and allows the impact to vary over time.[11]

Interactions between distance, $D_{i,}$ and the set of ring variables R_{it}^{LIHTC} permit us to

[7] We also include similar sets of ring variables (R_{it}^{O}) that control for proximity to other types of subsidized housing since it is possible that the location of these other types of units is correlated with that of the LIHTC units that we focus on. These include housing created or rehabilitated through other federal programs (such as Section 236, BMIR, public housing, Section 8, and Section 202), and through programs sponsored by the city under the Ten Year Plan .

[8] On average, city blocks in New York City are about 500 feet long. Thus, the 1,000-foot ring allows for impacts extending up to roughly two blocks away from the housing investment.

[9] We expect that larger projects may have been systematically sited in more distressed locations than smaller projects. This is a likely scenario given that the extent of blight to be removed is larger in more dilapidated neighborhoods.

[10] If a sale was within 1,000 feet of more than one project, we use the completion date of the first completed.

[11] To be clear, Tpost equals 1/365 if a sale is located within the ring of an LIHTC development and occurs the day after its completion; it equals one if the sale occurs one year after completion; and so on. We should note that the environmental disamenities literature has explored alternative ways to specify the decay or acceleration of impacts over time. See Kiel and Zabel (2002), for a useful discussion.

estimate a pre-project distance gradient within the 1,000-foot ring, a post-completion distance gradient (again within the ring) and allow this gradient to change over time post-completion. Specifically, D_i is interacted with the In Ring variable, as well as with the number of LIHTC units to be built to allow the pre-project gradient to vary with the size of the LIHTC site. We also interact the Post Ring variable with distance to allow impacts to vary with distance in a similar fashion. In addition, by interacting distance with Tpost and number of completed units, we explore how that gradient changes over time and with project scale.

Prior Trends

The above model controls for pre-existing differences in price levels between properties within 1,000 feet of LIHTC sites and those further away. However, it is possible that the location of LIHTC housing might be related in some systematic way to pre-existing *trends* in house prices. Subsidized housing might be built, for example, in micro-neighborhoods that were starting to appreciate, relative to the surrounding area, even before the development. First, subsidized housing developments are typically built in some of the most distressed sites in the city and it is possible that the value of the most distressed areas will naturally rise as prices bottom out and private developers begin to invest. Second, in choosing sites for new housing, developers might have simply picked winners (neighborhoods with growth potential). Both these scenarios suggest that what we interpret as positive LIHTC impacts might simply be a continuation of these prior trends.

To help mitigate concerns about such selection bias, we estimate a specification that includes controls for trends in the relative price of housing in the vicinity of subsidized housing sites prior to the construction of the housing. This specification provides an impact estimate in which the counterfactual is that the price gap between properties in the vicinity of subsidized housing sites and properties in the larger neighborhood would have continued to shrink (or grow) at the pre-completion rate, had no subsidized housing been built. This specification differs from equation (1) mainly in that here we add a ring-specific time-trend that measures the overall price trend in the ring (not simply the trend *after* completion). This variable is defined in much the same way as Tpost is, except that it also applies to properties sold prior to project completion. For example, if a property is sold exactly two years before completion, the trend takes the value of –2.

Does Project Density Matter? (Should we cluster units into fewer developments?)

To investigate whether project density matters in shaping impacts, we supplement the baseline model with a variable that indicates number of (completed) units per project.

Do Newly Constructed Buildings Have Greater Impacts than Rehabilitated Buildings?

To explore heterogeneity of impacts with respect to the type of intervention, we include separate sets of ring variables for the new construction and rehabilitation projects.[12]

[12] In this specification, we also control for the tax status (for-profit vs. nonprofit) of the sponsors of the projects within 1000 feet of a sale.

Do Projects Yield Greater Impacts in Lower Income or Higher Income Neighborhoods?

We next explore the extent to which the impacts of LIHTC projects vary with income levels in a neighborhood. We test for heterogeneity in impacts between low- and high-income areas by interacting all of our ring variables, ring-distance interaction variables and hedonic variables with a dummy variable indicating neighborhood income level.[13] Following Schwartz, Ellen, Voicu, and Schill (2006), we identified two submarkets - defined by community districts - based on household income information from the 1990 Decennial Census: the low-income submarket consists of community districts with an average household income less than 80 percent of the MSA mean household income and the higher-income submarket includes all the remaining districts.[14]

Do Projects Yield Greater Impacts in Lower Density or Higher Density Neighborhoods?

We perform a similar analysis to investigate whether impacts vary with neighborhood density. For this purpose, we identified two submarkets (defined by community districts) based on information from the 1990 Decennial Census: a high-density submarket, consisting of community districts with household density higher than the New York City median density, and a low-density submarket including all the remaining districts.[15]

---

[13] In earlier models, an F-test rejected the hypothesis that the coefficients on property characteristics are similar across neighborhoods.

[14] To create submarkets, we matched census tract-level data to community districts. The threshold used to distinguish the two submarkets is $39,037, or 80 percent of the MSA mean household income in 1990.

[15] Again, to create submarkets, we matched census tract-level data to community districts. Density is measured in households per 1,000 sq. meters. We use the median community district density (5.3 households per 1,000 square kilomters, as the threshold to distinguish the high and low density submarkets.

Impacts of individual projects

Although not discussed in the main report, we also estimated separate impacts for several LIHTC projects. These projects were selected from the largest developments completed between 1999 and 2001. Additional selection criteria were location in a low-income community district and the existence of a significant number of sales within 1,000 feet of the project, before and after its completion.

To estimate the impact of an individual project, we limit our sales sample to the 1990-2005 period, and to the community district(s) in which the project is located. Given the much smaller sample sizes, we use a specification that is more parsimonious than the baseline model described above. Specifically, the quarter dummies are replaced with a linear time trend, and we eliminate the distance interactions, the number of units variables and the TPost-squared term.

B. <u>Summary of Data</u>

To undertake our analysis, we utilized data from a variety of sources. From HUD User and LISC, we obtained data describing all housing created through the LIHTC program between 1987 and 2003. For each housing project, this dataset indicates its precise location (address), the year the project was completed, the number of units that were built or rehabilitated, the type of work (new construction or rehabilitation), and the sponsor tax status (for-profit vs. nonprofit).

. We also secured address-specific data on all other types of federally and city-subsidized housing developments from HUD User, the New York City Housing Authority (NYCHA), and New York City's Department of Housing Preservation and

Development (HPD).[16]

We supplemented these data on housing investments with data from two other city sources. First, we obtained a database including all sales prices for all apartment buildings, condominium apartments and single-family homes selling in the city between 1980-2005.[17] Our final sample includes 501,898 property sales, spread across 1,896 census tracts.

Second, we have data on the characteristics of all buildings in the city, collected for the purposes of computing property tax assessments (the RPAD file). The RPAD data contain little information about the characteristics of individual units in apartment buildings (except in the case of condominiums), but these building characteristics explain variations in prices surprisingly well.[18]

Identifying whether properties are in the vicinity of subsidized housing sites is critical to our analyses. We used GIS techniques to measure the distance from each sale in our database to all subsidized housing sites and, from these distance measures, we created a variable that identified properties within 1,000 feet of housing investments of different types.[19]

[16] See Ellen, Schill, Schwartz and Voicu (2006) for a detailed description of these datasets.
[17] We limited the analysis to properties that are located within the 52 community districts (of the total 59) where there LIHTC units were developed. Note that sales of cooperative apartments are excluded from the data set since they are not considered to be sales of real property.
[18] We use RPAD data from 1984 to 2005.
[19] We used a "cross-walk" (the "Geosupport File") to link each tax lot to an x,y coordinate (i.e. latitude, longitude using the US State Plane 1927 projection). We are able to assign x,y coordinates and other geographic variables to over 98 percent of the sales using this method. For federal housing units, we used a coordinate conversion software (PROLAT) to convert the latitude and longitude coordinates - available from HUD - into x,y coordinates.

References

Ellen, I.G., Schill, M.H., Schwartz, A.E., and Voicu, I. 2006. "Does Federally Subsidized Rental Housing Depress Neighborhood Property Value." *Journal of Policy Analysis and Management* (in press).

Kiel, K. and J. Zabel. 2002. "Estimating the Economic Benefits of Cleaning Up Superfund Sites: The Case of Woburn, Massachusetts" *Journal of Real Estate Finance and Economics* 22:2/3, 163-184

Schwartz, A.E., Ellen, I.G., Voicu, I. and Schill, M.H. 2006. "The External Effects of Subsidized Housing." *Regional Science and Urban Economics* 36(6): 679-709.

APPENDIX B
TABLES

Table 1: Size of LIHTC Projects, by Intervention Type

Intervention Type	Units per Project				Number of Projects	Number of Units
	Mean	Quartile 1	Median	Quartile 3		
New Construction	110	44	72	125	129	14,233
Rehabilitation	52	22	40	67	531	27,844
All LIHTC Projects	64	24	44	74	660	42,077

Notes: Statistics include projects completed between 1987 and 2003.
Quartile 1 (3) means that 25% (75%) of the projects have fewer units.

Table 2. Baseline Regression

LIHTC		
In Ring	-0.1276	***
	(0.0066)	
In Ring*D	1.1E-04	***
	(8.1E-06)	
Number of units ever completed	-3.0E-04	***
	(4.0E-05)	
Number of units ever completed^2	1.2E-07	***
	(3.1E-08)	
Number of units ever completed*D	2.2E-07	***
	(4.5E-08)	
Post Ring	0.0497	***
	(0.0101)	
Post Ring*D	1.5E-05	
	(1.3E-05)	
Number of units at the time of sale	1.2E-04	**
	(5.4E-05)	
Number of units at the time of sale^2	3.6E-08	
	(5.1E-08)	
Number of units at the time of sale*D	-3.8E-07	***
	(6.4E-08)	
TPost	0.0071	***
	(0.0018)	
TPost^2	8.8E-05	
	(9.1E-05)	
TPost*D	-1.3E-05	***
	(1.6E-06)	
Other Federal Programs		
In Ring	-0.0462	***
	(0.0050)	
Post Ring	0.0042	
	(0.0052)	
Number of units at the time of sale	-7.9E-05	***
	(5.0E-06)	
TPost	8.6E-04	***
	(1.1E-04)	

NYC Ten-Year Plan, new construction and rehab of vacant bldgs.	
In Ring	-0.0596 ***
	(0.0026)
Post Ring	0.0385 ***
	(0.0032)
Number of units at the time of sale	1.3E-05
	(1.6E-05)
TPost	0.0036 ***
	(3.3E-04)
NYC Ten-Year Plan, rehab of occupied bldgs.	
In Ring	-0.0481 ***
	(0.0019)
Post Ring	0.0147 ***
	(0.0019)
Number of units at the time of sale	2.5E-05 ***
	(5.0E-06)
TPost	0.0026 ***
	(2.0E-04)
Characteristics of properties sold	
Odd shape	2.3E-02 ***
	(1.6E-03)
Garage	0.0324 ***
	(0.0012)
Extension	0.0257 ***
	(0.0017)
Corner	0.0381 ***
	(0.0016)
Major alteration prior to sale	0.0623 ***
	(0.0041)
Major alteration prior to sale missing	0.1544 ***
	(0.0101)
Age of unit	-0.0065 ***
	(9.5E-05)
$(\text{Age of unit})^2$	4.4E-05 ***
	(8.4E-07)
Age of unit missing	-0.1048 ***
	(0.0037)

Log square feet per unit	0.4860	***
	(0.0015)	
Number of buildings on same lot	-9.2E-04	
	(0.0018)	
Includes commercial space	0.0158	***
	(0.0027)	
Square feet missing	3.2534	***
	(0.0153)	
Condo and square feet missing	0.2468	***
	(0.0090)	
Single-family detached	0.0966	***
	(0.0017)	
Two-family home	-0.3064	***
	(0.0016)	
Three-family home	-0.5398	***
	(0.0023)	
Four-family home	-0.6940	***
	(0.0036)	
Five/six-family home	-1.1183	***
	(0.0038)	
More than six families, no elevator	-1.4634	***
	(0.0039)	
Walkup, units not specified	-1.2604	***
	(0.0043)	
Elevator apartment building, cooperatives	-1.6151	***
	(0.0313)	
Elevator apartment building, not cooperatives	-1.4682	***
	(0.0060)	
Loft building	-0.6590	***
	(0.0208)	
Condominium, single-family attached	-0.2276	***
	(0.0095)	
Condominium, walk-up apartments	-0.2921	***
	(0.0047)	
Condominium, elevator building	-0.4184	***
	(0.0046)	
Condominium, miscellaneous	-0.1444	***
	(0.0284)	

Multi-use, single family with store	-0.0358 ***
	(0.0065)
Multi-use, two-family with store	-0.4234 ***
	(0.0046)
Multi-use, three-family with store	-0.6669 ***
	(0.0084)
Multi-use, four or more family with store	-0.8351 ***
	(0.0060)
N	501,898
R^2	0.8567

Note :
The regression include census tract and community district-quarter dummies. Standard errors in parentheses. *** denotes 1% significance level; ** denotes 5% significance level; * denotes 10% significance level.

Table 3. Does Project Density Matter?

	Model 1		Model 2	
LIHTC				
In Ring	-0.1234	***	-0.1232	***
	(0.0066)		(0.0066)	
In Ring*D	1.1E-04	***	1.1E-04	***
	(8.1E-06)		(8.1E-06)	
Number of units ever completed	-3.2E-04	***	-3.1E-04	***
	(4.0E-05)		(4.0E-05)	
Number of units ever completed^2	1.4E-07	***	1.4E-07	***
	(3.1E-08)		(3.1E-08)	
Number of units ever completed*D	2.2E-07	***	2.1E-07	***
	(4.5E-08)		(4.5E-08)	
Post Ring	0.0794	***	0.0857	***
	(0.0106)		(0.0108)	
Post Ring*D	-1.4E-05		-1.3E-05	
	(1.4E-05)		(1.4E-05)	
Number of units at the time of sale	4.5E-04	***	5.4E-04	***
	(6.7E-05)		(7.1E-05)	
Number of units at the time of sale^2	-5.3E-08		-1.5E-07	**
	(5.2E-08)		(5.7E-08)	
Number of units at the time of sale*D	-4.0E-07	***	-3.9E-07	***
	(1.1E-07)		(1.1E-07)	
Number of units per project at the time of sale	-8.9E-04	***	-1.2E-03	***
	(1.0E-04)		(1.3E-04)	
Number of units per project at the time of sale^2			7.1E-07	***
			(1.8E-07)	
Number of units per project at the time of sale * D	6.6E-07	***	6.3E-07	***
	(1.5E-07)		(1.5E-07)	
TPost	0.0042	**	0.0040	**
	(0.0019)		(0.0019)	
TPost^2	9.8E-05		8.9E-05	
	(9.1E-05)		(9.1E-05)	
TPost*D	-9.9E-06	***	-9.6E-06	***
	1.7E-06		1.7E-06	
Other Federal Programs				
In Ring	-0.0459	***	-0.0459	***
	(0.0050)		(0.0050)	
Post Ring	0.0043		0.0043	
	(0.0052)		(0.0052)	
Number of units at the time of sale	-7.9E-05	***	-7.9E-05	***
	(5.0E-06)		(5.0E-06)	
TPost	8.5E-04	***	8.5E-04	***
	(1.1E-04)		(1.1E-04)	
NYC Ten-Year Plan, new construction and rehab of vacant bldgs.				
In Ring	-0.0597	***	-0.0598	***
	(0.0026)		(0.0026)	
Post Ring	0.0384	***	0.0388	***
	(0.0032)		(0.0032)	
Number of units at the time of sale	-2.3E-05		-2.4E-05	
	(1.6E-05)		(1.6E-05)	
TPost	0.0037	***	0.0036	***
	(3.3E-04)		(3.3E-04)	

NYC Ten-Year Plan, rehab of occupied bldgs.		
In Ring	-0.0482 ***	-0.0482 ***
	(0.0019)	(0.0019)
Post Ring	0.0146 ***	0.0146 ***
	(0.0019)	(0.0019)
Number of units at the time of sale	2.4E-05 ***	2.4E-05 ***
	(5.0E-06)	(5.0E-06)
TPost	0.0026 ***	0.0026 ***
	(2.0E-04)	(2.0E-04)
N	501,898	501,898
R^2	0.8568	0.8568

Notes:

This table shows only the ring variables. The regression includes census tract and CD-quarter dummies, and the full set of building controls, as in Table 1.

Standard errors in parentheses. *** denotes 1% significance level; ** denotes 5% significance level; * denotes 10% significance level.

Table 4. New Construction vs. Rehabilitation

LIHTC - new construction		
In Ring	-0.1205	***
	(0.0124)	
In Ring*D	1.1E-04	***
	(1.5E-05)	
Number of units ever completed	-2.2E-04	***
	(7.4E-05)	
Number of units ever completed^2	1.3E-07	**
	(5.7E-08)	
Number of units ever completed*D	7.8E-08	
	(6.5E-08)	
Post Ring	0.1069	***
	(0.0216)	
Post Ring*D	-5.1E-05	*
	(2.8E-05)	
Number of units at the time of sale	-4.8E-04	***
	(9.1E-05)	
Number of units at the time of sale^2	3.4E-07	***
	(8.1E-08)	
Number of units at the time of sale*D	2.2E-07	***
	(8.4E-08)	
TPost	0.0055	
	(0.0045)	
TPost^2	3.5E-04	
	(2.7E-04)	
TPost*D	-9.0E-06	**
	(0.0000)	
LIHTC - rehab		
In Ring	-0.0835	***
	(0.0074)	
In Ring*D	6.0E-05	***
	(8.8E-06)	
Number of units ever completed	-5.9E-04	***
	(7.0E-05)	
Number of units ever completed^2	-1.6E-07	
	(1.1E-07)	
Number of units ever completed*D	9.1E-07	***
	(6.9E-08)	

Post Ring	0.0420	***
	(0.0111)	
Post Ring*D	2.1E-05	
	(1.4E-05)	
Number of units at the time of sale	5.7E-04	***
	(9.1E-05)	
Number of units at the time of sale^2	-1.2E-07	
	(1.5E-07)	
Number of units at the time of sale*D	-1.2E-06	***
	(1.0E-07)	
TPost	0.0030	
	(0.0019)	
TPost^2	1.6E-04	*
	(9.6E-05)	
TPost*D	-7.7E-06	***
	(0.0000)	
LIHTC - sponsor's tax status		
Share of units ever completed with for-profit sponsor	0.0218	***
	(0.0067)	
Share of units ever completed with missing tax status of sponsor	-0.0172	***
	(0.0052)	
Share of units at the time of sale with for-profit sponsor	2.0E-02	**
	(8.2E-03)	
Share of units at the time of sale with missing tax status of sponsor	8.6E-03	
	(5.5E-03)	
Other Federal Programs		
In Ring	-0.0462	***
	(0.0050)	
Post Ring	0.0052	
	(0.0052)	
Number of units at the time of sale	-7.9E-05	***
	(5.0E-06)	
TPost	8.1E-04	***
	(1.1E-04)	
NYC Ten-Year Plan, new construction and rehab of vacant bldgs.		
In Ring	-0.0596	***
	(0.0026)	
Post Ring	0.0399	***
	(0.0032)	
Number of units at the time of sale	1.2E-05	
	(1.6E-05)	

TPost	0.0033	***
	(3.3E-04)	
NYC Ten-Year Plan, rehab of occupied bldgs.		
In Ring	-0.0481	***
	(0.0019)	
Post Ring	0.0146	***
	(0.0019)	
Number of units at the time of sale	2.4E-05	***
	(5.0E-06)	
TPost	0.0026	***
	(2.0E-04)	
N	501,898	
R^2	0.8568	

Notes:
This table shows only the ring variables. The regression includes census tract and CD-quarter dummies, and the full set of building controls, as in Table 1.
Standard errors in parentheses. *** denotes 1% significance level; ** denotes 5% significance level; * denotes 10% significance level.

Table 5. Low-Income vs. High-Income Neighborhoods

	High Income Submarket (1)	Low Income - High Income Differential (2)
LIHTC		
In Ring	-0.2291 ***	0.1569 ***
	(0.0127)	(0.0150)
In Ring*D	2.4E-04 ***	-1.9E-04 ***
	(1.6E-05)	(1.9E-05)
Number of units ever completed	2.0E-04 ***	-9.6E-04 ***
	(5.8E-05)	(9.3E-05)
Number of units ever completed^2	-5.6E-08	3.6E-07 ***
	(3.7E-08)	(1.1E-07)
Number of units ever completed*D	-2.9E-07 ***	1.1E-06 ***
	(6.1E-08)	(1.1E-07)
Post Ring	0.0693 ***	-0.0369
	(0.0208)	(0.0238)
Post Ring*D	4.8E-05 *	-3.7E-05
	(2.7E-05)	(3.1E-05)
Number of units at the time of sale	-5.1E-04 ***	1.4E-03 ***
	(7.7E-05)	(1.2E-04)
Number of units at the time of sale^2	4.4E-07 ***	-9.2E-07 ***
	(6.2E-08)	(1.7E-07)
Number of units at the time of sale*D	1.3E-07	-9.5E-07 ***
	(8.5E-08)	(1.6E-07)
TPost	0.0102 ***	-0.0056
	(0.0037)	(0.0042)
TPost^2	8.5E-04 ***	-9.9E-04 ***
	(1.8E-04)	(2.1E-04)
TPost*D	-3.4E-05 ***	3.1E-05 ***
	(3.5E-06)	(4.0E-06)
Other Federal Programs		
In Ring	-0.1276 ***	0.1061 ***
	(0.0113)	(0.0126)
Post Ring	0.0872 ***	-0.1050 ***
	(0.0116)	(0.0129)
Number of units at the time of sale	-1.2E-04 ***	6.7E-05 ***
	(8.5E-06)	(1.0E-05)
TPost	5.7E-04 ***	6.1E-04 ***
	(1.8E-04)	(2.3E-04)

	(1)		(2)	
NYC Ten-Year Plan, new construction and rehab of vacant bldgs.				
In Ring	-0.0735	***	0.0220	***
	(0.0045)		(0.0055)	
Post Ring	0.0403	***	0.0026	
	(0.0060)		(0.0071)	
Number of units at the time of sale	-1.2E-04	***	1.6E-04	***
	(3.1E-05)		(3.6E-05)	
TPost	0.0036	***	-0.0002	
	(6.3E-04)		(7.3E-04)	
NYC Ten-Year Plan, rehab of occupied bldgs.				
In Ring	-0.0545	***	0.0243	***
	(0.0023)		(0.0042)	
Post Ring	0.0177	***	-0.0084	**
	(0.0027)		(0.0038)	
Number of units at the time of sale	3.9E-05	***	-2.1E-05	*
	(1.1E-05)		(1.2E-05)	
TPost	0.0030	***	-0.0006	
	(2.8E-04)		(4.0E-04)	
N			501898	
R^2			0.8602	

Note :
Coefficients in column (2) correpond to a set of interactions between the ring variables and a dummy which is equal to 1 for the low income submarket and 0 otherwise. The low income submarket comprises community districts for which the CD/MSA mean household income ratio is smaller than 0.8 (and the high income submarket includes all the other community districts).
The regressions include census tract and CD-quarter dummies, and the full set of building controls and their interactions with the low income submarket dummy.
Standard errors in parentheses. *** denotes 1% significance level; ** denotes 5% significance level; * denotes 10% significance level.

Table 6. Low-Density vs. High-Density Neighborhoods

	Low Density Submarket	High Density - Low Density Differential
	(1)	(2)
LIHTC		
In Ring	-0.0997 ***	-0.0437 ***
	(0.0122)	(0.0147)
In Ring*D	6.3E-05 ***	6.3E-05 ***
	(1.5E-05)	(1.8E-05)
Number of units ever completed	-1.0E-04	-8.0E-05
	(1.2E-04)	(1.2E-04)
Number of units ever completed^2	-1.2E-06 ***	1.3E-06 ***
	(1.9E-07)	(2.0E-07)
Number of units ever completed*D	6.6E-07 ***	-5.1E-07 ***
	(1.1E-07)	(1.2E-07)
Post Ring	0.0980 ***	-0.0529 **
	(0.0212)	(0.0241)
Post Ring*D	-4.9E-05 *	7.3E-05 **
	(2.8E-05)	(3.1E-05)
Number of units at the time of sale	-3.0E-04 *	4.8E-04 ***
	(1.6E-04)	(1.7E-04)
Number of units at the time of sale^2	1.3E-06 ***	-1.4E-06 ***
	(2.7E-07)	(2.8E-07)
Number of units at the time of sale*D	-6.9E-07 ***	3.9E-07 **
	(1.7E-07)	(1.8E-07)
TPost	0.0092 **	-0.0049
	(0.0040)	(0.0045)
TPost^2	-2.2E-04	5.5E-04 **
	(2.3E-04)	(2.5E-04)
TPost*D	-3.4E-06	-1.1E-05 ***
	(3.4E-06)	(3.9E-06)
Other Federal Programs		
In Ring	-0.0709 ***	0.0483 ***
	(0.0071)	(0.0099)
Post Ring	0.0042	-0.0012
	(0.0074)	(0.0102)
Number of units at the time of sale	-6.9E-05 ***	-4.9E-06
	(7.4E-06)	(9.9E-06)
TPost	1.6E-03 ***	-1.6E-03 ***
	(1.4E-04)	(2.2E-04)

	(1)	(2)
NYC Ten-Year Plan, new construction and rehab of vacant bldgs.		
In Ring	-0.0581 ***	-0.0008 ***
	(0.0031)	(0.0056)
Post Ring	0.0406 ***	-0.0051
	(0.0042)	(0.0063)
Number of units at the time of sale	2.4E-04 ***	-3.0E-04 ***
	(3.0E-05)	(3.5E-05)
TPost	0.0031 ***	-0.0002
	(4.4E-04)	(6.5E-04)
NYC Ten-Year Plan, rehab of occupied bldgs.		
In Ring	-0.0459 ***	-0.0499 ***
	(0.0020)	(0.0063)
Post Ring	0.0158 ***	-0.0130 ***
	(0.0022)	(0.0044)
Number of units at the time of sale	3.0E-05 ***	1.3E-06
	(7.0E-06)	(9.9E-06)
TPost	0.0037 ***	-0.0031 ***
	(2.3E-04)	(4.4E-04)
N	501898	
R^2	0.8617	

Note :
Coefficients in column (2) correpond to a set of interactions between the ring variables and a dummy which is equal to 1 for the high density submarket and 0 otherwise. The high density submarket comprises community districts with household density higher than the New York City median density (and the low density submarket includes all the other community districts).
The regressions include census tract and CD-quarter dummies, and the full set of building controls and their interactions with the low income submarket dummy.
Standard errors in parentheses. *** denotes 1% significance level; ** denotes 5% significance level; * denotes 10% significance level.