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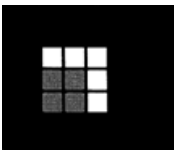

Do Tenants Capture the Benefits from the Low-Income Housing Tax Credit Program?

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This article compares the rent savings accrued by recipient households over the life cycle of Low-Income Housing Tax Credit (LIHTC) projects to their allocated tax credits. A simple two-stage empirical procedure is developed and implemented for a selected medium-sized metropolitan statistical area. Using hedonic pricing parameters estimated in the first stage, LIHTC ceiling rents are compared to predicted market rents. The findings indicate rent savings constitute a relatively small fraction of the programs costs, suggesting developers and investors may capture some of the program's benefits. As this finding characterizes only one potential source of benefits of the LIHTC program, a brief discussion of other potential benefits to low-income households supplements the analysis.

For more than two decades the Low-Income Housing Tax Credit (LIHTC) program has been the primary source of growth in federal support for enhancing the affordability and availability of rental housing for low- and moderate-income households in the United States (Cummings and DiPasquale 1999). Since it was created as a part of the Tax Reform Act of 1986, over 1.5 million rental housing units have been built under the program nationwide, and it has become the primary source of project-based federal aid.[1] Over 100,000 units are typically developed under the program on an annual basis. LIHTC-subsidized projects house a considerable fraction of all low-income renting families in urban, suburban and rural communities, now constituting a larger share of the overall stock of low-income housing than remaining public housing units (Schwartz 2006).[2]

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[1] See the website of the Danter Company (http://www.Danter.com) for data tables showing overall levels of LIHTC subsidized construction, including breakdowns by state.

[2] For a complete listing of all LIHTC-sponsored projects see the webpage http://lihtc.huduser.org.

However, the program is quite controversial and debates over its relative merits are far from being resolved.[3] At a tax expenditure of over five billion dollars annually, the burden of the LIHTC program on taxpayers is considerable.[4] On the other hand, measuring the benefits of the program is a complicated task, in part because the potential beneficiaries are numerous. In addition to benefits that accrue to low-income households (the intended benefit group), some benefits may be captured by project developers, ownership deal syndicators and private investors in LIHTC projects. The present investigation does not directly estimate the extent to which the LIHTC program benefits the latter three groups and, hence, makes no claim of carrying out a comprehensive cost–benefit analysis of the program. Instead, this article focuses on a single aspect of the LIHTC program that has not been addressed by empirical studies to date by investigating the following question: How do the rent savings that accrue to tenants over the life cycle of a typical LIHTC project compare to the magnitude of tax expenditures associated with the program?

This straightforward question is actually quite difficult to answer because rent savings are not directly observable. Therefore, this article develops a simple two-stage empirical methodology for estimating the rent savings of individual LIHTC projects. The procedure is applied for the population of LIHTC projects located in Tallahassee, Florida, a selected representative medium-sized metropolitan statistical area (MSA). To establish that Tallahassee is an appropriate case study, the article argues that median income and area median rents are two key factors in determining the magnitude of rent savings across various housing markets and shows how Tallahassee is representative on these dimensions. The results suggest that less than half of the tax expenditures are captured in the form of rent savings. An important finding is that, for the majority of the LIHTC projects in the test case housing market, the LIHTC pricing constraint becomes nonbinding at some point during the commitment period

[3]The term "relative merits" is meaningful in this context. Policy makers face trade-offs when they allocate scarce resources between the LIHTC program and other federal housing programs, most notably the Section 8 housing voucher program. Weicher (1990), Stegman (1991), Case (1991), Nelson (1994), Olsen (2000), McClure (1998, 2000) and Deng (2005) are a few of the existing studies that have investigated the efficiency and effectiveness of the LIHTC program relative to tenant-based vouchers.

[4]Note that LIHTC projects frequently receive support beyond the initial tax credits through other subsidy programs such as Section 8 project-based or tenant-based assistance (Cummings and DiPasquale 1999). There are also considerable administrative costs of the program. Hence, the magnitude of the tax credits alone, which represents the cost measure I later focus on, significantly understates the full cost of adding LIHTC units to the existing affordable housing stock. As such, the present exercise can be characterized as constructing only an extreme lower-bound estimate of the program's full costs. See Olsen (2003) for a detailed discussion of the various social costs associated with the LIHTC program and for a review of a handful of studies that have directly investigated the issue of administrative costs of the LIHTC program.

associated with the program. Instead, as the LIHTC complexes in the sample age, they become more affordable naturally. The LIHTC program seems to be placing low-income households into considerably newer (as opposed to larger, more conveniently located or less expensive) rental housing units. Additionally, the article argues the large gap between the tax expenditures associated with the program and the rent savings that accrue to tenants suggests that project developers, syndicators and investors are likely able to capture a significant portion of the benefits of the LIHTC program. Of course, an additional possibility is that production of LIHTC units is associated with excess real costs of production—perhaps related to competition over being awarded LIHTC project status. Regardless of whether the gap is due to excess developer profits, excessive inefficiencies or a combination of both, it is reasonable to argue this outcome compares unfavorably to the merits of demand-side voucher programs or other direct forms of household-level assistance and that future rental housing subsidy programs should incorporate a better understanding of the dynamic nature of rental housing prices as complexes age.

Tempering this conclusion is the possibility that the LIHTC program may generate other types of benefits to low-income households. Therefore, the following section presents a brief overview of the LIHTC program and develops a simple framework that outlines the potential channels by which the LIHTC program may benefit low-income households. It also briefly references some of the recent literature concerning each type of benefit. The third section presents the empirical approach, along with a description of the data used. The results of implementing the methodology for the selected housing market are presented in the fourth section. The fifth section considers discusses extensions and limitations. The sixth section discusses the policy implications of the findings and concludes.

Overview of the LIHTC Program

The LIHTC program has been the primary federal policy used in attempts to boost the production of affordable rental housing since it was created by the Tax Reform Act of 1986 (Cummings and DiPasquale 1999). Additionally, while the stock of public housing has been declining steadily for a number of years, the stock of LIHTC-developed units is rapidly growing each year. Schwartz and Melendez (2008) find that about 45% of LIHTC projects are located in urban areas, whereas about 30% and 25% of all projects are found in suburban and rural areas, respectively.

Qualified projects are selected by state housing finance agencies through a competitive process, and developers are awarded a 10-year stream of tax credits that begins only after the proposed development is completed. The size of the

tax credits follows a predetermined formula that depends upon the qualifying construction (rehabilitation) costs and the proportion of the projects' units to be occupied by low-income households.[5] Low-income households are defined as those earning no more than 60% of area median income (adjusted for family size). For new construction or substantial renovation projects, developers' total lifetime tax credit is typically set at 70% of the present value of the qualifying costs, which translates to an annual tax credit of roughly 9% of the project's initial costs. Existing property acquisition projects and projects receiving other forms of tax-exempt bond financing receive annual credits of roughly 4% of qualifying costs (McClure 2000).

Largely because the tax credits are nonrefundable, project developers typically sell the tax credits immediately to acquire up-front capital that is applied to construction costs, thereby reducing the size of the mortgage held on the property. This is usually accomplished by forming a limited partnership that involves both syndicators and investors (Schwartz and Melendez 2008). Syndicators effectively match groups of corporate and private investors to specific projects and the developers who need to sell their tax credits. Investors buy in with up-front cash payments in return for shares of ownership of the project and, in turn, future tax credits, depreciation allowances, cash flow from operations and capital gains if the property is ever sold.[6]

In return, project owners make a long-term commitment that units developed under the LIHTC subsidy will be occupied by qualifying households and that rents will not exceed LIHTC ceiling rents.[7] LIHTC ceiling rents are specific to local housing markets and are set each year as follows:

[5]Nondepreciable costs such as land acquisition, for example, do not qualify. Besides physical construction costs of the units, expenditures for impact fees, on-site infrastructure and landscaping and utility hookups are all eligible. If less than 100% of the units are committed to the program, the ratio of qualifying units to total units determines the fraction of these costs that can be claimed. Consistent with the vast majority of LIHTC projects, all complexes examined in the benefits estimation exercise carried out in this study took the 100% low-income tenant option. Note also that states can, and on occasion do, offer subsidies smaller than the maximum levels allowed under the law in an effort to serve more families.

[6]See Schwartz and Melendez (2008), Cummings and DiPasquale (1999) and Case (1991) among others for a more detailed description of the process typically used to finance LIHTC projects.

[7]Under the original 1986 enabling legislation, LIHTC project owners were required to meet defined affordability standards for 15 years. The 1989 Omnibus Reconciliation Act of 1989 mandates an additional 15-year "extended use agreement" period that covers years 16–30 of the project. All LIHTC projects considered presently were built after 1989 such that the extended use agreement applies. However, project owners are not subject to identical requirements during the two periods. Most importantly, provisions exist that allow project owners to request that the state make a "qualified contract" offer to purchase the project at the year-15 mark. If the state fails to find an entity to make an

1. HUD estimates and publishes the annual median family income for all housing markets. This occurs at the MSA level for Census-designated metropolitan counties. Nonmetropolitan counties have their own levels set, but there is little, if any, variation in rates across counties in relatively large geographic areas.
2. Sixty percent of this amount (family-size-adjusted) determines the cut-off for a marginally qualifying low-income family. The law stipulates this amount is multiplied by 30% (the implied affordability benchmark) and divided by 12 to determine the base value for the LIHTC ceiling rent.
3. This base value is adjusted for unit size: 75% for one-bedroom units, 90% for two-bedroom units and 104% for three-bedroom units.
4. These amounts are reduced by the amount the local public housing authority designates as utility allowances. The result now provides the final cap on rents that project owners can charge to the qualifying tenant.

It is worth noting that once this baseline standard is set, the actual rents collected for a particular unit *do not depend on individual characteristics* of the family renting that unit. Hence, families making less than 60% of adjusted area median income will, in turn, devote more than 30% of their annual income to rent.

Potential Benefits of the LIHTC to Low-Income Households

There are three channels through which the LIHTC program may benefit low-income households. First, the program may stimulate the overall production of rental housing units above the level that would have otherwise been constructed in the absence of the program. Higher construction levels for affordable rental units would shift the market supply curve forward and push down competitive rental housing prices (holding other factors constant).[8] If this occurs, households need not find themselves in an actual LIHTC unit to benefit from the

offer, the 15 years under the extended use agreement become void. For these reasons, it is hard to say just how different the long-term affordability commitment aspect of the program differs under the initial and subsequently updated rules. Also note that the exercise later carried out finds the gap between ceiling rents and market rents typically becomes small to nonexistent by the year-15 transition period. As such, both for the purposes of the present exercise and for more general questions relating to how long LIHTC projects create tangible benefits for low-income households, it is not clear what impact extending the commitment period from 15 to 30 years has made.

[8]Those interested in the nuanced relationship between the LIHTC program and the supply and demand for affordable rental housing services should refer to Sinai and Waldfogel (2005).

program; low-income households renting privately developed units will face lower rents than they otherwise would have.

However, although over 1.5 million units have been developed under the LIHTC program, it is naïve to assume these units have been net additions to the stock of affordable rental housing. "Crowding out" (*i.e.*, the possibility that LIHTC units are simply replacing units that would otherwise have been built under private financing) has been investigated by Malpezzi and Vandell (2002), Sinai and Waldfogel (2005), Baum-Snow and Marion (2007) and Eriksen and Rosenthal (2007). Malpezzi and Vandell (2002) find no significant relationship between the number of LIHTC units (and other subsidized units) built in a given state and the size of the current housing stock in that state. This suggests an extremely high rate of substitution (implying full crowding out) between LIHTC-funded developments and private developments. Sinai and Waldfogel (2005) find that, for supply-side subsidy programs, government-subsidized units do increase the total number of housing units, but that on average only one out of every three units built is an actual increase to the housing stock (*i.e.*, two out of every three subsidized units simply replace a unit that would have otherwise been provided by the private market). Baum-Snow and Marion (2007) find that, for every LIHTC unit built, the stock of rental housing increases by approximately 0.23 units within a one-kilometer concentric ring around the development, but that this effect dissipates to zero (*i.e.*, full crowding out) as the considered area becomes larger. Thus, although their results show the LIHTC program has a small effect on the geographic distribution of units built *within a given housing market*, they find no evidence for a positive overall effect on the stock of rental housing. Eriksen and Rosenthal (2007) find that, within a 10-mile area, only one-third of LIHTC development is offset by a reduction in privately constructed rental units, suggesting a somewhat larger positive effect on the stock of rental housing than other investigations. Collectively, the literature suggests that LIHTC-based additions to the rental housing stock are at least largely, and potentially fully, crowding out private construction. As such, it is reasonable to conclude that benefits from this first channel are small.

A second potential source of benefits is that, by giving state and local governments the authority to allocate awards to projects that they feel best serve the needs of low-income households, LIHTC projects may locate within higher-quality neighborhoods than privately developed units of similar quality, providing increased access to public services and social networks. An empirical literature investigating this possibility has recently emerged. Cummings and DiPasquale (1999) find that the program is most frequently used to provide additional rental housing opportunities in already poor neighborhoods rather than generating affordable units in higher-income areas. Newman and Schnare (1997) find that federal assistance programs including the LIHTC do a poor

job of improving recipients' neighborhood quality relative to welfare households, while voucher programs did reduce the likelihood that recipients lived in the worst areas. Eriksen and Rosenthal (2007) suggest that more recently developed LIHTC projects may have started to make inroads into middle- and upper-income areas to a small extent. They find that only 56% of LIHTC units were located within lowest-third income census tracks, comparing favorably to the 77% of traditional public housing units that fall into lowest-third income tracks. Again though, their findings show LIHTC units are largely crowding out units that would otherwise be developed privately in higher- and middle-income neighborhoods. Collectively, these findings suggest there is little, if any, improvement in neighborhood quality for low-income households renting LIHTC-sponsored units.

Finally, and of primary concern for the present analysis, LIHTC-subsidized units may simply cost low-income households less to rent than otherwise comparable units that were privately developed. Unlike the first potential benefits described above, rent savings accrue only to actual tenants of LIHTC units. Because benefits of this type are in-kind transfers, the value of the actual benefit to the recipient can be equal to *or less than* the rent savings and is not directly observable.[9] Furthermore, there is the possibility that the LIHTC pricing constraint may not bind. That is to say, the rent the unit could command in the private market may fall at or below the LIHTC ceiling rent. In this case no benefit attributable to the LIHTC program accrues. Because property age significantly affects market rents but does not influence LIHTC rent ceilings, the rent savings that accrue to tenants is expected to dissipate significantly over the life cycle of an LIHTC project. Unlike the first two potential sources of benefits that have been investigated in previous studies, scant attention has been directed toward the rent savings possibility. This study addresses this gap by developing and implementing a simple methodology for estimating the rent savings associated with the LIHTC program.

Data and Empirical Approach

The employed data come from 126 apartment complexes that were operational in 2002 in the Tallahassee, Florida, MSA.[10] However, apartment complexes themselves are not the unit of observation. Rather, an observation represents *all* the individual units within a given complex that share common physical characteristics and rent level within a complex. The 126 apartment complexes

[9]Thank you to an anonymous referee for pointing this out.

[10]All data, including monthly rent, come from a database that reflected current values in June 2002. The data were collected by the DeVoe L. Moore Center at Florida State University as a part of their ongoing efforts to explore issues of housing affordability.

produce 371 observations. Of these, 356 come from non-LIHTC-developed complexes and 15 come from LIHTC-subsidized complexes.[11] Despite the small number of LIHTC units available for the study, accurate estimates of the rent savings to tenants are obtainable due to the richness of the measures in the data. Individual apartment complexes contribute as many as nine observations. In total, there are just under 20,000 individual apartment units represented by the 371 observations in the data. Save privately rented homes and extremely small operations (duplexes and so on), the data cover the entire rental housing stock in the selected market. Observations are classified using 11 different "unit types" variables. To illustrate, if a complex has two-bedroom/one-bathroom as well as two-bedroom/two-bathroom units, with different rents for each, this contributes two distinct observations (each sharing the same complex-level variables but differing in unit-specific variables in addition to rent).

The Empirical Methodology

This article develops a simple procedure that can be used to estimate the rent savings that accrue to tenants over the life cycle of LIHTC projects and implements the procedure for the population of LIHTC projects in a selected medium-sized MSA (Tallahassee, Florida). A simple two-stage procedure to accomplish this task is developed. In the first stage, I follow a traditional approach to modeling apartment rents that employs hedonic regression techniques. The rent decomposition model is summarized by:

$$R_{ij} = a_1 + a_2 U_{ij} + a_3 C_j + a_4 A_j + a_5 N_j + a_6 L_j + a_7 P_j + e_{i,j} \quad (1)$$

where R_{ij} denotes the monthly rent paid by unit i located in complex j. U_{ij}, C_j, A_j and N_j represent physical attributes of the unit and complex, accessibility and neighborhood characteristics, respectively. L_j is a vector of contractual variables describing the leasing arrangement for complex j, P_j are variables reflecting the level of public service provision to complex j and $e_{i,j}$ is an unobserved error term with mean zero. These factors are commonly identified within the literature as important determinants of rent.[12] Equation (1) is estimated using only the 356 observations from non-LIHTC-subsidized projects, producing pricing

[11]Selection bias is not an issue because the data represent an exhaustive sample of apartment complexes in the housing market as of summer 2002. The original database contained 384 observations. One observation was dropped because monthly rent included a meal plan, utilities and other services. Another was dropped because several key explanatory variables were missing. The lone four-bedroom townhouse observation was also dropped. Finally, 10 observations came from complexes that were subsidized by the Section 8 new construction program. Because they are not free to charge market rent, but also are not LIHTC properties, they are unable to contribute to either the first or second stage of the empirical exercise.

[12]See Sirmans, MacPherson and Zietz (2005) for a recent review of this broad literature.

parameters (*i.e.*, estimated regression coefficients) that reflect market valuations. Because all variables are also observed for LIHTC units, the procedure estimates market rents for LIHTC units in the second stage. A comprehensive listing of all variables along with summary statistics can be found in Table 1. Means and standard deviations are presented for the full sample as well as the subsamples of LIHTC-subsidized units and nonsubsidized units.

Unit structure variables include square footage, a series of categorical variables that places the unit into its type (see Table 1 for a listing of the 11 types) and binary variables for a washer/dryer hookup and outdoor patio. Complex-level variables include age, age squared, number of units in the complex and binary variables for the presence of a pool, tennis court and clubhouse. Because more specific measures of unit quality (*i.e.*, floor type, window quality, appliances, efficiency of heating and air conditioning unit and so on) are not directly observed, age plays a very important role by likely serving as a proxy for aspects of unit quality that are not otherwise reflected in the data. Capturing accessibility is also an important but complicated task. Renters presumably value proximity to jobs, shopping, entertainment as well as interstates and other local thoroughfares. The monocentric model of urban land use, developed by Alonzo (1964), suggests that accessibility may be approximated by measuring the distance to a "central place" of economic activity. Following this approach, accessibility is measured using geographical information systems (GIS) software as the straight-line distance from the complex to a centrally located and heavily traversed major street intersection in the Tallahassee downtown area.[13]

Neighborhood characteristics are meant to control for renters' perceptions of how desirable it is to live in a particular area. Various measures have been used in previous studies of single- and multifamily housing, including the use of census-tract-level variables such as percent black, percent renter and median household income. The present study includes these measures but also adds a location-specific measure of the intensity of crime. Specifically, a crime-cost density measure is constructed (for each complex) using GIS techniques.[14]

[13]The intersection of Tennessee Street and Monroe Street was selected from a group of several potential locations. This heavily traversed intersection lies within a few blocks of the state capital building, the state supreme court, several large hotels and downtown Tallahassee. Knowledge of the local housing market along with early empirical results informed this selection.

[14]Census-tract-level variables come from the 2000 census. Crime data come from publicly available digitized arrest files that show the location and details of each arrest. The crime-cost measure accounts for the weighted seriousness of each arrest that occurred during 2002 within a one-half-mile concentric circle of the center of the apartment complex. Lynch and Rasmussen (2001) show that using simple count variables can be problematic in this application and demonstrate the advantages of weighting each crime by it seriousness. The weighting index used in the present analysis is taken from Cohen, Miller and Wiersema (1995).

Table 1 ■ Descriptive statistics.

Variable Description	Variable Vector	Type	Mean Full Sample	St. Dev. Full Sample	Mean Non-LIHTC	Mean LIHTC
Rent (monthly rent in dollars)	R_{ij}	Cont.	648.6	246.0	648.6	–
Log Rent (natural log of rent)	R_{ij}	Cont.	6.418	0.321	6.418	–
Interior Square Footage of the Unit	U_{ij}	Cont.	953.9	300.9	952.1	997.6
Efficiency Unit (reference category)	U_{ij}	Binary	0.027	0.162	0.028	0
One Bedroom/One Bathroom	U_{ij}	Binary	0.342	0.475	0.348	0.200
Two Bedroom/One Bathroom	U_{ij}	Binary	0.162	0.369	0.169	0
Two Bedroom/Two Bathroom	U_{ij}	Binary	0.213	0.410	0.208	0.333
Three Bedroom/Two Bathroom	U_{ij}	Binary	0.137	0.345	0.129	0.333
Three Bedroom/Three Bathroom	U_{ij}	Binary	0.022	0.145	0.020	0.067
Four Bedroom/Two Bathroom	U_{ij}	Binary	0.016	0.126	0.017	0
Four Bedroom/Four Bathroom	U_{ij}	Binary	0.024	0.154	0.025	0
2-Bedroom Townhouse	U_{ij}	Binary	0.032	0.177	0.034	0
3-Bedroom Townhouse	U_{ij}	Binary	0.024	0.154	0.022	0.067
Extra Half Bathroom	U_{ij}	Binary	0.046	0.209	0.048	0
Washer/Dryer Hook-Up	U_{ij}	Binary	0.650	0.478	0.635	1
Patio (or balcony)	U_{ij}	Binary	0.757	0.429	0.778	0.267
Age of Complex (2002 – Year Built)	C_j	Cont.	21.51	11.10	22.17	6.067
Age Squared	C_j	Cont.	585.6	434.3	608.8	39.27

Table 1 ■ continued

Variable Description	Variable Vector	Type	Mean Full Sample	St. Dev. Full Sample	Mean Non-LIHTC	Mean LIHTC
Number of Units in Complex	C_j	Cont.	157.9	91.50	156.14	198.5
Pool	C_j	Binary	0.868	0.339	0.862	1
Tennis Court	C_j	Binary	0.167	0.374	0.174	0
Clubhouse	C_j	Binary	0.245	0.431	0.225	0.733
Distance to City Center (miles)	A_j	Cont.	2.581	1.096	2.532	3.762
Crime Cost Measure	N_j	Cont.	114.9	145.6	117.0	65.12
% Black (census tract)	N_j	Cont.	30.05	13.29	29.92	33.07
% Renter (census tract)	N_j	Cont.	64.59	21.30	64.93	56.67
Median Household Income	N_j	Cont.	29613	15352	29391	34860
Individual Occupant Lease Structure	L_j	Binary	0.102	0.304	0.107	0
Resident Income Requirement	L_j	Binary	0.075	0.265	0.079	0
Elementary School Test Score	P_j	Cont.	375.2	65.63	372.2	444.67
LIHTC Complex		Binary	0.040	0.197	0	1
Observations			371		356	15

Notes: This table presents the descriptive statistics concerning each variable for: (1) the full sample, (2) the sample of privately developed non-LIHTC observations and (3) LIHTC subsidized observations. Column 3 shows whether the variable is measured as a continuous variable or a binary variable.

A measure of public school performance is used to reflect the quality of local public services associated with the unit. School zone designation maps provided by Leon County allow each apartment complex to be matched to its respective elementary school. The numerical score the corresponding elementary school earned on an annual statewide examination proxies for the level of public services provided to residents in the area.[15] Although the contractual nature of rental leasing agreements has been largely ignored in previous models of apartment rent, two important contractual variables are included in the present study. The first is a binary variable showing whether the lease structure is one rental contract per unit or one contract per resident. Although the former is easily the more common arrangement, the latter is rapidly growing in popularity. The second shows whether the complex has a formal policy requiring potential renters to document that they earn a minimum level of monthly income before signing the lease.

Because the second stage of the present empirical exercise involves out-of-sample prediction, it is important to note the similarities and differences between the LIHTC and non-LIHTC units in the Tallahassee market. Because nonrandom processes guide both the project developer's initial decision regarding application to the LIHTC program and the decisions over which projects are selected for LIHTC awards, it is important to consider the possibility of unobserved heterogeneity bias. A high degree of similarity is present when looking at the most important physical characteristics—interior square footage and the series of categorical unit type variables. The few differences that are present seem to revolve around the one variable for which the two subsamples differ greatly—property age. The LIHTC units have a mean age of 6.1 years as compared with 22.2 for the rest of the sample. Other differences are likely related to this gap. Compared to privately developed units, LIHTC units in this housing market are located farther away from the city center, have lower crime cost and reside in areas with higher school test scores.[16] Each of these tendencies is also found when looking only at the group of newer privately developed units, providing an indication that age is likely driving these trends.

[15]These scores are used by the state in a formula that assigns each elementary school a grade of A through F for its "accountability system." Schools care about these scores because they can affect state funding. Figlio and Lucas (2004) show that school grades have a significant impact on single-family house prices.

[16]Thank you to an anonymous referee for pointing out that none of the LIHTC properties used in the present exercise were developed in a qualified census tract (QCT). LIHTC properties developed in QCTs can be found in other housing markets and are eligible for additional credits. Unfortunately, the present exercise is not able to comment on how rent savings to tenants varies across QCT and non-QCT areas.

Pricing Equation Results and LIHTC Program Evaluation

Table 2 reports the findings of two ordinary least squares regression models. Model 1 represents a linear model, whereas Model 2 is of semilog form. The explanatory power is very high in both estimations. After using standard methods to compare the fit of both models, Model 1 was selected for use in the second-stage procedure and is primarily focused on in the discussion that follows.[17] Over 90% of the observed variation in market rents is explained by Model 1, and nearly all of the structural control variables coefficients are highly significant and of the anticipated sign. Although a few brief comments on some of the specific findings regarding the pricing equation follow, the most important point is that the fit of Model 1 is tight and, therefore, out-of-sample prediction should be accurate. Hence, it is reasonable to use these pricing parameters (estimated variable coefficients) in the second stage for the purpose of predicting otherwise obtainable market rents for LIHTC subsidized units.

Unsurprisingly, unit type and size, as well as complex size and age, are among the most influential explanatory variables. As expected, complex age exerts a significant downward pressure on rent. The significant nonlinearity of this relationship in the selected MSA is worth noting because previous research has found that age exerts a nearly constant effect on rents (Malpezzi, Ozanne and Thibodeau 1987). The relationship between property age and predicted market rent is summarized by Figure 1. The pricing parameters suggest that rents fall relatively quickly as complexes age initially, but that the rate of decline slows over time. For example, otherwise identical units would differ in rent by over $105 on average if one was new and the other was 10 years old, whereas the estimated difference in rent between 20- and 30-year-old units is less than $35.[18] It is worth noting that LIHTC rent ceilings are not adjusted based on the age of the complex. This implies the rent savings should initially be the greatest and then dissipate (potentially to zero) over the life cycle of the project.

Accessibility, as measured by distance to the selected central place, performs as expected. The negative gradient is consistent with traditional urban economic theories of land use patterns. Although most register with the anticipated signs,

[17]Model 1 has a slightly higher adjusted R^2 and also outperforms the semilog model using techniques that compute directly comparable sums of squared deviations of predicted values from observed values for the dependant variable. The qualitative results of the LIHTC program evaluation exercise that follows are highly robust to the use of either model.

[18]The relationship between age and rent should also be subject to expenditures on property maintenance and repair at the individual complex level, with greater expenditures leading to slower rates of decline in rents. *Ceteris paribus*, intuition suggests LIHTC complexes would invest less in property upkeep because they face a binding price constraint.

Table 2 ■ Ordinary least squares regression results.

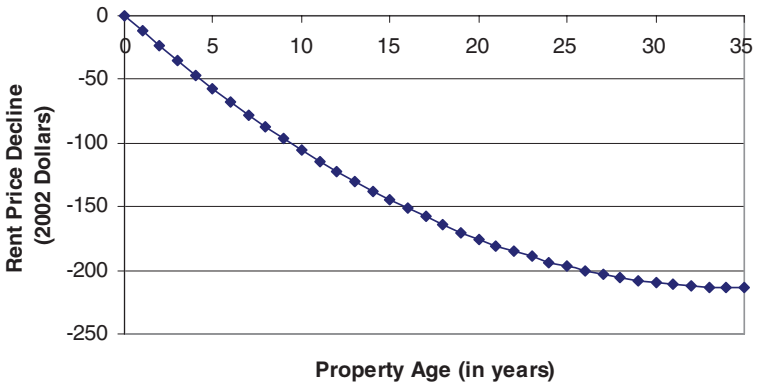
Dependent Variable	Model 1	Model 2
	Rent	*Log Rent*
Age of Complex	−12.321**	−0.0162**
	(1.702)	(0.0025)
Age Squared	0.178**	0.0002**
	(0.038)	(0.0001)
Individual Occupant Lease Structure	49.493*	0.0385
	(21.419)	(0.0314)
Interior Square Feet	0.078**	0.0002**
	(0.031)	(0.0000)
Number of Units in Complex	0.202**	0.0003**
	(0.058)	(0.0001)
Resident Income Requirement	−34.698*	−0.0657**
	(15.095)	(0.0221)
Distance to City Center	−9.803*	−0.0121
	(4.538)	(0.0067)
One Bedroom/One Bathroom	22.362	0.0557
	(25.774)	(0.0379)
Two Bedroom/One Bathroom	106.391**	0.2049**
	(29.979)	(0.0440)
Two Bedroom/ Two Bathroom	142.673**	0.2534**
	(31.494)	(0.0462)
Three Bedroom/ Two Bathroom	255.929**	0.3935**
	(37.292)	(0.0547)
Three Bedroom/ Three Bathroom	466.105**	0.5734**
	(45.625)	(0.0669)
Four Bedroom/ Two Bathroom	646.867**	0.7492**
	(47.998)	(0.0704)
Four Bedroom/ Four Bathroom	836.968**	0.8135**
	(52.444)	(0.0769)
Two-Bedroom Townhouse	161.574**	0.2793**
	(39.992)	(0.0586)
Three-Bedroom Townhouse	278.134**	0.4246**
	(45.382)	(0.0665)
Extra Half Bathroom	16.225	0.0379
	(19.779)	(0.0290)
Washer/Dryer Hook-Up	17.289	0.0547**
	(11.086)	(0.0163)
Patio	20.793	0.0367*
	(11.181)	(0.0164)
Pool	16.445	0.0416
	(14.473)	(0.0212)
Tennis Court	−0.442	0.0169
	(12.454)	(0.0183)
Clubhouse	16.065	0.0066
	(12.539)	(0.0184)

Table 2 ■ continued

Dependent Variable	Model 1	Model 2
	Rent	*Log Rent*
Crime Cost Measure	0.009	−0.0002
	(0.031)	(0.0005)
School Test Score	−0.031	−0.0001
	(0.091)	(0.0001)
% Black (census tract)	−0.668	−0.0018**
	(0.387)	(0.0006)
% Renter (census tract)	0.167	0.0013*
	(0.438)	(0.0006)
Median HH Inc. (census tract)	0.000	0.0014
	(0.001)	(0.0011)
Constant	552.390**	6.078**
	(62.435)	(0.092)
Observations	356	356
Adjusted R^2	0.919	0.900

Notes: This table presents the results from ordinary least squares regressions using *Rent* and *Log Rent* as dependant variables. Standard errors are in parentheses. Significance at the 5% level is designated by * and significance at the 1% level is designated by **.

Figure 1 ■ Estimated effect of complex age on market rent from Model 1.



the neighborhood characteristic variables typically do not achieve statistical significance. The exception is that both percent black and household median income are significant at the 1% and 5% levels (respectively) in the semilog model. The effect of individual occupant lease arrangements is positive in both Models 1 and 2, but it is only significant in Model 1. In equilibrium, landlords of both types should receive the same expected rate of return. One

explanation is that the individual occupant lease structure is associated with higher administrative costs on the side of the landlord stemming from increased paperwork and turnover, but that tenants are willing to bear these higher costs because of the reduced risk associated with having their own lease (*i.e.*, they are no longer at risk of being put in a troublesome situation if a roommate falls behind on rent and/or wants to leave the arrangement). Higher rents for individual leases may also be driven by higher repair and maintenance costs created by the types of renters using this arrangement (typically students). The income requirement variable is negative and significant. One explanation for this finding is that higher-income renters tend to pay the full rent each month more frequently than lower-income households. As such, landlords would be willing to accept a small reduction in monthly rent for the returned higher probability of timely payment. As such, the income requirement variable may be picking up an omitted variable—namely, the fraction of months that residents of the complex pay their full rent on time and without the landlords having to expend time and/or money to track down payment.[19]

LIHTC Program Evaluation[20]

As mentioned before, this article estimates the rent savings accruing to resident tenants, as a direct result of the LIHTC pricing commitment, over the life cycle of LIHTC projects. A straightforward approach to estimating this rent savings

[19]Thank you to an anonymous referee for a helpful suggestion concerning the explanation of the income requirement variable.

[20]The following exercise calculates the costs associated with the tax credits and the benefits (rent savings to tenants) associated with each unit that have accrued to the present year (2009). On the cost side this can be viewed as exhaustive—each of the 10-year streams of tax credits has presently expired. Unfortunately, on the benefits side, the same clean truncation does not apply. While several observations have reached the point where they generate little or no rent savings by 2009 (*i.e.*, predicted rent does not exceed allowable rent), others still are (in particular for the relatively younger properties developed in the late 1990s). Further discussion of this issue surfaces after presenting the results of the exercise. Also, transition issues will shortly arise as projects move from the original 15-year commitment into their 15-year extended use agreements. See footnote 7 for clarification. Note also that the use of LIHTC ceiling rent for the present exercise does not imply all tenants are actually paying ceiling rent. The database does not have tenant-specific rent payments. Because LIHTC projects frequently receive other subsidies, and because tenants residing in the facility may have personal vouchers, there are many reasons an individual tenant's monthly rent could fall below LIHTC ceiling rent. However, the goal of the exercise is to compare the tax expenditures associated with the LIHTC program to the rent savings attributable to this program. A consideration of the additional savings in rent due to other factors, as well as their associated public costs, is beyond the scope of this exercise. I also thank an anonymous referee for pointing out that Congress has recently decided to require that U.S. Department of Housing and Urban Development (HUD) collect actual monthly rent payments made by tenants living in LIHTC properties. The data collection should begin in 2010 and should be useful for future studies examining the LIHTC program.

involves taking the difference between the LIHTC rent ceiling and what the unit would otherwise rent for on the open market. This difference is characterized as an upper bound of the personal benefit to low-income households who rent units subsidized under the program.[21] Because the regression parameters are estimated using only observations from private apartment complexes, they reflect the market value of each measurable attribute. Hence, the variable coefficients from Model 1, along with the observed independent variables, are used to estimate otherwise obtainable market rents for LIHTC units. This allows the estimation of the rent savings which can, in turn, be compared to the size of the tax credits for the same project.

Recall that each LIHTC complex is given a tax credit that is allocated over a 10-year period following completion of the project. The annual credits are roughly 9% of the total project cost for new construction and 4% annually for acquisition of existing structures and cases where owners finance using tax-exempt bonds.[22] The discounted present value of the forgone tax revenue, at the time of initial allocation, provides a measure of the social cost of the project.[23] In return, owners make a long-term commitment to rent their units under the guidelines previously described. The analysis is straightforward: provided that this capped amount for a given year falls below predicted market rent, the difference becomes rent savings to the household. If the capped amount

[21]Three factors support this conjecture. First, even with a rich database, some aspects of quality are likely unobservable. Because LIHTC developers know they will face a binding pricing constraint for many years, subsidized units likely exhibit lower levels of quality with respect to unobservable variables. Second, the effect of age on complex rent may be sensitive to the level of maintenance expenditures. Again, because a price ceiling is in place for LIHTC units, owners may spend less on maintenance than complexes charging market rents. Lower levels of upkeep would suggest a more rapid decline in otherwise obtainable market rents. Supporting this claim, Schwartz and Melendez (2008) document that many LIHTC projects are in need of serious renovations when they reach the year-15 mark. Finally, as is always the case with in-kind transfers, the household may not place a monetary value on the additional housing consumption that is as large as the rent savings itself.

[22]Of the six LIHTC-developed apartment complexes, three used the 9% option and three selected the 4% credit plus tax-exempt bonds option (Florida Housing Finance Corporation 2007). Under the 4% option, the size of the tax credits is an inaccurate measure of the costs of the developer subsidy. Developers select the option generating the largest subsidy. As such, a lower bound estimate of the cost associated with the 4% plus tax-exempt bonds cases is easily found by calculating the size of tax credits that would have been associated with the 9% option. As such, for each of the 4% option projects, the size of the allocated tax credit is multiplied by 2.25 before beginning the exercise.

[23]A reasonable choice for a discount rate would be the 10-year Treasury yield at the time of allocation. The six LIHTC projects examined in this exercise were undertaken over a relatively short time period (1994–1998). For simplicity and to construct a conservative estimate of the social costs of the forgone tax revenue, I use a discount rate of 5% for all present value cost and benefit calculations later presented.

Table 3 ■ U.S. Department of Housing and Urban Development (HUD) allowed and predicted market rents: LIHTC-subsidized units.

Complex	Age (2002)	Unit Type	Ceiling Rent (2002)	Predicted Rent (2002)	Rent Savings Per Unit
1	7	1 bed/1 bath	578	617	39
1	7	2 bed/2 bath	693	737	44
1	7	3 bed/2 bath	791	859	68
2	8	2 bed/2 bath	693	713	20
2	8	3 bed/2 bath	791	837	46
3	7	3 bed/2 bath	791	851	60
3	7	3 bed town.	791	881	90
4	5	1 bed/1 bath	578	620	42
4	5	2 bed/2 bath	693	756	63
4	5	3 bed/2 bath	791	877	86
5	5	1 bed/1 bath	578	648	70
5	5	2 bed/2 bath	693	785	92
5	5	3 bed/2 bath	791	908	117
6	4	2 bed/2 bath	693	753	60
6	4	3 bed/2 bath	791	879	88

Notes: This table presents information concerning the 15 LIHTC-subsidized observations, coming from the six different LIHTC-developed complexes. The first three columns show the designated complex identification number, complex age in 2002 and unit type for each observation. The fourth column reports the unit-size-adjusted HUD-allowed maximum rent. The fifth column shows the predicted market rents for each observation.

exceeds predicted rent, the pricing constraint does not bind and the rent savings to the household is taken to be zero. The results of the hedonic pricing equation, along with the data from LIHTC units, allow for the computation of predicted market rent for the year 2002 for each subsidized unit. Predicted market rents are then compared to HUD's maximum allowable 2002 rents to see where (and to what extent) the constraint binds.[24]

Table 3 presents information concerning the 15 LIHTC-subsidized observations, coming from the six different LIHTC-developed complexes. The first three columns show the designated complex identification number, the complex age in 2002 and the unit type for each observation. The fourth column reports the unit-size-adjusted HUD-allowed maximum rent. The fifth column shows the predicted markets rents for each observation. As predicted rents

[24] Allowable rents are a function of the unit structure type (*i.e.*, number of bedrooms) and can be easily calculated once the annual median family income used by HUD is determined. The 2002 figure for the Tallahassee MSA is $57,200 (HUD 2007).

exceed maximum allowed rents for all cases, the sixth column reports the estimated rent savings to tenants, which fall between $20 and $117 per unit. It is worth noting that the vast majority of rent savings can be attributed to the requirement that LIHTC landlords account for utility allowances. More specifically, the LIHTC rent ceiling at step 3 in the process described in the second section is largely nonbinding, such that step 4 generates the vast majority of rent savings.[25] Note however that Table 3 only reflects a static snapshot and that rent savings for other years of each projects existence requires more detailed calculations that account for the properties' age fluctuating over time. Obtainable market rent declines over the life cycle of an LIHTC project, whereas LIHTC ceiling rent is unaffected by the age of the unit. As such, the largest portion of rent savings occurs during the initial years of a project's existence. Over time, allowable rents begin to approach, and even fall below, what the units could otherwise command on the private market. Thus, the pricing dynamics of rental housing with respect to project age are important to consider when estimating the benefits of the program to low-income households.

The following discussion outlines the dynamic comparison of the overall cost of the LIHTC tax expenditures to the magnitude of households' rent savings that have accrued over the projects' life cycle for the six LIHTC complexes in the data. The monetary costs of LIHTC program come from the 10-year stream of the tax credits allocated to the project owner. In each case, this stream of credits is turned into a present value at time of allocation using a discount rate of 5% (see footnote 23).

The rent savings that accrues to tenants for each complex is estimated as follows:

1. Using the estimated coefficients from Model 1, predicted 2002 market rents are computed for each observation (see Table 3). For each other year of the project's existence, predicted rents still make use of the estimated hedonic pricing parameters but are adjusted according to the varying age of the project, so that predicted rent is for a unit with the correct vintage (*i.e.*, all independent variables remain the same, except

[25]The Tallahassee Housing Authority provided historical utility allowances for the project. I am thankful for a suggestion from an anonymous referee that led me to confirm that LIHTC projects use the same utility allowances that apply to the Section 8 household voucher program. Unfortunately, the Tallahassee Housing Authority did not have records for years before 2005. However, the process used to generate utility allowances has been stable over the course of the program, and utility allowances for years prior to 2005 were estimated using the Consumer Price Index-All Urban Consumers (CPI-U), an index to which all future fluctuations in the annual utility allowances are now explicitly tied.

Table 4 ■ Example calculation of predicted market rents by year.

Year	Implied Age	2002 Predicted Rent (Varying Age)	Rental Housing Cost Index Multiplier	Adjusted Predicted Rent
2002	8	713	1	713
2001	7	723	0.961	695
2000	6	733	0.925	678
1999	5	743	0.898	667
1998	4	754	0.875	660
1997	3	765	0.847	648
1996	2	776	0.823	639
1995	1	788	0.798	629
1994	0	800	0.772	618

Notes: This table outlines the process used to calculate annual predicted rent for an example observation. The fifth column shows the final adjusted values that are compared against the LIHTC rent ceiling to determine the level of rent savings to tenants.

the age and age-squared variables which are modified to reflect the implied age the property was *in that year* prior to calculating predicted rent). The first three columns of Table 4 outline this process for an example observation. Beginning with the complex age in 2002 (8 years), moving down column three shows how the predicted rent increases as the unit becomes newer, holding all else constant.

2. Because values in the third column are in 2002 dollars, these figures must be adjusted to reflect market price conditions that prevailed in earlier years. Annual rental housing cost indexes are used to adjust these figures for each year.[26] Index multipliers are reported in the fourth column of Table 4, and the fifth column reports adjusted predicted rents.

3. LIHTC ceiling rents for each unit (by year) were obtained following the process outlined in the second section. This accounts for adjustments to the base rate for unit size and also incorporates the downward adjustment due to utility allowances.

4. If the difference between the adjusted predicted market rent for a year and LIHTC ceiling rent for that same year is positive, it is defined as

[26]The "owners' equivalent rent" series from the CPI-U found in the U.S. Statistical Abstract is used for this adjustment. A disadvantage of using this series is that it reflects national trends, while an advantage is that it is specific to rental housing costs (rather than housing cost indices which are sensitive to single-family-home prices). More specific indices with Tallahassee-MSA-specific rental housing price trends would be preferable; however, this series (contained in the Florida Statistical Abstract) was found to be extremely unstable over time. The index value for Tallahassee rises and then falls again by nearly 20% in just a few years, a highly implausible result.

Table 5 ■ LIHTC benefit to cost comparison results.

Complex	# Units	PV: Foregone Tax Revenue	PV: Rent Savings Stream	Rent Savings/ Cost Ratio
1	160	$6,175,267	$2,049,634	33.2%
2	183	$6,120,961	$2,504,728	40.9%
3	111	$4,086,633	$2,097,265	51.3%
4*	183	$7,594,483	$2,202,838	29.0%
5*	279	$10,798,555	$4,319,458	40.0%
6*	253	$11,507,253	$3,069,290	26.7%
Totals	1,169	$46,283,152	$16,243,213	35.1%

Notes: This table presents the final results of the main exercise carried out by this study as well as the net present value (PV) calculations (for both the tax expenditure and the rent savings to tenants) for each of the six LIHTC complexes at the time of project approval. An asterisk indicates the project selected the 4% tax credit paired with a tax-exempt bonds option such that the foregone tax revenue figures shown above reflect the actual annual tax credits multiplied by 2.25 in each case. See footnote 22 for additional explanation.

the rent savings per unit, per month. This is multiplied by 12 to obtain the rent savings associated with the unit for the full year. Where the predicted market rent falls below the maximum allowed rent, a rent savings of zero is assumed.

5. This figure is multiplied by the number of units of that type in the apartment complex, and rent savings across each different type of unit within each complex are summed to obtain the aggregate yearly benefit total for that complex.

6. Aggregate yearly rent savings totals for each complex are transformed into present values at the time of the initial year of operation (which is also the first year of credits) and summed across years. Again a 5% discount rate is employed.

7. Finally, the discounted present values of the tax expenditures and rent savings generated by the program are compared for the six LIHTC complexes examined. Table 5 reports the results of the exercise.

The rent savings is only 26.7%–51.3% as large as the magnitude of the tax credit costs, with the overall rent savings/cost ratio of 35.1%. Framing the results in a per-unit basis is illustrative. The present value cost, on average, is nearly $40,000 per unit, whereas the present value rent savings stream is just under $14,000. Also, for reasons discussed previously, the $40,000 figure likely represents an extreme lower-bound measure of the programs costs, potentially moving the ratio for the program in an even more unfavorable manner. This is

disturbing when combined with the previously described literature that suggests neither of the other two sources of benefits to low-income households of the program (stimulation of additional rental housing production and the possibility that affordable rental housing will be built in better areas) are very large. One point that tempers the harshness of this result to a degree is that most of the LIHTC complexes considered are still generating positive (albeit very small) rent savings during the final year under consideration (2009). This is not surprising because several complexes are still several years away from the year-15 transition. However, only a single complex (#5) experienced rent savings during the final year under consideration that exceeded 1% of the overall present value cost, and all complexes still experiencing rent savings were rapidly losing that status. All told, the results of the exercise suggest it is reasonable to question whether or not the considerable costs of the program are worthwhile, given the limited size of rent savings to low-income families.

Extensions and Limitations

Again, to be fair, there are other important potential benefits of the LIHTC program this study has not investigated directly. The possibility that the program enhanced the availability of affordable rental units and/or that the development of LIHTC projects helped dampen free market rental housing prices in the selected MSA must be recognized. The presented exercise attempts to quantify only one important aspect of the social benefits of the LIHTC program that has not been previously investigated.

Also, to the extent that forgone tax revenues exceed the rent savings that accrues to low-income households, it is inaccurate to characterize the difference as a pure loss to society. The present analysis is not able to comment directly on the magnitude of benefits from the LIHTC program that accrue to developers or project investors, because I have no data on profit levels from investments for the LIHTC projects considered. Still, the large gap between rent savings and the size of the subsidy implies they may be considerable. In fact, the results support a conjecture that those developers and investors fortunate enough to be awarded the tax credits gain much. Hence, the LIHTC program may partially act as a wealth transfer to recipient developers and project owners, rather than conferring benefits concentrated to low-income families.

Furthermore, a closer examination of the nature of the rent savings that accrue to low-income households is merited. Because a majority of the rent savings that accrues takes place during the early years of all considered projects' life cycles, the benefit of the LIHTC program to low-income households stems from a relatively small number of moderately low-income families paying well below market rents for the first several years of a project's life. Over

time, tenants receive fewer and fewer gains, eventually reaching a point where there is no gain associated with the pricing constraint faced by the project's owners. Thus, one interpretation would be that a primary benefit to low-income households is moving families into *newer housing*, rather than into housing that is larger, that is subject to improved locational amenities and/or increased access to public goods or that is less expensive. This should be considered a poor outcome if the primary goal of the program is to alleviate issues of housing affordability for low-income families. Conversely, the literature that has developed concerning the Section 8 program suggests that personal vouchers are a fairly efficient subsidy program, in the sense that transfers are made directly to lower-income families without distorting their housing consumption decisions on the margin.[27] Most notably, lower-income households may be unlikely to pay a significant premium for newer housing, instead focusing more on units' size, physical attributes and accessibility to employment opportunities and amenities.

A potential limitation of the study is that a single housing market (Tallahassee, Florida, and the LIHTC complexes within that housing market) has been selected as a case study to implement the procedure developed in the article. A natural question is: How do the results generalize to LIHTC projects in other housing markets? A rigorous investigation of this question would require obtaining the type of detailed data used in this article for both LIHTC and nonsubsidized apartment complexes in many different MSAs and stands as a potential area for future research. However, an informative preliminary answer to this question can be determined by focusing on the extent to which developers find the LIHTC generated pricing constraint to be binding within a given housing market. This should largely depend on two variables: area median income (which is used to determine allowable rents) and area median rent for nonsubsidized housing (serving as a rough proxy for the level of market rents units could otherwise obtain). Table 6 presents this information for 2002 for a sample of 30 metropolitan areas.

The percentages in the fourth column are the most important signal of how the results of the present exercise may relate to conditions in other housing markets across the United States. They show the fraction of area median income that would be needed to rent a median priced two-bedroom unit on the open market for one month. The intuition is straightforward: the lower the percentage, the more similar LIHTC allowable rents should be to market based rents, implying smaller levels of rent savings from the program. Conversely, as the percentage moves higher, the rent savings associated with the program should rise. Thus,

[27]Families pay 100% of the marginal cost of their housing choice unless the size of their individual voucher exceeds the magnitude of their rent.

Table 6 ■ HUD-defined area median income and median rent for 2002.

Housing Market	Median Income (2002)	Median Rent (2002) Two-Bedroom Unit	Monthly Rent As a Percentage of Median Income
Tier 1 Markets			
Atlanta, GA	71,200	878	1.23
Boston, MA	74,200	1,338	1.80
Chicago, IL	75,400	891	1.18
Dallas, TX	66,500	810	1.22
Houston, TX	59,600	709	1.19
Los Angeles, CA	55,100	882	1.60
Miami, FL	48,200	781	1.62
New York, NY	62,900	1,095	1.74
Philadelphia, PA	63,300	839	1.33
Washington, DC	91,500	943	1.03
Tier 1 Average	66,790	917	1.39
Tier 2 Markets			
Birmingham, AL	52,700	581	1.10
Charlotte, NC	64,100	725	1.13
Columbus, OH	63,400	673	1.06
Jacksonville, FL	55,600	701	1.26
Las Vegas, NV	54,300	783	1.44
Memphis, TN	57,300	656	1.14
Milwaukee, WI	67,200	697	1.04
New Orleans, LA	44,000	673	1.53
Oklahoma City, OK	46,000	566	1.23
Sacramento, CA	57,300	709	1.24
Tier 2 Average	56,190	676	1.22
Tier 3 Markets			
Ashville, NC	49,000	609	1.24
Boise City, ID	54,500	585	1.07
Des Moines, IA	66,900	609	0.91
Flint, MI	55,600	605	1.09
Jackson, MS	53,100	607	1.14
Mobile, AL	45,100	534	1.18
Reno, NV	62,300	792	1.27
Salem, OR	46,700	656	1.40
Spokane, WA	46,600	564	1.21
Tallahassee, FL	*57,200*	*670*	*1.17*
Tier 3 Average	53,700	623	1.17

Notes: This table provides 2002 levels of HUD-defined area median incomes and area median rents for a sample of 30 housing markets in the United States. Tier 1 contains the 10 largest housing markets in the United States. Tier 2 is a representative sample of housing markets that are clearly larger than Tallahassee, Florida. They are a subset of metropolitan areas with populations between one and two million in the 2000 census. Tier 3 is a representative sample of medium-sized housing markets, including Tallahassee, Florida. Each had a population above 300,000 but not greater than 500,000 in the 2000 census. The data section of HUD's website, www.huduser.org/datasets, is the source for all median income and rent data.

the potential benefits of the LIHTC program to low-income renters should be the largest (smallest) in housing markets where the percentage is large (small). Although Tallahassee is an average representative of the medium-sized housing markets, the potential benefits of the LIHTC program are expected to be somewhat larger for the other two tiers. In particular, very large urban areas seem to have the greatest potential for rent savings. For example, Boston, Los Angeles, Miami and New York may have larger rent savings for their LIHTC projects than those examined in the selected housing market.

Conclusions and Policy Implications

This study extends the literature concerning the LIHTC program by estimating the rent savings that accrue to low-income households over a typical LIHTC project's life cycle and comparing them to the costs of the same project. The analysis reveals that LIHTC project owners face pricing constraints that bind to the largest extent during the projects' initial years and that, over time, projects age and owners no longer face binding pricing constraints. The results imply the LIHTC program may significantly benefit project developers and owners, with approximately one-third of the programs' cost going to low-income households in the form of rent savings. All told, this study tends to support the notion that the LIHTC program is an inefficient mechanism for generating benefits to low-income households. Future work should verify whether similar results hold for other housing markets, particularly in large urban housing markets. Future attempts to model apartment rents should also further investigate the effect that property aging in various housing markets has on market rents and the extent to which this dynamic distorts the intended benefits of federal project-based subsidy programs, such as the LIHTC program.

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