

The Low-Income Housing Tax Credit Program: A Multicity Rent Savings Analysis

Uche Oluku & Shaoming Cheng

To cite this article: Uche Oluku & Shaoming Cheng (2022): The Low-Income Housing Tax Credit Program: A Multicity Rent Savings Analysis, Housing Policy Debate, DOI: [10.1080/10511482.2022.2070651](https://doi.org/10.1080/10511482.2022.2070651)

To link to this article: <https://doi.org/10.1080/10511482.2022.2070651>



Published online: 23 May 2022.



Submit your article to this journal [↗](#)



Article views: 27




View related articles [↗](#)



View Crossmark data [↗](#)



The Low-Income Housing Tax Credit Program: A Multicity Rent Savings Analysis

Uche Oluku  and Shaoming Cheng

Public Administration, Florida International University, Miami, FL, USA

ABSTRACT

The paper utilizes actual Low-Income Housing Tax Credit (LIHTC) rents rather than federally mandated maximum rents to evaluate LIHTC rent savings in 12 diverse housing markets across the United States. Monthly rent savings are greatest in large cities with strong housing markets (Chicago, Illinois; Miami, Florida; San Jose, California; and Washington, DC), ranging from \$708 for a new one-bedroom unit in Miami to \$1,114 for a new two-bedroom unit in San Jose. Monthly rent savings in mid-sized cities with weaker housing markets (Albuquerque, New Mexico; Buffalo, New York; Indianapolis, Indiana; and Louisville, Kentucky) and small cities with stronger housing markets (Manchester, New Hampshire, and Midland, Texas) are comparable, ranging from \$108 for a new one-bedroom unit in Midland to \$725 for a new three-bedroom unit in Indianapolis. Rent savings are considerably less in small cities with weak housing markets (Sioux Falls, South Dakota; and Billings, Montana). Meanwhile, nationwide, rent savings decline as properties age.

ARTICLE HISTORY

Received 9 April 2021
Accepted 12 April 2022

KEYWORDS

Low-income housing tax credits; LIHTC; affordable housing; rent savings

Introduction

In the 35 years since its inception, Low-Income Housing Tax Credit (LIHTC) has been the preeminent program for creating and preserving affordable housing¹ in the United States. The LIHTC program funded more than 3.23 million housing units in 48,672 projects between 1987 and 2018, and an annual average of 106,400 units in 1400 projects between 1995 and 2018 [U.S. Department of Housing & Urban Development, Office of Policy Development and Research (HUD PD&R), 2020b]. The LIHTC program served more than eight million households (Berger, 2020; Dietz, 2020), and as many as 18.7 million² people as of 2018 (Dietz, 2020).

The LIHTC program is estimated to cost the federal government approximately \$10.9 billion in forgone tax revenues annually (Keightley, 2021). Public benefits associated with this substantial loss in tax revenue include improvements to impoverished neighborhoods by lowering crime (Diamond & McQuade, 2017; Freedman & Owens, 2011), reducing poverty rates (Deng, 2011; Diamond & McQuade, 2017), and boosting property values (Baum-Snow & Marion, 2009). The construction and rehabilitation of affordable housing through LIHTC also creates jobs and generates income (Mitchell & McKenzie, 2009; Virginia Housing Study, 2020).

Nevertheless, there is a dearth of literature regarding rent savings accruing to eligible low-income residents of LIHTC housing. Notable exceptions are Burge (2011) and Oluku (2019), who found moderate rent savings in their respective evaluations of LIHTC in Tallahassee, Florida, and St. Louis, Missouri. However, such city-specific assessments of rent savings offer a narrow focus,

which may not be generalizable to LIHTC properties in other housing markets. This study builds upon and expands on earlier studies by analyzing LIHTC rent savings in multiple cities across the United States. The 12 cities are Albuquerque, New Mexico; Billings, Montana; Buffalo, New York; Chicago, Illinois; Indianapolis, Indiana; Louisville, Kentucky; Manchester, New Hampshire; Miami, Florida; Midland, Texas; San Jose, California; Sioux Falls, South Dakota; and Washington, DC. In this study, actual rents of LIHTC and market-rate developments are collected and utilized for estimating LIHTC rent savings.

Nationwide, 80% of LIHTC units are in metropolitan areas, and more than half are in central cities. Only 20% and 26% of LIHTC units are in rural and suburban areas, respectively (McClure, 2019). The 12 cities selected represent a diverse array of U.S. urban and suburban rental markets.³ The selection of the cities based on their geographic locations and population sizes, and the strength of their rental housing markets, also facilitates a comparison of LIHTC rent savings by region, population size, or other housing market dynamics.

Some existing studies of LIHTC rent savings rely on federally mandated maximum gross LIHTC rents, primarily because actual LIHTC rents are not readily available and are extremely time consuming to collect. To enhance the extant literature, actual LIHTC rents were collected and analyzed. Various sources were utilized, including apartments.com, LIHTC developments' own websites, apartmenthomeliving.com, rent.com, and forrent.com. When data were available from multiple sources, we cross-checked the data for accuracy and consistency. In some instances, we communicated directly with owner or management agent contacts by phone or email to obtain or verify actual LIHTC rent data.

If a market renter pays the prevailing rent for a conventional rental unit that is higher than the amount a LIHTC renter pays for a comparable unit in a proximate location, with similar amenities and physical attributes, the excess amount paid by the market renter is the LIHTC rent saving. One salient challenge to estimating rent savings is the systematic and idiosyncratic differences between LIHTC and conventional (market-rate) multifamily housing developments (henceforth: developments) and units. Such differences may arise from locational factors (access to transportation or shops, school quality, or crime rates), development characteristics (age, total number of units, or amenities, such as swimming pools or even concierge services), and unit attributes (in-unit washer and dryer, utilities included in rent, or square footage).

This paper is innovative and advances scholarly understanding of LIHTC rent savings in that we develop and apply a spatial matching algorithm which controls observable and unobservable locational factors and differences. Market-rate developments in close proximity to LIHTC developments are identified and exclusively used in the rent comparison analysis. The maximum distance limit between LIHTC and market-rate developments is 1500 ft (approximately 457.2 m), except in Chicago, Washington, DC, and Miami, three metropolitan areas with extremely tight housing markets where the limit is 1000 ft (approximately 304.8 m). Because the average distances between LIHTC and market-rate developments are much smaller than the upper limits, the two types of developments are geographically adjacent and share similar, if not the same, locational amenities and accessibility.

In addition to controlling for the influences of locational factors, this paper also collects and uses a wide range of development- and unit-specific characteristics to take into account their effects on rents and rent savings. LIHTC and market-rate units are also matched at a one-to-one ratio based on the number of bedrooms. The equal share of the two categories of rental housing ensures equal weights and prevents a skewed rent comparison where one type of housing predominates and is overrepresented.

Research results indicate LIHTC rent savings exist in all 12 cities. Among all cities examined, LIHTC rent savings are considerably higher in large metropolitan areas with strong housing markets where market rents are inflated. Rent savings are smaller in mid-sized cities with weaker housing markets or small cities with stronger housing markets. In all 12 cities examined, rent savings are greater for two- and three-bedroom units than for one-bedroom units.

Overview of the LIHTC Program

The LIHTC program was established on a temporary basis by Section 42 of the Tax Reform Act of 1986 and made permanent in 1993. The program provides tax incentives to for-profit and nonprofit housing developers (henceforth: developers) to invest in the acquisition, new construction, or rehabilitation of affordable housing for low-income households. Today, LIHTC is the leading and most enduring source of funding for creating and preserving affordable housing in the United States (Sally et al., 2018). LIHTC has funded 3.23 million housing units since its inception. In contrast, the existing inventory of the three next largest federal rental housing programs consists of 2.62 million Section 8 Housing Choice Vouchers (HCVs), 1.30 million Section 8 Project Based Rental Assistance (PBRA) units and 0.96 million public housing units (HUD PD&R, 2021).

LIHTCs: 9% Versus 4%

There are two categories of federal LIHTCs, namely the 9% and the 4%.⁴ The Internal Revenue Service (IRS) allocates a dollar amount of 9% LIHTCs annually to each state based on population. The District of Columbia and five U.S. territories⁵ (jointly referred to as “local”) also receive annual tax credit allocations. In 2021, the 9% LIHTC allocation cap is equal to the greater of \$2.815 multiplied by the state or local population, subject to a minimum of \$3,245,625 (IRS Revenue Procedure, 2020). State and local LIHTC administrative agencies award their 9% LIHTCs to developers for specific projects through a rigorous and competitive bidding process. Awards are based on criteria outlined in qualified allocation plans (QAPs) created by state and local administrative agencies annually, or during every award cycle in accordance with federal guidelines (Keightley, 2021).

Unlike the 9% LIHTC, the 4% LIHTC does not have an annual per capita cap and is more readily available to developers. The 4% tax credits are granted as noncompetitive awards to developers whose projects must first qualify for tax-exempt bonds⁶ issued by state and local administrative agencies. The 4% LIHTCs are generally used to leverage tax-exempt bond and grant proceeds for the acquisition and/or rehabilitation of existing housing, whereas the 9% LIHTC is primarily used for new construction projects (Keightley, 2021).

The LIHTC Stakeholders

As illustrated in [Figure 1](#), three main categories of LIHTC stakeholders exist: (a) the IRS and the state and local administrative agencies—public partners who jointly administer the program; (b) developers, syndicators, and investors—private sector stakeholders; and (c) eligible low-income renters who benefit through rent savings.

The LIHTC program owes its success to a framework of public–private partnerships. The private sector participants raise funds, construct new or rehabilitate existing housing, and operate the affordable housing projects. To raise equity for project development, developers sell the tax credits earned over a 15-year period to institutional investors who utilize the tax credits to defray their federal tax liability dollar-for-dollar over an accelerated 10-year period.

LIHTC project ownership entails a partnership between the developer(s) and investor(s). The developer is the general partner, with a stake of less than 1%, but with principal control of the ownership entity. Investors play a passive role, albeit with an ownership stake of 99% or more. Tax credit prices charged to investors depend on the quality of a housing project, the reputation of the developer and prevailing Community Reinvestment Act (CRA) and financial markets.⁷ Syndicators serve as intermediaries between investors and developers and expedite the delivery of tax credit proceeds needed to develop affordable housing (Cooper, 2019).

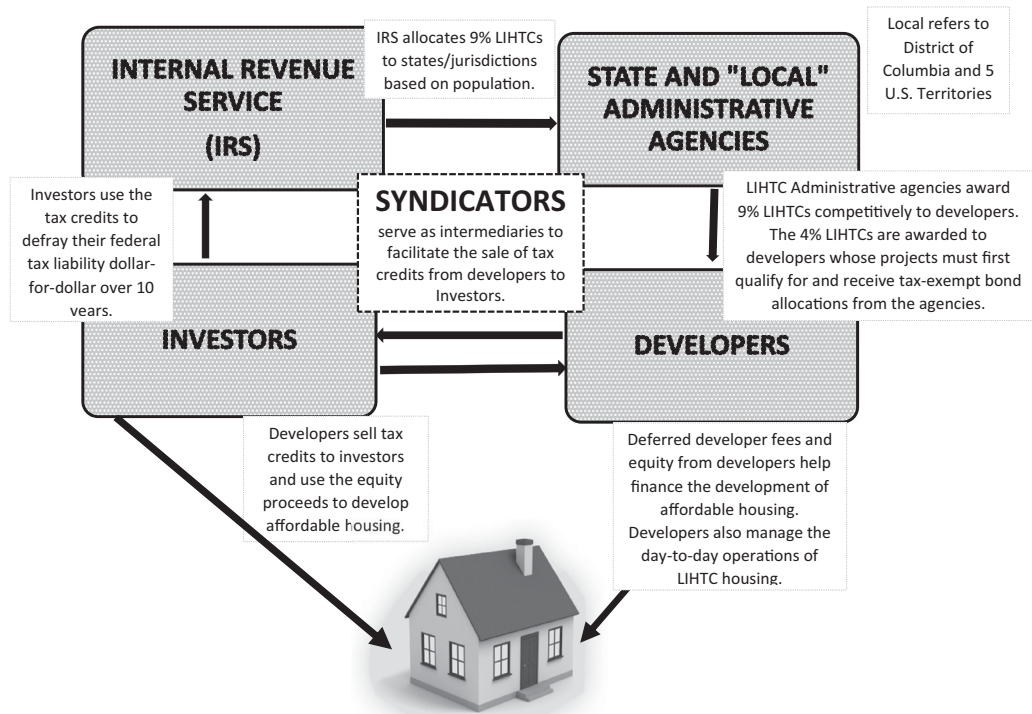


Figure 1. The Low-Income Housing Tax Credit (LIHTC) stakeholders.

LIHTC Affordability Restrictions

A property is deemed to be a qualified LIHTC development (or building) if a proportion of the units are rent restricted and earmarked for low-income households. Until 2018, the Code of Federal Regulations at 26 CFR § 42(g)(1)⁸ required developers to meet one of two affordability restrictions, namely the 40–60 or 20–50 tests. To satisfy the 20–50 test, 20% or more of the units at a project must be rent restricted and occupied by households earning 50% or less of area median income (AMI). Similarly, to meet the 40–60 test, at least 40% of the units must be rent restricted and occupied by households earning 60% or less of AMI.

The 2018 Consolidated Appropriations Act introduced a third affordability option. Property owners can satisfy LIHTC affordability restrictions if the average income of at least 40% of all households in a property does not exceed 60% of AMI and no individual household's income exceeds 80% of AMI (Bostic et al., 2019; Goldstein & Milder, 2018; Keightley, 2021). The income test adopted by a developer at project inception is irrevocable throughout the LIHTC compliance period and, as described in the next section, LIHTC rents are capped as a percentage of the AMI associated with the income test.

How Maximum LIHTC Rents Are Determined

Conventional landlords consider a myriad of factors, including the number of bedrooms and bathrooms, square footage, in-unit and property-wide amenities, age of property, and market forces, when setting rent prices. Federally mandated maximum gross LIHTC rents, on the other hand, are based solely on income limits, adjusted by family size. The number of bedrooms available to a LIHTC household is determined by family size. Income limits are published annually for each metropolitan area and nonmetropolitan county in the United States (HUD PD&R, 2020a).⁹

Table 1. Gross Low-Income Housing Tax Credit (LIHTC) rent calculation—Miami-Dade County, FL.

Family size	Bedroom size	50% of AMI		60% of AMI	
		Income limits	Monthly gross rents	Income limits	Monthly gross rents
1	0	\$32,000	\$800	\$38,400	\$960
1½ ^a	1	\$34,300	\$858	\$41,160	\$1029
2		\$36,600		\$43,920	
3	2	\$41,150	\$1029	\$49,380	\$1235
4		\$45,700		\$54,840	
4½ ^a	3	\$47,550	\$1189	\$57,060	\$1427
5		\$49,400		\$59,280	

Note. AMI = Area Median Income; FL = Florida.

^aImputed family size.

Source: U.S. Department of Housing and Urban Development, Office of Policy Development and Research – Income Limits, 2021, <https://www.huduser.gov/portal/datasets/il.html>.

The income limits for Miami-Dade County, effective April 2020, are shown in Table 1. For properties that received LIHTC allocations after December 31, 1989 (post-1990 LIHTC projects), family size is imputed to establish the appropriate income limit to use in calculating gross rent. For instance, it is assumed that a studio unit has one occupant, whereas units with separate bedrooms have 1½ persons¹⁰ per bedroom. In contrast, for properties that received LIHTC allocations before January 1, 1990 (pre-1990 LIHTC projects), the income limit for determining gross rent is based on the actual number of individuals occupying a unit [IRS Audit Guide 2007; Missouri Housing Development Commission (MHDC), 2006].

In Table 1, the federally mandated maximum gross monthly LIHTC rent for a post-1990 LIHTC property meeting the 20–50 (or 40–60) test is:

$$= 30\% \left(\frac{50\% \text{ (OR } 60\%) \text{ Income Limit, adjusted by family-size}}{12} \right) \quad (1)$$

Net rent (not shown in Table 1) is equal to gross rent minus the utility allowance, which is established for each bedroom type by a public housing agency in the jurisdiction where the LIHTC housing is located.

It is imperative to distinguish between the federally mandated maximum LIHTC rents in Table 1 and actual rents charged to LIHTC households. Actual LIHTC rents are not always equal to maximum LIHTC rents but must not exceed the established ceilings. This study is unique in that we used actual rents to determine LIHTC rent savings, unlike Burge's (2011) analysis of LIHTC rent savings where LIHTC rents are assumed to be equal to federally mandated maximum rents.¹¹

Cities Examined

This study compares LIHTC rent savings in multiple cities to provide some insight on how the strength of their housing markets, population sizes, geographic locations, and other factors affect the size of rent savings. The 12 cities selected for the study are Albuquerque, Billings, Buffalo, Chicago, Indianapolis, Louisville, Manchester, Miami, Midland, San Jose, Sioux Falls, and Washington DC.

As shown in Table 2, the 12 cities are spread across four regions in the United States and are placed in three categories based on population size and other housing market indicators. The Tier 1 cities—Chicago, San Jose, Washington DC, and Miami—are large cities with strong housing markets. Chicago and San Jose are the two cities with the largest populations, whereas the Washington DC and Miami metropolitan statistical areas (MSAs) are the 6th and 7th largest MSAs in the United States, respectively. All Tier 1 cities were ranked among the top 10 in terms of highest average rents nationwide in 2021 (Esejian, 2021). The Tier 1 cities also have

Table 2. Cities examined: region, size, and other housing market indicators.

Region	Cities	Tier	City population	MSA population	FMR 2-bedroom (2020)	Median owner cost	Mean travel time to work (minutes)
South	Miami, FL	Tier 1	467,963	6,166,488	\$1,625	\$1,973	29.3
	Louisville, KY	Tier 2	617,638	1,265,108	\$ 918	\$1,260	22.8
	Midland, TX	Tier 3a/tight market	146,038	182,803	\$1,349	\$1,767	19.1
Midwest	Chicago, IL	Tier 1	2,693,976	9,458,539	\$850–\$1,950	\$1,974	35.1
	Indianapolis, IN	Tier 2	876,384	2,074,537	\$946	\$1,170	23.6
	Sioux Falls, SD	Tier 3 b/soft market	183,793	268,232	\$839	\$1,363	16.9
West	San Jose, CA	Tier 1	1,021,795	1,993,804	\$3,051	\$3,153	30.9
	Albuquerque, NM	Tier 2	560,513	918,018	\$877	\$1,351	21.8
	Billings, MT	Tier 3 b/Soft Market	109,577	181,667	\$889	\$1,424	17.6
Northeast	District of Columbia	Tier 1	705,749	6,280,487	\$1,160–\$2,650	\$2,569	30.8
	Buffalo, NY	Tier 2	255,284	1,127,983	\$843	\$989	21.5
	Manchester, NH	Tier 3a/Tight Market	112,673	417,025	\$1,198	\$1,792	23.8

Note. FMR = Fair Market Rents.

Data Sources: U.S. Census Bureau—Quick Facts: <https://www.census.gov/quickfacts/fact/table/US/HSG860219>

U.S. Department of HUD Dataset—Fair Market Rents (FMR): <https://www.huduser.gov/portal/datasets/fmr.html>

U.S. Census Bureau—Metropolitan Area (MSA) Population Data: <https://www.census.gov/data/tables/time-series/demo/pop-est/2010s-total-metro-and-micro-statistical-areas.html>

comparatively higher fair market rents (FMRs), higher median monthly homeowner costs, and longer commute times to work, all indicators of tight housing markets.

The Tier 2 cities are mid-size cities with weaker housing markets. Albuquerque, Buffalo, Indianapolis, and Louisville have smaller populations relative to the Tier 1 cities (or MSAs in the case of Miami and Washington, DC). The Tier 2 cities also lag the Tier 1 cities with respect to FMRs, median homeowner housing costs, and commute times to work. The Tier 3 cities have populations of less than 150,000. Billings and Sioux Falls are small cities with soft housing markets, whereas Midland and Manchester have relatively stronger housing markets. The FMRs and median homeowner housing costs are significantly higher in Midland and Manchester than in Billings and Sioux Falls. Average commute times to work are also slightly higher in Midland and Manchester compared to Billings and Sioux Falls.

Previous Studies

Rent savings accruing to low-income households is arguably the LIHTC program's most intended and desired outcome and the main rationale for government intervention in this arena. Many studies have examined the economic benefits and other outcomes associated with the LIHTC program, but very few have analyzed the LIHTC rent savings accruing to low-income households. Some studies analyze the income and job growth arising from the development of LIHTC housing (Mitchell & McKenzie, 2009; Virginia Housing Study, 2020). Other studies highlight the displacement of the construction of market-based housing when LIHTC is used to subsidize the development of affordable housing, a supply-side effect known as crowding out (Baum-Snow & Marion, 2009; Eriksen & Rosenthal, 2010). Two studies demonstrate that LIHTC renters benefit through rent savings (Burge, 2011; Oluku, 2019).

There are many positive outcomes associated with the development of affordable housing through LIHTC. Mitchell and McKenzie (2009) and the Virginia Housing Study (2020) found that the development of LIHTC housing serves as a powerful economic engine for creating jobs and

generating income in Missouri and Virginia, respectively. Yet Eriksen and Rosenthal (2010) and Baum-Snow and Marion (2009) provide cautionary viewpoints on the use of LIHTC to boost overall housing stock. Meanwhile, Burge (2011) and Oluku (2019) found moderate rent savings in their respective evaluations of LIHTC in Tallahassee and St. Louis, respectively.

Mitchell and McKenzie (2009) analyzed the economic impact of LIHTC using a random sample of representative projects constructed in Missouri between 2000 and 2005. The LIHTC program created between 3,000 and 14,600 jobs, increased the gross state product by \$2.4 billion, and increased the state's tax revenues by \$191 million between 2000 and 2005. Mitchell and McKenzie also found that the economic impact of LIHTC was greater in the Kansas City and St. Louis MSAs (the two largest MSAs in Missouri) than in the rural and smaller metro areas of the state.

In 2020, several research centers and institutes at George Mason University, Virginia Tech, Longwood University, and Virginia Commonwealth University conducted a joint study for Virginia Housing, the LIHTC administrative agency in the Commonwealth of Virginia. The Virginia Housing Study (2020) describes the economic effects of the agency's various statewide rental housing, homeownership, and administrative programs. Between 2013 and 2018, Virginia Housing's rental housing programs developed 32,000 units, created 52,749 new jobs, and generated over \$2.9 billion in incomes. The LIHTC program accounted for 75% of all rental housing units developed by Virginia Housing during the 5-year period. Proportionally, 24,000 rental units, 39,562 new jobs and over \$2.1 billion in incomes across Virginia can be attributed to the LIHTC program between 2013 and 2018.

Eriksen and Rosenthal (2010) and Baum-Snow and Marion (2009) examined the crowding-out effect associated with the construction of new LIHTC units on the inventory of new unsubsidized rental housing in neighborhoods hosting LIHTC housing. Eriksen and Rosenthal (2010) examined the crowding-out effect at MSA and county levels and within a 10-mile radius, whereas Baum-Snow and Marion (2009) examined its effect within 1 km of the geometric center of a block group.

Eriksen and Rosenthal (2010) found that the highest rate of crowding out, at a one-to-one ratio, occurred within a 1-mile radius in high-income neighborhoods. They contend that the high rate of crowding out is unsurprising due to the inelasticity of housing demand juxtaposed against the elasticity of new housing supply. Eriksen and Rosenthal also found that LIHTC had a more moderate crowding-out effect on owner-occupied or rental housing in lower income neighborhoods. They concluded that the claim by affordable housing advocates that the construction of LIHTC housing increases overall housing supply is weakened by the crowding-out effect.

Baum-Snow and Marion (2009) found that each LIHTC unit constructed results in 0.8 new rental units overall, a modest crowding-out effect. The crowding-out rate rises significantly in gentrifying neighborhoods, where each LIHTC unit constructed leads to 0.37 new rental units overall. Baum-Snow and Marion also found that the construction of LIHTC housing leads to a decline in neighborhood income and no increase in median home values in gentrifying neighborhoods. In contrast, in stable or declining neighborhoods LIHTC does not crowd out newly constructed rental units. Additionally, in neighborhoods not experiencing gentrification, the construction of LIHTC housing results in a 14.9% increase in median home values.

Like the present study, Burge (2011) and Oluku (2019) evaluated LIHTC rent savings in Tallahassee and St. Louis, respectively. However, an important distinction between this study and Burge (2011) and Oluku (2019) is that whereas they conducted single-city assessments, we evaluate LIHTC rent savings in 12 diverse cities that are representative of most U.S. urban and suburban rental housing markets. Another important contribution of this study is the use of actual LIHTC rents to determine rent savings, as distinct from Burge's (2011) analysis where LIHTC rents are assumed to be equal to federally mandated maximum rents.

Burge (2011) and Oluku (2019) utilized two-stage empirical procedures to regress rent against housing development- and unit-specific variables. Demographic variables (at the census tract

level), crime rates, and public-school rankings were also used to control for neighborhood effects. Burge found that LIHTC households in Tallahassee saved between \$20 and \$117 in rents in 2002, whereas Oluku estimated rent savings in St. Louis at between \$139 and \$546 in 2017.

Oluku rationalized that LIHTC rent savings were relatively larger in St. Louis compared to Tallahassee because of a national trend of rising rents. Specifically, average market rents increased by 65% nationwide between 2002 and 2017. During the same period, median household incomes rose by only 4%. Because maximum LIHTC rents are set as a percentage of AMI, LIHTC rent savings were enlarged when the growth rate of market rents vastly outpaced median income gains. Moreover, St. Louis has a relatively stronger rental housing market than Tallahassee, which may partly explain the larger LIHTC rent savings in St. Louis.

Data and Methodology

In all 12 cities, market-rate and LIHTC developments are matched based on their geographic proximity (most less than 1000 ft) to control for observable and unobservable locational characteristics that may affect rents. Development-specific data for both market-rate and LIHTC observations used in the analysis include total number of units, year built and/or rehabilitated, and dummy variables for whether there is a swimming pool, whether utilities are included in rent, and availability of supplementary amenities (such as concierge and other services). The unit-specific data include actual rent, numbers of bedrooms and bathrooms, unit size, and a dummy variable for in-unit washer and dryer. Development- and unit-specific data for market-rate and LIHTC housing used in the analysis were for vacant (available for rent) units only.

LIHTC Data Description and Collection

A U.S. Department of Housing and Urban Development (HUD) database of all LIHTC properties nationwide is publicly available online.¹² An initial list of all LIHTC developments in the 12 cities was obtained from the LIHTC database. In cities with fewer than 100 LIHTC developments (i.e., Albuquerque, Billings, Buffalo, Manchester, Midland, and Sioux Falls), no sampling was conducted. In contrast, in cities with more than 100 LIHTC developments (i.e., Chicago, Indianapolis, Louisville, Miami, San Jose, and Washington, DC), a systematic random sample of 100 or fewer developments was selected. Pertinent information obtained from the LIHTC database includes development address, year placed in service,¹³ category of tax credits (4% vs. 9%), elderly or persons with disability designations, and total number of LIHTC and market-rate units in each development. We collected data only on LIHTC developments that were 30 years old or newer, to ensure that LIHTC developments that were no longer subject to affordability restrictions were excluded from the analysis.

Actual LIHTC rents are typically published only for vacant rental units. Therefore, the expectation was that data used in the analysis were actual LIHTC rents charged to renters at the time of data collection. Historically, LIHTC developments have low vacancy rates (Freddie Mac, 2017; McClure, 2006; Oluku, 2019), thus, obtaining actual rent and other development- and unit-specific data on LIHTC properties was challenging. For over 350 h, during a 7-week period in December 2018 and January 2019, we meticulously scoured online sources for relevant data on all LIHTC developments in the smaller cities, and on the sample LIHTC developments in the larger cities.

The initial source of all LIHTC data was apartments.com. But due to the scarce availability of LIHTC data, developments' own website, apartmenthomeliving.com, rent.com, and forrent.com served as secondary sources of data. When data were available from multiple sources, we cross-checked the data for accuracy and consistency. In a few instances, we communicated directly

with owner or management agent contacts by phone or email to obtain or verify the actual rent of available LIHTC units.

Market-Rate Data Description and Collection

All development- and unit-specific data for market-rate housing were obtained from apartments.com, a widely used source of listings for vacant rental housing, in four stages. First, we downloaded the list and addresses of all available market-rate developments in the 12 cities. Second, we matched each LIHTC development in the 12 cities with one geographically adjacent market-rate development (as described in the next section). Third, we collected development- and unit-specific data on the selected market-rate developments. There were significantly more vacant units per market-rate development than for each adjacent LIHTC development. Consequently, in the fourth stage, we randomly selected units from the available market-rate developments as “controls” to match the LIHTC units at a one-to-one ratio.

Other Data Collected

Demographic data at the census tract level, including the 2020 estimated median family income, percentage living below poverty line, percentage of minority population, renter-occupied and vacant units as a percentage of total housing units were collected from the Federal Financial Institutions Examination Council (FFIEC)’s website.¹⁴ The percentage of cost-burdened renters at the county level, another U.S. Census Bureau datum, was also used in the analysis. The ranking of the public school (grades 9–12) in closest proximity to each housing development was obtained from SchoolDigger.com, which publishes data for all school districts nationwide. Data from the National Housing Preservation Database¹⁵ were also used to identify which LIHTC developments included project-based rental subsidies, such as Project Based Vouchers (PBVs), Section 8 PBRA, and public housing. We calculated and included the straight-line distance between each housing development and city hall (in the respective city) as a measure of accessibility (Burge, 2011; Oluku, 2019).

Methodology

A rigorous and multifaceted method was developed and applied to identify and match market-rate and LIHTC developments based on their locations and the number of bedrooms. In so doing, systematic and idiosyncratic differences between LIHTC and market-rate developments are controlled for, thus facilitating and enhancing statistical comparability between their monthly rents. Such differences may arise from locational factors (access to transportation, hospitals or shops; school quality; or crime), development characteristics (age, total number of units, or amenities such as a swimming pool or even concierge services), and unit attributes (in-unit washer and dryer, utilities included in rent, or square footage).

Because rents are capitalized on locational attributes, such as amenities, accessibility and/or other conveniences (Benjamin and Sirmans, 1996), it is critical to select market-rate developments that are geographically adjacent to their LIHTC counterparts to control for variations in location-specific factors. All LIHTC and market-rate developments are geocoded based on their physical addresses. Centered on each LIHTC development, three buffer circles are drawn, based on three bandwidths of 250, 1,000, and 1,500 ft. Market-rate developments falling into the circles were selected for the rent savings analysis. [Figure 2](#) provides an illustration of the spatial selection of market-rate developments based on their proximity to LIHTC developments in Washington, DC. Darker dots are LIHTC developments, lighter dots are market-rate developments, and the three circles correspond to the buffer rings.

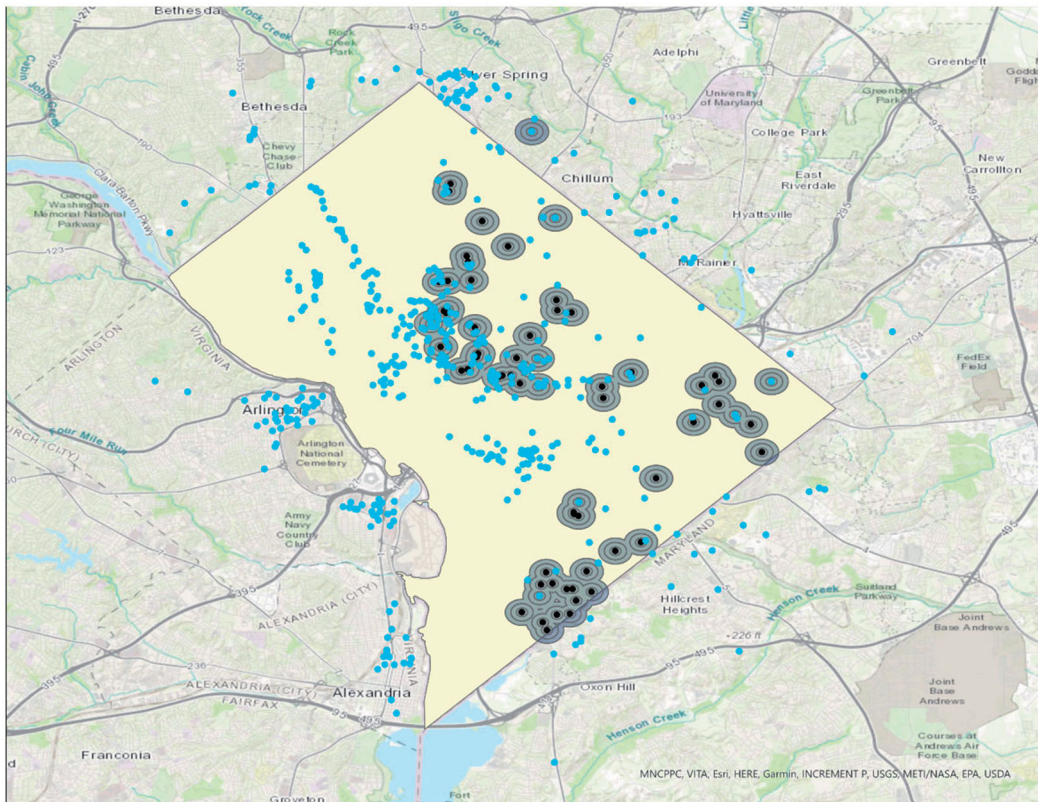


Figure 2. The spatial selection of housing developments in Washington, DC used in the analysis. The darker dots represent Low-Income Housing Tax Credit (LIHTC) developments, and the lighter dots represent market-rate developments. The three circles correspond to the buffer rings with bandwidths of 250, 1000, and 1500 feet.

The upper limit of the spatial bandwidth is determined when the total number of selected market-rate developments (i.e., those falling into rings) is comparable to the total number of LIHTC developments. Specifically, a bandwidth limit of 1000 ft is used for Chicago, Miami, and Washington, DC, the three large metropolitan areas in the sample, whereas a limit of 1500 ft is used for eight cities, with Billings as the one exception.

Figure 3 shows that distances are greater between LIHTC and market-rate developments in Billings, and only one market-rate development is within 1500-ft of any LIHTC development. Regression analyses on LIHTC rent savings are conducted with and without Billings, but the results are consistent, as will be discussed in the results section. Table 3 summarizes the total numbers of LIHTC and market-rate developments in each city, as well as average distances¹⁶ between the two. Table 3 also presents the numbers of units, by bedroom types in each city.

From the LIHTC and market-rate developments, units (floor plans) are selected and matched based on the numbers of bedrooms. For each city and for each bedroom type, there is an equal number of LIHTC and market-rate units. The equal share of units prevents the estimates of rent savings from being skewed by an overrepresentation of either LIHTC or market-rate units. The one-to-one case control match is commonly used so that both groups have equal weight: "Higher ratios typically increase bias because each additional matched control will be less comparable to the treated subject." (Linden & Samuels, 2013, p. 968). More controls (market-rate units in this paper) may be used when the number of cases (LIHTC units) is small (Grimes & Schulz, 2005) or there will be attrition of controls (Linden & Samuels, 2013). The total number of cases was not small here, nor was there an attrition of controls in the analysis.

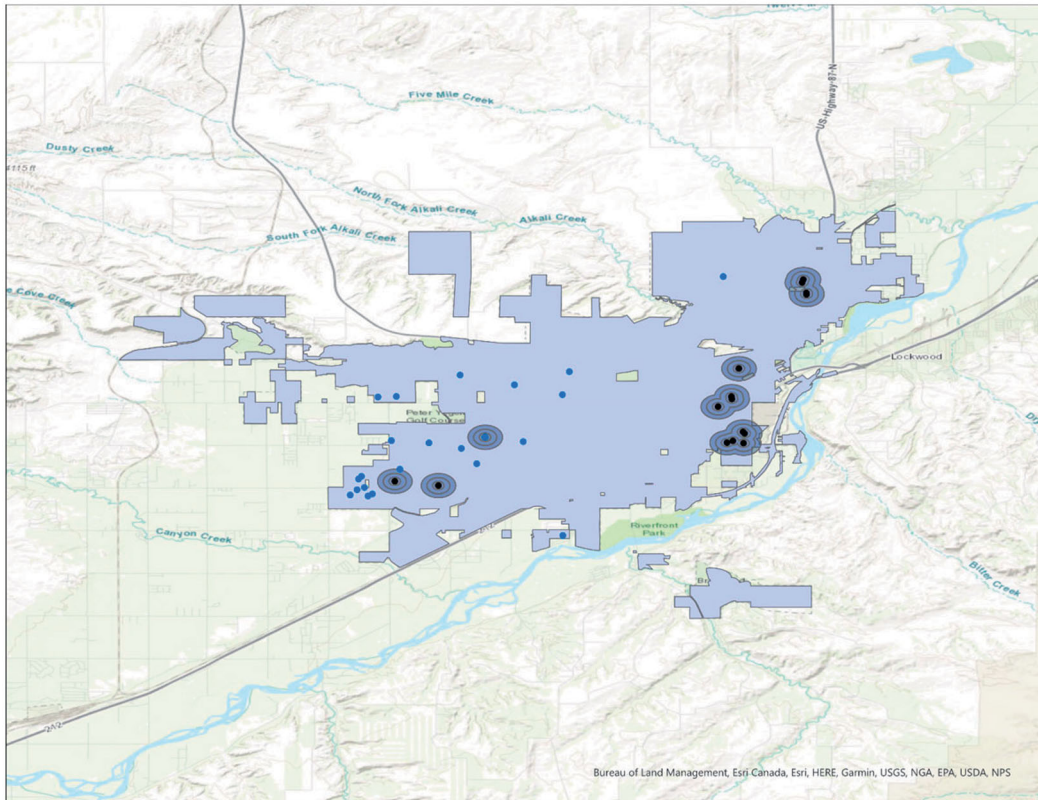


Figure 3. The spatial selection of housing developments in Billings, Montana used in the analysis. The darker dots represent Low-Income Housing Tax Credit (LIHTC) developments, and the lighter dots represent market-rate developments. The three circles correspond to the buffer rings with bandwidths of 250, 1000, and 1500 feet.

Regression analyses on rents are carried out against a wide range of development- and unit-specific characteristics, including amenities, number of bathrooms, and square footage. Location-specific factors and environments that may affect rents and rent savings, such as neighborhood crimes and access to public transportation, green space, hospitals, or shops/restaurants, are controlled by the spatial selection of market-rate developments. Proximity-matched LIHTC and market-rate developments suggest they are subject to the same or similar locational attributes, and hence capitalization of these neighborhood factors on their respective rents is very comparable. Rent comparison and savings of geographically adjacent LIHTC and market-rate units would therefore be free of the influence of most locational factors.

Mathematically, the rent regression model is expressed as:

$$\begin{aligned} \text{Rent} = & \alpha + \beta_1 \text{LIHTC} + \beta_2 \text{2BM} + \beta_3 \text{3BM} + \beta_4 \text{LIHTC} * \text{2BM} + \beta_5 \text{LIHTC} * \text{3BM} + \beta_6 \text{Development} + \beta_7 \text{Unit} \\ & + \beta_8 \text{Neighborhood} + \beta_9 \text{City} + \beta_{10} \text{LIHTC} * \text{City} + \varepsilon \end{aligned} \quad (2)$$

where *Rent* is the dependent variable of actual monthly rent of each unit, *LIHTC* is a dummy variable indicating whether a unit is a LIHTC property, and *2BM* and *3BM* are dummy variables signaling two- and three-bedroom units (with one-bedroom units as the reference group). *LIHTC*2BM* and *LIHTC*3BM* are two interaction terms showing any differentiated effects pertaining to bedroom types. *Development* is a vector of development-specific variables, such as amenities, total number of units, and property age.

Table 3. Number of housing developments/units evaluated and distance between developments.

City	No. of LIHTC developments	No. of market-rate developments	Avg. Distance between two types of developments (feet)	No. of one-bedroom units ^a	No. of two-bedroom units ^a	No. of three-bedroom units*
Albuquerque, NM	41	42	839	88	140	82
Billings, MT	10	13	>1,500 ^b	18	32	18
Buffalo, NY	23	28	1,125	4	38	16
Chicago, IL	27	32	797	98	84	40
Indianapolis, IN	34	34	1,066	132	150	84
Louisville, KY	30	21	833	52	78	44
Manchester, NH	11	5	1,000	22	34	22
Miami, FL	20	25	250	44	48	38
Midland, TX	9	11	682	22	28	18
San Jose, CA	33	27	1,037	80	90	52
Sioux Falls, ND	40	31	847	52	110	90
Washington, DC	70	78	753	216	170	66

^aTotal numbers of housing units —LIHTC and market-rate units are equally represented on a one-to-one basis (i.e., each type constitutes half of the total number of units).

^bOnly one market-rate apartment complex is within the 1,500-foot bandwidth in Billings, MT.

In large metropolitan areas and fast-growing cities, luxurious (high-end) multifamily housing developments may have supplementary amenities that are not available at conventional, sub-standard commercial, or LIHTC properties (Burge, 2011; Oluku, 2019). The variable *other amenities* captures these additional amenities, which may include but are not limited to concierge services, onsite dry-cleaning services, grocery stores or similar services, electric car charging stations, and restaurants or cafes.

Unit is a vector of unit-specific characteristics, such as the number of bathrooms, in-unit washer and dryer, and square footage. *Neighborhood* is a vector of neighborhood-specific factors, such as median family income, percentage living below poverty line, percentage of minority population, renter-occupied and vacant units as a percentage of total housing units, percentage of cost burdened renters, and school ranking.

We also applied a spatial matching algorithm to control for observable and unobservable locational differences between the LIHTC and market-rate developments within each city. *City* and *LIHTC*City* are, respectively, city dummy variables and their interaction terms with *LIHTC*. *Age* and *LIHTC*Age* are, respectively, the development age dummy variable and its interaction term with *LIHTC*. Washington, DC, is the reference group when comparing dummy variables of city-specific effects and is excluded from the regression. Table 4 lists and describes all variables used in the analysis and the data sources, whereas Table 5 shows the summary statistics of the variables.

Data Challenge: The Timing of Rent Data Collection

Actual rent data for the two categories of housing were collected during different time periods. LIHTC rent data were collected in December 2018 and January 2019 (Period A), whereas market-rate rent data were collected between July and November 2020 (Period B). The regression model estimates LIHTC rent savings based on actual LIHTC and market-rate rents during periods A and B, respectively. To avoid overstating the LIHTC rent savings in period B, we considered the possibility that actual LIHTC rents may have increased during the nearly 20–24 months between periods A and B. LIHTC landlords can request rent increases from administrative agencies annually if published income limits rise. If income limits decline, landlords are, however, not compelled to reduce actual rents below a previously established federal rent ceiling (MHDC, 2006; Oluku, 2019).

Recall from the illustration in Table 1 that the federally mandated maximum LIHTC rent is equal to 30% of 50 (or 60)% of AMIs (income limits), adjusted by family size for units meeting

Table 4. Variable description and data sources.

Variable	Description	Source
LIHTC	Whether it is a LIHTC unit (0/1)	apartments.com, ^a HUD's LIHTC database
Rent	Actual rent (for LIHTC in December 2018 and January 2019; for market rate between July and November 2020)	apartments.com ^a
2Bedroom	Whether a unit has 2 bedrooms (0/1)	apartments.com ^a
3Bedroom	Whether a unit has 3 bedrooms (0/1)	apartments.com ^a
Age (of development)	No. of years since most rehabilitation, if any, or year built or placed in service for LIHTC	apartments.com, ^a LIHTC database
Total units	No. of total units in an apartment complex	apartments.com, ^a LIHTC database
No. of bathrooms	No. of bathrooms in a unit	apartments.com ^a
Square footage	Square footage of a unit	apartments.com ^a
Pool	Whether an apartment complex has a swimming pool (0/1)	apartments.com ^a
Washer & dryer, in-unit	Whether a unit has in-unit washer and dryer (0/1)	apartments.com ^a
Utilities included in rent	If a unit has utilities all included (0–1)	apartments.com ^a
Other amenities	Whether a complex has other amenities (0/1)	apartments.com ^a
% living in poverty	2020 tract living in poverty (%)	Federal Financial Institutions Examination Council (FFIEC)'s Census Online Data System
Median family income	2020 estimated tract median family income	FFIEC Census Online Data System
% of renters	2020 tract renter occupied units (%)	FFIEC Census Online Data System
% of vacant units	2020 tract vacant units (%)	FFIEC Census Online Data System
% minority	2020 tract minority (%)	FFIEC Census Online Data System
School performance	Rankings of schools based on performance, test scores, student/teacher ratios and other metrics; lower number is higher ranking	SchoolDigger—K–12 school performance data
% of renters, cost burdened	% of renters who are paying 30% or more of income on rent	U.S. Census Bureau
Distance to city hall	Straight-line distance between a housing development and city hall	Authors' calculation

^aAll housing development- and unit-specific data for the market-rate properties were obtained from apartments.com. For LIHTC data, a development's own website, apartmenthomeliving.com, rent.com, and forrent.com served as secondary sources of data.

the 20–50 (or 40–60) affordability test. The maximum LIHTC rents in periods A and B were based on income limits published in April 2018 and April 2020, respectively. In all 12 cities, income limits rose between the two periods, but although actual LIHTC rents were expected to rise, LIHTC landlords do not always avail themselves of the opportunity to maximize profit by raising rents.¹⁷ Table 6 shows the estimated maximum feasible LIHTC rent increase, by city and by bedroom type between Periods A and B based on the increase in income limits between April 2018 and April 2020 (although rent increases may not have occurred). To ensure that our reported LIHTC rent savings in the current period (B) are not inflated, we subtract the estimated maximum allowable increase in LIHTC rents from the regression-predicted LIHTC rent savings.

Table 7 shows the average actual rents of all LIHTC observations used in the analysis compared to the federal maximum rent caps for the 50% and 60% of AMI income bands, for each bedroom category in all 12 cities. The applicable income limits at the time of data collection were published in April 2018. Table 7 shows that for all bedroom types, the average actual LIHTC rents in Sioux Falls, Louisville and Indianapolis were significantly below the 50% of AMI rent cap, whereas average actual LIHTC rents in Billings, Midland, Manchester, Albuquerque, Buffalo and Washington DC were below the 60% of AMI rent cap.

Table 5. Summary statistics.

Variable	Mean	SD	Min	Max	Mean	SD	Min	Max
	Market-rate units				LIHTC units			
Rent	1,678.2	848.6	449	5525	941.5	319.4	346	1,891
One-bedroom	0.31	0.46	0	1	0.30	0.46	0	1
Two-bedroom	0.37	0.48	0	1	0.35	0.48	0	1
Three-bedroom	0.18	0.38	0	1	0.23	0.42	0	1
Age (of development)	18.17	21.21	0	102	15.17	7.50	1	31
Total units	242	170	10	2,018	198	224	12	1,114
No. of bathrooms	1.45	0.54	1	3	1.32	0.47	1	3
Square footage	890	315	240	2,191	831	266	100	2,317
Pool	0.61	0.49	0	1	0.31	0.46	0	1
W&D, in unit	0.72	0.45	0	1	0.25	0.43	0	1
Utilities included	0.21	0.33	0	1	0.11	0.28	0	1
Other amenities	0.06	0.22	0	1	0	0	0	0
Median family income	87,351	47,872	16,114	224,533	59,246	33,497	12,627	211,880
% minority	52.25	23.92	1.00	99.86	59.09	30.58	1.00	99.83
School performance	0.68	0.29	0	0.99	0.66	0.26	0.01	0.99
% of renters	0.54	0.17	0.07	0.89	0.55	0.19	0.07	0.89
% vacancy	0.10	0.06	0	0.45	0.10	0.07	0	0.45
Distance to city hall	3.47	2.82	0.06	16.26	4.26	3.21	0.05	29.38
Poverty rate	20.90	11.78	2.35	55.22	26.15	13.39	2.35	60.93

Note. SD = Standard Deviation; Min = Minimum; Max = Maximum.

In San Jose, which has a strong housing market, LIHTC rents are significantly below the 50% of AMI rent caps. Notably, in California, LIHTC units are also targeted to other income bands, including 30% and 45% of AMI. In Miami, the average actual LIHTC rents seem to be closer to the 60% of AMI rent cap. Meanwhile, in Chicago, the average LIHTC rents for all bedroom types are slightly higher than the 60% of AMI rent cap. Upon further examination of the data, we found that approximately half of Chicago's LIHTC households (observations in the analysis) have utilities included in their rent, the highest proportion among all 12 cities, which may explain the higher rents.

To corroborate our estimates of the increase in gross LIHTC rents in [Table 8](#), we compared the actual LIHTC rents used in our analysis (collected in period A) with current actual LIHTC rents (period B) for a small sample of LIHTC properties in all 12 cities. The fourth, fifth, and sixth columns in [Table 8](#) show, respectively, the old (December 2018 and January 2019) actual LIHTC rent used in the analysis (A); current (January 2021) actual LIHTC rents (B); and the [Table 6](#) estimates of the increase in maximum LIHTC rents, based on 2018 and 2020 income limits (C). The closer the value of $B - (A + C)$ shown in the last column of [Table 8](#) is to zero, the more precise our estimates of the projected increase in LIHTC rents (C). As indicated, whereas LIHTC landlords can increase rents when income limits rise, they are not obligated to do so. Moreover, our estimate of C is based on average rents of LIHTC units for the 50% and 60% of AMI income bands only.

Empirical Findings

Regression results are presented in [Table 9](#). The two models in [Table 9](#) differ in that data pertaining to Billings are included in Model 1 but excluded from Model 2 because LIHTC and market-rate developments were farther apart in Billings compared to the other cities. When distant developments are compared, variations in location-specific factors, such as amenities, accessibility, or crimes, may distort the comparison. But the results listed in Models 1 and 2 are highly consistent, in part further strengthening the validity of the spatial selection algorithm for identifying market rate developments.

R^2 values of both model specifications are moderately high, suggesting the calibrated models are able to explain more than 83% of variation in the data. Most of the independent variables

Table 6. Estimated maximum Low-Income Housing Tax Credit (LIHTC) rent increase feasible between April 2018 and April 2020 based on the increase in income limits.

	One bedroom	Two bedrooms	Three bedrooms
Midland, TX	\$2	\$3	\$3
Manchester, NH	\$28	\$33	\$39
Buffalo, NY	\$30	\$36	\$42
Albuquerque, NM	\$43	\$51	\$59
Indianapolis, IN	\$49	\$59	\$69
Billings, MT	\$56	\$67	\$78
Louisville, KY	\$62	\$74	\$46
Chicago, IL	\$65	\$78	\$91
Sioux Falls, ND	\$78	\$92	\$107
Washington, DC	\$90	\$109	\$126
Miami, FL	\$131	\$157	\$182
San Jose, CA	\$258	\$309	\$356

Source of Income Limits data for calculating rent caps: U.S. Department of Housing and Urban Development, Office of Policy Development and Research – Income Limits, 2021, <https://www.huduser.gov/portal/datasets/il.html>

are statistically significant and have expected signs. The primary emphasis in interpreting the results will be placed on the dummy variables of LIHTC, bedroom type, and cities as well as their interaction terms. For the analysis, a development constructed or substantially rehabilitated (or a LIHTC development placed in service) in 2020 is regarded as new, with the variable age equal to zero. The reference groups for the LIHTC, bedroom type, and cities are, respectively, market-rate units, new one-bedroom units, and Washington, DC. Therefore, the coefficient (-839.600 in Model 1) of the LIHTC dummy variable denotes LIHTC rent savings of new one-bedroom units in Washington, DC. Specifically, compared to market-rate units, new one-bedroom LIHTC units in Washington, DC, have an average of \$839.60 in rent saving.

The coefficients of two-bedroom (214.615) and three-bedroom (221.699) dummy variables suggest average higher rents associated with more bedrooms for both market-rate and LIHTC units in Washington, DC. Compared to the average rents of one-bedroom units, actual rents of both new LIHTC and market-rate two- and three-bedroom units are \$214.62 and \$221.69 higher, respectively. The coefficients of the interaction terms of LIHTC and bedroom dummy variables show additional cost savings associated with more bedrooms in Washington, DC. Compared to new one-bedroom units, new two- and three-bedroom LIHTC units have an additional \$266.26 and \$285.01 in rent savings, respectively.

The city dummy variables capture city-specific, average influences, compared to Washington, DC, on both LIHTC and market-rate units and for all bedroom types. For example, the dummy variable of Chicago has a coefficient of -167.037 , thus suggesting that the average rent for new units in Chicago is \$167.04 lower than that in Washington, DC. The interaction terms of LIHTC and city dummy variables measure whether LIHTC rent savings for all bedroom categories in each city are greater or less compared to Washington, DC. For instance, compared to Washington DC, on average, San Jose has \$354.29 more, whereas Indianapolis has \$303.59 less in LIHTC rent savings across all bedroom types. The interaction terms of LIHTC and city dummy variables for Miami and Chicago are not statistically significant, which signifies that LIHTC rent savings are comparable in Miami, Chicago, and Washington, DC.

The interaction term of LIHTC and age measures the effect of age on LIHTC rent savings. The coefficient is 10.335 and statistically significant, indicating that on average, LIHTC renters save \$10.34 less for every unit increase in age. Essentially, in Washington DC with an average of \$839.60 in monthly LIHTC rent savings on a new one-bedroom unit, savings will be expected to decline to \$829.37 after one year. By years 15 and 30, the average LIHTC rent savings on a one-bedroom unit in Washington, DC, will be \$694.91 and \$539.86, respectively. This also implies that in Sioux Falls, Billings, Midland, and Louisville, there will be no LIHTC rent savings on a one-bedroom unit after 9, 10, 12, and 20 years, respectively.

Table 7. Actual Low-Income Housing Tax Credit (LIHTC) rents (average) compared to 50% and 60% maximum allowable LIHTC rents.

LIHTC rents	One-bedroom units			Two-bedroom units			Three-bedroom units		
	50% of AMI max. cap	Actual (average)	60% of AMI max. cap	50% of AMI max. cap	Actual (average)	60% of AMI max. cap	50% of AMI max. cap	Actual (average)	60% of AMI max. cap
Sioux Falls	\$738	\$598	\$886	\$886	\$694	\$1,064	\$1,023	\$833	\$1,228
Billings	\$668	\$663	\$801	\$801	\$784	\$962	\$926	\$933	\$1,111
Midland	\$849	\$837	\$1,019	\$1,019	\$1,075	\$1,223	\$1,177	\$1,227	\$1,412
Liouville	\$671	\$546	\$805	\$805	\$660	\$966	\$966	\$810	\$1,023
Albuquerque	\$609	\$645	\$731	\$731	\$769	\$878	\$845	\$901	\$1,014
Manchester	\$775	\$815	\$930	\$930	\$976	\$1,116	\$1,074	\$1,127	\$1,289
Buffalo	\$701	\$655	\$841	\$841	\$758	\$1,010	\$971	\$785	\$1,166
Indianapolis	\$724	\$580	\$869	\$869	\$695	\$1,043	\$1,004	\$829	\$1,205
Miami	\$738	\$847	\$886	\$886	\$998	\$1,064	\$1,023	\$1,156	\$1,228
Washington DC	\$1,099	\$1,116	\$1,319	\$1,319	\$1,262	\$1,583	\$1,524	\$1,529	\$1,829
Chicago	\$794	\$1,042	\$953	\$953	\$1,147	\$1,143	\$1,100	\$1,365	\$1,320
San Jose	\$1,247	\$1,187	\$1,496	\$1,496	\$1,386	\$1,796	\$1,729	\$1,506	\$2,075

Source of Income Limits data for calculating rent caps: U.S. Department of Housing and Urban Development, Office of Policy Development and Research – Income Limits, 2021, <https://www.huduser.gov/portal/datasets/il.html>

Table 8. Comparison of old (December 2018 and January 2019) Low-Income Housing Tax Credit (LIHTC) rents and new (January 2021) LIHTC rents with estimated gross LIHTC rent increase.

Property name	City	Bedroom type & Sq. Ft.	Old LIHTC rents A	New LIHTC Rents B	Gross LIHTC rent increase estimate ^a	Is A + C ≈ B?
					C	B - (A + C) =
Compass Pointe	Midland, TX	1-BR/730	\$975	\$975	\$2	(\$2)
Compass Pointe	Midland, TX	2-BR/954	\$1,165	\$1,165	\$3	(\$3)
Compass Pointe	Midland, TX	3-BR/1230	\$1,342	\$1,342	\$3	(\$3)
Sidoras Terrace	Manchester, NH	1-BR/740	\$780	\$780	\$28	(\$28)
Sidoras Terrace	Manchester, NH	2-BR/800	\$940	\$1,000	\$33	\$27
Sidoras Terrace	Manchester, NH	3-BR/1000	\$1,075	\$1,150	\$39	\$36
Hopkins Court	Buffalo, NY	1-BR/609	\$710	\$745	\$30	\$5
Hopkins Court	Buffalo, NY	2-BR/804	\$844	\$879	\$36	(\$1)
St. Johns	Buffalo, NY	3-BR/1350	\$625	\$676	\$42	\$9
Townhomes						
Silver Gardens	Albuquerque, NM	1-BR/619	\$661	\$707	\$43	\$3
Villa Hermosa	Albuquerque, NM	2-BR/881	\$787	\$853	\$43	\$23
Villa Hermosa	Albuquerque, NM	3-BR/1172	\$908	\$977	\$59	\$10
Parkview at Beach Grove	Indianapolis, IN	1-BR/738	\$632	\$658	\$49	(\$23)
Parkview at Beach Grove	Indianapolis, IN	2-BR/978	\$756	\$788	\$59	(\$27)
Parkview at Beach Grove	Indianapolis, IN	3-BR/1200	\$1,065	\$1,107	\$69	(\$27)
Central Court Village	Billings, MT	1-BR/575	\$700	\$735	\$56	(\$21)
Brush Meadows	Billings, MT	2-BR/905	\$852	\$940	\$67	\$21
Southern Lights	Billings, MT	3-BR/1023	\$925	\$1,018	\$78	\$15
Jacob School	Louisville, KY	1-BR/500	\$550	\$597	\$62	(\$15)
Jacob School	Louisville, KY	2-BR/625	\$640	\$714	\$74	\$0
Partridge Pointe	Louisville, KY	3-BR/878	\$691	\$795	\$46	\$58
Westhaven Park	Chicago, IL	1-BR/698	\$770	\$820	\$65	(\$15)
The Pavilion	Chicago, IL	2-BR/1096	\$1,479	\$1,595	\$78	\$38
Westhaven Park	Chicago, IL	3-BR/1408	\$1,100	\$1,143	\$91	(\$48)
West Creek Woods	Sioux Falls, ND	1-BR/540	\$584	\$596	\$78	(\$66)
Bristol Court	Sioux Falls, ND	2-BR/935	\$509	\$529	\$92	(\$72)
Chasing Willow	Sioux Falls, ND	3-BR/1317	\$765	\$883	\$107	\$11
Mass Place	Washington, DC	1-BR/675	\$1,232	\$1,317	\$90	(\$5)
Arbor View	Washington, DC	2-BR/835	\$964	\$1,064	\$109	(\$9)
Arbor View	Washington, DC	3-BR/1141	\$1,122	\$1,222	\$126	(\$26)
Tuscan Place	Miami, FL	1-BR/510	\$833	\$983	\$131	\$19
Tuscan Place	Miami, FL	2-BR/792	\$1,003	\$1,182	\$157	\$22
Tuscan Place	Miami, FL	3-BR/992	\$1,161	\$1,369	\$182	\$26
Turnleaf	San Jose, CA	1-BR/624	\$1,475	\$1,735	\$258	\$2
Lion Villas	San Jose, CA	2-BR/850	\$1,450	\$1,750	\$309	(\$9)
Kings Crossing	San Jose, CA	3-BR/735	1,510	1,834	356	(\$32)

Sources of data for LIHTC rents: apartments.com; development's own website; apartmenthomeliving.com; rent.com; and forrent.com.

The shrinking LIHTC rent savings during a development's life cycle corroborates the findings by Burge (2011) and Oluku (2019) in Tallahassee and St. Louis, respectively. The expectation is that a rational market renter will pay significantly more for a brand-new unit with new amenities than for a 30-year-old unit with older amenities, all else being equal. Conversely, actual LIHTC rents of a newly constructed LIHTC unit may vary only slightly from that of a comparable 30-year-old LIHTC unit in the same location because new and old LIHTC units are subject to the same federal rent ceilings. LIHTC property owners are less likely to charge significantly less for an older unit unless they are compelled to do so to lease up a vacant unit.

Table 9. Regression models.

Variables	Model (1)	Model (2)
Dep variable: monthly rent of an apartment unit		
LIHTC	−839.600*** (42.351)	−836.165*** (43.273)
2Bedroom	214.615*** (26.660)	220.751*** (27.463)
LIHTC*2Bedroom	−266.257*** (30.129)	−271.433*** (30.900)
3Bedroom	221.699*** (38.330)	231.649*** (39.381)
LIHTC*3Bedroom	−285.010*** (36.110)	−292.822*** (37.107)
Age of development	−6.998*** (0.535)	−6.996*** (0.546)
LIHTC*Age	10.335*** (1.413)	10.393*** (1.446)
Total units	0.184*** (0.046)	0.188*** (0.049)
No. of bathrooms	75.918*** (19.796)	74.100*** (20.296)
Square footage	0.697*** (0.047)	0.698*** (0.048)
Pool	116.819*** (18.499)	118.252*** (19.101)
Washer and dryer, in-unit	64.160*** (17.559)	63.412*** (18.041)
Utilities included	77.010*** (26.339)	81.281*** (27.926)
Other amenities	409.770*** (45.451)	410.530*** (46.058)
Median family income	0.002*** (0.000)	0.002*** (0.000)
% minority	−1.060*** (0.383)	−1.083*** (0.389)
School performance	−90.910*** (30.051)	−90.275*** (30.588)
% of renters	79.135 (52.836)	71.770 (54.200)
% vacancy	275.209 (223.623)	275.022 (225.505)
Distance to city hall	−28.028*** (3.031)	−28.956*** (3.108)
Poverty rate	0.454 (1.033)	0.370 (1.056)
Albuquerque	−1,210.936*** (39.360)	−1,212.084*** (40.016)
LIHTC*Albuquerque	613.828*** (50.831)	613.397*** (51.575)
Buffalo	−1,028.340*** (63.874)	−1032.647*** (64.749)
LIHTC*Buffalo	436.808*** (79.621)	438.788*** (80.609)
Chicago	−167.037*** (41.668)	−166.112*** (42.263)
LIHTC*Chicago	−67.698 (57.991)	−69.100 (58.853)
Miami	−176.079*** (52.219)	−174.516*** (53.018)
LIHTC*Miami	−95.060 (70.002)	−93.637 (70.994)
Indianapolis	−1,006.485*** (39.241)	−1,006.080*** (40.007)
LIHTC*Indianapolis	331.262*** (46.487)	330.956*** (47.132)

(continued)

Table 9. Continued.

Variables	Model (1)	Model (2)
Louisville	−1,290.235*** (50.307)	−1,292.091*** (51.079)
LIHTC*Louisville	652.517*** (61.914)	653.162*** (62.772)
Manchester	−873.164*** (62.966)	−876.743*** (63.773)
LIHTC*Manchester	535.067*** (81.487)	535.185*** (82.517)
Midland	−1,127.106*** (62.124)	−1,130.151*** (63.043)
LIHTC*Midland	729.500*** (83.891)	727.165*** (85.060)
SanJose	263.037*** (39.805)	263.126*** (40.366)
LIHTC*SanJose	−317.646*** (53.651)	−318.012*** (54.368)
SiouxFalls	−1,484.868*** (47.229)	−1,488.871*** (48.003)
LIHTC*SiouxFalls	761.059*** (53.320)	762.390*** (54.078)
Billings	−1,214.747*** (67.567)	
LIHTC*Billings	753.320*** (84.616)	
Constant	1,422.904*** (80.877)	1,432.019*** (82.402)
No. observations	2375	2307
F statistic	281.3***	285.0***

Note. Adjusted $R^2 = 0.835$. One-bedroom is excluded and is the reference group when comparing dummy variables of bedrooms; Washington, DC, is excluded and is the reference group when comparing dummy variables of city-specific effects.

* $p < .1$. ** $p < .05$. *** $p < .01$.

LIHTC Rent Savings by City and Bedroom Type

Table 10 shows the regression-predicted LIHTC rent savings using actual LIHTC rents from period A (December 2018 and January 2019) and actual market-rate rents from period B (between July and November 2020). In Table 6, we presented the estimated maximum feasible LIHTC rent increase between periods A and B based on the increase in income limits between April 2018 and April 2020. The Table 6 estimates are subtracted from the regression-predicted LIHTC rent savings in Table 10 to obtain the adjusted LIHTC rent savings in Table 11.

Actual LIHTC rents are often set at less than the maximum LIHTC rent ceiling. Meanwhile, LIHTC landlords would be even less likely to raise rents by the maximum allowable increase in gross LIHTC rents during the COVID-19 pandemic. Job losses during the pandemic disproportionately affected lower income earners (Parker et al., 2020) who were already the most cost-burdened renters. Moreover, as illustrated in Table 7, in most of the 12 cities, other than Chicago and Miami, actual LIHTC rents used in the analysis were below the maximum allowable federal maximum rents. Subtracting the maximum allowable increase in gross LIHTC rents between periods A and B (Table 6) from the regression-predicted rent savings (Table 10) ensures that the adjusted rent savings (Table 11) are conservative¹⁸ estimates. The actual amount of LIHTC rent savings should lie somewhere between the two extreme estimates in Tables 10 and 11.

Both Table 11 and Figure 4 show that LIHTC rent savings are significantly higher in Chicago, San Jose, Washington DC, and Miami, the large (Tier 1) cities with strong housing markets. Of the 12 cities, LIHTC households in San Jose save the most, averaging \$899, \$1,114, and \$1,086 per month on new one-, two- and three-bedroom units, respectively. Of the Tier 1 cities, Miami renters save the least (although their savings are still sizable), averaging \$708, \$949, and \$942 per month on new one-, two-, and three-bedroom units, respectively.

Table 10. Predicted monthly Low-Income Housing Tax Credit (LIHTC) rent savings by city.

	Sioux Falls	Billings	Midland	Louisville	Albuquerque	Manchester
1-bedroom	-\$79	-\$86	-\$110	-\$187	-\$226	-\$305
2-bedrooms	-\$345	-\$353	-\$376	-\$453	-\$492	-\$571
3-bedrooms	-\$364	-\$371	-\$395	-\$472	-\$511	-\$590
	Buffalo	Indianapolis	Miami	DC	Chicago	San Jose
1-bedroom	-\$403	-\$508	-\$840	-\$840	-\$840	-\$1157
2-bedrooms	-\$669	-\$775	-\$1106	-\$1106	-\$1106	-\$1424
3-bedrooms	-\$688	-\$793	-\$1125	-\$1125	-\$1125	-\$1442

Before subtracting estimated maximum gross LIHTC rent increases in Table 6. In Table 7, LIHTC savings are equal in Miami, Chicago, and Washington, DC. From Model 1, Chicago, and Miami's LIHTC savings are not statistically significantly different from Washington DC's. However, the estimated increase in LIHTC rents between 2018 and 2020 (Table 5) is not the same in the three cities.

Table 11. Predicted monthly Low-Income Housing Tax Credit (LIHTC) rent savings by city.

	Sioux Falls	Billings	Midland	Louisville	Albuquerque	Manchester
1 bedroom	-\$55	-\$31	-\$108	-\$187	-\$183	-\$276
2 bedrooms	-\$326	-\$285	-\$374	-\$379	-\$441	-\$538
3 bedrooms	-\$256	-\$294	-\$392	-\$426	-\$452	-\$551
	Buffalo	Indianapolis	Miami	DC	Chicago	San Jose
1 bedroom	-\$373	-\$460	-\$708	-\$750	-\$774	-\$899
2 bedrooms	-\$633	-\$715	-\$949	-\$997	-\$1027	-\$1114
3 bedrooms	-\$646	-\$725	-\$942	-\$999	-\$1033	-\$1086

After subtracting estimated maximum gross LIHTC rent increases in Table 6.

Compared to the Tier 1 cities, LIHTC rent savings are smaller in the mid-sized (Tier 2) cities (Buffalo, Indianapolis, Albuquerque, and Louisville) with relatively weaker housing markets. LIHTC households in Indianapolis, with average monthly rent savings of \$460, \$715, and \$725 on new one-, two-, and three-bedroom units, respectively, save slightly more than LIHTC renters in Buffalo. Compared to Buffalo and Indianapolis, monthly rent savings are much less in Albuquerque, at \$183, \$441, and \$452, and Louisville, at \$181, \$379, and \$426, for new one-, two-, and three-bedroom units, respectively.

Billings and Sioux Falls are small (Tier 3) cities with weak housing markets, whereas Manchester and Midland are small cities with relatively stronger housing markets. Monthly rent savings are \$276, \$538, and \$551 in Manchester, and \$108, \$374, and \$392 in Midland on new one-, two- and three-bedroom units, respectively. Interestingly, LIHTC rent savings in Manchester exceed those in Albuquerque and Louisville, two mid-sized cities, whereas LIHTC renters in Midland save nearly as much as those in Albuquerque and Louisville.

LIHTC rent savings are smaller in Sioux Falls and Billings, two small cities with weak housing markets compared to Manchester and Midland, similar size cities with relatively stronger housing markets. On average, monthly LIHTC rent savings are \$55, \$326, and \$256 in Sioux Falls, and \$31, \$285, and \$294 in Billings on new one-, two-, and three-bedroom units, respectively.

Other Factors That May Affect LIHTC Rent Savings

We analyzed the data to determine whether other features of a LIHTC development affect LIHTC rents and as such the size of the rent savings. We used *t*-tests to examine whether LIHTC rents were significantly different if a LIHTC development is: (a) designated as elderly, (b) set aside for persons with disabilities, (c) financed using 4% versus 9% LIHTC, or (d) includes additional project-based rental subsidies.

All LIHTC developments set aside for the elderly or persons with disabilities are designated as such in the LIHTC database. We used dummy variables to segregate both categories of LIHTC

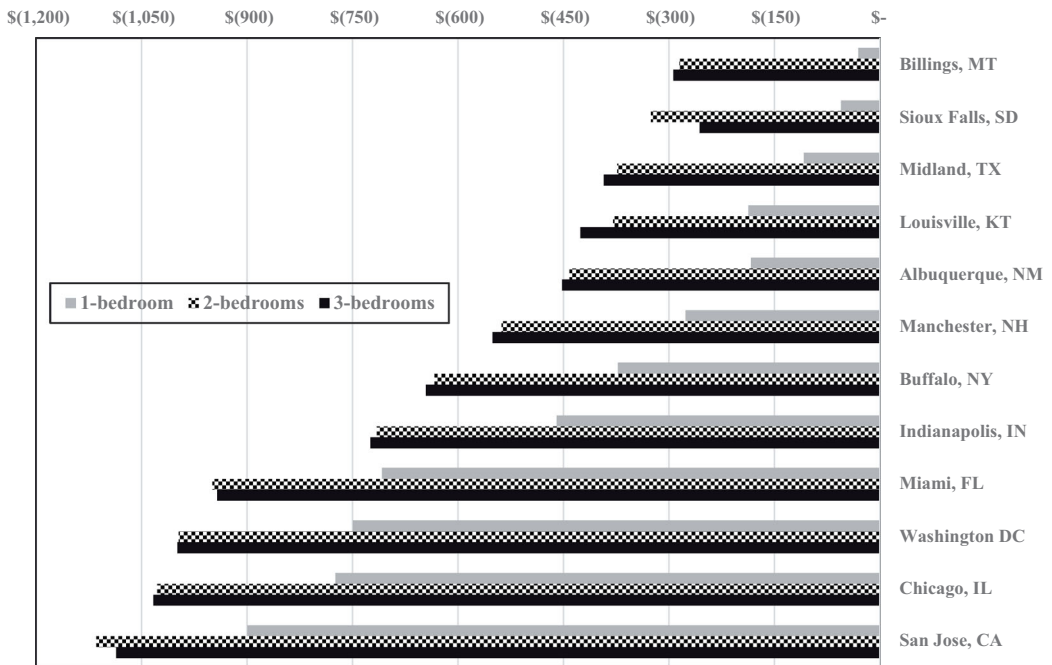


Figure 4. Low-Income Housing Tax Credit (LIHTC) rent savings on new 1-, 2-, and 3-bedroom units, by city.

developments and observed that they were not adequately represented in the data set. One possible explanation may be a protocol observed while gathering data. We excluded a few extreme outliers in cases where actual rents charged to LIHTC households appeared to far exceed federally mandated maximum rent. Some elderly LIHTC properties were designated as health care facilities, or provided supplementary services, such as feeding, caregiving, and other medical services. In these cases, there was no additional information to accurately allocate costs to the various services offered at such facilities, hence the observations were discarded.

We also used dummy variables to distinguish between housing developments funded through 4% and 9% LIHTCs. As previously indicated, unlike the 4% LIHTCs which are more readily available, the 9% LIHTCs are awarded to developers through a rigorously competitive bidding process. If a LIHTC awarding agency's QAPs so stipulate, developers can earn additional points and increase their odds of receiving 9% LIHTC allocations by targeting households earning less than 50% or 60% of AMI, the minimum thresholds required by the IRS. Because LIHTC rents are capped as a percentage of AMI, the expectation is that deeper income targets would result in lower rents in developments funded using 9% LIHTC compared to those financed with 4% LIHTC.

Tax credits are often used to leverage other funding sources to create or preserve other project-based rental subsidy developments (Sally et al., 2018). For instance, an average of 25% of LIHTC households in 40 states and U.S. territories (including the District of Columbia and four U.S. territories) reporting LIHTC tenant-level data received additional project- or tenant-based federal rental subsidies.¹⁹ Using data from the National Housing Preservation Database, we identified all LIHTC developments in our sample with project-based rental subsidies, such as PBVs, Section 8 PBRA, and public housing.

We conducted *t*-tests with different group variances for each of the four relevant attributes, for each city, and for each bedroom type. Results of *t*-tests are presented in Table 12. Because the data set used in this paper is all available/vacant LIHTC units in small cities, or available units from the sample of LIHTC developments in large cities, the relevant attributes were not

Table 12. Results of *t*-tests.

	Targeted to the elderly			Targeted to persons with disabilities			4% vs. 9%			Additional rental subsidy		
	Elderly minus nonelderly			Disabled minus nondisabled			4% minus 9%			No subsidy minus subsidy		
	1-bed	2-bed	3-bed	1-bed	2-bed	3-bed	1-bed	2-bed	3-bed	1-bed	2-bed	3-bed
Albuquerque	na	na	na	na	na	na	-35.80 (35.42)	-6.77 (36.18)	93.70** (39.33)	na	30.82 (93.85)	-122.36 (111.48)
Billings	-32.33 (45.78)	-60.67** (38.47)	na	na	na	na	na	na	na	-32.67 (62.85)	28.26 (34.58)	na
Buffalo	17.98 (56.39)	92.58*** (61.88)	na	-10.25 (24.87)	na	na	162.40 (222.24)	79.14 (78.64)	33.39 (54.18)	9.18 (54.75)	6.29 (83.71)	48.67 (261.07)
Chicago	-73.33 (110.10)	-40.63 (62.15)	na	na	na	na	459.04*** (68.25)	437.67** (128.03)	1053.56** (208.02)	315.14*** (55.28)	335.33*** (63.47)	664.61*** (218.05)
DC	-113.66** (51.35)	-113.45* (66.42)	-104.80 (83.61)	na	na	na	-93.29** (53.91)	-90.80 (72.49)	3.76 (124.44)	161.69*** (34.73)	100.34** (56.48)	33.59 (61.08)
Indianapolis	51.68 (78.25)	-48.25 (84.92)	na	126.39 (96.90)	29.75 (119.62)	51.00 (308.02)	na	na	na	28.37 (47.90)	-1.25 (28.20)	11.08 (30.10)
Louisville	-47.34 (37.33)	-149.88* (29.63)	na	na	na	na	55.71* (26.73)	48.05 (32.75)	-133.86 (114.49)	-24.68 (62.26)	21.98 (48.50)	-15.78 (38.37)
Manchester	0.00 (35.36)	31.67 (97.65)	na	na	na	na	4.17 (53.27)	12.67 (53.81)	0.00 (116.65)	-44.00 (30.32)	-21.92 (83.33)	na
Miami	-33.70*** (23.77)	-47.93 (53.94)	na	na	na	na	27.10 (20.57)	29.02 (27.58)	-10.39 (28.58)	na	na	na
Midland	na	11.25 (251.72)	na	na	na	na	na	na	na	92.39 (226.02)	-199.35 (223.62)	116.00 (250.89)
San Jose	16.25 (186.42)	na	na	na	na	na	282.12*** (57.74)	59.44 (125.25)	14.64 (144.17)	289.03** (116.65)	300.73*** (120.72)	152.16 (158.89)
Sioux Falls	na	na	na	146.00** (59.00)	56.75 (60.85)	na	na	69.37** (24.61)	82.99*** (19.90)	-30.33 (52.22)	na	na

Note: na: not applicable. Standard errors are given in parentheses.
* $p < .1$. ** $p < .05$. *** $p < .01$.

adequately represented. Due to the data constraints, *t*-tests were infeasible in some instances, as shown in [Table 12](#). Nevertheless, the *t*-test comparison indicates that LIHTC units with additional project-based rental subsidies consistently have lower rents than those without, particularly in strong rental markets, such as Chicago, San Jose, and Washington, DC.

Conclusion and Policy Recommendations

The paper evaluates the rent savings accruing to low-income households, the key public benefit of the LIHTC program. We compared rent savings in multiple cities of varying sizes and housing market strengths in the South, Midwest, and Northeast and on the West Coast of the United States. The 12 cities are Albuquerque, Billings, Buffalo, Chicago, Indianapolis, Louisville, Manchester, Miami, Midland, San Jose, Sioux Falls, and Washington, DC.

A unique contribution of this paper is the use of actual LIHTC rents rather than federally mandated maximum LIHTC rents to determine rent savings. Additionally, using *t*-tests, we found that LIHTC units with additional project-based rental subsidies consistently have lower rents than those without, particularly in tight rental markets such as Chicago, San Jose, and Washington, DC.

Our results show that LIHTC households in all 12 cities benefit from the program and there appears to be no regional disparity in the magnitude of LIHTC rent savings. Rent savings on new rental units are significantly greater in large cities with strong housing markets. Mid-sized cities with weaker housing markets and small cities with relatively strong housing markets have smaller, yet sizable LIHTC rent savings. In small cities with weak housing markets, rent savings are much smaller. We also found that across various development floor plans, LIHTC rent savings are typically larger for units with more bedrooms.

Both [Table 11](#) and [Figure 4](#) show that among the large cities (Chicago, Miami, San Jose, Washington DC), LIHTC households in San Jose had the largest rent savings, whereas those in Miami had the smallest, albeit still sizable. On average, monthly LIHTC rent savings on newly constructed one-, two- and three-bedroom units are: \$899, \$1,114, and \$1,086 in San Jose; \$774, \$1,027, and \$1,033 in Chicago; \$750, \$997, and \$999 in Washington DC; and \$708, \$949 and \$942 in Miami, respectively.

The mid-sized cities with softer housing markets have relatively smaller LIHTC rent savings. Average monthly LIHTC rent savings on new one-, two-, and three-bedroom units are, respectively, \$460, \$715, and \$725 in Indianapolis, and \$373, \$633, and \$646 in Buffalo. In Albuquerque and Louisville, savings are smaller and comparable. Monthly rent savings on new one-, two- and three-bedroom units are, respectively, \$183, \$441, and \$452 in Albuquerque, and \$187, \$379, and \$426 in Louisville.

There are two categories of small cities. Manchester and Midland have stronger housing markets relative to Billings and Sioux Falls. Monthly rent savings are \$108, \$374, and \$392 in Midland, and \$276, \$538, and \$551 in Manchester on new one-, two- and three-bedroom units, respectively. Remarkably, LIHTC rent savings in Manchester are slightly larger, whereas those in Midland are comparable to the rent savings in Albuquerque and Louisville, two larger cities. Billings and Sioux Falls are small cities with weaker housing markets. On average, monthly LIHTC rent savings are \$55, \$326, and \$256 in Sioux Falls, and \$31, \$285, and \$294 in Billings, on new one-, two- and three-bedroom units, respectively.

The results discussed in this paper are LIHTC rent savings on new units. However, we also found that LIHTC rent savings progressively decline during a LIHTC development's life cycle. For instance, for a one-bedroom unit in Washington DC, LIHTC rent savings are \$839.60 when the unit is new compared to \$539.86 for a 30-year-old unit, a difference of nearly \$300, a 36% decrease in savings. Our analysis indicates that there are no longer any LIHTC rent savings on one-bedroom units in Sioux Falls, Billings, Midland, and Louisville, after 9, 10, 12, and 20 years,

respectively. The decrease in LIHTC rent savings with age is consistent with the Burge (2011) and Oluku (2019) assessments of LIHTC rent savings in Tallahassee and St. Louis, respectively.

The LIHTC program costs the federal government approximately \$10.9 billion in forgone tax revenues annually (Keightley, 2021). New or rehabbed housing funded through LIHTC can improve the physical appearance of a neighborhood. LIHTC also improves impoverished neighborhoods by lowering crime (Diamond & McQuade, 2017; Freedman & Owens, 2011), reducing poverty rates (Deng, 2011; Diamond & McQuade, 2017), and boosting property values (Baum-Snow & Marion, 2009). LIHTC also leverages funds to create or preserve project-based rental subsidy units through various programs and facilitates the successful implementation of the Section 8 HCV program (Sally et al., 2018). Moreover, as discussed in the literature review section, LIHTC creates jobs and generates income. Notwithstanding the foregoing public and economic benefits, rent savings accruing to low-income households remains the LIHTC program's most intended and desired outcome and the main rationale for instituting the program as public policy.

The diverse array of cities of different sizes included in this study makes the findings generalizable to LIHTC properties in most U.S. urban and suburban housing markets, where 80% of LIHTC properties reside. The study reveals that LIHTC renters in large cities with strong housing markets benefit the most, whereas rent savings are smaller in small cities with weak housing markets. Meanwhile, other economic benefits associated with LIHTC, such as job creation, tax revenue and income growth, also appear to favor larger metropolitan areas (Mitchell & McKenzie, 2009).

The broader policy implication of the study is that "flat" or "shallow" subsidy programs like LIHTC are most effective in large cities with strong housing markets and for larger units which tend to command substantially higher rents than one-bedroom units.²⁰ These findings can be valuable to state or local LIHTC administrators who seek to maximize the benefits from the program by awarding more tax credits to regions and housing developments that benefit the most.

Each state or U.S. territory, and the District of Columbia, is not required to fully utilize its 9% tax credit allocation each year. Any jurisdiction's unallocated tax credits are placed in a national pool after 2 years. Jurisdictions with excess demand can apply for additional tax credits from the unused national pool (Keightley, 2021). The finding that LIHTC rent savings are proportionally higher in large cities with strong housing markets could also be useful to federal administrators in deciding to which states or jurisdictions to award the additional tax credits from the unused national pool.

Notes

1. In the context of the LIHTC program, rental housing is considered affordable if a household earning 50 (or 60)% of area median income, adjusted by family size, spends 30% of household income on rent.
2. The estimate is consistent with the average of 2.3 persons per household reported for the Section 8 Housing Choice Voucher (HCV) program at <https://www.huduser.gov/portal/datasets/asstshg.html>. This is pertinent as, based on data reported from 23 states, half of the households residing in LIHTC properties also receive rental assistance through Section 8 HCVs or reside in units receiving additional project-based rental subsidies (Sally et al., 2018).
3. See Table 2 and the section titled Cities Examined for a discussion of how the cities were categorized into three market tiers.
4. The amount of tax credits awarded per project was equal to the applicable federal rate (AFR) multiplied by eligible basis (costs). AFRs are published monthly for both categories of tax credits by the Internal Revenue Service. Since 2015, a permanent floor was established for the 9% LIHTC. Developers now receive the greater of 9% or the AFR multiplied by a project's eligible costs. A permanent floor has yet to be established for the 4% LIHTC, although it was proposed in the FY 2021 Omnibus Bill.
5. Five U.S. territories, namely Puerto Rico, US Virgin Islands, Guam, American Samoa, and Northern Mariana Island, also receive LIHTC allocations from the IRS.
6. Each state or locality can issue tax-exempt bonds annually subject to a private activity bonds (PAB) volume cap. In 2021, the PAB volume cap was \$110 multiplied by the state or local population, subject to a minimum of \$324,995,000 (IRS Revenue Procedure, 2020). Every year, most jurisdictions utilize approximately 10% of their volume cap (Driessen, 2016). Developers who are issued tax-exempt bonds also receive an allocation of 4% LIHTCs, hence the latter is perceived to be readily available to qualified developers.

7. Tax credit prices tend to be higher in markets where more financial institutions (LIHTC investors) compete for the limited supply of tax credits to satisfy their CRA needs (Copeman et al., 2013). Financial institutions receive favorable consideration toward their CRA ratings for purchasing tax credits [Office of the Comptroller of the Currency (OCC), 2014; Cohn Reznick LLP, 2014]. During the early years of the LIHTC program, investors paid less than \$0.50 for each dollar of tax credits, leaving very little equity available to develop affordable housing. After the LIHTC program became permanent in 1993, investors paid up to \$0.80 per dollar, and by 2006, prices were above \$0.90 per dollar (Schwartz, 2014), and regularly priced between \$1.04 and \$1.05 per dollar by 2016 (Novogradac, 2020). The Tax Reform Act of 2017 reduced top corporate tax rates from 35% to 21%. Tax credit prices have since stabilized at between \$0.91 and 0.95 per dollar (Novogradac, 2020), and in the high \$0.90s to \$1 per dollar in competitive CRA markets (Kincer & O'Meara, 2020).
8. 26 C.F.R. §42g1 is available at <https://www.law.cornell.edu/uscode/text/26/42>.
9. See <https://www.huduser.gov/portal/datasets/il.html#2021>
10. The income limit for a 1½ person household is calculated as follows:

$$\frac{\text{Income Limit of 1 – person Household} + \text{Income Limit of 2 – persons Household}}{2}$$

11. We thank an anonymous peer reviewer for highlighting the significance of this contribution to existing literature on LIHTC rent savings.
12. See <https://www.huduser.gov/portal/datasets/lihtc.html>
13. A LIHTC property is placed in service upon completion (newly constructed or rehabbed) and an eligible low-income family initially occupies a unit.
14. See <https://geomap.ffiec.gov/FFIECGeocMap/GeocodeMap1.aspx>
15. See <https://preservationdatabase.org/>
16. Please note that the average distances in Table 3 are based on actual distances between the LIHTC and market-rate developments.
17. Owners of LIHTC properties serve low-income groups and other special needs populations, such as the elderly and disabled, and some LIHTC property owners are nonprofit entities.
18. We thank Alex F. Schwartz, professor at the Milano School of Policy, Management and Environment, New School of New York, for his additional insight on this point after a courtesy review of this paper.
19. See <https://www.huduser.gov/portal/datasets/lihtc/tenant.html>
20. Thanks to Alex F. Schwartz, Professor at the Milano School of Policy, Management and Environment, New School of New York for his additional insight on this point after a courtesy review of this paper.

Disclosure Statement

No potential conflict of interest was reported by the authors.

Notes on Contributors

Uche Oluku is on the adjunct faculty of Florida International University's Master's in Public Administration program where he teaches a course on U.S. housing policy. He has over 22 years of extensive housing industry experience in the U.S. public and private sectors. He earned graduate degrees at Johns Hopkins University (MS in applied economics); University of South Florida (MBA, specializing in finance); and University of Missouri–St. Louis (MA & PhD in political science, specializing in housing policy). He also earned an undergraduate degree from the University of Benin, Nigeria, in economics and statistics.

Shaoming Cheng is an associate professor at the Department of Public Policy and Administration, Florida International University. He received his PhD in public policy from George Mason University. His research interests center on entrepreneurship and small business development policy, spatial econometric modeling, firm location decisions responding to various policy incentives and locational conditions, and regional economic health, performance, and development. He has been engaged in a wide variety of funded research projects with support from the National Science Foundation, the U.S. Economic Development Administration, the U.S. Department of Agriculture, the Kauffman Foundation, and the Lincoln Institute of Land Policy.

ORCID

Uche Oluku  <http://orcid.org/0000-0002-7681-5260>

References

- Baum-Snow, N., & Marion, J. (2009). The effects of low-income housing tax credit developments on neighborhoods. *Journal of Public Economics*, 93(5–6), 654–666. <https://doi.org/10.1016/j.jpubeco.2009.01.001>
- Benjamin, J., & Sirmans, S. G. (1996). Mass transportation, apartment rent and property values. *Journal of Real Estate Research*, 12(1), 1–8. <https://doi.org/10.1080/10835547.1996.12090830>
- Berger, M. (2020). *Low-income housing tax credit fact sheet*. National Multifamily Housing Council. Retrieved on January 24, 2021 from <https://www.nmhc.org/advocacy/issue-fact-sheet/low-income-housing-tax-credit-fact-sheet/>
- Bostic, R., Jakabovics, A., Voith, R., & Zielenbach, S. (2019). *Mixed-income LIHTC developments in Chicago: A first look at their income characteristics and spillover impacts*. Retrieved November 28, 2020, from <https://case.edu/social-work/nimc/sites/case.edu.nimc/files/2019-04/Mixed-Income%20LIHTC%20Developments%20in%20Chicago%20Bostic%20et%20al.pdf>
- Burge, G. S. (2011). Do tenants capture the benefits from the low-income housing tax credit program? *Real Estate Economics*, 39(1), 71–96. <https://doi.org/10.1111/j.1540-6229.2010.00287.x>
- Cohn Reznick LLP (2014). *The community reinvestment act and its effect on housing tax credit pricing*. Retrieved January 28, 2018, from https://ahic.org/images/downloads/Research_and_Education/the_community_reinvestment_act_and_its_effect_on_housing_tax.pdf
- Cooper, J. (2019). *Multifamily rental housing, financing with tax-exempt bonds* (2nd ed.). Orrick. Retrieved October 25, 2020, from <https://www.orrick.com/Insights/2010/06/Multifamily-Rental-Housing-Financing-With-Tax-Exempt-Bonds>
- Copeman, F., Barcello, M., & Fang, C. (2013). *Tax credit equity: Study credits CRA for motivating LIHTC investment*. Affordable Housing Finance. Retrieved November 21, 2020, from https://www.housingfinance.com/finance/study-credits-cra-for-motivating-lihtc-investment_o
- Deng, L. (2011). Low-income housing tax credit developments and neighborhood change: A case study of Miami-Dade County. *Housing Studies*, 26(6), 867–895. Volume Issue <https://doi.org/10.1080/02673037.2011.593130>
- Diamond, R., McQuade, T. (2017). *Who wants affordable housing in their backyard? An equilibrium analysis of low-income property development*. Paper. Stanford GSB. Retrieved February 8, 2021, from https://web.stanford.edu/~diamondr/LIHTC_spillovers.pdf
- Dietz, R. (2020). *Affordable housing credit beneficiaries: 2020 update*. *Eye on housing*. National Association of Home Builders Discusses Economics and Housing Policy. Retrieved on January 24, 2021, from: <https://eyeonhousing.org/2020/07/2020-affordable-credit-estimates/>
- Driessen, G. A. (2016). *Tax-exempt bonds: A description of state and local government debt*. Congressional Research Service Report for Congress - Washington D.C. Retrieved June 9, 2018, from <https://fas.org/sgp/crs/misc/RL30638.pdf>
- Eriksen & Rosenthal (2010). Crowd out effects of place-based subsidized rental housing: New evidence from the LIHTC program. *Journal of Public Economics*, 94 (11–12), 953–966. <https://doi.org/10.1016/j.jpubeco.2010.07.002>
- Esejian, J. D. (2021). *U.S cities with highest rents (updated 2021)*. Retrieved August 14, 2021, from: <https://www.for-tunebuilders.com/top-10-u-s-cities-with-the-highest-rents/>
- Freddie Mac (2017). *Multifamily 2017 outlook: Positioned for further growth*. Freddie Mac Multifamily. Retrieved on August 15, 2021, from: http://www.freddiemac.com/multifamily/pdf/mf_2017_outlook.pdf
- Freedman, M., & Owens, E. G. (2011). Low-income housing development and crime. *Journal of Urban Economics*, 70(2–3), 115–131. <https://doi.org/10.1016/j.jue.2011.04.001>
- Goldstein, R. S., & Milder, F. D. (2018). *Important new changes to LIHTC law made by Consolidated Appropriations Act of 2018*. Nixon Peabody - Affordable Housing Alert. Retrieved November 29, 2020, from <https://www.nixonpeabody.com/en/ideas/articles/2018/03/28/important-new-changes-to-lihtc-law>
- Grimes, D., & Schulz, K. (2005). Compared to what? Finding controls for case-control studies. *The Lancet*, 365(9468), 1429–1433. [https://doi.org/10.1016/S0140-6736\(05\)66379-9](https://doi.org/10.1016/S0140-6736(05)66379-9)
- Internal Revenue Service (IRS) Revenue Procedure. (2020). *Revenue procedure 2020-45*. Retrieved January 31, 2021, from <https://www.irs.gov/pub/irs-drop/rp-20-45.pdf>
- IRS Audit Guide (2007). *Internal Revenue Service Audit Guide. Guide for completing form 8823 low-income housing credit agencies report of noncompliance or building disposition - chapter 11 - Category 11g Gross Rent(s) exceed tax credit limits - calculation methods*. http://www.in.gov/ihcda/files/8823_audit_guide.pdf
- Keightley, M. P. (2021). *An introduction to the low-income housing tax credit*. Congressional Research Service Report for Congress - Washington D.C. Retrieved January 31, 2021, from: <https://crsreports.congress.gov/product/pdf/RS/RS22389>
- Kincer, B. H., & O'Meara, M. (2020). *A look at the LIHTC: Past pricing trends, the current market and future concerns*. Retrieved November 18, 2018, from: <https://www.novoco.com/periodicals/articles/look-lihtc-past-pricing-trends-current-market-and-future-concerns>
- Linden, A., & Samuels, S. (2013). Using balance statistics to determine the optimal number of controls in matching studies. *Journal of Evaluation in Clinical Practice*, 19(5), 968–975. <https://doi.org/10.1111/jep.12072>

- McClure, K. (2006). The low-income housing tax credit program goes mainstream and moves to the suburbs. *Housing Policy Debate*, 17(3), 419–446. <https://doi.org/10.1080/10511482.2006.9521576>
- McClure, K. (2019). What should be the future of the low-income housing tax credit program? Fannie Mae. *Housing Policy Debate*, 29(1), 65–81. <https://doi.org/10.1080/10511482.2018.1469526>
- Missouri Housing Development Commission (MHDC). (2006). *MHDC low-income housing tax credit program compliance monitoring manual*. Retrieved November 15, 2020, from http://www.mhdc.com/program_compliance/tax_credit/Tax_Credit_Manual_FINAL_Posted_11-2006.pdf
- Mitchell, D. M., & McKenzie, R. (2009). Analysis of the economic effects of low-income housing tax credits. *Journal of Business & Economics Research*, 7(8), 61–70.
- Novogradac. (2020). *LIHTC pricing trends—January 2016 - October 2020*. Affordable Housing Resource Center. Retrieved December 20, 2020, from: <https://www.novoco.com/resource-centers/affordable-housing-tax-credits/data-tools/lihtc-pricing-trends>
- Office of the Comptroller of the Currency (OCC) (2014). *Low-income housing tax credits: affordable housing investment opportunities for banks*. Community Developments Insights. Office of the Comptroller of the Currency—Washington DC. Retrieved August 19, 2018, from: <https://www.occ.gov/publications-and-resources/publications/community-affairs/community-developments-insights/ca-insights-mar-2014.html>
- Oluku, U. (2019). The low-income housing tax credit program: An evaluation of household rent savings. *Journal of Housing Research*, 28(2), 215–235. <https://doi.org/10.1080/10527001.2020.1776515>
- Parker, K., Minkin, R., & Bennett, J. (2020). *Economic fallout from COVID-19 continues to hit lower-income americans the hardest*. Pew Research Center—Social and Demographic Trends. Retrieved January 31, 2021, from <https://www.pewresearch.org/social-trends/2020/09/24/economic-fallout-from-covid-19-continues-to-hit-lower-income-americans-the-hardest/>
- Scally, C. P., Gold, A., Hedman, C., Gerken, M., & DuBois, N. (2018). *The low-income housing tax credit past achievements, future challenges*. Research report. Urban Institute. Retrieved November 7, 2020, from https://www.urban.org/sites/default/files/publication/98761/lihtc_past_achievements_future_challenges_final_0.pdf
- Schwartz, A. F. (2014). *Housing policy in the United States: An introduction* (2nd ed.). Routledge Taylor and Francis Group.
- U.S. Department of Housing and Urban Development, Office of Policy Development and Research (HUD PD&R) (2020a). *Data sets—income limits*. Retrieved December 5, 2020, from <https://www.huduser.gov/portal/datasets/il.html>
- U.S. Department of Housing and Urban Development, Office of Policy Development and Research (HUD PD&R). (2020b). *Data sets—low income housing tax credits*. Retrieved December 12, 2020, from <https://www.huduser.gov/portal/datasets/lihtc.html>
- Virginia Housing (VA) Study (2020). *Economic and programmatic impacts of Virginia housing*. Retrieved December 20, 2020, from https://cra.gmu.edu/wp-content/uploads/2020/07/Virginia-Housing-RD.-1-3-16-2020_w_cover-FINAL.pdf