Occasional Studies

Apartment Rents and the City Tenure of Renters in the District of Columbia

The Impact of the Subsidized Rents (via the Housing Production Trust Fund) on the Tenure of Low-income Renters

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I. Introduction

A recent study by the Institute on Metropolitan Opportunity finds that from 2000 to 2016, the District of Columbia experienced the strongest degree of gentrification and displacement of long-time residents of any city in the country.[1] One reason for the large degree of outmigration of low- to moderate-income long-time residents from the District of Columbia is the crisis level shortage of affordable housing.[2] Against this backdrop, however, the city's government continues to rely on its Housing Production Trust Fund (HPTF) as the primary local policy tool to produce and preserve affordable housing throughout the city. It is a special revenue fund administered by the city's Department of Housing and Community Development (DHCD) that provides gap financing for new or renovated residential projects dedicated to low- and moderate-income households. Over 9,000 affordable housing units have been produced using the HPTF since 2001.

To better understand the role of housing costs in the city's growth and development, this study seeks to identify the effect of both market and subsidized apartment rents on the length of city tenure of tenants of multifamily buildings in the city. That is, do apartment tenants with relatively lower apartment rents remain in the city longer than tenants with relatively higher apartment rents. This study examines this issue from two perspectives. First, the study assesses the effect of subsidized apartment rents (via HPTF housing) on respective tenant's tenure in the city relative to apartment tenants with market rents in comparable Class B and C buildings. And second, the study assesses the effect of relatively high apartment rents (in Class A, large investor-grade multifamily buildings) on the respective tenant's tenure in the city relative to apartment tenants with market rents in comparable Class B buildings.

Using geocoded District of Columbia individual income tax data for years 2001 to 2016 and HPTF housing data, this study finds that the level of apartment rents faced by renters influences their length of tenure in the city. While the study finds tenants who lived in Class B apartments with market rents (i.e. the control group) tend to remain city residents approximately 6 years on average, lower income residents with HPTF subsidized monthly rents tend to remain city residents an average of 1 year and 9 months longer than the control group, and Class A tenants despite their higher incomes were inclined to remain 1 year and 4 months less than the control group.

The next section discusses the HPTF program in more detail. Section three discusses the CoStar property data, DHCD housing data and the unique administrative individual income and real property tax data used in this study. Section four discusses the econometric models used, and section five provides an interpretation of the models' results. The conclusions are presented in the final section.

[1] American Neighborhood Change in the 21st Century, Institute on Metropolitan Opportunity, April 2019. https://www.law.umn.edu/sites/law.umn.edu/files/metro-files/american_neighborhood_change_in_the_21st_century_-_executive_summary_-_4-2-2019.pdf

[2] Meeting the Washington Region's Future Housing Needs, Urban Institute, September 2019. https://www.urban.org/research/publication/meeting-washington-regions-future-housing-needs/view/full_report

II. Background

The Housing Production Trust Fund (HPTF) is a revenue fund administered by the Department of Housing and Community Development (DHCD). The HPTF provides gap financing for new and renovated residential projects meant to be affordable for low- to moderate-income households. The goal of the HPTF program is to make sure that "every resident in the District can afford a place to call home."[3] Since 2001, more than 9000 affordable housing units[4] have been produced using HPTF, and at the end of fiscal year 2019 the HPTF had an available balance of $142.9 million.[5]

The HPTF requires that, for each fiscal year:

- At least 40 percent of its spending serves households with incomes below 30 percent of the area's median family income (MFI)
- At least another 40 percent of expenditures serve households with incomes between 30 percent and 50 percent of MFI
- The balance of funds can serve households with incomes up to 80 percent of MFI

Usually, the HPTF begins financing approved projects by issuing a notice of funding availability or a request for proposals. After an initial assessment, DHCD's Development Finance Division gives pre-development loans to non-profit housing developers. The selected housing developers then use the loan to construct a new building or renovate an existing one. After construction ends, the developers sell or rent these buildings to lower-income residents who must qualify under the HPTF's established "income limits" in order to live in the new buildings.

HPTF's income limits vary based on household size. Table 1 shows the income limits for HPTF applicants in 2016. Rents are also progressively different based on the income level and family size. Table 2 shows rents by household income and unit size also for 2016.

Table 1 **Income Limits for HPTF Residents in 2016**[6]

	Household Size				
Income Band	**1 Person**	**2 Person**	**3 Person**	**4 Person**	**5 Person**
0-30% of MFI	$22,806	$26,064	$29,322	$32,580	$35,838
31 – 50% of MFI	$38,010	$43,440	$48,870	$54,300	$59,730
51 – 80% of MFI	$60,816	$69,504	$78,192	$86,880	$95,568

Table 2 **Rent limits for HPTF Residents in 2016**[7]

Income Band	Efficiency	1 BD	2 BD	3 BD	4 BD	5 BD
0-30% of MFI	$570	$651	$733	$814	$895	$977
31 – 50% of MFI	$950	$1,086	$1,221	$1,357	$1,493	$1,629
51 – 80% of MFI	$1,520	$1,737	$1,954	$2,172	$2,389	$2,606

[3] 2015 HPTF Affordable Housing Annual Report, available at https://dhcd.dc.gov/sites/default/files/dc/sites/dhcd/publication/attachments/2015%20HPTF%20Affordable%20Housing%20Annual%20Report.pdf

[4] https://dhcd.dc.gov/page/housing-production-trust-fund

[5] https://dhcd.dc.gov/sites/default/files/dc/sites/dhcd/publication/attachments/Final%20HPTF%20Quarterly%20Report%20-%20Q4%20FY19.pdf

[6] Housing Production Trust Fund (HPTF) Program Limits, DHCD

[7] Ibid.

As of 2016, there were 714 residential buildings in the city delivered to the market via the HPTF.[8] The distribution of these buildings is shown in Figure 1. Wards 1 and 8 had the highest density of HPTF buildings, and only a few HPTF buildings were in Wards 2 and 3. Of all of these buildings, 32 percent were multi-family, and 5.1 percent were single-family structures. Figure 2 shows the change over time in the number of HPTF buildings and tenants. The figure also shows that as the actual number of affordable housing units continues to expand under HPTF (particularly after the ramp up in 2008), more residents derived valuable benefits of this program. According to city tax records, there were 6,689 income tax filers (i.e. tenants) domiciled in the 714 HPTF residential buildings in 2016.

Figure 1 **Location of HPTF Buildings in 2016**

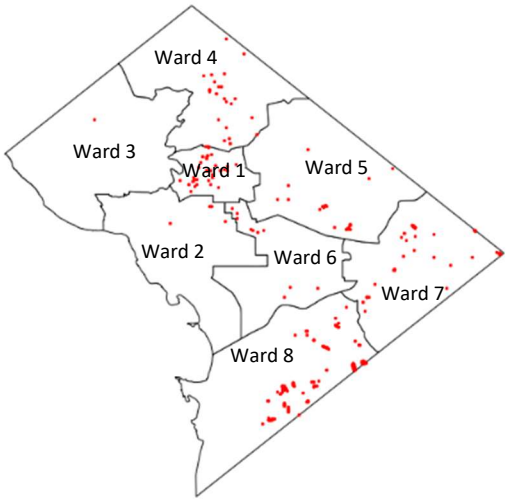
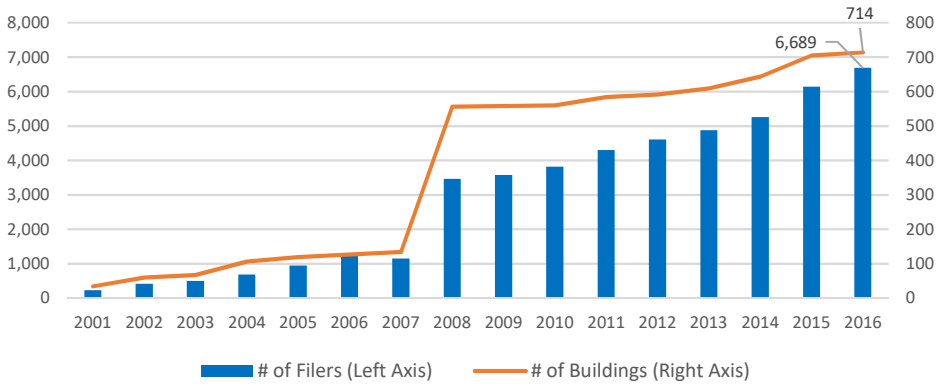


Figure 2 **Number of HPTF Buildings and Tax Filers/Tenants, 2001-2016**



[8] This report uses data from buildings financed by HPTF, derived from DHCD open-source databases and HPTF annual reports.

III. Data

This study utilizes three general types of data. The first is administrative tax data. This includes District of Columbia individual income tax data for 2001 to 2016, property tax data for 2001 to 2016, and federal individual income tax data for city residents for years 2006 to 2016. The tenure of tenants is based on the cumulative number of years tenants filed their income taxes with the city from particular residences. The second data type is HPTF housing data collected from the DHCD Open Data database[9] and DHCD HPTF Annual Reports. The DHCD HPTF Annual Reports feature a complete list of funding disbursement by residential project. By matching residential project names with disbursement data, this study confirmed that 714 buildings were completed under HPTF between 2001 and 2016. The third type of data is descriptive property data from CoStar, a real estate property database. This database provides average rents for all multifamily buildings in the study, the building type (Class A, B and C) and helped confirm the addresses for the HTPF buildings.[10]

The first set of models focus on income tax filers that were residents of HPTF multifamily buildings for at least one year between 2008 and 2012.[11] This is the treatment group. Accordingly, income tax filers who resided solely in market-rate (i.e. non-subsidized rent) Class B or Class C buildings between 2008 and 2012 are the control group.[12] The use of tenants' income tax data for years 2001 to 2007 and 2013 to 2016 helps to more accurately identify the start and ending year of city residency and tenure in the treatment or control groups. All tax filers were between the ages of 22 and 70 when they first moved into any of the buildings in the study.

For the second set of models, we attempt to be more comprehensive by not only analyzing the "low end" of the multifamily rental market as specified in the first set of models, but also the "high end" of the market. To this end, we compare city tenures of income tax filers that were residents of Class A multifamily buildings for at least one year between 2008 and 2012 to income tax filers that were solely residents of market-rate Class B buildings in the same neighborhoods for the same time period.[13] Costar data indicates that in 2016, the average monthly rent for a one-bedroom in a Class B building was $745 (29 percent) cheaper than a typical one-bedroom in a Class A building ($2,575 vs $1,830). Since HPTF buildings only accept applicants with certain incomes, people who on average earned more than $86,880 per year are excluded from the study.[14]

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[9] There are two sources for DHCD's open database: the DHCD and the Housing Insights websites. Both websites publish data on HPTF buildings. However, as the data on buildings from these two websites could not be entirely matched, this study used only the overlapping entries for a final HPTF building list.

[10] Buildings in the District are categorized into Class A, B and C based on several indicators, such as location, age and quality of buildings, amenities, access to public transportation, and efficiency. The categorization used in the study is retrieved from CoStar Real Estate database.

[11] For years 2001 to 2007, most of the HPTF housing units were single-family/owner-occupied residences. The vast majority of the HPTF multifamily buildings (providing significantly more individual housing units) opened after 2007. This is the cause of the spike in HPTF buildings in 2008 shown in Figure 2.

[12] The assumption is that residents of Class B or C buildings in neighborhoods with numerous HPTF multifamily housing projects have income levels similar to the HPTF residents and tend to make similar residency decisions.

[13] Since the treatment group and the control group could overlap if a resident lived in both HPTF housing and a Class B/C building between 2001 and 2012, this study excludes from the control group residents who lived in HPTF buildings at any time. Also, since the city annually attracts a large number of young adults to study or intern, we excluded tax filers younger than 22 years old from the study.

[14] Per Table 1, $86,880 is the yearly income limit for HPTF residents in a 4-person household.

Data Description for the HPTF Analysis

For the first set of models, the size of the treatment group is 4,973 tax filers/residents, and the size of the control group is 1,579. Figure 3 shows the wards of residency for both groups in 2016. Ward 8 has the highest amount of HPTF tenants, which is about half of the whole sample. Ward 2 has the highest share (26 percent) of tenants in the control group from market-rate Class B and C buildings tenants.

Figure 3 **Residency of Tax filers/Tenants by Ward, 2016**

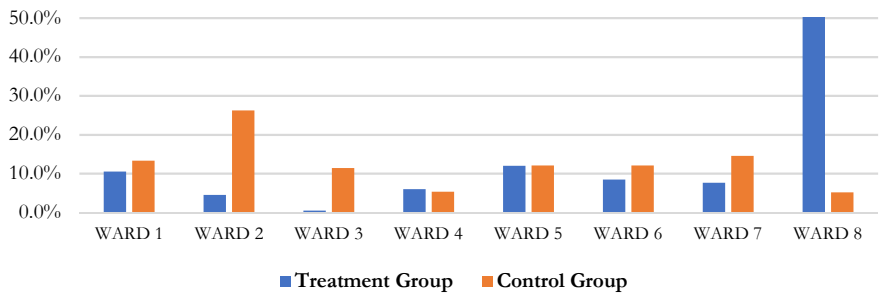

Table 3 is the statistical summary of the data for the dependent and independent variables used in the first set of models. The table shows that tenants in the city tend to reside at several different residences throughout their entire city residency, which is why the city tenure statistics are greater than specific building tenure statistics. The table shows that tenants in HPTF buildings remained in the city an average of 7.5 years while tenants in the control group (Class B or C buildings) remained in the city 5.1 years. This means tenants in HPTF buildings remained in the city an average of 2 years and 5 months longer than the control group. The table also shows that the treatment group on average earned 33.6 percent less income, tended to be slightly older, be more likely to have (or have more) dependents and be more likely to be a recipient of the Earned Income Tax Credit.

Table 3 **Statistical Summary of HPTF Tenure versus Class B & C Tenure, 2001-2016**

Dependent Variables (DV)	**Analysis Group**	**Median**	**Mean**	**# of Observations**
Cumulative tenure in buildings	Treatment group	3.2	4.3	4,973
	Control group	2.1	2.7	1,579
Cumulative tenure in the city	Treatment group	7.4	7.5	4,973
	Control group	4.2	5.1	1,579
Independent Variables	**Analysis Group**	**Median**	**Mean**	**# of Observations**
DC Adjusted Gross Income	Treatment group	$19,255	$22,978	4,973
	Control group	$27,269	$34,618	1,579
Age in 2016	Treatment group	36.1	38.6	4,973
	Control group	29.3	35.5	1,579
Number of Dependents in 2016	Treatment group	2.0	1.7	2,543
	Control group	1.1	1.5	356
		Median	**Mean**	**Coverage (%)**
Property Tax Credit	Treatment group	$651	$567	4.4%
	Control group	$774	$635	2.3%
Income Related Credits	Treatment group	$877	$880	54.1%
	Control group	$633	$754	21.4%

Data Description for the Class A Analysis

For the second set of models, the treatment group comprises tax filers who resided in Class A buildings for years 2008 to 2012, and the control group comprises tax filers who resided in Class B buildings during that same time period. Table 4 shows that tenants in Class A buildings remained in the city an average of 5.4 years while tenants in the control group remained in the city 7.8 years on average. This means tenants in Class A buildings remained in the city an average of 2 years and 5 months shorter than their counterparts. The table also shows that the treatment group tended to earn 2.5 times more income, tended to be younger, and be less likely to have (or have less) dependents.

Table 4 **Statistical Summary of Class A Tenure versus Class B Tenure, 2008-2016**

Dependent Variables (DV)	**Analysis Group**	**Median**	**Mean**	**# of Observations**
Cumulative tenure in the building	Treatment group	2.1	2.9	3,840
	Control group	4.0	4.2	487
Cumulative tenure in the city	Treatment group	5.2	5.4	3,840
	Control group	7.1	7.8	487
Independent Variables	**Analysis Group**	**Median**	**Mean**	**# of Observations**
DC Adjusted Gross Income	Treatment group	$54,942	$75,326	3,672
	Control group	$25,366	$29,133	472
Age in 2016	Treatment group	31.3	33.1	3,811
	Control group	35.1	39.4	484
Number of Dependents in 2016	Treatment group	1.1	1.4	194
	Control group	1.3	1.7	175
		Median	**Mean**	**Coverage (%)**
Property Tax Credit	Treatment group	$772	$653	6.8%
	Control group	$816	$645	2.2%
Income-Related Credits	Treatment group	$188	$530	4.2%
	Control group	$796	$834	23.5%

The above description of the data indicates that while the control groups (tenants that only lived in Class B and C rental units for the entirety of 2008 to 2012 at a minimum) were likely to remain city residents approximately 6 years, lower income residents with HPTF subsidized monthly rents remained city residents on average of 2 years and 5 months longer. Class A tenants, despite their incomes tending to be 2.5 times higher, remained city residents 2 years and 5 months fewer than the control group. An inference can be made that HPTF tenants with subsidized rents have a tendency to stay in the city as residents nearly 5 years longer than Class A tenants with higher incomes.

IV. Models

To more succinctly measure the impact of HPTF residency on the tenure in HPTF buildings, we use regression model (1) which controls for age, dependents, income, tax filing status and select tax credits.

$$\begin{aligned} &Building\ Tenure \\ &\quad = \beta_0 + \beta_1 HPTF + \beta_2 age + \beta_3 (age)^2 + \beta_4 Number\ of\ Dependents + \beta_5 AGI \\ &\quad + \beta_6 Property\ Tax\ Credit + \beta_7 Income\ Related\ Tax\ Credit + \beta_8 Head\ of\ Household \\ &\quad + \beta_9 Single + \varepsilon \end{aligned} \tag{1}$$

To measure the impact of HPTF residency on city tenure, we use regression model (2) which also controls for age, dependents, income, tax filing status and select tax credits.

$$\begin{aligned} &City\ Tenure \\ &\quad = \beta_0 + \beta_1 HPTF + \beta_2 age + \beta_3 (age)^2 + \beta_4 Number\ of\ Dependents + \beta_5 AGI \\ &\quad + \beta_6 Property\ Tax\ Credit + \beta_7 Income\ Related\ Tax\ Credit + \beta_8 Head\ of\ Household \\ &\quad + \beta_9 Single + \varepsilon \end{aligned} \tag{2}$$

In the above regressions, HPTF variable is the dummy variable where HPTF = 1 indicates living in HPTF buildings for at least one year between 2008 and 2012 and HPTF = 0 indicates living in Class B/C buildings for the entirety of 2008 to 2012. AGI stands for DC Adjusted Gross Income. Since residents live in these buildings in different years, the AGI in this model is averaged over the years that residents stayed in the treatment or control group, adjusted to account for the inflation rate of different years. Income-related tax credit includes the DC Earned Income Tax Credit, federal Earned Income Tax Credit and the DC Low-Income Credit. The property tax credit and income-related tax credit are dummy variables. Head of Household and Single are dummy variables representing a resident's filing status.

To measure the impact of Class A residency on the tenure of residents of Class A buildings, we use regression model (3) which controls for age, dependents, income, tax filing status and select tax credits.

$$\begin{aligned} &Building\ Tenure \\ &\quad = \beta_0 + \beta_1 Class\ A + \beta_2 age + \beta_3 (age)^2 + \beta_4 Number\ of\ Dependents + \beta_5 AGI \\ &\quad + \beta_6 Property\ Tax\ Credit + \beta_7 Income\ Related\ Tax\ Credit + \beta_8 Head\ of\ Household \\ &\quad + \beta_9 Single + \varepsilon \end{aligned} \tag{3}$$

And, to measure the impact of Class A residency on overall city tenure, we use regression model (4).

$$City\ Tenure = \beta_0 + \beta_1 Class\ A + \beta_2 age + \beta_3 (age)^2 + \beta_4 Number\ of\ Dependents + \beta_5 AGI + \beta_6 Property\ Tax\ Credit + \beta_7 Income\ Related\ Tax\ Credit + \beta_8 Head\ of\ Household + \beta_9 Single + \varepsilon \quad (4)$$

In the above two regression, Class A is the dummy variable where Class A = 1 means lived in Class A buildings for at least one year between 2008 and 2012 and Class A = 0 means living in Class B buildings for all years between 2008 and 2012.

V. Empirical Results

All models were conducted using an OLS regression, and the results are shown in Table 5. For model 1, which has tenure in HPTF buildings as the dependent variable (DV), the coefficient for the HPTF dummy variable is 1.29. This coefficient means that controlling for other factors (e.g. income, age, dependents, income tax filing status), living in an HPTF building is correlated with residents living in the building 1 year and 4 months longer on average than residents living in Class B or C buildings. Model 2 has tenure in the city as the DV, and the coefficient for the HPTF dummy variable is 1.71. This number means that controlling for other influential factors, living in an HPTF building is correlated to residents living in the city 1.71 years longer (1 year and 9 months) on average than residents living in Class B or C buildings. The results for models 1 and 2 also indicate that as income increases tax filers are also more likely to remain both in their respective apartment building and in the city. Also, model 2 indicates that older residents, residents with dependents and residents that claim the Earned Income Tax Credit tend to remain city residents longer.

Table 5 **Regression Results for the Four Regression Models**

	HPTF Models			Class A Models	
	DV: Tenure in HPTF buildings (Model 1)	DV: Tenure in city (Model 2)		DV: Tenure in Class A buildings (Model 3)	DV: Tenure in city (Model 4)
Explanatory Variables			Explanatory Variables		
HPTF	1.29 ***	1.71***	Class A buildings	-0.68***	-1.36***
	(0.09)	(0.13)		(0.10)	(0.17)
Age	0.01	0.11***	Age	0.26***	0.26***
	(0.02)	(0.03)		(0.02)	(0.04)
Age^2	0.00*	-0.00	Age^2	-0.00***	-0.00***
	(0.00)	(0.00)		(0.00)	(0.00)
Number of dependents	0.15 ***	0.77***	Number of dependents	0.08	0.60***
	(0.05)	(0.07)		(0.08)	(0.15)
Average Income	0.26***	0.77***	Average Income	-0.13***	0.22***
	(0.04)	(0.06)		(0.05)	(0.08)
Income-related credits	-3.05***	-8.35***	Income-related credits	-3.32***	-3.91*
	(0.78)	(1.12)		(1.16)	(2.02)
Property tax credit	0.22	0.65***	Property tax credit	0.89***	0.73
	(0.18)	(0.25)		(0.29)	(0.50)
Single	-0.14	0.33	Single	0.37***	0.58***
	(0.15)	(0.21)		(0.09)	(0.16)
Head of household	0.28*	1.22***	Head of household	0.99***	2.40***
	(0.15)	(0.22)		(0.18)	(0.31)
Income-related credit*Average income	0.29***	0.85***	Income-related credit*Average income	0.35	0.38*
	(0.08)	(0.11)		(0.12)	(0.31)
Degree of freedom	5,960	5,960	Degree of freedom	4,144	4,144

*** indicates significance at the 0.01 level, ** indicates significance at 0.05 level, and * indicates significance at 0.10 level

For model 3, which has tenure in a Class A building as the DV, the coefficient for the Class A dummy variable is -0.68. This number means that controlling for other influential factors living in a Class A building is correlated with residents living in the building for 8 months shorter than their Class B counterparts. For model 4, which has tenure in the city as the DV, the coefficient for the Class A dummy variable is -1.36. This number means that controlling for other influential factors, living in a Class A building is correlated with these residents living in the city a shorter time on the order of 1 year and 4 months, on average, than residents living in Class B buildings.

Models 3 and 4 also show interesting coefficients for the average income variable. For model 3, the coefficient of -0.13 indicates that as income increases for Class A tenants' (which are relatively high- income earners), they are less likely to remain in Class A buildings. But simultaneously, the coefficient of 0.22 in model 4 indicates that as Class A tenants' income increases, they are more likely to remain in city. One possible explanation for these findings is that being a relatively short-term Class A tenant may be a deliberate choice or common phase that many high-income residents go through as part of their District of Columbia experience. It appears that these younger, higher income tenants prefer living in, commonly, new and amenity-rich apartment buildings for a few

years; however, in order to being financially able to extend their tenure in the city they may then choose to relocate to a more reasonably priced Class B rental unit. Another explanation may be that, these tenants may rent Class A units with the initial intention of maintaining such a lifestyle for a relatively long time period. After a few years, however, in their Class A apartment and ultimately being faced with the stark reality of the high costs of living in a trendy Class A unit, they may feel compelled, after reexamining their income and expense situation, to relocate to a more affordable Class B unit. But regardless of the reason, model 3 indicates that the tenure of tenants in Class A buildings is likely to be 8 months less than tenants in Class B buildings, and the city tenure of Class A tenants is inclined to be 1 year and 4 months less than tenants in Class B buildings.

Based on the statistical analysis of the original data in section three, it can be deduced that low-income HPTF tenants with subsidized rents have a tendency to stay in the city as residents nearly 5 years longer than higher income Class A tenants. The regression models help us to refine this deduction by attempting to explain residents' city tenure with other factors also. As a result of the inclusion of other factors in the models, the models indicate that HPTF tenants remain city residents a total of 3 years and 1 months longer than Class A tenants explicitly because of the HPTF subsidized rents (1 year and 9 months) relative to the Class A premium rents (1 year and 4 months).

VI. Conclusion

This study investigated the effects of housing cost on residents' tenure in the city. The study found that when controlling for income, age and dependents, lower apartment rental rates via the HPTF program helped tenants stay in the city one year and nine months longer, on average, than tenants in comparable Class B and C multifamily units. And, tenants in Class A rental units have a tendency to reside in the city 1 year and 4 months less, on average, than residents living in Class B buildings.

Since 2006, the District of Columbia has been renowned for its population growth. However, there has continued to be a simultaneous and persistent pattern of out-migration of residents at all levels of incomes from the city. And whereas, renters in Class B units remained in the city as residents about 6 years, on average, this study found that HPTF residents with low-income were city residents about 7 years and 9 months because of HPTF subsidized rents. And in contrast, this study found that Class A tenants stayed in the city an average of 4 years and 8 months because of the Class A premium rents and despite their high incomes. The models do not discern if Class A tenants tend to come to the city with the intention of an approximate 4 to 5-year tenure or if these tenants leave the city under financial distress largely caused by the premium rents of Class A apartments. The model does suggest that the relatively long city tenure of HPTF residents are largely due to the HPTF subsidized rents. This is evidenced by the fact that the average HPTF resident income was $23,000 in 2016 while the average Class B resident facing market rents had an average income was almost $35,000.

This study finds the level of apartment rents faced by the city renters significantly influences their length of tenure in the city. HPTF appears to be providing an increasing number of affordable housing units to low -to moderate income residents, which in turn is helping to counter the more general pattern of out-migration caused, in part, by the lack of affordable housing and gentrification.