Utilizing Logistic Regression Modeling to Measure Generational-Age-Cohort Housing Preferences in the District of Columbia

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Low-income neighborhood transformation is a major issue in many urban communities, especially in the District of Columbia, which has become a focal point of urban transformation with its recent growth in population, economic wealth, and housing values. In the past, the District of Columbia generally gained jobs but lost residents. While the district continues to experience job growth in both the private and public sectors since the turn of the millennium, it is now a more viable place to live. Many researchers have found that the large gains in economic wealth and property values are indicators for gentrification or neighborhood change (Hamnet 2003; Smith 1987; Ley 1986; Kennedy and Leonard 2001).

In particular, housing prices in the district have recently risen well above the national trend. Based on Standard & Poor's Case-Shiller Home Price Index, an average home purchased in the District of Columbia in 2000 was worth 88 percent more in 2013. The district's housing price index is 37 percentage points above the U.S. 20-city index, numbers calculated in real terms (Quealy 2013). Research has also found that younger adults play an important role in the housing market (Fischer and Gervais 2011).

Despite representing a minority among household data, young adults are the majority of first-time homebuyers (Fisher and Gervais 2011). Young adults make up a generational cohort ranging from 15 to 34 years of age, also known as millennials. This important generational cohort contributed to the rise in the district's population from 2000 to 2012. Using 2010–2012 American Community Survey data from the Census, Frey (2013) found that the District of Columbia ranked as the most desired metropolitan area for 25- to 34-year-olds.

The millennial age cohort was also of particular interest to McKinnish, Walsh, and White (2010), who found that a key hallmark of neighborhood change was the in-migration of white college gradu-

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ates, particularly those younger than 40 and without children. Similarly, Drew argued that not only will young adults

> *influence housing demand in the near future, but they will also drive trends in the housing type and location with their different tastes and preferences relative to prior generations* (Drew 2015, 3).

Given the district's changing demographic and economic landscape, it is important for policy makers to identify the areas of change, determine who is fostering this change, and decide whether this change is economically viable. Assessing how this generation has influenced the district's neighborhood transitions and housing-tenure preferences may offer policy makers greater insight into how the district can maintain its economic viability. In this paper, we define economic viability as neighborhood growth and stability through owner-occupied housing demand and homeownership. We derived our definition of economic viability from previous works by Grimes (1981), Schoenberg (1979), Yancey and Ericksen (1979), and Zwiers et al. (2014).

Housing-demand choices and age-cohort analysis can shed light on the wealth, income, and lifestyle choices of the district's income and property tax base. For instance, a report by the Bipartisan Policy Center (2012) forecast that an increasing senior population will contribute to the housing supply; however, the echo boomers will account for 75 to 85 percent of the owner-occupied housing demand by 2020. (Echo boomers are also known as millennials born between 1981 and 1995.) The report also highlighted the growing trend of renter-occupied housing due to the Great Recession (Freiman 2012). In this analysis, we approach the topic of neighborhood change in the district by exploring how changes in housing-tenure decisions made by the district's population by age cohort influence economic growth and stability in low- to moderate-income neighborhoods.

Defining Neighborhood Change

An influx of residents into a city can create a larger income base, thus bidding up the rent for land (Alonso 1964).The bidding up of land could cause neighborhoods to transform from low-income into high-income communities. Many social scientists refer to this change in economic wealth and transformation of property values in a neighborhood structure as gentrification or neighborhood change (Hamnet 2003; Smith 1987; Ley 1986; Kennedy and Leonard 2001). Likewise, Wyly and Hammel (1999) and Bounds and Morris (2006) also found that differences in household income are key in measuring neighborhood change.

Other studies on neighborhood change have found both positive and negative socioeconomic effects, such as revitalization, reinvestment, gentrification, and displacement. Some researchers view the revitalization and reinvestment processes as involving government and businesses embracing entertainment, demographic changes, and a more youthful migration into the area (Bounds and Morris 2006; Kennedy and Leonard 2001). Other researchers view the tandem gentrification and displacement process as a removal of the less educated, underfunded, and larger families from an existing community (Ley 1986; Smith 1996). Several empirical studies have examined the idea that neighborhood growth and change may cause displacement; they found that the undereducated and underfunded were less likely to move from a neighborhood experiencing neighborhood growth (Freeman and Braconi 2004; McKinnish, Walsh, and White 2010; Ellen and O'Regan 2011).

More specifically, McKinnish, Walsh, and White (2010) suggested that the original, low-income residents in such neighborhoods might possibly have

experienced an increase in average income during the time period of growth. Furthermore, Ellen and O'Regan (2011) examined whether members of low-income groups who stayed in growing neighborhoods were *incumbent upgraders*, a term described by Clayton (1979) as naming an existing low-income subgroup that has possibly gained from a neighborhood's transition to high-income status. Although 70 percent of income gains in the growing neighborhoods were from in-migrants, Ellen and O'Regan (2011) found that 21 percent of income gains went to the neighborhood's existing residents. This finding supports the idea that neighborhood change fosters economic viability for both new and existing residents, reducing the consequences of displacement.

A recommended extension of this analysis by Freeman (2005) suggests a shift in the discussion of gentrification and neighborhood change toward an examination of their causes and effects. Our analysis heeds Freeman's recommendation by examining the effects of neighborhood change, offering a discussion and analysis of neighborhood economic viability through the evaluation of age-cohort housing preferences and homeownership.

Demand for Housing and Stability of Neighborhoods

According to the U.S. Census Bureau, the District of Columbia's population increased by 7.4 percent from 2010 to 2013, 5 percentage points above the national average. The district's growth in population has particularly affected certain neighborhoods, increasing local demand for housing. Research has shown the importance of housing demand to community and social development. The introduction to the 1995 National Homeownership Strategy included the following statements (Rohe, Van Zandt, and McCarthy 2001):

- Homeownership is a commitment to strengthening families and good citizenship.
- Homeownership enables people to have greater control and exercise more responsibility over their living environment.
- Homeownership is a commitment to communities.
- Homeownership helps stabilize neighborhoods and strengthen communities.
- Homeownership creates important local and individual incentives for maintaining and improving private property and public spaces.

Residential satisfaction is determined by characteristics of the individual, the housing unit, and the surrounding neighborhood (Galster 1987). Since communities and neighborhoods play a vital role in the demand for housing and in the neighborhood where people choose to live, low demand for housing in certain communities means that families do not want to live in that neighborhood and stifles local growth and development. Research by Goodchild, Hickman, and Robinson contended that low demand for housing is problematic, since it is closely related to the unpopularity of neighborhoods,

> *which causes high levels of vacant property, imposes additional costs on public services, offers poor and sometimes unacceptable living conditions for its residents, and can trap owner-occupiers in particular areas from which they cannot move without paying a premium for doing so* (Goodchild, Hickman, and Robinson 2002, 2).

Low demand for housing and vacancies at the neighborhood level can result from structural weaknesses and chronic unemployment in regional and local

economies, poor management of certain neighborhoods, disorder, weakening of informal social controls, despair, a high proportion of vacant dwellings that exacerbates management problems and conditions, and neighborhood instability (Fenton and Lupton 2013).

Neighborhood stability, as defined by Rohe, Van Zandt, and McCarthy (2001), is the average length of tenure among neighborhood residents; a lower turnover ratio equals greater neighborhood stability. Thus, homeownership assists neighborhood and community stability. In demonstration, Rohe and Stewart (1996) show four indicators in which homeownership helps stabilize neighborhoods:

1. The length of tenure of current residents
2. Property values
3. Physical condition of the property
4. Social conditions in the neighborhood, such as school-dropout and crime rates.

The relationship between homeownership and stability can be viewed in two distinct ways. First, regarding the accumulation of human capital, most homeowners are usually older family households with high levels of education and higher incomes. With a median tenure of 8.2 years, Rohe, Van Zandt, and McCarthy (2001) found owner-occupied households resided in a home for a longer time than their renter counterparts. Second, they described homeowners as having additional interest in their homes, both economic (potential financial gain and wealth accumulation) and use (amenities, security) interests. Homeowners were found to be actively engaged in the neighborhood, compared to renters. This level of engagement is connected to the homeowners' desire to maximize their investment, if successful. Therefore, homeowners may be more likely to participate in community organizations designed to protect their interests, to get to know their neighbors, to maintain their properties at a higher standard, and to develop a strong sense of community (Rohe, Van Zandt, and McCarthy 2001).

Neighborhood threshold effects, explored by Galster, Quercia, and Cortes (2000), helped to demonstrate that when certain neighborhood indicators reach a critical value, change occurs within that neighborhood's environment. To demonstrate, they found that certain social indicators—specifically, female headship rate for families with children, overall nonemployment rate, and poverty rate—were very sensitive to homeownership rates in a neighborhood. Thus, the threshold for neighborhood changes for these three social indicators resulted in small changes leading to dramatic changes in neighborhood composition and stability.

As a community becomes more unstable, leading to low demand for housing, homeownership can act to trap households in neighborhoods. Homeowners are less likely to move than renters are, as renters maintain their residences for a median duration of only 2.1 years (Rohe, Van Zandt, and McCarthy 2001). This decrease in mobility due to homeownership and the high transportation cost of moving can also lead to segregation and isolation among households living in distressed neighborhoods, reducing the ability of homeowners to

> *improve their neighborhood social characteristics, such as levels of employment and the number of families on public assistance, as well as physical characteristics like the number of dilapidated houses or the median value of homes* (Rohe, Van Zandt, and McCarthy 2001, 13).

Who resides in any particular neighborhood? In this analysis we used housing-tenure choices based on neighborhood changes to predict whether an age cohort will own a home, thus providing the greater neighborhood and community stability researchers have found throughout the literature.

Generational Age-Cohort Housing Preferences

A survey performed by The Demand Institute (2014) showed that young families and millennials crave urban living and want to live in homes close to urban amenities; these preferences differ from those of previous generations. As Drew wrote,

> *given that young adults will be called on to replace baby boomers as the latter start to leave the housing market over the next few decades, the implications of young adult preferences for housing will have significant impacts on the makeup of the housing stock for years to come* (Drew 2015, 3).

Many social scientists have used the generational age-cohort method to capture generational preferences: Noble and Schewe (2003), Alwin (1997), Schewe and Meredith (2004), Farley (1996), Pitkin and Myers (1994), Masnick, Di, and Belsky (2006), Bitter and Krause (2012), and Yip, Forrest, and LaGrange (2007). Generational-age cohorts, defined by Noble and Schewe (2003), are a proposed group of individuals who were born during the same period and who make certain choices based on similar external events that occurred during their formative or coming-of-age years. Moreover, Schewe and Meredith (2004) explained that historical events experienced during one's coming-of-age years create values that remain relatively unchanged throughout one's life.

In the literature, researchers have attempted to connect housing demand to the events and experiences of generations' unique trajectories (Alwin 1997; Farley 1996; Myers 1990; Gober 1992; Clark and Dieleman 1996; Pitkin and Myers 1994; Masnick, Di, and Belsky 2006; Bitter and Krause 2012; Yip, Forrest, and LaGrange 2007; Myers and Pitkin 2009). Going back to the 1950s, Myers and Pitkin (2009) demonstrated the important role that age-cohort preferences play in the prediction of urban-housing demand and gentrification or neighborhood change. They ascertained that the 25- to 34-year-old age cohort was most likely to form new households and thus increase housing demand. The increased consumption of housing by millennials includes renters, as nearly 6 in 10 millennials would rather rent a home than buy one, and just 1 in 4 is either very or completely likely to purchase a home sometime in the next 5 years, according to a 2014 survey of 1,300 millennials by *EliteDaily* and Millennial Branding (Hill 2015).

A 2014 study by *RealtyTrac*® showed that millennials are now having an impact on the markets for housing rental; it found that rental markets in those parts of the country with the biggest millennial population are a better bargain than buying a home. That is, in 25 counties where the millennial population had increased the most between 2007 and 2013, renting a 3-bedroom property in 2015 requires 30 percent of the median income in the local area, while buying a median-priced home of the same size consumes an average of 36 percent of median income (Bloomquist 2014).

The *RealtyTrac* study also confirmed the importance of homeownership in the United States. The company analyzed 2015 fair market data released by the U.S. Department of Housing and Urban Development. The fair market data concerned 3-bedroom properties in 543 counties nationwide with a population of at least 100,000. *RealtyTrac* found that in more than 68 percent of these counties, buying a 3-bedroom median-priced home was more affordable than renting a similar property. This statistic represents 57 percent of the total population in those counties (Bloomquist 2014).

Equally, Myers and Pitkin (2009) found that homeownership expanded among the 25- to 34-year-old age cohort, contracting after the age of 44. They posited that the demand for homes in urban areas could cause younger

homeowners to be priced out of their preferred neighborhoods, therefore causing a spatial migration to adjacent communities that, in turn, increased the likelihood of gentrification.

To evaluate trends in generational housing finance and housing demand, Masnick, Di, and Belsky (2006) utilized the Survey of Consumer Finance. They found unmarried, younger homeowners endured higher housing-cost burdens and lower housing-equity accumulation. The examination of age-cohort housing demand through a Swedish Organization for Economic Cooperation and Development time-series database by Lindh and Malmberg (2008) found that housing investment increased among younger age cohorts. These findings all support the theory that younger age cohorts influence neighborhood change through increased housing investment and higher housing-cost burdens.

Our analysis extends the work of Masnick, Di, and Belsky (2006), Lindh and Malmberg (2008), and Myers and Pitkin (2009) to investigate the generational influence of the 25- to 34-year-old age cohort on housing demand and to examine the sustainability of recent neighborhood changes in the District of Columbia.

Data and Descriptive Findings

The data for this analysis were drawn from three main sources:

- District of Columbia individual income tax
- Real property tax rolls
- U.S. Census Bureau Block Group Level databases.

The tax data for this study focus on the exact (not estimated) economic and demographic characteristics of each individual household in the District of Columbia, using micro tax data for each individual income taxpayer, real property taxpayer, and household in the city. Individual income and property tax data were obtained for both the 2001 and 2010 tax years, while block-group-level data came from the 2000 and 2010 Decennial Census database. (The Washington, D.C., Office of Chief Financial Officer ensured the confidentiality of the use of the individual income and property tax data for this study through the aggregation of individual and property tax filers to the larger assessment-level neighborhoods identified based upon GIS geocoding and mapping.)

We prepared the data used in the analysis by geocoding the income-tax data and spatially joining this information with District of Columbia property assessment neighborhoods (hereafter termed neighborhoods) provided through the DC Geographic Information System (DCGIS). The Real Property Tax Administration (RPTA) defines assessment neighborhoods by the structural, economic, political, and geographic environment of a subject property that has a direct and immediate effect on its value (Office of Tax and Revenue 2007). In general, one assessment neighborhood may contain several thousand homogenous properties based on the above assessment characteristics. The property tax data did not need geocoding, as it was already joined with the DCGIS assessment-neighborhood information.

Individual Income Tax Return Data

We used District of Columbia micro-level, individual income tax return data for 2001 and 2010. In order to identify the geographic, residential location of an individual income filer in the district, we had to have a workable permanent district address. After geocoding the data and filtering out non-district addresses, we retained 73 percent of the 270,768 filers in 2001 and 79 percent of the 316,890 files in 2010. (The Comprehensive Annual Financial Report [CAFR] numbers are slightly different from the numbers that were geocoded into the database.) We aggregated the geocoded addresses by income tax filer status and by the district's

unique assessment-neighborhood identifier. Income filer status was determined by the three Internal Revenue Service income tax codes for individuals: filing single, head of household, or married.

Real Property Data

We also used District of Columbia parcel-level real property data. The data contained property value, billing, and other property information for each of the city's over 172,000 properties for 2001 and 206,000 properties for 2010. The District of Columbia uses an annual property assessment cycle, meaning that all real property in the city is valued annually for property tax purposes. A property is assessed at its estimated, full market value, considered the most probable price for which a property would sell that year given normal terms and conditions of sale year. The full (100 percent) property assessment is the basis for calculating the annual property tax bill.

Market value is the most probable price a property should bring in a competitive and open market, which generally means a sale is under the following conditions: (a) the buyer and seller each act prudently and knowledgeably; (b) the price is not affected by undue stimulus; (c) a typical market transaction takes place when the buyer and seller are typically motivated; (d) both parties are well informed or well advised and act in what they consider their best interests; (e) reasonable time is allowed for exposure in the open market; and (f) the price represents the normal consideration for the property sold, unaffected by special or creative financing or sales concessions granted by anyone associated with the sale.

The District of Columbia's assessment process uses actual property sales data to normalize recent sale activity, so that current, general market trends are appropriately applied to every property in the city regardless of its physical condition. Nonetheless, statistical analysis and a review of assessment performance measures indicate that District of Columbia property valuations are very near the market prices of properties that actually sold. This implies that the annual assessment level for a given property and year is highly correlated to recent sales activity and market conditions.

Census Block Group Data

The third data source was the U.S. Census Bureau (2000 and 2010 block-group level decennial data for Washington, D.C.). (A census block group is a cluster of census blocks within a census tract generally containing between 600 and 3,000 people, with an optimum size of 1,500 people [U.S. Census Bureau 2013].) The variables of analysis at the block-group level include total population, population by age, and housing tenure. To reconcile the 2000 and 2010 boundary changes in the Washington, D.C., block groups, we utilized the DC Neighborhood Database provided by the Urban Institute (2013). This database uses a *common* District of Columbia assessment neighborhood GIS boundary file to create a bridge between 2000 and 2010 census block-group level data. About 15 percent of the block-group boundaries overlapped with two or more assessment neighborhoods. We reallocated the specific block-group data counts based on the percentage of block-group land area and/or housing unit counts found within each assessment neighborhood.

The result of this data and spatial integration process produced geographically defined neighborhoods matched with income and property tax data for most of the city's income tax filers for 2001 and 2010. We also integrated the city's census block group data for 2000 and 2010 with the same 73 neighborhoods.

Measuring Neighborhood Change

The typical economic proxy for neighborhood change, used by many scholars, is to examine the thresholds of neighborhood gains and losses by measuring

household income over a specified time period (Fogarty 1977; Berry 1985; Wyly and Hammel 1999; Bounds and Morris 2006; McKinnish, Walsh, and White 2010; Ellen and O'Regan 2011). The relative income approach is a more refined method utilized by scholars to analyze changes in neighborhoods. Incorporating this approach, Ellen and O'Regan (2011) calculated income quintiles for all U.S. metropolitan areas in 1990 and 2000. Restricting their analysis to the two bottom quintiles of each tract, they defined the relative income ratio as the average household income in the Census tract divided by the average household income of the metropolitan area. Thus, the authors' defined changed neighborhoods as tracts whose average income increased by more than the average household income of the metropolitan area over the studied period. Along with household income, housing property value has been embraced by several researchers as an indicator for neighborhood change by several researchers (Owens 2012; Hamnet 2003; Smith 1987; Ley 1986; Kennedy and Leonard 2001). Owens (2012) highlighted the importance of using housing costs as a measure for transition in a neighborhood.

This study adapted a measure similar to that of Ellen and O'Regan (2011), extending the model by identifying neighborhood transition with respect to both housing values and household income and by using the 73 assessment neighborhoods as defined by RPTA as the main geographic unit of analysis. This relative housing value and household income approach offers an additional and important threshold for evaluating neighborhood transition. Hence, we identify neighborhood change in a subset of all the city's neighborhoods using micro-level household income data and parcel-level residential property value data.

Measuring Neighborhood Transition in the District of Columbia

For this analysis, a neighborhood is in transition if it meets the following three important conditions:

1. A transitioning neighborhood experienced a median property value below the city-wide median in 2001. Therefore, the first qualifier of a transitioning neighborhood was the criterion that this neighborhood lagged in property value and adjusted gross income (AGI) relative to the entire city, during the beginning of the study period.
2. A transitioning neighborhood must also have had median federal AGI below the city-wide median in 2001.
3. If conditions 1 and 2 were met, a transitioning neighborhood also had to have had, from 2000 to 2010, a relative increase in income and home values compared to the rest of the city.

While federal AGI and residential property values for all neighborhoods in the city increased in 2010 relative to 2001, AGI and residential property values for these 18 selected transitioning neighborhoods not only grew but also accounted for a greater share of both AGI and residential property value in the city in 2010 relative to 2001. In other words, AGI and residential property values in the transitioning neighborhoods grew significantly faster than in all other city neighborhoods. Therefore, certain neighborhoods in the District of Columbia may have had a median property value and AGI below the city-wide 2001 median but nevertheless do not qualify as transitioning if they had not experienced any relative increase in income or home values over the decade. Likewise,

a neighborhood might meet the third condition without qualifying as gentrified if the neighborhood had a median property value and AGI at or above the city-wide median in 2001.

Figure 1 illustrates the locations of and table 1 lists our identified neighborhoods using the relative income and property value approach. Geographically, the 18 growing neighborhoods are located within the eastern half of the city. In the district, low-income individuals and minorities tend to reside in this same eastern half of the city. These low-income minority communities began experiencing a transition in the early 2000s into more economically diverse communities (Brown-Robertson and Muhammad 2013; Urban Institute 2013). More recent data show that the same eastern neighborhoods experienced an increase in singles and married tax filers with dependents (Brown-Robertson and Muhammad 2013). In order to understand unique characteristics of the transitioning neighborhood housing demand, we created a process to measure generational-cohort housing unit preferences for growth neighborhoods compared to all other neighborhoods in the District of Columbia. We measured generational-age-cohort residential-location decisions through the logistic regression method.

Figure 1. Gentrified neighborhoods in Washington, D.C., 2001–2010

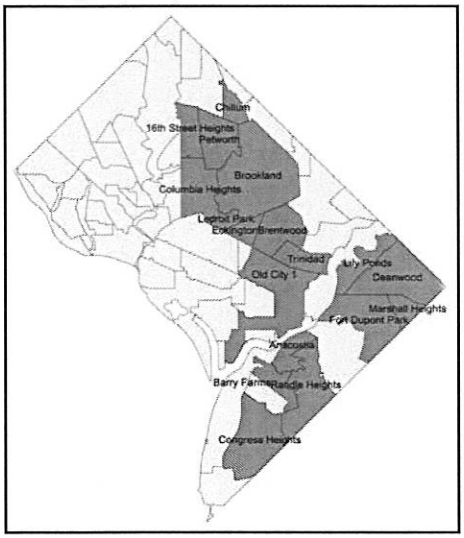


Table 1. Washington, D.C., transitioning neighborhoods 2000–2010

1. Anacostia	10. Fort Dupont Park
2. Barry Farms	11. Ledroit Park
3. Brentwood	12. Lily Ponds
4. Brookland	13. Marshall Heights
5. Chillum	14. Old City 1
6. Columbia Heights	15. Petworth
7. Congress Heights	16. Randle Heights
8. Deanwood	17. Sixteenth St. Heights
9. Eckington	18. Trinidad

Identifying Generations

To identify generational-age cohorts, Pitkin and Myers (1994) developed a method of generational-age-cohort analysis known as cohort-linked cross section (CLCS). The CLCS method analyzes generational-age cohorts over successive cross-sectional periods based on year of birth. After implementation, Pitkin and Meyers (1994) found that the CLCS method effectively eliminated biases in estimating housing demand. The CLCS method is premised upon findings in the social science literature that generational experiences facilitate the prediction of cohort preferences and consumption habits (Noble and Schewe 2003; Schewe and Meredith 2004).

Other noted work by Myers and Pitkin (2009), Myers (1999), and Yip, Forrest, and LaGrange (2007) has supported the method of cohort-linked cross-section analysis over standard cross-sectional modeling. Yip, Forrest, and LaGrange (2007) adopted a method similar to CLCS, studying age-cohort trajectories through the creation of a *pseudo* longitudinal database. They used data employing five waves of Hong Kong Population Census to form age cohorts beginning with birth year 1961 to 1966.

In utilizing the CLCS method to identify and track generational-age-cohort housing preferences, we took 2000 and 2010 Census data regarding housing unit by age cohort and created a pseudo longitudinal database that

follows cohorts by birth years over a 10-year period. Table 2 categorizes the 2000 and 2010 age cohorts by birth year and generational-age-cohort title. The generational-age-cohort categories were adopted from Farley (1996), Meyers (1999), Taylor and Keeter (2010), and Rosenbaum (2013).

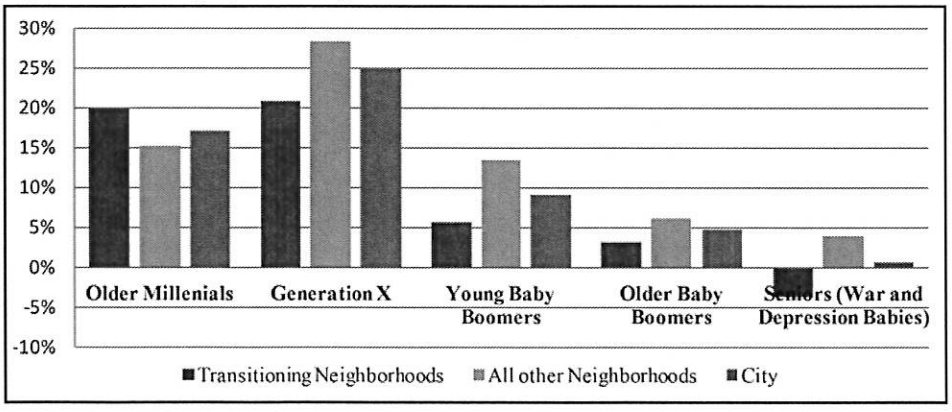
After identifying the generational-age-cohort categories, we examined homeownership rates in the district by the categories presented in table 2. Figure 2 displays the percentage point change in homeownership rates in these generational-age cohorts in the district from 2000 to 2010. The descriptive findings show that generation X experienced the largest percentage growth in homeownership over this decade, growth that occurred throughout the city, with larger levels in neighborhoods not identified as transitioning. While this growth was significant, the 2000–2010 Census data revealed that millennials showed the largest growth in owner-occupied housing. The millennial homeownership growth shown in figure 2 occurred mostly in the district's transitioning neighborhoods, which experienced larger percentage gains in millennial homeownership rates compared to the other neighborhoods in the city.

We can infer that millennials are not only migrating to the district but also embracing homeownership at greater levels in transitioning neighborhoods. Alternatively, the War and Depression babies cohorts, who together constitute the senior cohort, experienced a four percentage-point decline in homeownership rates over the 2000–2010 study period. The growth in millennial homeownership, with its commensurate increase in neighborhood income and property values, may offer an opportunity for the district's once economically challenging communities to maintain economic viability. An additional concern, which is beyond the scope of this paper, is whether the existing residents are *incumbent upgraders* or victims of displacement.

Table 2. Generational-age cohorts by birth year

2000	Birth Year	2010	Generation-Age Cohort Title	Variable Names
5–14*	1985–1994	15–24	Younger millennials (echo boom)	YM
15–24	1975–1984	25–34	Older millennials (gen Y)	OM
25–34	1965–1974	35–44	Generation X (baby bust)	Gen X
35–44	1955–1964	45–54	Young baby boomers	Y boomer
45–54	1945–1954	55–64	Older baby boomers	O boomer
55–64	1935–1944	65 plus*	War babies	WB (seniors)
65 plus	Before 1935	65 plus	Depression babies	DB (seniors)

Figure 2. Percentage-point change in homeownership rates



Model

Measuring Generational-Cohort Residential Location

The model used to determine the likelihood that a particular age cohort will reside in a growth neighborhood is similar to previous methods used by Sturtevant (2014), Conrad and Brown (2012), and Conrad and Alleyne (2011). Likewise, Conrad and Brown (2012) and Conrad and Alleyne (2011) built upon the models of Li (1977) and Gujarati (1995). The dependent variable is the odds of a particular neighborhood experiencing growth using the relative income and property value approach, thus becoming a transitioning neighborhood. Equation 1 defines the dependent variable as the natural log of the odds in favor of a transitioning neighborhood. This variable is dichotomous, with a value of 1 for any assessment neighborhood that met the following three conditions:

1. A growing neighborhood experienced a median property value below the city-wide median in 2001.
2. A growing neighborhood also must have had a median federal AGI below the city-wide median in 2001.
3. If conditions 1 and 2 were met, a growing neighborhood also had to experience, from 2000 to 2010, a relative increase in income and home values compared to the rest of the city.

We then derive the independent variables for the equation as follows. Each independent variable in the model captures the change in a generational cohort's housing tenure by neighborhood location from 2000 to 2010.

The equation for the preference for a growing neighborhood by generational-age cohort and housing-tenure demand (see table 2 for generational-age cohort labels) is

(1)

$$ln[P \div (1 - P_i)] = \beta_1 + \beta_2 + \beta_3 + u$$

where

β_2 = vector of the difference in renter-occupied housing units by generational-age cohort between 2000 and 2010)

β_3 = vector of the difference in owner-occupied housing units by generational-age cohort between 2000 and 2010

Results

Owner-Occupied Housing Units

Table 3 shows the results of the logistic regression, which estimates the probability that a specified generational cohort will own or rent in a transitioning neighborhood from 2000 to 2010. These findings suggest that older millennials were significantly more likely to own and occupy in a transitioning neighborhood compared to the rest of the city. This finding corresponds with 2012 Census median household income data, which show that the median income for individuals younger than 45 in Washington, D.C., was approximately $77,000, while the median income for individuals older than 45 was about $67,000. In addition, after adjusting for inflation, we found that, from 2010 to 2012, real median household income for individuals younger than 45 in Washington, D.C., increased by 5.4 percent, while individuals older than 45 experienced only a 2.6 percent increase in real income. In line with the descriptive statistics on homeownership found in figure 2, the generation Y cohort was more likely to own a home in a gentrified neighborhood but at an insignificant rate.

Therefore, the results reveal that the older millennial cohort has a significant influence on homeownership practices in the form of the district's transitioning neighborhoods. This influence may lead to greater economic viability in transitioning neighborhoods. As research has shown, homeownership creates economic and neighborhood stability (Rohe, Van Zandt, and McCarthy 2001; Galster

1987; Goodchild, Hickman, and Robinson 2002; Fenton and Lupton 2013; Galster, Quercia, and Cortes 2000). Also, if displacement is not an issue (as once thought by researchers), the influx of older millennials owning and occupying homes in a transitioning neighborhood can reduce the segregation and economic isolation of the district's incumbent low-income residents.

Renter-Occupied Housing Units

The results in table 3 show that when older millennials are more likely to own and occupy a home in a transitioning neighborhood, this same generational cohort is less likely, at an insignificant rate, to rent a home in the same transitioning neighborhoods during the 2000–2010 period. As stated earlier, the district's transitioning neighborhoods had median income and property values below the city median in 2001 but grew faster than the rest of the city from 2001 to 2010. Therefore, the findings of the logistic regression suggest that millennials migrating to the district have preferred low-cost but growing and transitioning neighborhoods for their homeownership opportunities.

Table 3. Logistic regression results; dependent variable odds of living in a transitioning neighborhood

	B	Exp B
Intercept	−1.978	0.138[a]
Difference in owner		
Older millennials (gen Y)	.031	1.032[b]
Generation X (baby bust)	−.007	.993
Younger baby boomers	.013	1.014
Older baby boomers	.000	.999
Seniors (war and Depression babies)	−.006	.994
Difference in renter		
Older millennials (gen Y)	−.005	.995
Generation X (baby bust)	.002	1.002
Younger baby boomers	.048	1.048[b]
Older baby boomers	−.035	.965
Seniors (war and Depression babies)	−.001	.999
"−2 log L" = 37.198[a]		
$\chi^2 = 412.408$[a]		
Nagelkerke $R^2 = 0.666$		

[a] $p < .01$

[b] $p < .05$; .05 to .10 fairly good at predicting outcome.

The cohort that exemplified the greatest demand for renter-occupied homes in transitioning neighborhoods from 2000 to 2010 was the younger baby boomers. This finding is consistent with the Joint Center for Housing Studies (2013) research, which found that the rental rates for individuals 35 to 54 years old increased by 36 percent between 2003 and 2013. In particular, the younger baby boomer cohort has increased the demand for rental housing more than 6 percent during this period.

Researchers have attributed this *later in life* demand for rental housing to downsizing empty nesters, who wish to live in the city near transportation and other urban amenities. While demand for rental housing among younger baby boomers closely relates to the rhetoric for millennial housing demand, the Joint Center for Housing Studies also highlighted the baby boomers' need for flexible living standards, a feature that renting, rather than owning, offers.

Conclusion

This paper has sought to explore how changes in the district population's housing-tenure decisions by age cohort have influenced economic growth and stability in neighborhoods with low to moderate incomes. We found that the older millennial cohort residing in the District of Columbia displayed a significant increase in owner-occupied housing demand from 2000 to 2010 in transitioning neighborhoods. In addition, the younger baby boomers displayed the greatest odds of residing in a renter-occupied housing unit in a transitioning neighborhood.

Overall, this study reveals that older millennials have been attracted to transitioning neighborhoods in the district. Their demand for owner-occupied homes in transitional neighborhoods signals not only economic growth for

the district but also economic viability for many of the district's changing neighborhoods. This influx can offer existing low- to moderate-income residents a new surge in income growth and improvement in neighborhood amenities.

We have discovered in our research of the literature that displacement may not occur in district neighborhoods; thus, the in-migration of millennial homeowners may reduce the segregation and economic isolation of the district's incumbent low-income residents. Current evidence of such reduction in economic isolation and increased growth can be seen in the district's minimum wage policy changes and the city's generous social service and tax policy programs, such as the Earned Income Tax Credit program. Future research should aim to determine whether the district's transitioning neighborhoods drive displacement or simply attract a high in-migration of millennial homeowners.

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