

Crime and Neighborhood Change in the Nation's Capital: From Disinvestment to Gentrification

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Research on crime and neighborhood racial composition establishes that Black neighborhoods with high levels of violent crime will experience an increase in Black residents and concentrated disadvantage—due to the constrained housing choices Black people face. Some studies on the relationship between gentrification and crime, however, show that high-crime neighborhoods can experience reinvestment as well as displacement of Black residents. In Washington, DC, we have seen both trends—concentration of poverty and segregation as well as racial turnover and reinvestment. We employ a spatial analysis using a merged data set including crime data, Census data, and American Community Survey (ACS) data to analyze the relationship between crime and neighborhood change at the Census tract level. Our findings demonstrate the importance of distinguishing between periods of neighborhood decline and ascent, between the effects of property and violent crime, and between racial change and socioeconomic change.

Introduction

In 1991, the homicide rate in Washington, DC peaked at 80 per 100,000 – the highest rate of all cities in the United States ever, earning the nation's capital the moniker, “Murder Capital.” The rates of homicide and violent crime have steadily decreased since 1991. At the same time, the Black population of DC declined from 65% in 1990 to 48% in 2015, leading the *Washington Post* to release an article with the headline “Chocolate City No More” and sociologist Brandi Thompson Summers to call the city “Post-Chocolate” in her 2019 book. Similarly, in 2017, Derek Hyra described Washington, DC as “Cappuccino City” because of the influx of young White professionals into previously Black working-class and poor neighborhoods.

In the 1980s and 1990s, most Black neighborhoods in DC had high rates of violent crime. Extensive research establishes that the concentration of violent crime in Black neighborhoods is due to resource deprivation and structural barriers in those neighborhoods and that Black neighborhoods with high levels of violent crime will experience an increase in Black residents and concentrated disadvantage (Hipp 2010; Krivo, Peterson, and Kuhl 2009; Hipp 2011; Morenoff and Sampson 1997). Washington, DC experienced concentrated disadvantage in its primarily Black and poor neighborhoods, but saw a decline, rather than an increase in the number of Black residents in the late twentieth century.

Since 2000, Washington DC's violent crime rate has plummeted; its once-declining population has increased, as have its median home value and median household income. Some neighborhoods that were nearly all Black in the 1990s now have significant White populations. Some neighborhoods that experienced concentrated disadvantage in the 1990s have seen an influx of wealthier residents in the 2000s. How do we explain this transition? Research on violent crime rates and neighborhood racial composition indicates that Black neighborhoods with high levels of violence will experience socioeconomic decline and a concentration of Black residents (Morenoff and Sampson 1997; Hipp 2010; Raleigh and Galster 2015). A study in Chicago found that neighborhoods with high concentrations of Black people rarely gentrify (Hwang and Sampson 2014). In Washington, DC, however, many Black neighborhoods did gentrify.

Research on neighborhood characteristics and crime predicts that neighborhoods that have high rates of violent crime and concentrations of African Americans will decline. However, we know that some of these neighborhoods gentrify instead of continuing to decline. This decline is in fact a necessary precursor for gentrification. This raises the question: what factors

predict continued decline versus gentrification? We propose that, during periods of disinvestment and decline in a city, high-crime neighborhoods will decline. But, during periods of reinvestment, neighborhoods with high rates of crime become eligible for gentrification. The reason for this is the “rent gap” (Smith 1987: 462), meaning that the land in these neighborhoods has the possibility to become more highly valued if the social characteristics change and investment opportunities arise. High crime rates are an example of a characteristic that could change and lead to higher land values. The racial composition of a neighborhood is another example of a characteristic that could change and lead to higher land values.

This study considers the extent to which crime is associated with neighborhood change. We know from previous research that high levels of violent crime lead to concentrated disadvantage and an increase in Black residents. We know less about the relationship between property crime and neighborhood change or the relationship between crime and neighborhood socioeconomic ascent, as these relationships have not been adequately explored. We draw from a merged data set of crime data, Census data, and American Community Survey (ACS) data for our analyses. We use measures of educational attainment and home value at the Census tract level as indicators of socioeconomic decline or ascent (Freeman 2005; Papachristos et al 2011; Owens 2012; Martin and Beck 2018). Our findings reveal that the role of crime in neighborhood change is variable, depending on whether the city is experiencing socioeconomic decline or ascent; that property and violent crime have different effects on neighborhoods; and that crime rates affect both racial and socioeconomic changes, although not always in the same ways.

Crime and Neighborhood Change

Most recent research on neighborhood change and crime has explored the extent to which gentrification affects the crime rate (MacDonald and Stokes 2020; Barton, Valasik, Brault, and

Tita 2020). Although we are analyzing how the crime rate affects neighborhood change, these studies provide useful guides. For example, Papachristos *et al* (2011) found that gentrifying neighborhoods see a decrease in homicides over time. However, they also found that Black gentrifying neighborhoods see an increase in street robberies. These findings point to the importance of thinking about racial change alongside socioeconomic change. In a related study, Smith (2014) found that although gentrification measured by private investment is associated with reduced levels of gang-related homicides, public investment is associated with increases in gang-related homicides. Boggess and Hipp (2016) also found that gentrification produced an increase in aggravated assaults in nearby neighborhoods; they used change in housing values as the sole indicator of gentrification. Conversely, Kreager *et al* (2011) found that gentrification led to a reduction in crime rates – and they used housing investments as their primary indicator of gentrification. More recently, Barton *et al* (2020) found that gentrification was positively associated with non-gang homicide. They considered neighborhoods to be gentrified if they met several criteria including high rates of poverty at the beginning of the temporal period and increases in college education, median income, rent, and the presences of White residents at the end of the period.

Despite the proliferation of research on how gentrification affects crime, the research on the extent to which crime can predict gentrification is scant and mixed. Hipp, Tita, and Greenbaum (2009) find that violent crime can depress property values. Ellen, Horn, and Reed (2016) found that declines in crime are associated with increases in the likelihood that high-income and college-educated households choose to move to central city neighborhoods. Kreager *et al* (2011) find that tracts in Seattle that had gentrified in 2000 had higher-than-average

property and violent crime in 1990, suggesting that high-crime neighborhoods may be predisposed to gentrification.

Violent Crime

Researchers agree that structural forces lead to the concentration of African Americans in neighborhoods with high rates of violent crime. In a study of the relationship between homicide and neighborhood transition in Chicago from 1970 to 1990, Morenoff and Sampson (1997) found that high rates of homicide in neighborhoods led to both decreases in the White population and increases in the Black population. In a longitudinal study of 13 cities from 1990 to 2000, Hipp (2010) found that violent crime correlated positively with percentages of African Americans and poverty rates and negatively with retail options. African Americans' constrained housing choices often prevent them from leaving crime-ridden neighborhoods (Hipp 2011; Morenoff and Sampson 1997). Relatedly, high rates of segregation and concentrated poverty are associated with higher rates of violent crime (Stretesky, Schuck, and Hogan 2004; Covington and Taylor 1989; Johnson and Kane 2018), particularly in Black neighborhoods (Krivo, Peterson, and Kuhl 2009).

The research on violent crime and neighborhood change points to socioeconomic decline in areas plagued by violent crime (Hipp 2010; 2011; Raleigh and Galster 2015). For example, one study found that Census tracts with more violent crime have lower property values the following year, which indicates decline (Hipp, Tita, and Greenbaum 2009). A concentration of violent crime in a neighborhood is a clear sign that the neighborhood is disinvested and disadvantaged (Friedson and Sharkey 2015). Violent crime leads to residential mobility as it causes fear and uncertainty among residents and those residents who can leave do so (Hipp 2010).

High rates of violent crime in 1990 in Washington, DC were concentrated in Black neighborhoods. These neighborhoods experienced severe resource deprivation and disinvestment, which, in turn, led to more crime (Asch and Musgrove 2017). Nevertheless, some of the neighborhoods with the highest rates of violent crime in 1990 have since lost Black residents and experienced socioeconomic ascent, providing evidence that disinvested Black neighborhoods can and do gentrify.

Although most research on violent crime and neighborhood change predicts decline for these neighborhoods, research on gentrification points out that these same neighborhoods are prime examples of the “rent gap” (Smith 1987: 462) insofar as neighborhoods with these characteristics could dramatically increase in value if either of those characteristics were to change.

Neighborhoods with high levels of violent crime and high concentrations of Black residents could continue to decline as predicted by crime researchers. But, they also could gentrify – as they are also candidates for gentrification.

Property Crime

The linkages between violent crime and neighborhood transitions are more firmly established in the literature than those between property crime and neighborhood change. The research on property crime is much less clear and sometimes contradictory. For example, Gibbons (2004) found that high rates of property crime can depress housing prices, although burglaries do not have an impact, yet Pope and Pope (2012) found that decreasing crime led to increasing property values. And, Tita, Petras, and Greenbaum (2006) find that property crime can lead to increases in housing prices over time.

In one set of studies, the effects of property and violent crime are similar and consistent with most research on violent crime. In an early study, Thaler (1978) found that high rates of

property and violent crimes lead to decreased home values. More recently, Xie and McDowall (2010) found that high crime rates led to increasing numbers of Black residents. By linking household data to 1980-1985 property and violent crime data, they found that higher rates of crime in the vicinity increased the chances that, when White people moved out of the neighborhood, the new occupants would be Black. Boggess, Greenbaum and Tita (2013) also found that higher levels of both violent and property crime lead to higher numbers of home sales, although the effect is stronger for violent crime. These studies show that both property and violent crime are *disamenities* – meaning people will be more likely to move and less willing to pay high prices for housing when crime rates are high.

Other researchers find similar, but not identical, effects of property and violent crime. Hipp et al (2019) found that both violent and property crimes are associated with business failure. Whereas property crime mostly affects retail and service firms, violent crime had a more significant impact on professional, real estate, insurance, education, and health firms. In an earlier study of the relationship between crime and neighborhood change, Hipp (2010) found that violent crime was correlated with higher percentages of Black residents and higher poverty rates. He did not find the same results for property crime. Using a national sample, Xie and McDowall (2014) found that White residents are likely to move subsequent to experiencing either property or violent crime, although the relationship between moving and being a victim of a violent crime was stronger. In contrast, Black residents were more likely to move after experiencing a property crime and the relationship between violent crime victimization was only significant for Black residents who lived in racially diverse areas. They do not have a concrete explanation for these differences but surmise that Black people may be more likely to believe that property crimes could happen again and that violent crime is unlikely to re-occur. These studies suggest that

property and violent crime function in similar ways in terms of their association with racial and socioeconomic changes in neighborhoods, albeit with nuanced differences.

There are also some studies that show the opposite effects of property and violent crimes and attribute this to reporting differences. Lynch and Rasmussen (2001) found that the number of property crimes positively affected the selling price of homes in Jacksonville, Florida whereas the number of violent crimes negatively affects the selling price of homes. However, they attribute that finding to increased property crime reporting in higher-income communities. In a study in Houston, Texas, Thompson (2019) also found that violent crimes reduced the selling price of homes whereas property crime had a positive effect. Similar to Lynch and Rasmussen (2001), Thompson (2019) attributes this to reporting differences. Notably, Baumer and Lauritsen (2010) found that the probability of notifying police for Black and White property crime victims was fairly similar and increased each year for both groups between 1973 and 2005. In sum, the extant research on the relationship between property crime and neighborhood change is much less coherent than the research on violent crime and neighborhood change.

Race, Class, and Neighborhood Change in Washington, DC

Gentrification involves a shift in a neighborhood from lower to middle class. Racial turnover involves a change in the racial composition of a neighborhood. Neighborhoods in Washington, DC have experienced both racial turnover and gentrification. These changes have not been even – some neighborhoods have changed in terms of class yet not race, and vice-versa. Nevertheless, the most prominent trend in terms of racial turnover over the past 30 years has been a decline in the percentage of Black residents in majority Black tracts.

Studies of racial turnover traditionally have focused on White flight – when White residents leave a neighborhood – and not Black displacement – when Black residents leave a

neighborhood (Lee and Wood 1991; Crowder 2000; Kye 2018). The departure of White residents from cities in the mid-twentieth century is one of the primary reasons urban areas are racially segregated (Crowder 2000). Washington, DC, once a majority-White city, experienced White flight in the 1950s and 1960s. By 1970, the city had 756,510 residents and was 70% Black. Beginning in the 1970s, with the passage of the 1968 Fair Housing Act, Black people began to move to the suburbs as well.

Whereas White families who left the city settled in the suburbs in Northern Virginia and Montgomery County, African Americans largely headed for Prince George's County, which transitioned from a rural White community to becoming the first majority-Black, majority-affluent county in the United States by 1990. The Black population in Prince George's county rose from 30,000 in 1960 to over 500,000 by 2000. Many of these new PG County residents were African Americans who left Washington, DC because of poor schools and high rates of crime (Harrell 2008). Three-quarters of the city's Census tracts lost Black residents between 1990 and 2000. By 2000, the city's population reached a nadir, with just 572,059 residents – 60% of them Black (Kijakazi et al 2016). The city also experienced socioeconomic decline in the 1990s, with citywide decreases in home values and income.

Washington, DC experienced a transformation and a reversal of these trends in the 21st century. The Mayor, Anthony Williams, announced his plans to attract 100,000 new residents to the city. His goal was to attract people who contribute significant taxes yet use few resources – young, childless, high-income people – many of whom would be White (Asch and Musgrove 2017). Williams' plan worked: Between 2000 and 2010, DC residents with lower educational and financial resources were more likely to leave than those with higher educations and incomes. The nation's capital gained 50,000 White residents and 10,000 Latinx residents in the first

decade of the twenty-first century yet lost 39,000 Black residents during this time (Sturtevant 2014). Whereas White out-movers were more likely to leave the region, Black out-movers were more likely to move to the primarily Black suburb of Prince George's County (Sturtevant 2014). By 2018, the DC population was just over 700,000. DC also lost its Black majority – by 2017 only 47.1% of its residents were Black. Meanwhile, the White population increased from 27% in 1990 to 36% in 2016. Many of these new residents have moved into neighborhoods that had been ravaged by violence and poverty in the 1990s (Hyra 2017).

Washington, DC is similar to cities like New York, Philadelphia, San Francisco, and Atlanta insofar as these cities all experienced an influx of White residents and a loss of Black residents between 1990 and 2010. The patterns of both gentrification and Black displacement are the most extreme in Washington, DC – a recent report based on a nationwide study found that DC had the highest percentage of gentrified tracts in the country as well as the highest rate of Black displacement in their study period of 2000 to 2013 (Richardson, Mitchell, and Franco 2019). Insofar as these trends of gentrification alongside Black displacement are evident in other cities, we can expect that the findings for this study may also be applicable in other cities.

When looking at how Washington, DC has changed since 1990, two distinct trends emerge. Between 1990 and 2000, the median change in home value at the Census tract level was an 8% decline. The median change in household income was a 5% decline. In contrast, between 2000 and 2015, the median change in home value was an 80% increase and the median change in household income was a 20% increase. These descriptive statistics make it clear that there are two distinct periods of socioeconomic change in Washington, DC, and we divide our analyses accordingly. We separate our analyses into two periods: the period of 1990 to 2000 is one of

disinvestment and decline and the period from 2000 to 2015 is one of gentrification and reinvestment.

From 1990 to 2000, Washington, DC was at the tail end of a prolonged phase of disinvestment, with declining population numbers and declining numbers of middle-class residents. Research on declining neighborhoods shows that these neighborhoods tend to see increasing concentrations of poverty and of Black residents. Based on this research, we put forth the following hypotheses:

H1: During the period of disinvestment (1990-2000), increases in property and violent crime will yield: a) decreases in the percentage of residents with a higher education; b) decreases in median home value, and c) increases in the number of Black residents at the level of the Census tract.

Beginning in the 20th century, Washington, DC began to see a significant turnaround, with public investments in amenities and private investments in real estate. These investments were most profitable in those neighborhoods primed for gentrification: neighborhoods that had previously experienced decline and disinvestment. Insofar as high crime is associated with disinvestment and decline, and those very neighborhoods are the ones subject to gentrification, we put forward the following hypotheses for the more recent period:

H2: During the period of gentrification (2000-2015), increases in property and violent crime will yield: a) increases in the percentage of residents with a higher education; b) increases in home value and b) decreases in the number of Black residents at the level of the Census tract.

Methods

Measuring neighborhood change

Socioeconomic change in neighborhoods involves a change in the class status of residents.

Common measures of socioeconomic change include average income, educational attainment,

new housing structures, and/or housing values (Freeman 2005; Papachristos et al 2011). Ann Owens (2012) identifies five factors that can be used to measure to neighborhood socioeconomic change: household income, educational attainment, occupation type, rent, and home values. This study focuses on two kinds of neighborhood socioeconomic change: gentrification (ascent) and decline. The broad trends in Washington, DC point to a period of decline between 1990 and 2000 and gentrification from 2000 to 2015. Between 1990 and 2000, there was a citywide decrease in the average home value and median household income. Since 2000, there has been a citywide increase in these indicators.

Our analyses only include those Census tracts that are eligible for gentrification or Black displacement. Following researchers on gentrification (Martin and Beck 2018; Freeman 2005), we consider a Census tract eligible for gentrification if it was below the median income in 1990. We also include all those Census tracts that were more than 50% Black in 1990 because we wanted to be sure to include those working and middle-class Black neighborhoods that have experienced Black displacement. Three-quarters of the city's Census tracts lost Black residents between 1990 and 2000 – mostly from majority Black neighborhoods. Many of these majority Black Census tracts were at or around the median income in 1990. Some of these tracts have experienced socioeconomic decline due to the outmigration of middle-class Black residents and some have experienced reinvestment and redevelopment. We include these majority Black tracts to capture these trends. We consider DC Census tracts that were majority Black in 1990 as eligible for Black displacement.

We use two measures of gentrification: changes in educational attainment and home value. Educational attainment is a useful measure of gentrification because, after the age of 25, it is a relatively fixed attribute. Young people with college degrees may start their careers with low

incomes and their occupation may change over time. But the fact of their college graduation remains stable. When the percentage of residents in a Census tract who have a college degree increases, we can say the Census tract is experiencing gentrification. If this percentage decreases, the neighborhood is experiencing decline. The increase in home values allows us to measure the characteristics of the neighborhood as opposed to the residents. It is another reliable measure of gentrification as housing prices go up as neighborhoods gentrify. If housing values increase, the tract is experiencing gentrification, and, if the median home value decreases, the tract is experiencing socioeconomic decline (Owens 2012; Martin and Beck 2018).

Data and Variables

To test our hypotheses, we used Census tract level data from the District of Columbia in 1990, 2000, and 2015. Since the number of DC Census tracts has changed over time (192 tracts for 1990, 188 tracts for 2000, and 179 tracts for 2015), we relabeled the Census tracts to reflect 2010 Census-tract boundaries, yielding a full dataset of 179 tracts by 3 years. Then, from the full dataset of DC tracts, we included 87 tracts that were eligible to gentrify and 138 tracts were historically Black neighborhoods in 1990, respectively. Neighborhoods eligible to gentrify include Census tracts that reported lower levels of household income than the median across all 179 tracts in 1990 (\$61,815 in 2015 dollars). And historically Black neighborhoods are Census tracts that were more than 50% Black in 1990. Because the mechanisms and consequences of gentrification for neighborhoods that were already gentrified are not identical with those for neighborhoods that are eligible to gentrify (Beck 2020), our choice of such tracts allows us to consider the impacts of violent and property crimes across years on neighborhood changes in those neighborhoods most likely to change.

Our socioeconomic indicators – median home value and the percentage of residents with a college degree – are extracted from the 1990 and 2000 Decennial Census and the 2010-2015 American Community Survey (ACS). Home value and income are adjusted in constant 2015 dollars, reflecting the consumer price index. Changes in the percentage of Black residents in a given tract are also taken from the Census and ACS in each year.

To construct the crime variables, we first gathered the Census-tract level crime incidents across years from the Urban Institute, Greater DC. Using data from the Uniform Crime Reporting (UCR) program produced by the U.S. Department of Justice, the Urban Institute interpolates the year-based geographic-level crime data of the District of Columbia. The Census tract-level violent and property crime incidents per each year are publicly available on their website.¹ Then, we calculated the violent and property crime rates per 100,000 across years. Violent crime includes homicide, rape, robbery, and assault. Property crime categories are burglary, larceny, motor vehicle theft, and arson.

As controls, we added a series of other tract-level neighborhood conditions from Census and ACS that are acknowledged to be relevant in previous studies. To account for population size and demographic composition, the numbers of total population and the percentage of White residents in given years are included. We also control for two indicators of neighborhood well-being. The median household income adjusted in constant 2015 dollars across years is added. We also included a structural disadvantage index. Following prior research, we constructed this index as a function of the percentage of the population in poverty, unemployed, with less than a high school degree, and the percentages of female-headed households with children under 18

¹ <https://greaterdc.urban.org/data-explorer>

years and of households with public assistance income (Kane et al. 2013; Donnelly et al. 2019).² To account for the housing situation, variables for the percentages of owner-occupied housing units, vacant housing units, building of five more units, buildings built before 1950, and households moved before 1990 are included. Across all variables, missingness is less than 0.1%. For the analyses, we replaced the missing values by mean imputation, which does not affect the pattern of distribution of the variables. The spatial panel regression with fixed-effects does not provide direct tests for multicollinearity. Findings from an OLS regression with the same variables showed that except for the two crime indicators, variance inflation factor (VIF) for all other covariates are lower than 10, indicating that there is no issue of multicollinearity among our explanatory variables. Descriptive statistics of all variables are presented in Table 1.

[TABLE 1 ABOUT HERE]

Analytic strategy

To examine the association between crime and neighborhood change in DC neighborhoods in given periods, we employ a spatial panel regression analysis with fixed effects. Social scientists have used spatial panel analysis to focus on changes in spatial attributes over time using geospatial panel data (Anselin 1999; Haining 1993; Elhorst 2003; Anselin, Le Gallo, and Jayet 2008). Spatial panel modeling encompasses the spatial effects of the cross-sectional dimension. It assumes that geographic units of analysis – cities, counties, states, or countries – are interdependent, indicating a region’s features are not simply determined by itself, but are simultaneously influenced by others. By including the time dimension, it entails the cross-sectional dependency in a given period. Applying a framework of regression, spatial panel

² Prior studies also use the percentage of Black residents as an element for creating the structural disadvantage score. However, since it is our variable of interests, we did not include this indicator. This omission does not violate internal consistency of the scale construction ($\alpha = .892$ for 1990, $\alpha = .899$ for 2000, versus $\alpha = .779$ for 2015)

regression analysis, thus, suggests that independent variables do not only affect the outcome variable in each region, but neighboring regions do as well in the time-series setting (LeSage 1997; Elhorst 2003; Anselin, Le Gallo, and Jayet 2008; Lee and Yu 2010; Baltagi, Egger, and Pfaffermayr 2013; Ward and Gleditsch 2018).

Further, we used fixed-effects modeling to focus on the association between crime and neighborhood changes in DC Census tracts in a given period. Fixed-effects modeling considers the individual heterogeneity among units to be constant over time. And individual effects can be correlated with both independent and dependent variables. Therefore, fixed-effects model enable us to focus on the estimated result obtained to the sample in given conditions across both panels and time (Lee and Yu 2010; Salima, Julie, and Lionel 2018).

This approach is appropriate for our investigation, since as Figure 1, 2, and 3 demonstrate, there are clear spatial trends in our data. In our baseline year, 1990, Census tracts that are close to one another have similar levels of our relevant indicators: home value, the percentage of residents with a college degree, and the percentage of Black residents. In addition to the visualization of our variables of interest, results from Moran's I test revealed that there are significant spatial autocorrelations in those variables with a contiguity weight matrix, which enables contiguous neighbors to affect and to be affected by each other (for median home value, $I = .209, p < .001$; for the percentage of residents with a college degree, $I = .226, p < .001$; and for the percentage of Black residents, $I = .224, p < .001$). Our results indicates that these indicators in each tract are influenced by tracts with which they share a common boundary.

[FIGURES 1, 2, AND 3 ABOUT HERE]

Using fixed effects spatial panel regression modeling, we test how crime variables shape neighborhood changes in DC neighborhoods for each dependent variable. For our multivariate

analyses, the unit of analysis is the tract-year. We run models separately for two different time periods: a period of disinvestment (1990-2000) and a period of gentrification (2000-2015) to examine the impacts of crime variables.

Findings

Bivariate findings

Table 1 reports descriptive statistics on tract-level variables for the DC Census tracts of interest by eligibility. This table displays trends in neighborhood changes and crime rates, along with neighborhood decline or ascent across all 179 Census tracts. The data show that, from 1990 to 2000, DC neighborhoods experienced economic slowdown and stagnation. For instance, there was only a 4.6 percent point increase in the residents with a college degree from 1990 and 2000. The change in home value makes clear the trend of neighborhood decline in the disinvestment period – a decrease from \$320k to \$296k. There was an average 4.7 percent point decrease in the number of Black residents, an 8.1 decrease in violent crime rate and a 4.7 decrease in property crime rate from 1990 to 2000 (per 100k), despite this economic stagnation.

In contrast, from 2000 to 2015, gentrification and Black displacement accelerated. During these 15 years, the percentage of the population with a higher education increased by 16.5 percent point, and there was an almost 65% of increase in the median home value. The Black population was also depleted by 11.2 percentage points, as well as 9.9 percentage point increase in the White population. In this period, there was a slow decline in the violent crime rate by 5.9 (per 100k). The property crime rate sharply decreased by 10.8 per 100k.

Other panels in Table 1 shows similar trends were observed for both disadvantaged and historically Black tracts. They had both experienced economic slowdown and stagnation from 1990 to 2000 and gentrification and Black displacement from 2000 to 2015.

The period from 1990 to the present is marked by a slow and steady decrease in crime rates nationwide. Washington, DC is no exception. We found that crime rates in tracts eligible to gentrify had sharply dropped during the period of socioeconomic decline from 1990 to 2000. There was decrease of 11.6 in the violent crime rate and a decrease of 41.2 in the property crime rate from 1990 to 2000 (per 100k). During the gentrification period from 2000 to 2015, there was a slower decrease in both crime rates (a 6.6 decrease in the violent and a 2.9 decrease in the property crime rate). Regardless of neighborhood decline or ascent, the crime rates in the 138 tracts that were historically Black fell steadily. For instance, we found that there was a 7.3 decrease in the violent crime rate and a 7.6 decrease in the property crime rate from 1990 to 2000. And, from 2000 to 2015, there was a decrease of 6 per 100k in the violent crime rate and a decrease of 7 per 100k in the property crime rate. This difference, as well as other covariates, is a key factor for understanding the impact of crime on neighborhood changes in the periods of neighborhood ascent or decline.

Multivariate findings 1: Crime Effects on Class and Racial Changes during the Period of Disinvestment

[TABLE 2 ABOUT HERE]

Table 2 presents the results from spatial panel regression with fixed effects predicting class and racial changes during the period of disinvestment from 1990 to 2000. The first model regresses the change in the percentage of residents with a college degree on violent and property crime rates in the given period. To assess the impact of crime indicators in disadvantaged neighborhoods, we only included 87 tracts that were eligible to gentrify in 1990. We find that the violent and property crime rates yield opposite effects on the change in the percentage of population with a college degree. That is, during neighborhood decline, an increase in the violent

crime is associated with an increase in the highly educated population ($b = .020$). Otherwise, an increase in the property crime is negatively associated with it ($b = -.008$). And yet, these crime effects are not statistically significant. Among controls, we found that the percentage White ($b = .410, p < .001$) is associated with an increase in the percentage of residents with a college degree.

Model 2 estimates the impact of crime indicators during the disinvestment period on the change in median home value. The dependent variable – median home value – is natural logged after adjusting in 2015 dollars. From 1990 to 2000, notably, we found another opposite effect between crime rates on neighborhood class change – negative for violent crime ($b = -.006$) and positive for property crime ($b = .002$). However, those impacts are still not statistically significant. The coefficient for spatial lag is significant ($\rho = -.828, p < .001$), indicating that there is a spatial autocorrelation in the dependent variable in the given period.

In Model 3, to see the impact of crime on neighborhood racial change, we regressed the change in the Black residents on both crime rates, as well as other control variables. Herein, we also included the change in median home value to the model as another indicator of neighborhood well-being. The variable was added as using the natural log transformation. The model only examines 138 D. C. tracts that were historically Black in 1990. It reveals that from 1990 and 2000, an increase in the violent crime rate yielded a decrease in the percentage of Black residents in Black neighborhoods ($b = -.077, p < .01$). On the other hand, an increase in the property crime rate led to an increase in the Black population ($b = .004, p < .001$). In addition, White residents ($b = -.939, p < .001$), household income ($b = -5.381, p < .01$), and the percentage of old buildings ($b = -.066, p < .05$) are other factors that reduce the Black population growth in Black residents during the disinvestment period. We also found a significant spatial autocorrelation in our dependent variable ($\rho = .642, p < .001$).

Our multivariate findings on the impacts of crime on class and racial change in disadvantaged neighborhoods are somewhat puzzling. We expected that during neighborhood decline, increases in crime will lead to decreases in residents with a college degree and in median home value, and an increase in Black residents. In our analyses on disadvantaged or Black neighborhoods in the District of Columbia during the disinvestment period from 1990 to 2000, we did not find an evidence that crime affects class changes in disadvantaged neighborhoods. Instead, we did find significant impacts of crime on racial change, indicating that an increase in the violent crime rate is associated with a decrease in the percentage of Black residents while an increase in the property crime rate aligns with an increase in the Black population. Our analyses on all 179 D.C. tracts, reported in the Appendices, revealed similar findings.³

Multivariate findings 2: Crime Effects on Class and Racial Changes during the Period of Gentrification

[TABLE 3 ABOUT HERE]

We then ascertained crime effects on neighborhood changes during the period of neighborhood ascent. We included D.C. neighborhoods that were eligible for gentrification and Black displacement from 2000 and 2015. Table 3 reports spatial panel regression models estimating the impacts of crime indicators on class and racial changes in disadvantaged or Black neighborhoods during the period of gentrification.

Model 1 regresses the change in the percentage of residents with a college degree on violent and property crime rates in 87 disadvantaged tracts. It reveals that an increase in the violent crime yields a decrease in the percentage of residents with a college degree ($b = -.146, p < .01$). Although an increase in the property crime is associated with an increase in the dependent

³ See Appendix A.

variable ($b = .007$), the effect is not statistically significant. Among controls, increases in household income ($b = 6.175, p < .01$), the percentages of White residents ($b = .797, p < .001$), owner occupied housing units ($b = .327, p < .001$), household moved before 1990 ($b = .108, p < .01$) were associated with an increase in residents with a higher education. Instead, the population growth has a buffering effect that marginally reduces the percentage of residents with a college education ($b = -.002, p < .01$). The significant spatial lag is also found in the dependent variable ($\rho = .209, p < .001$).

The second model assesses the impacts of crime on the change in home value. Herein, we also found an opposite effect between the violent and the property crime rates. That is, during neighborhood ascent, an increase in the property crime led to an increase in home value ($b = .003, p < .001$). Although the impact is not significant, an increase in the violent crime rate is associated with a decrease in home value ($b = -.006$). The model reveals that increasing social and economic disadvantage yields declines in housing prices ($b = -.003, p < .01$). Increase in total population ($b = .642, p < .001$), the percentages of White residents ($b = .010, p < .05$) and buildings built before 1950 ($b = .010, p < .01$) are associated with the changes in housing price.

Lastly, Model 3 regresses crime indicators, as well as other controls, on the percentage of Black residents. Only 138 historically Black tracts were included. It indicates that there are significant crime effects on racial change. During the period of neighborhood ascent, an increase in the violent crime rate yields a decrease in Black residents ($b = -.169, p < .01$) while an increase in property crime is associated with an increase in the Black population ($b = .015, p < .05$). Among controls, an increase in the structural disadvantage score is linked with an increase in the percentage of Black residents ($b = .040, p < .05$). Otherwise, increase in White residents (b

= -.982, $p < .001$), home value ($b = -3.138$, $p < .05$), and residential stability ($b = -.148$, $p < .05$) reduce the Black population.

Those findings are also puzzling. We hypothesized that increases in property and violent crime would yield increases in the percentage of residents with a higher education and home value, but a decrease in Black residents during the period of gentrification. Our spatial panel regression models revealed that from 2000 to 2015, crime indicators had mixed effects on class changes: an increase in the property crime led to an increase in home value and the violent crime rate is negatively associated with the percentage of residents with a college degree. Likewise, for racial change, although an increase in violent crime was linked with a decrease in the percentage of Black residents, the property crime had the opposite effect. Our second hypothesis on the association between crime and neighborhood class and racial changes during the period of gentrification is only partially supported.

Discussion and Conclusion

We hypothesized a total of 12 different relationships between crime and neighborhood change. Of these, six were revealed to have no statistically significant relationship; three were significant and in the direction we hypothesized; and three were significant and not in the direction we hypothesized. We will use this last section to explore the reasons behind this and offer suggestions for future research.

We will start with our hypotheses that are most firmly established in the literature. Previous research makes it clear that high violent crime rates are associated with concentrations of poverty and of Black residents. Our findings, however, do not support this. We found that, during the period of disinvestment from 1990 to 2000, increases in violent crime were not associated with changes in the percentage of residents with a college degree or with median

home value. Moreover, increases in violent crime were associated with decreases in the percentage of Black residents. This finding is contrary to previous research on this topic as well as our hypotheses, which were based on this literature.

We did not find an association between crime and gentrification variables during the period of disinvestment. This finding reaffirms our decision to divide our analyses into two parts as crime is not associated with these variables during this period of decline whereas there are statistically significant associations during the gentrification period. We thus suggest that future researchers who explore the relationship between neighborhood change and crime rates consider the broader socioeconomic context of the city.

We do, nevertheless, think there is an explanation for the negative association between violent crime and the percentage of Black residents. During both the period of disinvestment and the period of gentrification, we found the racial change variables were in the same direction, although the coefficients are larger during the gentrification period. We found a negative association between violent crime and changes in the percentage of Black residents in both periods. We argue this relationship can be explained by the phenomenon of Black suburbanization. After the passage of the 1968 Fair Housing Act, Black DC residents began to leave the city for the suburbs, due to high crime rates and poor schools in the city (Harrell 2008). Other scholars have argued that Black people have constrained choices in the housing market (e.g. Hipp 2011; Morenoff and Sampson 1997). However, in Washington, DC, the Prince George's County suburbs became a welcoming and safer option for many Black DC residents. The housing market was still constrained for Black people, but many were able to leave the city for the suburbs, making the housing market less constrained.

We also found a positive association between property crime rates and the percentage of Black residents during the period of disinvestment as well as during the period of gentrification. This runs counter to previous research that shows that Black residents are more likely to move after experiencing a property crime (Xie and McDowall 2014). It is possible this positive association between property crime and the percentage of Black residents is due to a decrease in guardianship as Black middle- and working-class residents left DC neighbourhoods (Sturtevant 2014; Jargowsky and Park 2009). During the gentrification period, the structural disadvantage score is positively associated with changes in the percentage of Black residents, lending further support to this possibility. This finding is also consistent with the Black suburbanization hypothesis – showing that there are decreases in the percentage of Black residents in areas with high levels of violent crime, but not with high levels of property crime. This means that Black people may be likely to move away from areas with high levels of violent crime when that option is available, but property crime does not have that effect. We also should note that our data do not allow us to know whether or not individual people move. Thus, it is possible that Black residents do move after experiencing a crime, but that they are replaced by another Black resident. We also cannot be sure about directionality. It could be that increases in Black residents lead to more property crime and less violent crime.

Throughout our analyses, we also found a consistent pattern of property crime having the opposite effect of violent crime – a finding not well-supported in the scholarly literature. These findings point to the need for future researchers to distinguish property and violent crime and to develop theorizations as to why property and violent crime have different relationships with neighborhood change. We would have missed important trends had we not included both

property and violent crime in our analyses as the direction of our coefficients was consistently in opposite directions for property and violent crime.

Although we did not confirm most of our hypotheses, we argue our findings have important relevance for future research. These findings can be summed up as: 1) Crime has different effects on neighborhood economic change depending on whether the city is experiencing sustained disinvestment or reinvestment; 2) Property and violent crime have distinct relationships with neighborhood change variables; and 3) Economic change (gentrification or socioeconomic decline) is a distinct process from racial change and should be measured separately.

Works Cited

- Anselin, Luc, Julie Le Gallo, and Hubert Jayet, "Spatial panel econometrics," in *The econometrics of panel data*, eds. Mátyás, László, and Patrick Sevestre (Springer, 2008), 625-60.
- Asch, Chris Myers, and George Derek Musgrove. *Chocolate City: A History of Race and Democracy in the Nation's Capital*. UNC Press Books, 2017.
- Baltagi, Badi H., Peter Egger, and Michael Pfaffermayr. "A generalized spatial panel data model with random effects." *Econometric Reviews* 32, no. 5-6 (2013): 650-85.
- Barton, Michael S., Matthew A. Valasik, Elizabeth Brault, and George Tita. "'Gentefication' in the Barrio: Examining the Relationship Between Gentrification and Homicide in East Los Angeles." *Crime & Delinquency* 66, no. 13-14 (December 2020): 1888-1913.
- <https://doi.org/10.1177/0011128719860835>.

- Baumer, Eric P., and Janet L. Lauritsen. "Reporting crime to the police, 1973–2005: a multivariate analysis of long-term trends in the National Crime Survey (NCS) and National Crime Victimization Survey (NCVS)." *Criminology* 48, no. 1 (2010): 131-185.
- Boggess, Lyndsay N., Robert T. Greenbaum & George E. Tita "Does crime drive housing sales? Evidence from Los Angeles," *Journal of Crime and Justice*, 36, no. 3 (2013): 299-318
- Boggess, Lyndsay N., and John R. Hipp. "The spatial dimensions of gentrification and the consequences for neighborhood crime." *Justice Quarterly* 33, no. 4 (2016): 584-613.
- Crowder, Kyle. "The racial context of white mobility: An individual-level assessment of the white flight hypothesis." *Social Science Research* 29, no. 2 (2000): 223-257.
- Covington, Jeanette, and Ralph B. Taylor. "Gentrification and crime: Robbery and larceny changes in appreciating Baltimore neighborhoods during the 1970s." *Urban Affairs Quarterly* 25, no. 1 (1989): 142-172.
- Donnelly, Ellen A., Jascha Wagner, Tammy L. Anderson, and Daniel O'Connell. "Revisiting Neighborhood Context and Racial Disparities in Drug Arrests Under the Opioid Epidemic." *Race and Justice* (2019): 1-22.
- Elhorst, J. Paul. "Specification and estimation of spatial panel data models." *International Regional Science Review* 26, no. 3 (2003): 244-68.
- Ellen, Ingrid Gould, Keren Mertens Horn, and Davin Reed. "Has falling crime invited gentrification?" *Journal of Housing Economics* 46 (2019): 101636.
- Freeman, Lance. "Displacement or succession? Residential mobility in gentrifying neighborhoods." *Urban Affairs Review* 40, no. 4 (2005): 463-91.

- Friedson, Michael, and Patrick Sharkey. "Violence and neighborhood disadvantage after the crime decline." *The Annals of the American Academy of Political and Social Science* 660, no. 1 (2015): 341-58.
- Gibbons, Steve. "The costs of urban property crime." *The Economic Journal* 114, no. 499 (2004): F441-F463.
- Haining, Robert. *Spatial data analysis in the social and environmental sciences*. Cambridge University Press, 1993.
- Harrell, Rodney. 2008. "Understanding Modern Segregation: Suburbanization and the Black Middle Class" Dissertation. University of Maryland.
- Hipp, John R. "A dynamic view of neighborhoods: The reciprocal relationship between crime and neighborhood structural characteristics." *Social Problems* 57, no. 2 (2010): 205-30.
- Hipp, John R. "Violent crime, mobility decisions, and neighborhood racial/ethnic transition." *Social Problems* 58, no. 3 (2011): 410-32.
- Hipp, John R., George E. Tita, and Robert T. Greenbaum. "Drive-bys and trade-ups: The impact of crime on residential mobility patterns in Los Angeles." *Social Forces* 87, no. 4 (2009): 1777-812.
- Hipp, John R., Seth A. Williams, Young-An Kim, and Jae Hong Kim. "Fight or flight? Crime as a driving force in business failure and business mobility." *Social Science Research* 82 (2019): 164-80.
- Hwang, Jackelyn, and Robert J. Sampson. "Divergent pathways of gentrification: Racial inequality and the social order of renewal in Chicago neighborhoods." *American Sociological Review* 79, no. 4 (2014): 726-51.

- Hyra, Derek S. *Race, class, and politics in the cappuccino city*. University of Chicago Press, 2017.
- Jackson, Jonathan. "The consequences of gentrification for racial change in Washington, DC." *Housing Policy Debate* 25, no. 2 (2015): 353-73.
- Jargowsky, Paul A., and Yoonhwan Park. "Cause or consequence? Suburbanization and crime in US metropolitan areas." *Crime & Delinquency* 55, no. 1 (2009): 28-50.
- Johnson, Lallen T., and Robert J. Kane. "Deserts of disadvantage: the diffuse effects of structural disadvantage on violence in urban communities." *Crime & Delinquency* 64, no. 2 (2018): 143-65.
- Kane, Robert J., Joseph L. Gustafson, and Christopher Bruell. "Racial encroachment and the formal control of space: Minority group-threat and misdemeanor arrests in urban communities." *Justice Quarterly* 30, no. 6 (2013): 957-82.
- Kelejian HH and Prucha IR (2010) Specification and estimation of spatial autoregressive models with autoregressive and heteroskedastic disturbances. *Journal of Econometrics* 157(1): 53-67.
- Kijakazi, Kilolo, Rachel Marie Brooks Atkins, Mark Paul, Anne E. Price, Darrick Hamilton, and William A. Darity Jr. *The color of wealth in the nation's capital*. Duke University (2016).
- Kreager, Derek A., Christopher J. Lyons, and Zachary R. Hays. "Urban revitalization and Seattle crime, 1982–2000." *Social Problems* 58, no. 4 (2011): 615-39.
- Krivo, Lauren J., Ruth D. Peterson, and Danielle C. Kuhl. "Segregation, racial structure, and neighborhood violent crime." *American Journal of Sociology* 114, no. 6 (2009): 1765-802.
- Kye, Samuel H. "The persistence of white flight in middle-class suburbia." *Social Science Research* 72 (2018): 38-52.

Lee, Barrett A., and Peter B. Wood. "Is neighborhood racial succession place-specific?"

Demography 28, no. 1 (1991): 21-40.

Lee, Lung-fei, and Jihai Yu. "Estimation of spatial autoregressive panel data models with fixed

effects." *Journal of Econometrics* 154, no. 2 (2010): 165-85.

LeSage, James P. "Bayesian estimation of spatial autoregressive models." *International Regional*

Science Review 20, no. 1-2 (1997): 113-29.

Lynch, Allen K., and David W. Rasmussen. "Measuring the impact of crime on house

prices." *Applied Economics* 33, no. 15 (2001): 1981-1989.

MacDonald, John M., and Robert J. Stokes. "Gentrification, Land Use, and Crime." *Annual*

Review of Criminology 3 (2020): 121-38.

Martin, Isaac William, and Kevin Beck. "Gentrification, property tax limitation, and

displacement." *Urban Affairs Review* 54, no. 1 (2018): 33-73.

Morenoff, Jeffrey D., and Robert J. Sampson. "Violent crime and the spatial dynamics of

neighborhood transition: Chicago, 1970–1990." *Social Forces* 76, no. 1 (1997): 31-64.

Owens, Ann. "Neighborhoods on the rise: A typology of neighborhoods experiencing

socioeconomic ascent." *City & Community* 11, no. 4 (2012): 345-69.

Owens, Ann, and Jennifer Candipan. "Racial/ethnic transition and hierarchy among ascending

neighborhoods." *Urban Affairs Review* 55, no. 6 (2019): 1550-78.

Papachristos, Andrew V., Chris M. Smith, Mary L. Scherer, and Melissa A. Fugiero. "More

coffee, less crime? The relationship between gentrification and neighborhood crime rates in

Chicago, 1991 to 2005." *City & Community* 10, no. 3 (2011): 215-40.

Pope, Devin G., and Jaren C. Pope. "Crime and property values: Evidence from the 1990s crime

drop." *Regional Science and Urban Economics* 42, no. 1-2 (2012): 177-88.

- Raleigh, Erica, and George Galster. "Neighborhood disinvestment, abandonment, and crime dynamics." *Journal of Urban Affairs* 37, no. 4 (2015): 367-96.
- Richardson, Jason, Bruce Mitchell, and Juan Franco. 2019. "Shifting Neighborhoods: Gentrification and cultural displacement in American Cities" National Community Reinvestment Coalition.
- Salima, Bouayad A., Le Gallo Julie, and Védérine Lionel. "Spatial econometrics on panel data," in *Handbook of Spatial Analysis: Theory and practical application with R*, ed. Institut national de la statistique et des études économiques (INSEE Eurostat, 2018), 179-203.
- Smith, Chris M. "The influence of gentrification on gang homicides in Chicago neighborhoods, 1994 to 2005." *Crime & Delinquency* 60, no. 4 (2014): 569-91.
- Smith, Neil. "Gentrification and the rent gap." *Annals of the Association of American Geographers* 77, no 3 (1987): 462-5.
- Stretesky, Paul B., Amie M. Schuck, and Michael J. Hogan. "Space matters: An analysis of poverty, poverty clustering, and violent crime." *Justice Quarterly* 21, no. 4 (2004): 817-41.
- Sturtevant, Lisa. "The new District of Columbia: What population growth and demographic change mean for the city." *Journal of Urban Affairs* 36, no. 2 (2014): 276-99.
- Thaler, Richard. "A note on the value of crime control: evidence from the property market." *Journal of Urban Economics* 5, no. 1 (1978): 137– 145
- Thompson, Samuel D. "How the Proximity of Crime Impacts Housing Prices: A Hedonic Pricing Study of Inner-Loop Houston, TX." (2018). Master's Thesis, University of New Mexico.
- Tita, George E., Tricia L. Petras, and Robert T. Greenbaum. "Crime and residential choice: a neighborhood level analysis of the impact of crime on housing prices." *Journal of Quantitative Criminology* 22, no. 4 (2006): 299.

Ward, Michael D., and Kristian Skrede Gleditsch. *Spatial regression models*. Sage Publications, 2018.

Xie, Min, and David McDowall. "Impact of victimization on residential mobility: Explaining racial and ethnic patterns using the national crime victimization survey." *Criminology* 52, no. 4 (2014): 553-87.