

ABSTRACT

Title of Document: LOCAL ECONOMIC INVESTMENT AND
CRIME: NEIGHBORHOOD CHANGE IN
WASHINGTON, DC

Mauri J. Matsuda, Master of Arts, 2009

Directed By: Professor Alex R. Piquero, Department of
Criminology and Criminal Justice

The purpose of this analysis is to shed light on the relationship between large-scale economic investment and crime in Washington, DC neighborhood clusters (N=39) from 2001 to 2007. Using panel data and a two-way fixed effects analytic strategy, results indicate that investment in large scale economic development projects (in millions of dollars) and crime rates (per 1,000) are inversely related controlling for disadvantage and time effects. Further analyses indicate that the relationship is dependent on a number of investment related factors, including major use of investment project (e.g. industrial, retail), financing source (public versus private), construction type (new versus renovation), as well as outcome variable (i.e. violent versus property crime). Residential investment has the strongest and most consistent relationship with both violent and property crime suggesting that the changes which accompany residential investment may be responsible for reduced crime. Theoretical mechanisms and future research directions are discussed.

LOCAL ECONOMIC INVESTMENT AND CRIME: NEIGHBORHOOD CHANGE
IN WASHINGTON, DC

By

Mauri J. Matsuda

Thesis submitted to the Faculty of the Graduate School of the
University of Maryland, College Park, in partial fulfillment
of the requirements for the degree of
Master of Arts
2009

Advisory Committee:
Professor Alex R. Piquero, Chair
Professor John H. Laub
Professor Raymond Paternoster

© Copyright by
Mauri Matsuda
2009

Acknowledgements

I am grateful to many people who helped me complete this project. First, my advisor and the members of my committee provided valuable comments, criticisms, and advise about my thesis. My advisor, Professor Alex R. Piquero, was always available for feedback, provided a positive attitude, and kept me focused and on track. Both members of my committee - Professor John H. Laub and Professor Raymond Paternoster - challenged me to think critically and defend my ideas. In addition, John Laub and Professor David S. Kirk assisted me with the front end of this project. I owe much gratitude to them and the Washington, DC Economic Partnership for sharing the data. David Kirk served as my initial advisor and helped me form a coherent research question out of a chaotic array of thoughts. In addition, John Laub encouraged me to select a topic I felt passionate about. I am also grateful for Ray Paternoster's guidance and mentorship. Finally, I am indebted to the many professors and graduate students I have taken courses with, as well as friends, family, and loved ones who provided me with support, humor, and intellectual stimulation through out the process.

Table of Contents

Acknowledgements	ii
Table of Contents	iii
List of Tables.....	iv
List of Figures	v
Chapter 1: Introduction.....	1
Washington, DC	5
Chapter 2: Theoretical Framework.....	10
Chapter 3: Data and Methods.....	18
Hypotheses	18
Data.....	23
Measurement and variables.....	24
Population and sample	27
Analytic strategy.....	29
Chapter 4: Results of Analysis	34
Descriptive statistics	34
Aggregate analysis.....	36
Additional analyses.....	39
Within-cluster analysis.....	42
Chapter 5: Discussion	47
Implications.....	47
Limitations and future research.....	51
Chapter 6: Conclusion	56
Appendices.....	59
Bibliography.....	69

List of Tables

Table 1: Summary Statistics.....	58
Table 2: Correlation Matrix.....	59
Table 3: Results of Fixed Effects Regression of Crime on Investment.....	60
Table 4: Results of Fixed Effects Regression of Crime on Investment by Major Use and Construction Type.....	61
Table 5: Results of Fixed Effects Regression of Crime on Investment by Major Use and Source of Financing.....	62
Table 6: Results of Fixed Effects Regression of Investment on Crime by Type.....	63
Table 7: Washington, DC Neighborhood Clusters.....	68

List of Figures

Figure 1: Crime by Type, Washington, DC, 2002-2007.....	64
Figure 2: Investment by Major Use, Washington, DC, 2001-2006.....	64
Figure 3: Scatterplot of Ordinary Least Squares Regression of Total Crime on Total Investment.....	65
Figure 4: Scatterplot of Fixed Effects Regression of Total Crime on Total Investment.....	65
Figure 5: Histogram of Total Investment	66
Figure 6: Washington, DC Neighborhood Clusters.....	67

Chapter 1: Introduction

Two perspectives have traditionally informed scholarship on the causes of crime. Theories that fall under a micro level perspective view crime in terms of individual action, and focus on decision-making, biosocial factors, and social-psychological processes that contribute to criminal behavior. Macro level theories, on the other hand, focus on different aggregates of people or places and are concerned with the structural and cultural factors that organize groups and the mechanisms that lead some to have higher levels of criminal events than others. Ecological theories, for example, seek to explain how crime rates vary by space and time by studying different geographic aggregates of individuals, such as neighborhoods. This latter perspective – one which emphasizes place – is not only salient for understanding crime, but social organization and inequality in general. Neighborhood of residence, for example, consistently stratifies access to health care, education, and jobs, as well as exposure to crime, poverty, and other social dislocations (Squires and Kubrin, 2005). Metropolitan areas in particular are characterized by geographically structured inequalities that intersect racial and class identities. High crime areas, for example, are typically dense urban neighborhoods of concentrated disadvantage, characterized by factors including: unemployment and overall low socio-economic status, racial and ethnic heterogeneity¹, residential mobility and

¹Racial composition may play a more important role than racial or ethnic heterogeneity per se. For example, highly homogenous Black/African-American neighborhoods tend to have high rates of violence and homicide (Sampson and Lauritsen, 1994). There is strong evidence to attribute this correlation to the higher levels of concentrated disadvantage in neighborhoods that are predominantly Black. As Sampson and Wilson (1995:45) note: "...racial differences in poverty and family disruption are so strong that the

population instability, family disruption, social and physical disorder, and mixed land use patterns (Stark, 1987; Sampson, 2006). Much like people, places such as those above can be characterized by criminality. As Reiss argues, “our sense of personal safety and potential victimization by crime is shaped less by knowledge of specific criminals than it is by knowledge of dangerous and safe places and communities (1986:1).” Simply put, understanding place is vital to understanding crime.

Given the prominent role of place in criminology, a practical question emerges: what happens when places change? Metropolitan areas have experienced a number of recent phenomena – particularly since the middle of the century – that may be relevant to the macro level understanding of crime, including suburbanization, immigration, and gentrification (Wilson 1987; MacDonald, 1986). Criminologists have called for further examinations of community change and crime (Kirk and Laub, forthcoming; Kubrin and Weitzer, 2003; Reiss, 1986). Despite this, few criminological investigations have focused on the process by which neighborhoods become high or low crime areas (Schuerman and Kobrin, 1986). Likewise, few research studies have examined the relationship between crime and contemporary urban change. The impact of disinvestment and decline, for example, has been well documented in the criminological literature (Skogan, 1986; Schuerman and Kobrin, 1986), but reverse processes such as reinvestment and renewal are less understood.

Many urban neighborhoods across the United States have undergone significant amounts of reinvestment within the last decades. For example once disadvantaged neighborhoods in Bronzeville, Chicago and Harlem, New York have slowly begun to

‘worst’ urban contexts in which whites reside are considerably better than the average context of black communities.”

transform from areas of urban neglect to those of reinvestment and renewal (Hyra, 2008). Investment varies according to both magnitude and kind— from small scale renovations of single family homes in the form of “gentrification,” to large scale development of mixed-use, multi-unit buildings (Harcourt, 2004; Kennedy and Leonard, 2001). Reinvestment in urban communities has the potential to reshape the physical and social landscape. Many changes brought about by investment are striking when juxtaposed with previous decades of accumulated poverty and decay, much of which was facilitated by middle class migration to the suburbs, job loss due to deindustrialization, and urban riots fueled by racial and class tensions (Sampson, 1987; Wilson, 1987).

Like these historic forces that contributed to the earlier decline of urban neighborhoods, contemporary structural factors, such as the rise of the global economy, have engendered a recent revival of urban America (Hyra, 2008). Both logic and evidence suggest that these factors will correspond with a myriad of changes in urban neighborhoods, including the purposes they are used for (i.e. for work, home, shopping, or recreation) and the people they are used by. Research by Hyra (2008) has shown how cities as diverse as Chicago and New York have experienced similar types of change in the last decade, such as an increase in the number of white collar jobs and residents, changes in public housing², and renewed interest in investment in inner-city neighborhoods by businesses and private developers. These changes in land use and population have important implications for indicators of community well-being, such as crime.

² Hyra (2008) describes how changes in public housing policy in New York City and Chicago varied in the nineties. For example, in Chicago, mismanagement of public housing led to the necessary demolition of high rise housing projects, displacement of former tenants, and investment in the surrounding real estate. In New York City, tenants maintained much more control of the management and, as a consequence, did not experience the same levels of displacement despite redevelopment.

Crime is commonly considered an urban problem (Shaw and McKay, 1942). As urban areas undergo transformations, the geographic distribution of crime comes into question. Though crime began to drop in many cities in the mid nineties (Blumstein and Wallman, 2006), it is unclear if ecological changes contributed to this.³ Evidence that there is considerable variation in crime trends once units of analysis are disaggregated suggests the importance of examining micro-level (i.e. within-city) processes, particularly those at the neighborhood level (Weisburd, Bushway, Lum, and Yang, 2004).

Despite a strong theoretical tradition of ecological research in criminology (Shaw and McKay, 1942; Sampson, 2006; Bursik and Grasmick, 1993), little is known about the impact of different kinds of urban change on crime in the short and long term (Kirk and Laub, forthcoming). Given that some cities are undergoing both increases in investment and reductions in crime, it is surprising that few researchers have turned the criminological lens on this relationship. Answers to these questions are important not only for urban policy, but also for criminological theory. There is a dearth of research that tests if and how these types of neighborhood change affect crime (Bursik, 1989). In addition, studies that do focus on the relationship between ecological factors and crime have often failed to capture the dynamic nature of neighborhoods, often having to make do with cross-sectional data to answer research questions that are implicitly concerned with change. The following research will attempt to fill in these gaps in the literature by exploring the relationship between one contemporary aspect of urban change – local large-scale economic investment – and crime, across units of space and time.

³ Scholars have suggested that many factors, including the changing age structure of the population, immigration, mass incarceration, and changes in policing contributed to the crime drop (Blumstein and Wallman, 2006).

Washington, DC

The metropolitan area of Washington, DC, which includes suburban Virginia and Maryland, is home to over five million people, over half a million of whom live inside the city's borders (U.S. Census Bureau, 2009). After several decades of malaise, Washington, DC has experienced a number of short term trends indicative of the broader renewal undergoing the city (Urban Institute, 2008). Increases in population, racial and ethnic diversity, employment, income, home values, and home sales are all signals that the city may be emerging from the blight that characterized much of the latter half of the twentieth century. Population counts from the decennial Census demonstrate the dramatic exodus that occurred in Washington between 1950 and 2000 (Urban Institute, 2008). From a zenith of over 800,000 residents in 1950, the population declined by nearly 30 percent over fifty years to 572,059 in 2000. Estimates for 2008, indicate that the city may finally be experiencing a population increase, having risen by a slight three percent to 591,833 (U.S. Census Bureau, 2009)⁴. Since 1990, the proportion of White, Hispanic, and Asian residents has increased, while the proportion of Black residents has declined. Though overall population was dropping between 1990 and 2000, the share of Whites increased from 27.4 to 28.1 percent of the population and the share of Hispanics increased from 5.4 to 7.9 percent of the population; conversely, the share of Blacks decreased from 65.1 to 60.5 percent (U.S. Census Bureau, 2001). These trends have continued into the new millennium. According to the American Community Survey (U.S. Census Bureau, 2009) estimates for 2005-2007, Blacks currently constitute 55.4 percent of the population, Whites constitute 34.4 percent, and Hispanics constitute 8.3 percent.

⁴ Though many cities have experienced population stabilization or growth relative to the last fifty years, many cities continue to lose population. Further, growth in suburban areas considerably outpaces these recent trends (U.S. Census Bureau, 2008).

In general, the economic status of the District of Columbia has improved since the nineties. The local economy has benefited from an influx in white collar and service jobs, particularly in the hospitality, international finance, business services, and information technology industries; a large contributor to the boost in jobs is the rise in federal government contracting with private firms (Urban Institute, 2008). Labor force and employment have risen consistently since the late nineties, a reflection of the growing population base. Unemployment rates, though more variable, have improved since the nineties – declining between 1998 and 2000 and 2004 and 2007 (U.S. Bureau of Labor Statistics, 2009). Poverty, though also variable, has declined since 2000. Finally, though median income fell between 1990 and 2000, estimates for 2005-07 from the ACS show an increase (Urban Institute, 2008).

Both economic and population growth in the new millennium have coincided with an explosion in the housing market relative to the eighties and nineties. This is evident when examining a number of different housing market indicators. Home sales increased by 20 percent between 2000 and 2004 and condominium sales increased 123 percent between 2000 and 2005, before slowing down in the last few years. The value of single family homes increased approximately 13 percent each year between 2000 and 2007 and the value of condominiums increased 12 percent annually for the same time series. In less than ten years, the number of mortgage loans doubled. High income homebuyers make up a greater share of overall homebuyers. Finally, the number of owner-occupied units declined (Urban Institute, 2008). Taken altogether, the data suggest that the increasing demand and value of real estate in Washington, DC is driven by higher-income homebuyers and real estate investors, most likely in part due to the recent economic

improvements in the region. In 2008, the Washington Business Journal reported that Washington, DC was the second most popular real estate market in the world for international investors (Killian, 2008).

Finally, like many cities across the country, the city has seen a decline in crime since the mid-nineties. Homicides, for example, have declined consistently since the early nineties. In 1993, the city saw 454 homicides; by 2005 that number had dropped to 196 (Metropolitan Police Department, 2009). In general, total crimes declined by approximately 50 percent between 1993 and 2005. The same pattern is true for most other Index crimes⁵. Though part of the drop in the raw number of crimes may be accounted for by the continuing population loss of the nineties, crime has continued to drop in the new millennium when the population decline began to turn around.

Despite such changes in the socio-demographic character and economic well-being of the District as a whole, there is considerable variation within the city. Over half of all neighborhood clusters have experienced population loss since 2000 (Urban Institute, 2008). Despite increased racial and ethnic diversity, it is not clear whether in or out migration has contributed to residential segregation or income inequality between racial and ethnic groups. Though economic conditions have improved the overall standing of the city, it is unclear whether this is caused by migration of new residents to the city or improved economic conditions benefiting existing residents. Regardless, a number of neighborhoods have high rates of unemployment and median incomes below the poverty line. In light of rising values in the real estate market, affordable housing remains a critical concern. Although Washington no longer holds the title of “murder

⁵ Aggravated assaults and larceny-thefts experienced even more dramatic drops, declining by approximately 60 and 70 percents respectively. Arsons dropped by approximately 7 percent.

capital” of the nation, it remains characterized by high crime and violence. In 2007, for example, the city recorded 181 homicides. Cities of comparable population – such as Milwaukee, Nashville, Boston, and Seattle – experienced considerably less: 105, 73, 65, and 24 homicides respectively. Finally, it is important to note that these disparities are geographically structured, with higher rates of disadvantage (i.e. crime, poverty, and population loss) particularly pronounced in neighborhoods on the east half of the city and in the city’s Ward 8.

In sum, while the District has experienced uplift, there is much variation in where these changes are manifested. Given the overlap between these phenomena – in and out migration, economic improvement, a robust real estate market, and the crime drop – it is natural to ask if and how these changes are related. For example, is the in-migration of Whites and out-migration of Blacks related to changes in the local economy? Are changes in the real estate market related to community crime levels? The growth of large scale projects in many parts of the city has been noticeable at the neighborhood level. Though local economic investment appears to impact neighborhoods at a superficial level, as evidenced by the plethora of new and renovated buildings that have emerged in place of once-abandoned and dilapidated blocks, it is unclear if this has had any meaningful effect on the community. Specifically, it is unclear if investment of this nature has reduced crime and increased safety for neighborhood residents and visitors.

The goal of this study is to answer four main questions: 1) What is known about investment in neighborhood clusters between 2001 and 2006? 2) Is overall investment in neighborhood clusters related to crime? 3) How does the relationship between investment and crime fare when investment is disaggregated according to the major use of the

project? 4) Finally, is the relationship between investment – both overall and specific types – the same for violent and property crime rates? The descriptive and aggregate analysis will conclude with a descriptive within-neighborhood cluster examination of several areas of the city that have experienced change.

In order to do this, I utilize two sources that feature data on local economic investment and crime in Washington, DC neighborhood clusters in the first several years of the twenty-first century. The Washington, DC Economic Partnership (WDCEP) provides data on large-scale investment projects in the District of Columbia. The Urban Institute's Neighborhood Info DC database provides data on aggregate crime, as well as other relevant community-level indicators (e.g. disadvantage). The following analysis, utilizing a panel data-set constructed from these two sources, will provide insight into the relationship between investment and crime.

Chapter 2: Theoretical Framework

The concept of place is central to the intellectual history of criminological thought. Theorists have been examining the relationship between ecological factors and crime since the 18th century (Levin and Lindesmith, 1937). The processes of urbanization, industrialization, and immigration provided the context for the concept of anomie – a lack of norms and breakdown in social control caused by rapid social change. Similar historical forces that characterized early twentieth century neighborhoods of Chicago were salient factors in Clifford Shaw and Henry McKay’s research on neighborhood change and juvenile delinquency (Shaw and McKay, 1942). Their discovery that crime persisted in structurally disadvantaged neighborhoods (i.e. zones of transition) despite turnovers in population challenged xenophobic explanations of crime and led to their social disorganization thesis. They argued that neighborhood structural factors – specifically poverty, residential turnover, and ethnic heterogeneity – led to a breakdown in neighborhood social control, which then led to crime. Though lacking adequate measures to empirically test this particular assertion, their research laid the foundation for a number of different hypotheses about the ecological distribution of crime, neighborhood level social control, and cultural facilitation of crime (Sampson and Groves, 1989).

Later research that attempted to test Shaw and McKay’s work supported the notion that social disorganization (measured as local friendship networks, control of street youth, and participation in organizations) was responsible for mediating the

relationship between structural factors and crime (Sampson and Groves, 1989).

Contemporary research has moved beyond an interpretation of social disorganization based merely on social ties to conceptualizations that account for the normative aspect of neighborhood social control. The concept of collective efficacy, which is defined as “social cohesion” combined with “shared expectations” for control envelops both structural elements – social networks – and cultural elements – shared understandings of residents (Sampson, Raudenbush, and Earls, 1997; Sampson, 2006).

Research from the latter half of the twentieth century has shown that different historical processes, such as Black urban migration, suburban flight, urban deindustrialization, and gentrification have had an impact on the distribution and character of crime (Morenoff and Sampson, 1997). Bursik and Webb (1982) analyze the relationship between juvenile delinquency and four types of structural change in Chicago neighborhoods – population size, percent foreign born whites, percent non whites, and household density – for census years from 1940 to 1970. They find that, although Shaw and McKay’s basic thesis is confirmed in the earliest period (1940-50) – that is, that delinquency is geographically stable despite change - change from 1950-60 and 1960-70 is associated with change in delinquency. Additional analyses indicate that neighborhoods with more rapidly increasing proportions of nonwhites had higher rates of delinquency, which the authors attribute to the rapidly increasing migration of Blacks to the inner city during these eras. In other words, different historical forces have important implications for neighborhood change: as the authors note, “it is the nature of change that is related to delinquency rather than the groups involved (Bursik and Webb, 1982: 39).” Findings such as these challenge theoretical arguments derived from cross-sectional data

and underscore the importance of examining socio-historical impacts on social processes. Other studies have examined the impact that increasingly greater concentrations of disadvantage – attributed to forces such as middle class migration to the suburbs and urban deindustrialization - have had on crime. Taylor and Covington (1988) find that relative reductions in status and stability in “underclass” Baltimore neighborhoods are associated with increases in murder and aggravated assaults, further underscoring the importance of examining different types of neighborhood change and the factors that precede them. Finally, Schuerman and Kobrin (1986) examine the development of high crime census tract spatial clusters from 1950-70 in Los Angeles County, identifying “emerging,” “transitional,” and “enduring” crime areas. They find that a number of structural factors related to land-use, socio-demographic characteristics, and economic variables converged over the span of twenty years, characterizing a process of gradual abandonment, disinvestment, and concentrated disadvantage.

Despite a rich literature on the relationship between neighborhood-level structural factors, ecological change, and crime, few have examined the relatively recent phenomenon of urban renewal and none have examined the consequences of large-scale economic investment. A handful of studies have examined a related phenomenon – gentrification – which began to emerge in the 1970s (McDonald, 1986; Taylor and Covington, 1988; Covington and Taylor, 1989). Gentrification is typically conceptualized as a process whereby middle and upper class residents buy into the affordable housing stock in lower income neighborhoods, displacing existing residents and driving up property values. Using a qualitative approach to identify fourteen gentrifying neighborhoods in five American cities, McDonald (1986) found that, relative to the city

as a whole, gentrifying neighborhoods had modest to significantly decreasing rates of violent crime, but little to no change in rates of property crime from 1970 to 1984.

McDonald's examination of gentrification provides not only an important glimpse of changing neighborhoods in diverse city contexts but also highlights several potential explanations for the relationship between gentrification and crime, many of which could apply to the related phenomenon of large scale economic investment. First, he posits that gentrification may reduce crime via its replacement of lower income residents with middle to upper income residents. According to this demographic argument, the selective out-migration of lower-income residents – who tend to have higher rates of both victimization and offending – combined with the selective in-migration of higher income residents may simply reduce crime because areas characterized by more affluent residents tend to have lower rates of crime. McDonald points out that this may also have a displacement effect on other neighborhoods, or even a retaliatory effect on the gentrifying neighborhoods themselves if middle to upper income residents become attractive targets for victimization. Second, McDonald makes the argument that the changing physical appearance of neighborhoods may reduce crime by reducing disorder. Though the empirical status of the “broken windows” thesis is debatable (Sampson and Raudenbush, 1999; Sampson and Raudenbush, 2004), it is possible that reductions in disorder may play a causal role in the reduction of crime. Third, McDonald seems to make the argument that gentrifying neighborhoods may reduce crime through its effect on social organization if efforts are made by residential newcomers to control crime. If residents are effective at establishing social networks and shared understandings regarding neighborhood social control it is possible that neighborhood crime will be

thwarted. In addition, McDonald notes that incoming residents may have a greater ability at accessing formal social control agents (e.g. the police). While these residents may be more politically connected because of their privileged racial or class positions, and therefore more capable of demanding formal social control, they may also be more trusting of agents of formal social control and thus more likely to call upon police and other authorities. Finally, McDonald draws attention to the possibility that gentrification may increase crime, at least temporarily, by widening the gap in neighborhood economic inequality, disrupting social ties in cohesive neighborhoods, and creating conflicts based on friction between neighborhood residents of differing socio-economic, racial-ethnic, and cultural backgrounds.

Taylor and Covington (1988) find that changes in stability and status have a positive impact on murder and aggravated assault in gentrifying Baltimore neighborhoods between 1970 and 1980. In support of social disorganization theory, they find that stability change is more strongly related to violence than status change, though both have important implications for neighborhood crime rates. In a later examination of property offenses in Baltimore, Covington and Taylor (1989) find that gentrifying neighborhoods have significantly higher rates of larceny and robbery and lower rates of burglary than other appreciating neighborhoods, again highlighting the role of social disorganization and rapid population change in examinations of neighborhood processes such as gentrification.

A number of studies outside of criminology – particularly in economics and urban studies – have examined the relationship between different types of investment and crime. Using a two-stage random effects estimation, Bowes (2007) finds that retail

development in Atlanta, Georgia census tracts between 1991 and 1994 increases reported crime (per spatial unit), particularly property crime. In the second stage, however, he finds that violent crime repels retail development. Thus, it is likely that crime and development have a complex relationship with one another that is concealed in single equation models that report single coefficients.

Related studies have examined the impact that Business Improvement Districts (BIDs) have in curbing crime. Business Improvement Districts are “self-organizing, local public-private organizations that collect assessments and invest in local-area service provisions and activities, such as place promotion, street cleaning, and public safety (MacDonald et al., 2009: p xiii). Research about the efficacy of BIDs is mixed. For example, MacDonald et al. (2009) detail the relationship between BIDs and youth exposure to violence and crime in Los Angeles. Though they do not find that there is any difference in youth exposure to violence between BID and comparable non-BID neighborhoods, they find that BIDs reduce overall violent crime rates and this is particularly dramatic for robbery offenses. In addition, they find that violent crimes tended to drop after BIDs were adopted. The specific mechanisms by which BIDs may reduce crime include reduced disorder and increased security and informal social control. Hoyt (2005) finds that BIDs and surrounding areas are less likely to have criminal activity than non-BIDs.

Other studies have examined the relationship between investment in infrastructure and transit and crime. Ihlanfeldt (2003) analyzes the impact of transit lines on crime in Atlanta and DeKalb county census tracts between 1991 and 1994 using both fixed and random effects models. Access to rail transportation significantly affects crime

and this nonlinear relationship is moderated by median income. As median income increases, the relationship between investment and crime becomes negative. Further, crime is increased by rail access in neighborhoods that are both close to the poor and not high-income. Thus, transit lines may generate crime by increasing the mobility of potential offenders, but it may also have the effect of reducing crime by providing increased economic development in surrounding areas.

Finally, a number of studies have examined the relationship between different types of public housing investment and neighborhood crime. Bursik (1989) finds that public housing construction was associated with subsequent neighborhood instability in Chicago neighborhoods. Suresh and Vito (2007) find that revitalization and removal of public housing in Louisville reduces the concentration of aggravated assaults, but leads to their dispersion in other areas of the city. This suggests the importance of policy interventions outside of criminal justice in eliminating hot spots of crime, but also the potential pitfalls of displacement.

Taken altogether, the prior literature does not offer a clear picture of how local economic development will affect crime. While all of the aforementioned theoretical explanations are possible, it is not feasible to adjudicate between them without better sources of data than have been utilized in prior research. Much like gentrification, investment may influence crime through multiple mechanisms such as population composition, land use patterns, disorder, and overall social organization (or disorganization) of a neighborhood. This research provides a first step in this analysis by undertaking a descriptive summary of neighborhood investment in Washington, DC and an aggregate analysis of the relationship between neighborhood investment and crime.

The final component will be a descriptive examination of neighborhood clusters that have experienced change since 2000.

Chapter 3: Data and Methods

Hypotheses

In the following analysis, I expect that investment will be significantly related to crime. Given that there are many potential pathways by which investment might affect crime, I refrain from making definitive statements about the direction of the relationship. The nature of this analysis is exploratory, therefore results should be interpreted with caution. Below I outline some of the potential relationships between investment and crime, as well as the importance and limitations of disaggregating both investment and crime. In general, I expect that investment will affect crime through three primary mechanisms.

First, investment may affect crime by altering the physical environment of the neighborhood. Proponents of the broken windows thesis argue that physical and social disorder has a direct, positive effect on crime (Wilson and Kelling, 1982). Provided the broken windows thesis is accurate, higher amounts of investment should lead to fewer instances of crime because areas that receive considerable investment are likely to experience reductions in physical and social disorder. Broken windows, for example, are likely to be repaired if buildings are renovated. Investment should be accompanied by an increase in neighborhood stake-holders – such as property owners, business owners, and residents – who may be more likely to invoke a response from formal agencies – such as police or planning departments – to reduce disorder. Stakeholders may have greater direct access (for example, by political connections, Business Improvement Districts), indirect

access (for example, through resources such as knowledge), or incentive (i.e. property values) to reduce disorder than original residents.

Second, investment may affect crime by altering the land use patterns of the neighborhood. Increased retail investment may attract more pedestrian and vehicular traffic. Infrastructural investment – such as investment in roads and public transportation– may also bring more people to an area. These alterations in the use of the neighborhood will affect routine activities and as a consequence may facilitate the convergence of motivated offenders and attractive targets (Sherman, Gartin, and Guerger, 1989). On the other hand, bringing more people to an area – particularly residents and business owners, who are likely to be more invested in keeping the area safe – may increase capable guardians by increasing the amount of “eyes on the street” (Jacobs, 1961). An additional benefit of increased investment is the potential for providing jobs for neighborhood residents.

Finally, investment may affect crime by altering who resides in the neighborhood. It is not clear if investment is necessarily followed by population turnover; however, a net increase in housing units may, at the very least, attract new residents, even if it does not displace current residents. Changes in the crime rate may be a product of this demographic effect. If increased residential investment attracts more crime prone residents then crime is likely to go up; if investment attracts less crime-prone residents then crime is likely to go down. Residents are likely to be attracted to or repelled by an area for a number of reasons, all of which may function as intervening mechanisms. Factors such as property and rental values, the types of amenities available, and demographic make-up of residents may all alter the character of the neighborhood and, as

a consequence, the types of people who select to move to or from the area. In turn, these people may have a greater or lesser likelihood of committing crimes or of reporting crimes to the police. Crime may also be affected if a rapid influx of new residents disrupts social networks that foster collective efficacy in the neighborhood. Crime may initially go up after areas undergo significant population change before resuming to average or below average levels. Yet, some social networks may actually foster social disorganization and crime, so the influx of new residents may have a negative effect on crime (Sampson, 2006). Another consequence of neighborhood change may result if investment generates conflict between old and new residents.

As expected, the theoretical picture of the relationship between investment and crime is not obvious. These mechanisms will likely depend on both the type of investment and crime under consideration. Criminal events include a broad array of offenses that may have different causal mechanisms. Certain features of the environment may either generate or inhibit different types of criminal events (Felson and Cohen, 1980). Thus, it is possible that violent crimes, such as homicide, rape, aggravated assault, and robbery, have different ecological precedents than property crimes such as larceny-theft, burglary, auto-vehicle theft, and arson (Lawrence, 1995). For this reason, I examine the different impacts of investment on violent versus property crimes. Investment is a broad category as well and includes a wide range of projects that could have different causal impacts on crime. The types of projects included in the analysis range from industrial to residential to educational. Different consequences may follow different types of investment. For example, residential investment could lead to a population increase or

a population change whereas infrastructural investment might make areas more accessible (or residents more mobile).

Many different relationships are possible depending on the type of investment, crime, and mechanism hypothesized. If investment affects crime by reducing physical disorder, then we should expect any kind of investment, so long as it has the effect of reducing disorder, to reduce crime. In general, investment – whether it is renovation or a new construction – is likely to convey that an area is orderly, monitored, and under control. If investment affects crime through land use and routine activities, a more complicated picture emerges. Investment of all kinds may increase attractive targets – specifically residential, hospitality, industrial and retail investment may increase potential burglaries, robberies, or larceny and motor-vehicle thefts – but it may be coupled with an increase in capable guardians. Some types of investment may increase the supply of motivated offenders by affecting opportunity – infrastructural investment may increase access to a particular area. Finally, residential investment is likely to have an effect on all types of crime. Of the eight types of investment included in the analysis, I expect the relationship between residential investment and crime to be the strongest and most consistently linked to crime. If residential investment is negatively related to crime then it is more reasonable to expect support for the demographic, population change argument given that residential investment could lead to displacement of crime-prone residents. If the opposite is true and investment and crime are positively linked, it is more reasonable to expect support for a social disorganization argument – that rapid social change brought by economic investment will reduce shared understandings for control and disrupt social networks.

Given that the rate of violence has remained relatively stable throughout the time series under investigation, and that violent crimes may be more susceptible to individual-level situational factors (e.g. personal disputes) rather than aggregate-level features of the environment⁶, I expect that investment and violent crime will have a less consistent relationship.

Though I expect that investment has an influence on crime, the following analysis makes use of observational data that does not permit conclusions about causality. There are a number of reasons why this is so. Investment is neither evenly nor randomly distributed. Instead, local economic development is likely to be influenced by a number of factors, such as the value of the land and the support of local officials and residents. Many community level factors – including the crime rate of an area – are likely to have some direct or indirect influence on where investment projects occur. Because of this, the direction of the relationship (positive or negative) and causal ordering is not entirely clear. Both relationships are likely and the current data do not make it possible to disentangle them. In addition to these limitations, the study is unable to account for any intervening mechanisms in the analysis or include additional variables to control for alternative explanations. To sum, the goals of this study are modest; the analysis will be primarily descriptive rather than explanatory in nature, focusing on the relationship between investment and crime rather than any causal effect of investment and crime. The analysis will provide a foundation for future research that – given more rigorous methods

⁶ Some theorists have posited that individual level situational factors may have a greater influence on violent crime than situational opportunities. Consider Clarke (1997:9): “Crimes of sex and violence have been regarded as less amenable to situational controls because they are less common and less likely to cluster in time and space (Heal and Laycock, 1986; Gabor, 1990).” However, as Sherman (1995:44) notes, “to the extent that place features enhance the ability of offenders to commit some crimes, but not any crime, in theory, places should display some specialization.”

and available data – can make stronger assertions about the nature of the relationship between investment and crime.

Data

These hypotheses will be tested utilizing existing data from two sources. The Washington, DC Economic Partnership (WDCEP) provides information on the primary independent variable – investment – and Neighborhood Info DC (a partnership between the Urban Institute and the Washington, DC Local Initiatives Support Corporation) provides information on the outcome variable – violent, property, and total crime rates. In addition, this dataset provides information on multiple indicators of disadvantage that will be scaled and included as a control variable in the analysis. WDCEP is a non-profit organization that provides resources and information to the business and planning community of Washington, DC. Since 2001, WDCEP has maintained a data-base of projects of various sorts that cost at least one million dollars. By tracking large-scale development projects in the District, the WDCEP provides data on the trends, location, make-up, and amount of investment activity within the city. The project-based dataset includes relevant information on each project, including name, project cost, land cost, major use, date in which the project was delivered, and physical address. The project based data-set was converted into a panel data-set (i.e. data that combine units of space and time) by first identifying where and within which spatial unit each project was located using ArcGIS and then aggregating investment for each space-time unit.

Neighborhood Info DC is a public source that provides data on a number of community level indices at various levels of aggregation (e.g. census tracts, police service areas, neighborhood clusters) for the District of Columbia. The data are collected

and compiled by the Urban Institute from a multitude of sources, such as the US Census, public loan data, and Washington, DC's Metropolitan Police Department, Department of Health, and Department of Human Services. Indicators of crime, socio-demographic composition, poverty levels, and housing are included in the data-set on either a yearly or decennial basis.

Measurement and variables

The outcome variable in this analysis is *reported crime rate* (per 1,000) and is measured as the number of reported crimes divided by the population of the neighborhood cluster according to the 2000 Census. The data come from the Metropolitan Police Department and are compiled by the Urban Institute into two categories – violent and property – that are consistent with the FBI's Part I Index Crimes. The crime rate is lagged by one year in order to establish a sequential time ordering between the independent and dependent variables; thus, investment is measured annually between 2001 and 2006 and crime is measured annually between 2002 and 2007. Multiple models will be estimated with three different crime rates: total, property, and violent. It is important to note that there are several known problems with utilizing official police data⁷ instead of self report or victimization data (for example, see Mosher, Miethe, and Phillips, 2002; Kirk, 2006), however there are practical challenges to using

⁷ Like many other police departments, the recording practices of Washington, DC's Metropolitan Police Department have been highly criticized (e.g. see McCabe, 2009). In order to check the validity of the data, bivariate correlations were inspected using data from the 2000 U.S. Census. Violent crime is highly correlated with the percent below the poverty line (correlations range from .76 to .82) and percent of female-headed households (correlations range from .79 to .82), which is consistent with prior literature (Sampson and Lauritsen, 1994). In addition, correlation matrices were inspected for each year's crime rate between 2002 and 2007. All bivariate correlations are above .99 for violent and property crime and between .93 and .99 for total crime.

alternative measures given the unavailability of other measures of crime at the neighborhood level. Future research should address these limitations by utilizing additional measures of crime.

The primary independent variable in this analysis is *economic investment* and is measured as the total amount of investment in millions of dollars per cluster-year. Investment is limited to large scale projects – those over 1 million dollars – that affect the built environment. For example, projects may be new construction of a retail business or renovation of an existing office building. Investment covers a broad array of uses – from residential to retail, office to infrastructure – and may be publicly or privately financed⁸. The investment is a sum of the project and land costs from all completed projects in a neighborhood cluster that are delivered in a given year. These include “hard and soft costs” associated with the project according to building permit data or estimates based on historical data (Washington, DC Economic Partnership, 2008). The delivery date is when the project is scheduled for completion and is determined by the date the first certificate of occupancy is issued or a date supplied by a primary or secondary source⁹.

The analysis includes eight categories of investment based on the major use of the projects: education, hospitality, industrial, infrastructure, mixed-use, office, residential, and retail. Though specific definitions are not available, examples of projects within each category provide some insight into what each entails. *Education* projects include hospitals, universities, and primary/secondary education – both public and private – as well as affiliated athletic and arts centers. *Hospitality* projects include recreation centers, religious institutions, hotels, and museums. *Industrial* projects include storage facilities

⁸ More information can be found at <http://www.wdcep.com>.

⁹ Unfortunately, the code-book does not provide a more specific definition of these sources.

and a distribution warehouse. *Infrastructure* projects consist of metrorail stations, garages, and street widening and rehabilitation. *Mixed-use* projects include buildings with multiple uses, such as residential, retail, and office. *Office* projects include office buildings as well as organizational headquarters, such as the Greater Washington Urban League and Human Rights Campaign. *Residential* projects include apartment and condominium buildings, as well as assisted and senior living facilities. Finally, *retail* projects comprise a number of establishments such as a Giant grocery store or McDonald's food chain.

Projects were selected from the original WDCEP database based on several criteria. First, while the full database includes 1,068 projects, the present analysis is restricted to those that have been completed (N=586) as opposed to planned, proposed, or under construction¹⁰. In addition, only investment for years 2001 through 2006 are included in the present analysis. Though the WDCEP database includes investment projects for 2007, there is no data on the crime rate for 2008 that is comparable to earlier years in the time series. This eliminates 108 projects totaling 4.35 billion dollars. Finally, a number of projects were located in a "non-cluster" area. Non-cluster areas are spread through-out the city and include locations such as the National Mall, Walter Reed Army Medical Center, the National Arboretum, and the United States Soldiers and Airmens Home (an example of a project in the non-cluster area is the renovation of the National Archives). This eliminates 22 projects totaling 1.09 billion dollars. The final number of

¹⁰ Reinvestment and redevelopment may provide unique opportunities for crime. For example, areas undergoing building booms have been associated with thefts of appliances and other valuable materials from sites undergoing construction and renovation (Clarke and Goldstein, 2003). Future research would benefit from an examination of projects in the early stages of construction.

projects is 523 and amounts to 16.65 billion dollars worth of investment in the District as a whole.

Given that there is considerable variation in the types of projects included in the WDCEP database, overall investment will be disaggregated according to the major use of the project. Projects are sorted into eight mutually-exclusive categories based on the major use of the project: education (80), hospitality (60), industrial (3), infrastructure (15), mixed-use (14), office (98), residential (235), and retail (18).

Finally, one additional independent variable¹¹ will be included in the analysis in order to control for competing explanations. *Disadvantage* is a scale composed of four indicators: rates of low weight births, births to teen mothers, food stamp enrollment, and enrollment in Temporary Assistance for Needy Families (TANF) per cluster-year. Factor analysis indicated strong evidence in favor of a single underlying factor with a large drop (to below 1.0) after the first factor. When scaled, the four items have a Cronbach's alpha reliability coefficient of .879. In addition, dummy variables for each year in the analysis are included to control for *time effects*.

Population and sample

The unit of analysis in this study is the *neighborhood cluster-year*. A neighborhood cluster is a large unit of aggregation that makes up three to five contiguous neighborhoods whose boundaries are defined by the District of Columbia Office of Planning (n=39). Though selecting an appropriate unit of analysis is one of the biggest challenges of neighborhood research, there are theoretical, methodological, and practical

¹¹ A number of other variables were included in the model but had to be removed because of high collinearity between independent variables.

considerations that shape this decision. To start, conceptualizations of neighborhood involve assessments beyond geographic boundaries that should be informed by both theory and research questions (Hipp, 2004). In addition, methodological factors affect the selection of an appropriate level of aggregation. Though a larger unit of analysis increases the likelihood that meaningful variation within the unit will be obscured, it reduces the possibility of spatial auto-correlation and the prospect of data thinning out, which can be problematic for tests of significance (Pindyck and Rubinfeld, 1998). Ultimately, the most easily accessible data for Washington, DC is aggregated at the neighborhood cluster¹².

For this analysis, data are available for the years 2001 through 2006. Though a longer time period would be preferable, the WDCEP began collecting data on investment projects in 2001. In fact, investment in the District is a relatively recent phenomenon (Urban Institute, 2008). The final number of observations for this analysis is 234 (6 years for each of 39 neighborhood clusters).

There are several benefits to panel data sets. First, panel data increases the number of observations and therefore the statistical power of the analysis (Sayrs, 1989). Second, panel data allow researchers to control for both space and time effects, which reduce the opportunities for results to be influenced by omitted variable bias. Finally, the

¹² Crime and community-level (i.e. disadvantage) data were aggregated into a number of different units by the Urban Institute – including wards, advisory neighborhood commissions (ANCs), police service areas (PSAs), zip codes, and census tracts. Though census tracts may have been more theoretically relevant given that they constitute much smaller spatial areas than neighborhood clusters, aggregating both crime and investment (which are highly concentrated in a small number of geographic areas) to such small units (Washington, DC has 188 census tracts) would have “thinned out” the data and inflated standard errors, jeopardizing significance tests. Problems with spatial correlation are also a concern with smaller units of analysis. The question of what is the most relevant spatial unit is directly tied to the theory under consideration. Thus if the mechanism by which investment influences crime is salient at the block level, then this would be the most appropriate unit to assess the research question. Given that little is known about the relationship, and several potential mechanisms are likely, the neighborhood cluster is a good starting point.

inclusion of temporal data points allows the researcher to better assess the issue of change.

The target population of this study is urban neighborhoods undergoing reinvestment, however the current analysis is restricted to neighborhood change within one city. Rather than employ a sampling strategy (for example, by randomly selecting urban neighborhoods across a number of different cities), the analysis will focus on a population – the city of Washington, DC. The reasons for this are both practical and theoretical. Given that there is little uniformity in data collected on investment at the neighborhood level, it may not be possible to consistently measure investment in multiple cities. In addition, neighborhood change exists in the broader city context; thus, the process of neighborhood investment should be evaluated relative to changes occurring in the city as a whole. While the findings from this study may not be completely generalizable to other urban neighborhoods undergoing similar changes, the intent of this analysis is to shed light on the general process of investment with the hopes that replication in other contexts will further knowledge of this topic. Thus, future studies should examine the impact of investment on crime in cities other than Washington, DC. In addition, replications should include examinations of suburban and rural areas in order to determine whether findings from this study are applicable to non-urban contexts and whether displacement to non-urban areas is a possible consequence of reinvestment.

Analytic strategy

The research will begin with a description of overall and specific types of investment in Washington, DC's neighborhood clusters between 2001 and 2006. The

goal is to answer several exploratory questions in order to establish a better sense of which neighborhoods have received investment – measured by number of projects and dollar amount – and when the investment occurred. In other words, where and when is investment concentrated (i.e. spatially as well as temporally)? What are the characteristics of neighborhoods that receive investment of varying types? In order to answer the latter questions, I draw on available Census, as well as other community-level data. The descriptive analysis will be followed by an aggregate analysis of the relationship between crime (measured at time t) and investment (measured at $t-1$) controlling for disadvantage and time effects. The analysis will end with a descriptive examination of investment and crime over time in several neighborhood clusters that have experienced change.

The strategy I utilize for the aggregate analysis is a pooled cross section-time series analysis, which is well suited for panel data. Panel data include units of both space and time – in this case, the cross-sectional units are neighborhood clusters which are measured yearly between 2001 and 2006. With panel data it is possible to analyze within unit change (over time) and between unit change (across space). As mentioned earlier, panel datasets are useful because they provide additional observations and therefore more degrees of freedom for statistical tests. In addition, repeated measurements of cross-sectional units may reduce the odds of omitted variable bias given that it is possible to control for time effects (Pindyck and Rubinfeld, 1998).

Several different strategies are available for analyzing panel data. The simplest method is to pool all the cross-section and time series data and estimate a basic ordinary least squares regression (OLS) model. The problems with this strategy are numerous.

First, it is less sophisticated because it ignores the structured or “stacked” nature of the data (Pindyck and Rubinfeld, 1998). Second, because cross-sectional units are measured repeatedly over time, it is highly probable that assumptions of serial independence will be violated (Stimson, 1985). Third, if heteroscedasticity is a problem, it will be exacerbated because it will affect multiple observations within a given unit. Fourth, the OLS assumption of a constant intercept and slope is overly restrictive (Pindyck and Rubinfeld, 1985); it may be unreasonable to assume that the relationship between the covariates and the dependent variable are the same for all cross-section and time series units (Sayrs, 1989). Finally, misspecification about homogeneity of the dependent variable is common with pooled data, which can bias estimators by producing inflated variance of error terms (Stimson, 1985).

There are a number of other methods available to researchers working with panel data that account for the limitations of the simple OLS model. The fixed-effects model adds dummy variables to account for variation in intercepts between units (Pindyck and Rubinfeld, 1998). This model assesses between-unit difference in intercepts, assuming a uniform slope for covariates and constant variance between groups (Park, 2008). There are a number of different fixed-effects models including the least squares dummy variable model and within-effect model, however both produce identical parameter estimates for covariates.

There are many limitations to fixed-effects models. First, it is not possible to explain why the regression line might change between units and over time. In addition, fixed-effects models may use up a considerable amount of degrees of freedom, depending on the number of cross-sectional and time series units in the analysis. Because of this,

one-way fixed-effects models are used more frequently. One-way fixed-effects models introduce dummy variables for either cross-sectional or time series units, but not both (Pindyck and Rubinfeld, 1998). Two-way fixed-effects models account for both group and time effects by including dummy variables for cross-section and time-series units. Given that the notion of change is an important part of this analysis, the number of years in the model is small ($t=6$), and the benefits of controlling for time effects are considerable, the two-way model is preferable to the one-way model.

Alternatives to the fixed-effects model are the random-effects (error-components model) and the time-series autocorrelation models (Pindyck and Rubinfeld, 1998). The random-effects model assumes that differences between units affect the error term (as opposed to the intercepts, which is the case in the fixed-effects model). Because the random-effects model is more efficient (Park, 2008) it is often preferred to the fixed-effects model. The problem with the random effects model is the assumption that the group and time effects within the error term are uncorrelated with the covariates. In other words, random-effects models are more susceptible to omitted variable bias and, as a consequence, biased parameter estimates (Pindyck and Rubinfeld, 1998). The time-series autocorrelation model assumes correlation between units of time and independence between cross-sectional units. This model is more focused on within unit change (i.e. over time) rather than between unit change. Because auto-correlation is less of a problem when the number of cross-section units is considerably greater than the number of time series units, this method is less applicable to the current research question (Stimson, 1985).

Chapter 4: Results of Analysis

Descriptive statistics

Table 1 displays mean, median, standard deviation, minimum, and maximum values of each of the variables in the sample. The panel structure of the data allow for descriptive statistics for spatial (between) and temporal (within) units, as well as the full sample of cluster-years (overall). There are, on average, 15.2 violent crimes per 1,000 people in each neighborhood cluster-year and this value ranges from a low of .5 to a high of 49. In general, there is much more variation in violence across the city (between neighborhood clusters) than over time (within neighborhood clusters). Property crime is much higher, with an average of slightly over 51 incidents per 1,000 residents in a year, and exhibits more spread and skew, ranging from a minimum of 10 crimes per 1,000 residents to a maximum of 243 crimes per 1,000 in a year, with a median value of 44. Again, there is more variability between neighborhood clusters than within (over time). Inspection of histograms reveals that in general all three rates of crime display a fairly normal distribution. Figure 1 indicates that total and property crime decreased between 2002 and 2006 and increased slightly between 2006 and 2007, whereas violent crime stayed relatively stable for the time series.

The primary independent variable – total investment – is considerably more skewed. Overall, the average amount of investment in a cluster-year is 71 million dollars. The standard deviation, on the other hand, is over 188 million. Thus, the median may be a more reliable estimate of central tendency. For total investment, the median value is

almost 12 million. Notably, there is considerable within and between unit variation. Inspection of frequency distributions reveals that about a third of cluster-years had no investment (0). The remaining cluster-years have a range of 1 million to over 1.5 billion dollars of investment in a given year.

Over the six year period, nearly all neighborhood clusters received some amount of investment¹³, ranging from over five million to over six billion dollars. In 2001, 2.21 billion dollars were invested in 77 projects between the 39 neighborhood clusters, at an average of 53.73 million per project¹⁴. The following year there is a slight increase to 2.47 billion dollars between 84 projects averaging around 63 million dollars each. In 2003, the city received a nearly one billion dollar boost in investment to 3.25 billion dollars for 95 projects over 83 million each. In 2004, investment dropped back to the same level as 2002 – nearly 2.5 billion dollars for 89 projects averaging almost 64 million each. Investment increases slightly in 2005, but the most notable increase occurs at the end of the time series. In 2006, the District received almost 3.6 billion dollars of investment for 95 projects averaging almost 92 million dollars each.

Total investment is broken down into the eight major use categories, which reflect similar degrees of variation. A simple glance at histograms (see Figure 5) reveals a dramatic right skew. For example, medians for all major use investment types are 0, though the maximums range from 8 to 900 million. In other words, at least half of all cluster-years receive no investment, though at least some receive investment of extreme proportions. Figure 2 shows the breakdown of investment by major use of the project between 2001 and 2006. Office development accounted for the majority of investment,

¹³ Two neighborhood clusters – 16 and 29 – received no investment throughout the entire time series.

¹⁴ These data are not reported in tabular form.

followed by residential, hospitality, education, mixed-use, infrastructure, retail, and industrial development. In general, total investment followed an upward trend between 2001 and 2006. As mentioned previously, the data account for over 16.5 billion dollars of investment between 523 projects. Finally, disadvantage, much like crime, reveals a fairly normal distribution.

Aggregate analysis

Table 2 displays a matrix of correlation coefficients for all variables included in the analysis. Total investment has a moderate positive correlation with both total and property crime (.5878 and .6275 respectively). Office investment has a slightly higher positive correlation with total and property crime (.623 and .6576 respectively). Hospitality, mixed-use, and residential investment have correlations in the .3 to .4 range. The remaining correlations are all below .2.

Disadvantage appears to have a strong relationship with the violent crime rate, but has a considerably smaller relationship with total and property crime. This highlights the possibility that there are very different etiological factors in the production of violent and property crime (or, at the very least, different correlates of violent and property crime). Unfortunately, there were few theoretically relevant control variables that might explain the variation in property crime.

Finally, I examined correlations between investment according to major use to address the issue of collinearity between independent variables. None of the correlations were high enough to warrant concern, however separate regressions were estimated for each type of major use investment category in order to minimize potential problems associated with multicollinearity. Substantively, the results were the same when the

independent variables were assessed in separate equations and when they were all included together.

For contrast, Figure 3 is a scatterplot of the regression of total crime on total investment using ordinary least squares methods. The fitted values show a strong positive linear relationship between total investment and total crime. The regression coefficient for this analysis is highly significant and indicates that each million dollar increase in total investment results in an increase in the total crime rate by .11. As mentioned previously, ordinary least squares regression is not likely to be the best method for analyzing panel data because of assumptions that units are independent. Thus, the analysis turns to the fixed effects regression, which acknowledges the panel structure of the data.

Table 3 shows the results of the fixed effects regression¹⁵. Total investment has a significant negative relationship with total and property crime, controlling for disadvantage¹⁶ and time effects. The coefficients indicate that for every million dollars of investment in the previous year, crime goes down by about .02. Total investment has no significant effect on violent crime, however.

Next, investment is disaggregated according to major use category. Hospitality and mixed-use investment have a significant negative relationship with total and property crime – about .02 and .06 respectively. Neither has a significant relationship with violent crime.

¹⁵ Different analyses were estimated using AR1 and random effects models. There was less consistency amongst the different results than expected. The positive relationship for office investment and negative relationship for residential investment are supported for total crime, but there is less consistency for hospitality and mixed-use investment and for violent versus property crime.

¹⁶ The null effect of disadvantage was unanticipated and may either be due to the high correlation with the dependent variable (at least, violent crime), decreased salience through out the crime drop, or an artifact of the specific modeling technique. Further empirical and theoretical work is needed.

Third, office investment has a significant positive relationship with total crime and violent crime. The coefficient indicates that every one million dollars in office investment in the previous year, corresponds with an increase of about .02 in the total crime rate and .01 in the violent crime rate. This relationship is not significant when examining property crime.

Finally, residential investment has significant negative relationship with all three outcomes. The coefficient indicates that a one million dollar increase in investment in the prior year evokes a reduction in total crime of .09, a reduction in violent crime of .018, and a reduction in property crime of .07.

In sum, overall investment is negatively related to total and property crime, but does not have a significant relationship with violent crime. Figure 4 shows the fitted values of the fixed effects regression. Comparison with figure 3 highlights the importance of utilizing appropriate analytic methods to analyze panel data. Whereas the ordinary least squares regression showed a strong positive relationship between investment and crime, the fixed effects regression, which accounts for both spatial and temporal variation, indicates that the two variables are, in fact, negatively related. Closer examination of the scatterplots reveals that the positive relationship was likely driven by particular neighborhood clusters – those that may have greater amounts of investment as well as crime – which are measured at six different time periods, giving the impression that crime and investment are directly related. The fixed effects analysis adjusts for this by looking at the within unit change while controlling for between unit variation.

Increases in certain kinds of investment appear to reduce crime – hospitality, mixed-use, and residential – and the effect appears to be strongest for property crime

specifically. Residential investment, though, appears to exhibit a strong negative effect on violent crime in addition to property crime. The exception to this is office investment, which exhibits a positive relationship with violent crime, but not property crime.

Additional analyses

The previous analysis highlights the relationship between investment and crime before and after disaggregating investment by major use and crime by broad categories – violent or property offenses. Additional analyses further disaggregate investment according to the type of construction – whether it is a new construction or a renovation of an old building – and the type of financing – whether public or private¹⁷. This is performed for each type of crime – total, violent, and property – and each major use category of project – total, retail, residential, industrial, infrastructural, hospitality, office, education, and mixed-use. This is important because other project-level factors may be correlated with area crime. For example, new construction projects and those that are privately financed may be concentrated in affluent, low crime areas, whereas renovations and projects that are publicly financed may be concentrated in more disadvantaged, high crime areas. There may be different pathways – through the changing physical environment, land use patterns, and residential composition – that vary according to the type of financing and construction.

¹⁷ Public and private are mutually exclusive categories, but they are not exhaustive. A number of projects were financed through other sources of financing such as bonds and tax increment financing, and various combinations of different categories. Public (313) and private (73) are the two modal categories and make-up approximately 74 percent (386) of the total projects included in the analysis and over 72 percent of total investment (over 12 billion dollars). For the sake of parsimony, the other categories were excluded, however future analyses would benefit from more in depth examinations of different sources of financing, particularly those that are targeted toward urban neighborhood revitalization.

First, investment was disaggregated into two mutually exclusive and exhaustive categories – new construction and renovation¹⁸. Table 4 displays the coefficients and standard errors for this analysis. Recall that total investment has a significant negative relationship with total and property crime, but not violent crime. This relationship holds for new construction, but not renovation. Further, disaggregating by construction type reveals that total investment has a significant relationship with violent crime; the relationship is negative for new construction and positive for renovation. The opposite relationships between the two types of construction concealed the significance of the relationship in the aggregate analysis. That the effect of renovation is positive may be indicative of other forces occurring in the city-wide context. For example, research has shown that high crime areas are characterized by structural deterioration (Schuerman and Kobrin, 1986). Since it is likely that renovation investment occurs in neighborhoods that have a greater amount of distressed buildings in need of restoration, it may be that the positive relationship is explained by various urban renewal programs that provide incentives for developers to invest in particular areas of the city. In addition, the negative relationship between residential investment and crime holds for private investment only. Private residential investment may attract new residents who are more affluent and therefore less likely to either commit crime or be reported/report offenses to the police. As a consequence, private investment may reduce crime through a compositional effect. If displacement of crime-prone residents occurs, then the reduction in crime should be even more dramatic. Three other findings are noteworthy. The positive relationship between office investment and crime is strongest for renovation. New construction

¹⁸ Infrastructural investment had its own category so is excluded from this analysis.

hospitality investment seems to affect violent crime as well. Finally renovation mixed-use investment reduces total and violent crime.

Second, total investment is disaggregated according to the type of financing. Table 5 demonstrates that there are two opposite relationships between investment and crime. Total investment with public financing has a strong positive relationship with all three outcomes, whereas total investment with private financing has a moderate negative relationship with total and property crime. Further, residential and mixed-use investment has a negative relationship with all three outcomes for private investment only. Office investment has a positive relationship with all three outcomes for public investment only. Finally, private hospitality has a positive relationship with violent crime only.

Third, in order to examine the impact of crime on investment, the panel dataset was reconstructed to determine how crime predicts investment. In other words, for each row, investment is specified as the dependent variable and is measured at year t . Crime is thus specified as the independent variable and is measured at $t-1$. Thus crime between 2001 and 2006 is expected to predict investment between 2002 and 2007, holding disadvantage and time effects constant. Separate regressions are estimated for total, education, hospitality, industrial, infrastructure, mixed-use, office, residential, and retail for total, violent, and property crime (because violent and property crime may be related, the impact of each type was assessed in a separate equation)¹⁹. Table 6 indicates that violent crime significantly reduces the amount of investment in education and mixed-use

¹⁹ Because investment is highly skewed, these variables were log transformed to resemble a normal distribution. First, a 1 was added to each value given that there were many values of zero in the data (which could not be log transformed). Second, the natural logarithm was taken for each of these values. The purpose of this analysis is to examine whether or not crime in one year can predict investment in the next year rather than to assess the specific degree of impact of crime on investment.

projects, total crime significantly reduces the amount of hospitality investment, and all types of crime reduce both residential and retail investment.

Within-cluster analysis

In the present section, I examine two neighborhood clusters over time to provide some contextual background for understanding the possible relationship between investment and crime. The selection was based on an inspection of the ranking of neighborhood clusters according to the overall amount of investment between 2002 and 2007 (as well as separate rankings of residential, office, mixed-use, and hospitality investment), as well as rankings of crime rates by neighborhood cluster during the initial years of the time series. In other words, clusters that experienced a considerable amount of total, residential, office, hospitality, or mixed-use investment (or some combination), but had relatively high levels of crime (in the top half) were selected. This was done in order to examine relative (i.e. rank ordering) and absolute (i.e. percent change) differences in crime over the time series; presumably, neighborhoods that experience investment should have more dramatic changes in crime. First, cluster eight was selected because it ranks the highest regarding both investment and crime rates²⁰. Geographically, this cluster is centrally located in the Northwest quadrant of DC, north of the National

²⁰ Because of its outlier status, the analysis was performed without cluster eight. Substantively, the results are very similar, though with some slight differences. On the one hand, the results are no different for total investment. On the other hand, many types of investment lost significance once total investment is disaggregated. Only office investment is significantly related to the three outcome variables once total investment is disaggregated, and this relationship is consistently positive. In addition, total renovation and public investment are significantly and positively related to all three outcomes. Finally, office investments that are publicly financed and renovations stand out as the most strongly related to crime, and these relationships are all positive. This suggests that the findings regarding residential, hospitality, and mixed-use investment may be more applicable to cluster eight (perhaps because only cluster eight consistently received these types of investments), whereas the findings regarding office investment are likely to apply to the whole city.

Mall. The specific parameters of cluster eight are M Street to the north, Pennsylvania Avenue to the south, North Capitol Street to the east, and 15th Street to the west, and it includes the neighborhoods of Downtown, Chinatown, Penn Quarters, Mount Vernon Square, and North Capitol Street. Several notable landmarks in the region include the Walter E. Washington Convention Center (completed in 2003) and Verizon Center (completed in 1997; bought and revitalized in 2006²¹). In addition, the area is served by several Metro subway stops (most of which are busy hubs of transportation), has numerous museums, theatres, and hotels, and contains the District of Columbia City Hall, the Federal Bureau of Investigation, and other office buildings housing federal and city government agencies, as well as private industry, non-profit organizations, and residential units.

Overall, cluster eight received the greatest amount of investment, both in terms of dollars, number of projects, and average cost of project. From 2001 to 2006, the area received over 5.7 billion dollars of investment, from 97 projects averaging 58.93 million dollars each. In addition, cluster eight led the rest of the city in investment in hospitality, mixed-use, office, and residential projects. Each year, this cluster ranked highest compared to the rest of the city in the amount of overall investment received. Private and new construction vastly outnumbered public and renovation investment and this is true for almost all major uses of investment that are significant in the aggregate analysis (i.e. hospitality, office, and residential, though not mixed-use).

In addition to being a center of heavy investment, cluster eight has the highest crime rate of any other neighborhood cluster. This may be attributed to the low

²¹ This area, and Verizon center in particular, are frequently cited as the catalysts of “gentrification” in Washington.

population base (8,609 in 2000) and high amount of foot traffic generated by the numerous retail, office and hospitality venues in the area²². Consider that the city's median cluster population in 2000 of 13,179 (mean of 15,958). In 2000, cluster eight ranked 31st (out of 39) in terms of population size, though this is up slightly from 34th in 1980 (population 7,587). Positive population change is noteworthy given that many clusters in DC have lost population over the last few decades. In general, between 2002 and 2007, the cluster experienced a more dramatic drop than the average neighborhood cluster. Whereas the city's crime drop was approximately 11 percent for overall, violent, and property crime, cluster eight dropped by about 23, 19.5, and 24 percents respectively. Whether this more dramatic decline is due to the amount of investment in the neighborhood cluster cannot be assessed with this particular analysis. What is notable is that the pattern of crime did change at a different rate than the overall city, and this coincided with dramatic changes in neighborhood structure.

To contrast, cluster 39 has a population considerably higher than average, though it has experienced population loss since 1980. Over thirty thousand people live in this area (down from nearly forty thousand in 1980), which is comprised of the Congress Heights, Bellevue, and Washington Highlands neighborhoods. This cluster is located in Ward eight in the Southeast quadrant of the city, and houses some of the District's poorest residents (Urban Institute, 2008). Geographically, this cluster is located in the southernmost tip of the city and is bordered by Southern Avenue and the state of Maryland to the East, the Anacostia river to the South, Interstate 295 and Bolling

²² This is an important limitation of crime *rates*. There are likely to be units in the numerator that are not accounted for in the denominator, leading to over or under inflation of estimates. In this case, crime events may be experienced by individuals who are not accounted for in the residential population base (i.e. the denominator). In neighborhoods with high volumes of foot traffic from the non-residential population (i.e. workers or visitors) and a low residential population, such as cluster eight, crime rates may be over inflated.

Airforce Base to the West, and Alabama and 13th St. to the North. This area received over 294 million dollars in investment and ranked 12th in total investment. Almost 90 percent of this (over 263 million dollars) is concentrated in residential investment; this cluster ranked sixth in this category compared to other clusters. Total investment is evenly split between new construction and renovations; however public financing outspends private financing by a ratio of approximately 20:1. Though new construction (versus renovation) accounts for more than two thirds of residential investment, public financing (versus private) accounts for over ninety percent of all residential investment.

This cluster is characterized by average to below average levels of total and property crime and considerably higher levels of violent crime. However, like cluster eight, changes have occurred over time. In 2002, there were 69 total crimes per 1,000 residents, 26 of which were violent. Between 2002 and 2007, the total crime rate increased almost 20 percent. This is attributable to the nearly 42 percent increase in property crime. Relative to the rest of neighborhood clusters, this area increased from 25th to 16th in property crime rankings and 18th to 12th in total crime rankings. Violent crime decreased by almost eight percent in this cluster and dropped from sixth to eighth relative to the other clusters. Thus, this neighborhood cluster does not follow the city-wide trend of decreases in both violent and property crimes, nor does it follow the more dramatic declines of cluster eight.

Chapter 5: Discussion

Implications

The previous analyses provided an initial look at the relationship between investment and crime in Washington, DC and several important findings emerged. First, investment is highly variable by neighborhood cluster. This is apparent when examining the wide discrepancy between two measures of central tendency – the mean and median – and various measures of dispersion such as range and standard deviation. Next, investment and crime are related, but this relationship differs according to the major use category of the investment and the type of crime investigated. Importantly, the source of financing and the construction type all affect the relationship between investment and crime. Finally, different processes appear to be operating in neighborhoods over time. The data seem to support several different hypotheses and future research that explores these mechanisms with greater precision will provide more insight into these mechanisms.

In general, investment has a significant inverse relationship with overall and property crime, when controlling for disadvantage. Once both variables are disaggregated, the data reveal several significant relationships between investment and crime. Investment in hospitality, mixed-use, and residential projects all have a significant negative relationship with total and property crime. Investment in office projects has a significant direct relationship with total and violent crime. Residential investment has the

most robust relationship with crime and is significantly related to all three outcomes – total, violent, and property crime. However, these effects seem to be moderated by two other important factors. First, for total investment the signs of the coefficients are opposite depending on the source of financing and type of construction. Private investment and new construction has a negative effect on crime whereas public investment and renovation has a positive effect on crime. In addition, residential investment that is either privately financed or a new construction is negatively related to crime; however residential investment that is publicly financed or a renovation is not significantly related to crime. The opposite is true of office investment; the positive relationship between office investment only holds up for publicly financed projects and renovations. The exception to this is for violent crime, for which new constructions are positively related. The relationships for hospitality and mixed-use investment are less consistent.

These results may support multiple hypotheses about the relationship between economic investment and crime. Overall, investment may have the effect of reducing crime through its impact on the physical environment, though this hypothesis is impossible to confirm without observation of physical or social disorder. It may also affect land use patterns, perhaps through the process of increased guardianship. Hospitality and mixed-use investment, for example, may increase the amount of foot traffic in the area (and, as a consequence, the amount of crime), but it may also lead to greater “eyes on the street,” such as those of bystanders, employees (restaurant hosts and servers, bouncers, valets, private security), or stakeholders (business owners, business improvement districts). Residential investment, too, may increase the number of

stakeholders within the community who might intervene in both violent and property crime (though direct examination of this mechanism would necessitate survey data).

Office investment may increase targets (e.g. daytime office employees), but without the attendant guardians.

Residential investment may disrupt neighborhood social control by destabilizing neighborhood social ties and trust or by generating conflict between long time residents and newcomers, particularly if they vary in terms of socioeconomic, demographic, or cultural factors. Surprisingly, residential investment did not increase crime by destabilizing the neighborhood as might be expected from extant theory. Given that residential investment had a consistent and significant negative relationship with crime, it is likely that different mechanisms are operating. Perhaps residential investment replaces crime-prone residents with law-abiding residents or changes the population composition such that emergent properties such as collective efficacy become operable. It may also be that residential investment is accompanied by increased formal social control due to the more powerful voices of newcomers who may have more wealth or connections to different public agencies (i.e. investors, property owners, and residents). This hypothesis is indirectly supported by the finding that residential investment only reduces crime in the case of private investment and new construction. These types of projects may be in areas that are receiving more public attention as areas of redevelopment and may therefore have better access to crime control agencies. However, given that the data lack measures of population displacement, it is not possible to directly test these mechanisms.

Office investment, on the other hand, appears to increase violent crime. This may be evidence of the changing land use patterns of the neighborhood. Perhaps greater

investment in office investment increases the number of attractive targets – white collar employees – without the guardianship necessary to prevent crime. Given that this relationship is stronger for public investment and renovation, it may be that areas that receive these types of office investment have fewer financial resources to hire security needed to deter crime. In addition, these renovations may occur in older areas of the city which are less a target of redevelopment interest than a function of long-needed infrastructural improvements.

It is worth keeping in mind that the dependent variable is not measuring *actual* crime, but rather is a measure of *reporting* of crime. Thus, it may be that increases in violent crime associated with office investment are due to greater reporting of crime, and decreases in crime associated with hospitality, mixed-use, and residential investment are due to decreased reporting of crime. Finally, given that crime was decreasing throughout the city between 2002 and 2007, it may be that other factors explain the variation in crime and the relationship reported is spurious. It is impossible to rule out the possibility of omitted variable bias without controlling for more competing explanations.

To sum, area investment and crime are significantly related, however this relationship is moderated by different properties of investment and types of crime. Why is this the case? First, why does investment show a more consistent relationship with property than violent crime? This may be due to the differences in the distribution and occurrence of violent crime. Property crime is much more prevalent; it also is less concentrated in disadvantaged areas. Thus increased investment in most areas may be accompanied by increases in guardianship and social control. Areas that are more violent – those that have greater levels of disadvantage - may be less affected by investment

because they do not experience the same levels of guardianship and social control. This may also explain why new and private investment are also related to crime. Altogether, these conclusions suggest the importance of studying mechanisms of social control and guardianship, as well as population change, in future examinations of investment.

Limitations and future research

Though the previous analysis provides insight into the relationship between local economic development and crime, several important methodological limitations are worth noting in order to guide future research. The first is related to measurement. The investment variable may not fully capture the construct of interest in this analysis. Investment is measured in dollars and only includes projects that have occurred since 2001 that cost at least one million dollars. This leaves out smaller scale projects and projects that occurred in the first few years of the District's economic boom. This measure also does not account for the base condition of the neighborhood. Some neighborhoods may not receive any investment because they are already highly developed. Conversely, highly developed neighborhoods may regularly receive investment dollars because they have more powerful stake-holders or are more desirable areas to invest in. If this is the case, then it is not appropriate to compare these neighborhoods with the aforementioned measure of investment, without somehow accounting for initial neighborhood differences. In addition, investment is measured as the sum of all projects completed in one year. If the effects of investment carry over to future years, then a cumulative measure may be more appropriate. Finally, investment only captures one type of economic investment. There are a number of modern types of neighborhood investment that may have an effect on crime. While block-busting and

redlining were important contributors to the changes in urban neighborhoods in the middle of the century, shifts in access to traditional and predatory home mortgage lending may be important drivers of change in today's urban neighborhoods. Future research should explore subprime mortgage lending, tax incentive programs for residential and business investment, and other types of private and public financing.

Additionally, the crime rate is subject to a number of limitations. The measure captures reported crime rather than the universe of criminal offenses in the neighborhood cluster. Summary measures of crime may also be limited in that many criminal offenses are vastly different from one another (e.g. robbery versus intimate partner violence) and have unique causal pathways at the aggregate level. In addition to the usual limitations of official police data the crime rate may be more suspect in neighborhoods undergoing significant population change. If investment has caused a change in population that affects community characteristics correlated with the likelihood of reporting crime, then any relationships uncovered in the analysis will reflect a change in the reporting of crime rather than actual crime. A final limitation to the crime rate is that the population base for all years is from the 2000 Census. If there has been considerable in or out migration per neighborhood cluster, the crime rates may then be under-inflated (in the case of in-migration) or over-inflated (in the case of out-migration).

A second issue has to do with the proper time lag, functional form, and temporal ordering between the two variables. The time lag utilized (one year) may not be long enough, such that it may take several years for investment to have an effect on the local crime rate. Prior research has most often used Census data that span multiple decades. If the process of neighborhood change takes over a decade, then the current analysis may be

measuring smaller, less meaningful fluctuations that are smoothed out over longer spans of time. The relationship also may be curvilinear, such that investment must reach a certain threshold before it has an effect on crime. There may be other moderating factors that interact with investment to affect crime. In addition, as the previous analysis indicated, there may be a simultaneous or reciprocal relationship between investment and crime. For example, crime did predict certain types of investment. Both violent and property crime reduced residential and retail investment. Violent crime also seemed to deter investment in hospitality and education. Thus, future research should use techniques such as two stage least squares models that assess for simultaneity to unpack these potentially confounding relationships.

A third consideration is whether or not the appropriate spatial unit was utilized. For the most part, the unit of analysis was selected based on convenience rather than theoretical importance. It is important to keep in mind that the neighborhood cluster is a large unit – often encompassing as many as five distinct²³ neighborhoods. If the relationship between investment and crime is more salient at the block or census tract level, then the use of neighborhood clusters – which constitute multiple blocks and census tracts – may obscure meaningful relationships. This is of specific concern if investment or crime is not randomly distributed across the unit of observation. For example, one neighborhood cluster may consist of two non-adjacent neighborhoods – one which receives a great deal of investment, without any change in crime, and one which experiences a considerable drop in crime, with no investment. The analysis would give the impression that investment reduced crime when, in fact, the two phenomena are

²³ Though operationalizing even small neighborhoods is difficult because specific boundaries are often not clear.

completely independent from one another. If there is no reason to expect a diffusion effect across the neighborhood cluster then the results of an analysis whereby larger spatial units are used may not be valid. On the other hand, if investment has a geographically diffuse impact on crime, such that investment in one neighborhood affects crime around a several block radius, then neighborhood clusters may be an appropriate unit of observation (Hipp, 2004). The downside of this is that the analysis is more vulnerable to spatial correlation.

In addition, the analysis does not include a sufficient number of variables to control for alternative explanations or to test important theoretical mechanisms. Sampson (2006) and others (Sampson and Groves, 1989), for example, have used neighborhood level survey data to test the relationship between structural characteristics, collective efficacy, and crime. Regardless of these theoretical and empirical refinements of social disorganization theory, much of the extant literature on neighborhood processes fails to account for these intervening mechanisms. Measurement of social disorganization or collective efficacy requires data that are not readily available in many cities – surveys of attitudinal and behavioral characteristics of residents; thus, most examinations of neighborhood change only test the relationship between structural factors and crime, and rely on speculations about unobserved processes to explain the process that mediates these relationships. This is particularly needed in the current study given the vast array of mechanisms that could potentially explain the relationship between investment and crime.

Finally, the current analysis includes only one city – Washington, DC – which may not be representative of all cities undergoing urban change. For example, the city's

designation as the nation's capitol and seat of the federal government may provide a more favorable environment for investment and economic development than "rust belt" cities – former centers of manufacturing that have suffered from deindustrialization and have been particularly hard-hit by the modern economic context. Future research should test the relationship between investment and crime in these other urban contexts –as well as suburban and rural communities. The current analysis would be strengthened by inclusion of spaces that are adjacent to areas undergoing reinvestment, which may experience neighborhood change if they become areas of displacement.

Chapter 6: Conclusion

The purpose of this analysis was to explore the phenomenon of urban reinvestment in hopes of gaining a better understanding of modern neighborhood processes and how they are related to crime. A necessary first step in answering this question is to examine the distribution of urban reinvestment across space and time. In Washington, DC, investment is highly variable by neighborhood cluster and year. There were few areas of the city in particular that were the beneficiaries of a considerable amount of investment. Further, investment increased significantly toward the end of the time series, though there was fluctuation between years in certain types of investment. In addition, the analysis showed that overall investment is related to crime, though this relationship is moderated by the major use, source of financing, and type of construction of investment, as well as the type of crime. Though the current data are unable to capture the particular process by which crime and investment influence one another, there may be several mechanisms that occur simultaneously.

While no specific theory is tested in this analysis, the results point to some useful directions for further refinement of theories of neighborhood change and crime. First, investment may have reduced crime by reducing disorder, though this is not necessarily evident from the analysis. Though total investment had a significant negative relationship with property crime, once investment was disaggregated, only certain kinds of investment remained significant. Further, many types of investment had a positive relationship with crime in the following year. As a consequence, alternative explanations are warranted. In this case, land use patterns and routine activities seem to matter. Consider the positive

relationship between office investment and violent crime. This relationship held for both new construction and renovations, but not for privately financed projects. One reason this may be the case is because privately financed projects are more likely to have the resources to hire private security or establish Business Improvement Districts. Finally, results regarding residential investment seem supportive of the social composition argument. Specifically, residential investment had a negative relationship with both violent and property crime, but this is only true for new construction and private financing. This is aptly demonstrated in the descriptive analysis. For example, cluster 39 received a considerable amount of public residential investment, but experienced significant increases in property crime both in absolute and relative terms. Cluster eight, on the other hand, received over 917 millions dollars of private residential investment and less than 1.5 million dollars of investment in public residential investment, yet experienced more dramatic reductions in both violent and property crime than the city. This provides mixed support for the argument that change necessarily increases crime; it may also be important to consider the nature of change and the specific impacts on population that occur under conditions of different types of investment. Data from the 2010 Census should provide important insights into this question by permitting additional analyses of change²⁴.

Prior evidence has shown that rapid change may disrupt important neighborhood level mechanisms of social control, leaving neighborhoods, their residents, and their visitors vulnerable to crime. The results of this analysis show less support for this idea.

²⁴ The next Census should aid researchers in estimating reasonable population counts on an annual basis or allow analyses of inter-Census change (i.e. change scores between 2000 and 2010). In addition, the Census Bureau has forecasted the collection of annual data on smaller geographic units (such as census tracts) beginning after 2010.

Instead, investment appears to reduce crime – though it is not clear if this is because of guardianship or population displacement.

However, investment did not uniformly reduce crime. In some cases – such as public and renovation investment - it had no effect, and in other cases – such as office investment - it had a positive effect. Though economic development is often touted as beneficial to the general region (Washington, DC Economic Partnership, 2008), it is important to consider these and other potential costs to communities that may be incurred by investment and its consequences. For example, displacement and access to affordable housing and rentals are particularly likely consequences for communities experiencing increased attention by investors and city planners. Even if investment does reduce crime in neighborhoods that are targeted for redevelopment, while still preserving equal access and affordability, it may have the effect of pushing crime to more vulnerable areas that have fewer resources and protective factors to insulate residents and visitors from crime. Future research will benefit from expanding this analysis to other data sources, measures, and contexts. In the meantime, this analysis has provided a first step in understanding the relationship between investment and crime and a direction for future research in this area to pursue.

Appendices

Table 1: Summary Statistics: Overall, N = 234, Between, n = 39, Within, t = 6

Variable	Mean	Median	Std. Dev.	Min	Max
Total Crime Rate	66.221	60	37.937	10.7	289
			36.793	13.333	221.333
			10.701	31.888	133.888
Violent Crime Rate	15.2	15	9.437	0.5	49
			9.192	0.667	39.333
			2.526	5.2	28.2
Property Crime Rate	51.021	44	30.976	10	243
			29.844	12.667	182
			9.378	22.021	112.021
Total Investment	71.153	11.966	188.453	0	1612.115
			171.318	0	1035.503
			82.427	-484.135	647.764
Education Investment	6.981	0	21.284	0	188
			12.887	0	71.4
			17.044	-64.418	157.631
Hospitality Investment	10.204	0	63.752	0	900
			38.031	0	232.338
			51.469	-222.134	677.866
Industrial Investment	0.047	0	0.542	0	8
			0.219	0	1.333
			0.497	-1.286	6.714
Infrastructure Investment	2.056	0	14.465	0	187
			6.295	0	32.5
			13.056	-30.444	156.555
Mixed-Use Investment	5.111	0	32.748	0	394
			21.378	0	123.5
			25.003	-118.389	275.611
Office Investment	25.759	0	100.785	0	903.222
			86.018	0	501.455
			54.011	-405.496	427.527
Residential Investment	20.296	0	44.619	0	371.541
			32.25	0	156.778
			31.194	-136.482	235.059
Retail Investment	0.705	0	4.426	0	47
			2.254	0	11.833
			3.823	-11.128	35.872
Disadvantage Scale	12.566	10.724	8.805	0.641	32.606
			8.824	1.597	29.71
			1.154	7.891	15.477

Crime rate is per 1,000

Investment is in millions of dollars

Table 2: Correlation Matrix

	Total Crime	Violent Crime	Property Crime	Total Investment	Education	Hospitality	Industrial	Infrastructure	Mixed-Use	Office	Residential	Retail
Total Crime	1											
Violent Crime	0.793	1										
Property Crime	0.982	0.665	1									
Total Investment	0.588	0.303	0.627	1								
Education	-0.033	-0.143	0.003	0.255	1							
Hospitality	0.324	0.164	0.346	0.732	0.022	1						
Industrial	0.024	0.009	0.026	-0.015	-0.017	-0.015	1					
Infrastructure	0.014	0.011	0.014	0.078	-0.028	0.007	0.131	1				
Mixed-Use	0.343	0.187	0.363	0.501	0.219	0.327	-0.013	-0.021	1			
Office	0.623	0.346	0.658	0.843	0.095	0.417	-0.023	0.001	0.207	1		
Residential	0.345	0.183	0.367	0.704	0.174	0.404	-0.024	0.016	0.292	0.481	1	
Retail	0.092	-0.018	0.119	0.186	0.385	0.022	-0.003	0.005	0.537	0.016	0.053	1
Disadvantage	0.370	0.778	0.215	0.035	-0.175	0.029	-0.021	0.025	0.064	0.056	0.013	-0.067

Table 3: Results of Fixed Effects Regression of Crime on Investment

	Total Crime		Violent Crime		Property Crime	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
	Total Investment					
Intercept	63.245	7.087	11.890	1.911	51.355	6.300
Total Investment	-.024***	.007	-.003	.002	-.021***	.007
Disadvantage	.308	.544	.229	.147	.079	.483
2001	7.552***	2.151	1.791***	.580	5.761**	1.912
2002	9.931***	2.151	2.222***	.580	7.709***	1.912
2003	-.575	2.152	-.175	.580	-.399	1.905
2004	-4.762**	2.143	.411	.578	-5.174**	1.905
2005	-7.438***	2.141	-.531	.577	-6.907***	1.903
	By Major Use					
Intercept	64.103	6.614	11.906	1.86	52.197	6.013
Education	-.012	.037	-.000	.011	-.011	.034
Hospitality	-.025*	.012	-.003	.003	-.022*	.011
Industrial	.785	1.170	.229	.329	.555	1.064
Infrastructure	-.032	.045	-.008	.012	-.024	.040
Mixed-Use	-.063*	.033	-.008	.009	-.060*	.030
Office	.026*	.014	.010**	.004	.017	.013
Residential	-.091***	.019	-.018***	.005	-.073***	.018
Retail	.179	.188	-.004	.053	.183	.171
Disadvantage	.248	.505	.225	.142	.023	.459
2001	6.674***	2.00	1.64**	.564	5.033**	1.822
2002	9.165***	2.022	2.112***	.569	7.053***	1.838
2003	-.365	2.027	-.058	.570	-.307	1.843
2004	-4.076*	2.01	.645	.564	-4.721**	1.825
2005	-6.974***	1.976	-.443	.556	-6.531***	1.797
*p<.05, **p<.01, ***p<.001 (two tailed test)						

Table 4: Results of Fixed Effects Regression of Crime on Investment by Major Use and Construction Type²⁵

	Total Crime		Violent Crime		Property Crime	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
	New Construction					
Total Investment	-0.042***	0.009	-0.007**	0.002	-0.035***	0.008
Education	-0.024	0.038	-0.003	0.010	-0.021	0.034
Hospitality	-0.045***	0.012	-0.008**	0.003	-0.037***	0.011
Industrial	0.453	1.345	0.160	0.355	0.293	1.196
Infrastructure	N/A	N/A	N/A	N/A	N/A	N/A
Mixed-Use	-0.037	0.023	-0.008	0.006	-0.028	0.021
Office	0.022	0.014	0.006*	0.003	0.015	0.012
Residential	-0.111***	0.023	-0.022***	0.006	-0.089***	0.021
Retail	0.017	0.2	-0.014	0.053	0.032	0.177
	Renovation					
Total Investment	0.021	0.019	0.011**	0.005	0.010	0.017
Education	-0.043	0.141	0.000	0.037	-0.043	0.125
Hospitality	0.01	0.039	0.012	0.010	-0.003	0.034
Industrial	3.989	7.650	0.010	2.022	3.978	6.799
Infrastructure	N/A	N/A	N/A	N/A	N/A	N/A
Mixed-Use	-0.285***	0.065	-0.038*	0.018	-0.248	0.058
Office	0.207***	0.034	0.045***	0.009	0.162***	0.031
Residential	-0.043	0.038	-0.001	0.010	-0.042	0.034
Retail	-0.254	0.327	-0.079	0.086	-0.175	0.291
*p<.05, **p<.01, ***p<.001 (two tailed test)						

²⁵ All models include disadvantage and time effects.

Table 5: Results of Fixed Effects Regression of Crime on Investment by Major Use and Source of Financing²⁶

	Total Crime		Violent Crime		Property Crime	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
	Private					
Total Investment	-0.018*	0.01	-0.001	0.003	-0.0167*	0.009
Education	0.022	0.087	-0.004	0.023	0.026	0.077
Hospitality	0.021	0.047	0.021*	0.012	-0.001	0.042
Industrial	3.989	7.650	0.010	2.022	3.978	6.799
Infrastructure	-0.153	0.346	0.004	0.091	-0.157	0.307
Mixed-Use	-0.131***	0.042	-0.022*	0.011	-0.109**	0.038
Office	0.016	0.014	0.004	0.004	0.012	0.012
Residential	-0.107***	0.021	-0.017**	0.006	-0.09***	0.019
Retail	-0.012	0.185	-0.008	0.049	-0.004	0.164
	Public					
Total Investment	0.09**	0.032	0.021**	0.008	0.068**	0.029
Education	0.090	0.128	-0.004	0.034	0.095	0.113
Hospitality	0.067	0.512	0.0615	0.135	0.006	0.455
Industrial	N/A	N/A	N/A	N/A	N/A	N/A
Infrastructure	-0.036	0.055	0.001	0.015	-0.037	0.049
Mixed-Use	N/A	N/A	N/A	N/A	N/A	N/A
Office	0.197***	0.044	0.046***	0.012	0.151***	0.039
Residential	-0.056	0.162	-0.024	0.0423	-0.032	0.144
Retail	N/A	N/A	N/A	N/A	N/A	N/A
*p<.05, **p<.01, ***p<.001 (two tailed test)						

²⁶ All models include disadvantage and time effects.

Table 6: Results of Fixed Effects Regression of Investment on Crime by Type²⁷

	Total Investment		Education		Hospitality	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Total Crime	-0.001	0.007	-0.004	0.006	-0.010*	0.005
Violent	-0.026	0.039	-0.058*	0.033	-0.031	0.028
Property	-0.000	0.008	-0.003	0.007	-0.011	0.006
	Industrial		Infrastructure		Mixed-Use	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Total Crime	-0.000	0.001	0.000	0.004	-0.005	0.003
Violent	-0.002	0.004	0.006	0.02	-0.042**	0.018
Property	0.000	0.001	-0.000	0.004	-0.004	0.004
	Office		Residential		Retail	
	Coefficient	SE	Coefficient	SE	Coefficient	SE
Total Crime	0.006	0.005	-0.02**	0.007	-0.007*	0.002
Violent	0.041	0.026	-0.080**	0.038	-0.028**	0.013
Property	0.006	0.005	-0.021**	0.008	-0.007*	0.003
*p<.05, **p<.01, ***p<.001 (two tailed test)						

²⁷ All models include disadvantage and time effects.

Figure 1: Crime by Type, Washington, DC, 2002-2007

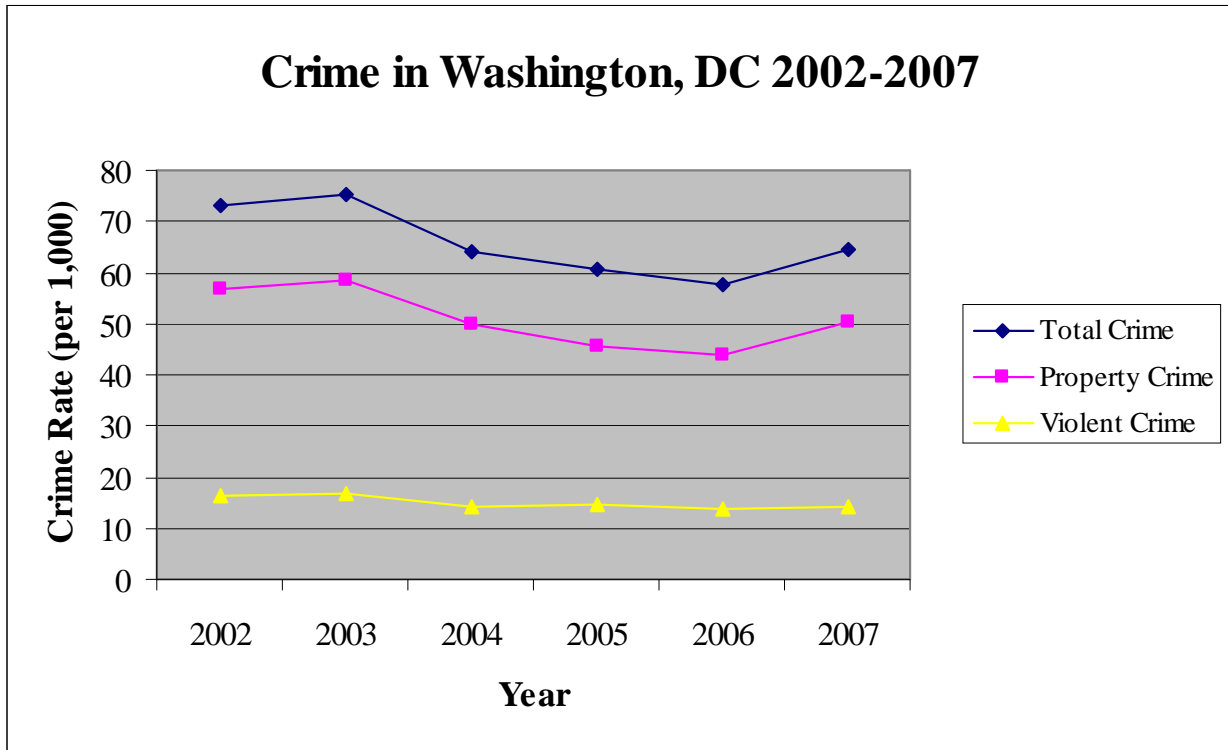


Figure 2: Investment by Major Use, Washington, DC, 2001-2006

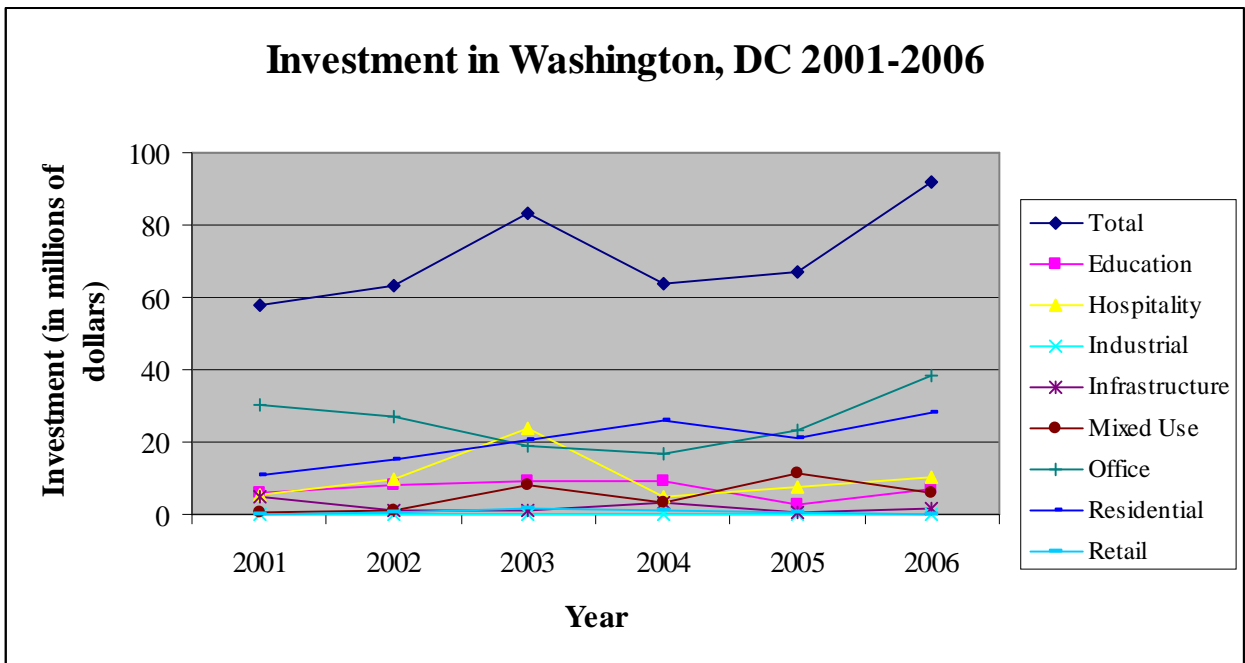


Figure 3: Scatterplot of Ordinary Least Squares Regression of Total Crime on Total Investment

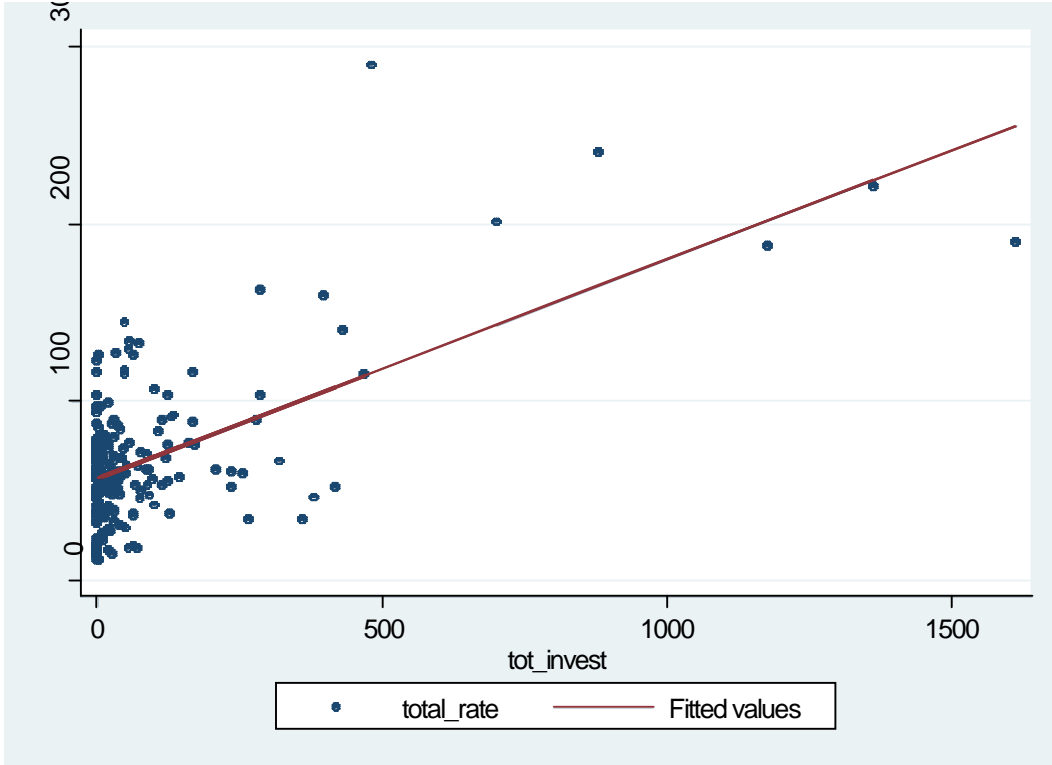


Figure 4: Scatterplot of Fixed Effects Regression of Total Crime on Total Investment

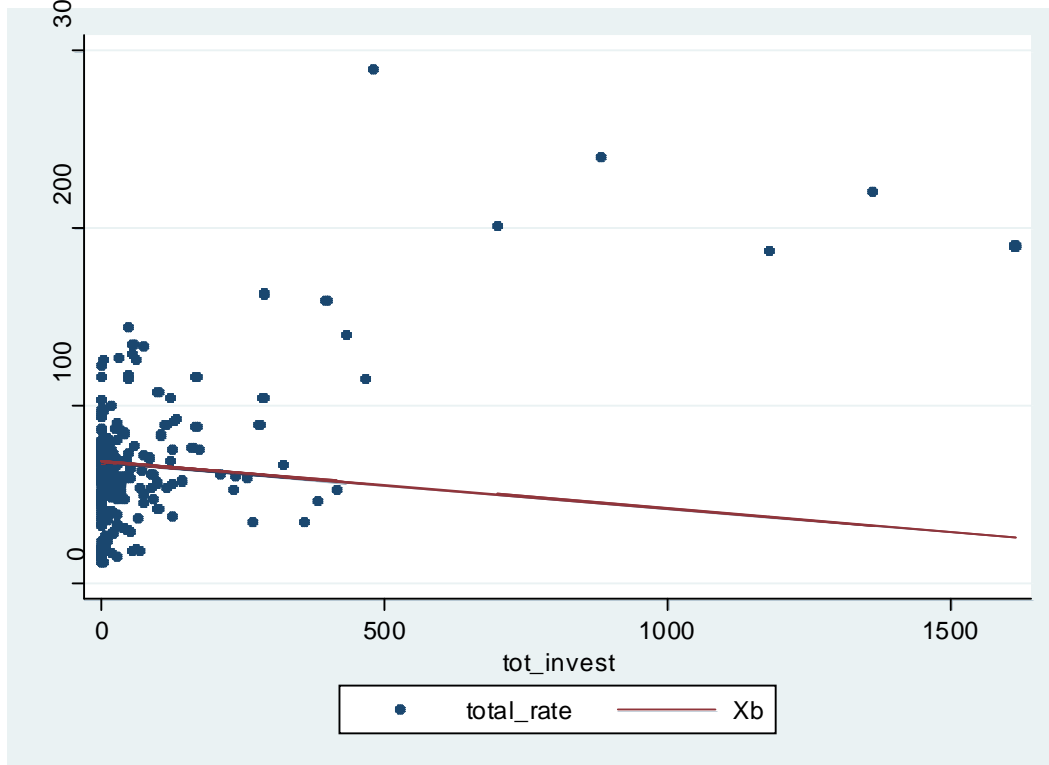


Figure 5: Histogram of Total Investment (without values of zero)

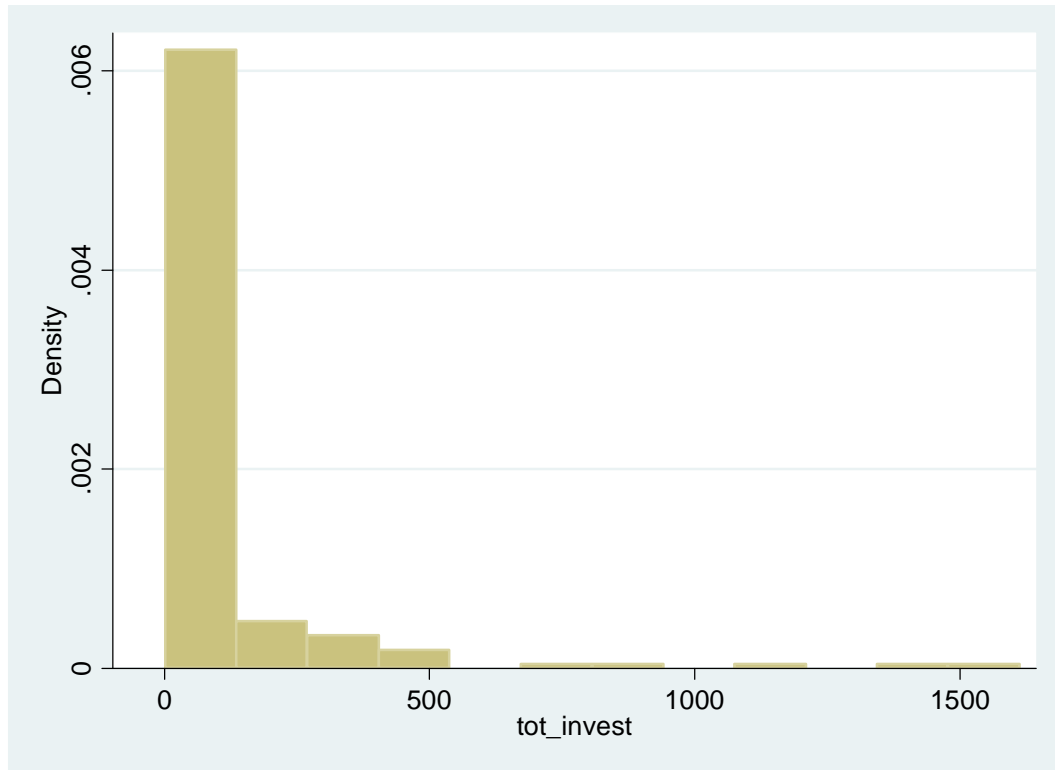
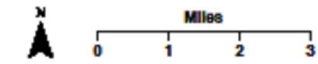


Figure 6: Washington, DC Neighborhood Clusters



District of Columbia Neighborhood Clusters



★ ★ ★ Government of the
District of Columbia
Anthony A. Williams, Mayor

Office of Planning ~ May 22, 2003

This map was created for planning
purposes from a variety of sources.
It is neither a survey nor a legal document.
Information provided by other agencies
should be verified with them where appropriate.

- Neighborhood Clusters
- Major Roads
- Water
- Parks

Table 7: Washington, DC Neighborhood Clusters

Cluster	Neighborhood Names
1	Kalorama Heights, Adams Morgan, Lanier Heights
2	Columbia Heights, Mt. Pleasant, Pleasant Plains, Park View
3	Howard University, Le Droit Park, Cardozo/Shaw
4	Georgetown, Burleith/Hillandale
5	West End, Foggy Bottom, GWU
6	Dupont Circle, Connecticut Avenue/K Street
7	Shaw, Logan Circle
8	Downtown, Chinatown, Penn Quarters, Mount Vernon Square, North Capitol Street
9	Southwest Employment Area, Southwest/Waterfront, Fort McNair, Buzzard Point
10	Hawthorne, Barnaby Woods, Chevy Chase
11	Friendship Heights, American University Park, Tenleytown
12	North Cleveland Park, Forest Hills, Van Ness
13	Spring Valley, Palisades, Wesley Heights, Foxhall Crescent, Foxhall Village, Georgetown Reservoir
14	Cathedral Heights, McLean Gardens, Glover Park
15	Cleveland Park, Woodley Park, Massachusetts Avenue Heights, Woodland-Normanstone Terrace
16	Colonial Village, Shepherd Park, North Portal Estates
17	Takoma, Brightwood, Manor Park
18	Brightwood Park, Crestwood, Petworth
19	Lamont Riggs, Queens Chapel, Fort Totten, Pleasant Hill
20	North Michigan Park, Michigan Park, University Heights
21	Edgewood, Bloomingdale, Truxton Circle, Eckington
22	Brookland, Brentwood, Langdon
23	Ivy City, Arboretum, Trinidad, Carver Langston
24	Woodridge, Fort Lincoln, Gateway
25	Union Station, Stanton Park, Kingman Park
26	Capitol Hill, Lincoln Park
27	Near Southeast, Navy Yard
28	Historic Anacostia
29	Eastland Gardens, Kenilworth
30	Mayfair, Hillbrook, Mahaning Heights
31	Deanwood, Burrville, Grant Park, Lincoln Heights, Fairmont Heights
32	River Terrace, Benning, Greenway, Dupont Park
33	Capitol View, Marshall Heights, Benning Heights
34	Twining, Fairlawn, Randle Highlands, Penn Branch, Fort Davis Park, Fort Dupont
35	Fairfax Village, Naylor Gardens, Hillcrest, Summit Park
36	Woodland/Fort Stanton, Garfield Heights, Knox Hill
37	Sheridan, Barry Farm, Buena Vista
38	Douglas, Shipley Terrace
39	Congress Heights, Bellevue, Washington Highlands

Bibliography

- Bowes, David R.
2007 A two-stage model of the simultaneous relationship between retail development and crime. *Economic Development Quarterly* 21(1):79-90.
- Blumstein, Alfred and Joel Wallman
2006 The crime drop and beyond. *Annual Review of Law and Social Science* 2:125-146.
- Bursik, Robert J.
1989 Political decision-making and ecological models of delinquency: Conflict and consensus. In *Theoretical Integration in the Study of Deviance and Crime*, eds. Steven F. Messner, Marvin D. Krohn, and Allen E. Liska. Albany: SUNY Press.
- Bursik, Robert J. and Jim Webb
1988 Community change and patterns of delinquency. *American Journal of Sociology* 88:24-42.
- Bursik, Robert J. and Harold G. Grasmick
1993 *Neighborhoods and Crime: The Dimensions of Effective Community Control*. New York: Lexington Books.
- Clarke, Ronald V.
1997 Introduction. In *Situational Crime Prevention: Successful Case Studies*, ed. Ronald V. Clarke. Guilderland, NY: Harrow and Heston Publishers.
- Clarke, Ronald V. and Herman Goldstein
2003 *Reducing thefts from constructions sites: A problem oriented project*. US Department of Justice: Office of Community Oriented Policing Services.
- Covington, Jeanette and Ralph B. Taylor
1989 Gentrification and crime: Robbery and larceny changes in appreciating Baltimore neighborhoods during the 1970s. *Urban Affairs Quarterly* 25: 142-172.
- Felson, Marcus and Lawrence E. Cohen
1980 Human ecology and crime: A routine activity approach. *Human Ecology* 8(4): 389-405
- Harcourt, Bernard E.

- 2005 Policing L.A.'s skid row: Crime and real estate development in downtown Los Angeles. University of Chicago School of Law Working Paper Series.
- Hipp, John R.
 2007 Block, tract, and levels of aggregation: Neighborhood structure and crime and disorder as a case in point. *American Sociological Review* 72:659-680.
- Hoyt, Lorlene M.
 2005 Do business improvement district organizations make a difference? Crime in and around commercial areas in Philadelphia. *Journal of Planning Education and Research* 25: 185-199.
- Hyra, Derek S.
 2008 *The New Urban Renewal*. Chicago: University of Chicago Press.
- Ihlanfeldt, Keith R.
 2003 Rail transit and neighborhood crime: The case of Atlanta, Georgia. *Southern Economic Journal* 70(2):273-294.
- Jacobs, Jane
 1961 *The Life and Death of Great American Cities*. New York: Random House.
- Kennedy, Maureen and Paul Leonard
 2001 *Dealing with neighborhood change: A primer on gentrification and policy choices*. The Brookings Institution. Retrieved November 11, 2008 from www.brook.edu/urban
- Killian, Erin
 2008 D.C. hot real estate market for foreign investors. *Washington Business Journal*. February 1, 2008. Retrieved from <http://washington.bizjournals.com/washington/stories/2008/01/28/daily47.html> August 1, 2009
- Kirk, David S.
 2006 Examining the divergence across self-report and official data sources on inferences about the adolescent life-course of crime. *Journal of Quantitative Criminology* 22:107-129.
- Kirk David S. and John H. Laub (Forthcoming)
 Neighborhood change and crime in the modern metropolis. In *Crime and Justice: A Review of Research*, vol. 39. Chicago: University of Chicago Press.

Levin and Lindesmith

1937 *English ecology and criminology of the past century*. Journal of Criminal Law and Criminology 6(2): 801-816

Macdonald, John, Ricky N. Bluthenthal, Daniela Golinelli, Aaron Kofner, Robert J. Stokes, Amber Sehgal, Terry Fain

2009 *Neighborhood effects on crime and youth violence: The role of business improvement districts in Los Angeles*. Technical Report. Santa Monica: Rand Corporation.

McCabe, Scott

2009 DC police stats show spike in violent crime during early 2008. *Washington Examiner*. April 1, 2009. Retrieved from <http://www.washingtonexaminer.com/local/DC-police-stats-show-spike-in-violent-crime-during-early-2008-42275492.html> October 1, 2009

McDonald, Scott

1986 Does gentrification affect crime rates? In *Communities and Crime*, eds. Albert J. Reiss, Jr. and Michael Tonry. Chicago: University of Chicago Press.

Metropolitan Police Department

2009 *Citywide Crime Statistics Annual Totals, 1993-2008*. Retrieved August 20th, 2009 from <http://mpdc.dc.gov/mpdc/site/default.asp>

Morenoff, Jeffrey D. and Robert J. Sampson

1997 Violent crime and the spatial dynamics of neighborhood transition, 1970-1990. *Social Forces* 76:31-64.

Mosher, Clayton James, Terance D. Miethe, and Dretha M. Phillips

2002 *The Mismeasure of Crime*. Newbury Park: Sage Publications.

Park, Hun Myoung

2008 *Linear Regression Models for Panel Data Using SAS, Stata, LIMDEP, and SPSS*. Technical Working Paper. The University Information Technology Services (UITS) Center for Statistical and Mathematical Computing, Indiana University.

Pindyck, Robert S. and Daniel L. Rubinfeld

1998 *Econometric Models and Economic Forecasts*. Boston: McGraw-Hill.

Reiss, Albert J.

1986 Why are communities important in understanding crime? In *Communities and Crime*, eds. Albert J. Reiss, Jr. and Michael Tonry. Chicago: University of Chicago Press.

- Sampson, Robert J.
 1987 Urban black violence: The effect of male joblessness and family disruption. *American Journal of Sociology* 93(2):348-382.
- Sampson, Robert J.
 2006 Collective efficacy theory: Lessons learned and directions for future inquiry. In *Taking Stock: The Status of Criminological Theory*, eds. Francis T. Cullen, John Paul Wright, and Kristie R. Blevins. Transaction Publishers.
- Sampson, Robert J. and W. Byron Groves.
 1989 Community structure and crime: Testing social disorganization theory. *American Journal of Sociology* 94:7740-802.
- Sampson, Robert J. and Janet L. Lauritsen
 1994 Violent victimization and offending: Individual-, situational-, and community-level risk factors. Pp. 1-114 in *Understanding and Preventing Violence: Social Influences (Volume 3)*, edited by Albert J. Reiss Jr. and Jeffrey Roth. (National Research Council.) Washington, D.C.: National Academy Press.
- Sampson, Robert J. and Stephen W. Raudenbush
 2004 Seeing disorder: Neighborhood stigma and the social construction of “broken windows.” *Social Psychology Quarterly* 67:319-342.
- Sampson, Robert J. and Stephen W. Raudenbush
 1999 Systematic social observation of public spaces: A new look at disorder in urban neighborhoods. *American Journal of Sociology* 105:603-651.
- Sampson, Robert J., Stephen W. Raudenbush, and Felton Earls
 1997 Neighborhoods and violent crime: A multi-level study of collective efficacy. *Science* 277:918-924.
- Sampson, Robert J. and William Julius Wilson
 1987 Toward a theory of race, crime, and urban inequality. In *Crime and Community*, eds. John Hagan and Ruth Peterson. Stanford, CA: Stanford University Press.
- Sayrs, Lois W.
 1989 *Pooled Time Series Analysis*. Newbury Park: Sage Publications.
- Schuerman, Leo and Solomon Kobrin
 1986 Community careers in crime. In *Communities and Crime*, eds. Albert J. Reiss, Jr. and Michael Tonry. Chicago: University of Chicago Press.

- Shaw, Clifford R. and Henry D. McKay
 1942 *Juvenile Delinquency and Urban Areas*. Chicago: University of Chicago Press.
- Sherman, Lawrence W.
 1995 Hot spots of crime and criminal careers of places. In *Crime and Place*, eds. John E. Eck and David Weisburd. Monse, NY: Criminal Justice Press.
- Sherman, Lawrence W., Patrick R. Gartin, and Michael E. Buerger
 1989 Hot spots of predatory crime: Routine activities and the criminology of place. *Criminology* 27: 27-55.
- Skogan, Wesley
 1986 Fear of crime and neighborhood change. In *Communities and Crime*, eds. Albert J. Reiss, Jr. and Michael Tonry. Chicago: University of Chicago Press.
- Squires, Gregory D. and Charis E. Kubrin
 2005 Privileged places: Race, uneven development and the geography of opportunity in urban America. *Urban Studies* 42(1):47-68.
- Stark, Rodney
 1987 Deviant places: A theory of the ecology of crime. *Criminology* 25(4):893-909
- Stimson, James A.
 1985 Regression in space and time: A statistical essay. *American Journal of Political Science* 29:914-947.
- Suresh, Geetha and Gennaro F. Vito
 2007 The tragedy of public housing: Spatial analysis of hotspots of aggravated assaults in Louisville, KY (1989-1998) *American Journal of Criminal Justice* 32:99-115.
- Taylor, Ralph B. and Jeanette Covington
 1988 Neighborhood changes in ecology and violence. *Criminology* 26:553-589.
- Urban Institute
 2008 *State of Washington, DC's Neighborhoods*. Retrieved February 20th, 2009 from <http://www.neighborhoodinfodc.org>
- United States Bureau of Labor Statistics
 2009 *Local Area Unemployment Statistics: Washington, DC*. Retrieved August 20th, 2009 from <http://www.bls.gov/data/>

United States Census

2001 *2000 Census, Summary File 1 and Summary File 3: Washington, DC.*
Retrieved August 20th, 2009 from <http://factfinder.census.gov>

United States Census

2009 *2006-2008 American Community Survey: Washington, DC.* Retrieved
August 20th, 2009 from <http://factfinder.census.gov>

Washington, DC Economic Partnership

2008 *DC Development Report.* Washington, DC Economic Partnership.
Retrieved from January 25th, 2009 from <http://www.wdcep.org>

Weisburd, David, Shawn Bushway, Cynthia Lum, and Sue-Ming Yang

2004 Trajectories of crime at places: A longitudinal study of street segments
in the city of Seattle. *Criminology* 42: 283-321.

Wilson, William Julius

1987 *The Truly Disadvantaged: The Inner City, the Underclass, and Public
Policy.* Chicago: University of Chicago Press.

Wilson, James Q. and George L. Kelling

1982 Broken windows: The police and neighborhood safety. *Atlantic
Monthly* 249:29-38.