

Mortgage Foreclosures and the Shifting Context of Crime in Micro-Neighborhoods

Johanna Lacoë*

Lacoë@price.usc.edu

Sol Price School of Public Policy, University of Southern California
Lusk Center for Real Estate, University of Southern California

Ingrid Gould Ellen

Ingrid.Ellen@nyu.edu

Robert F. Wagner Graduate School of Public Service, New York University
Furman Center for Real Estate and Urban Policy, New York University

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Objectives. The main objectives of the study are to estimate the impact of mortgage foreclosures on the location of criminal activity within a blockface. Drawing on routine activities theory and social disorganization theory, the study explores potential mechanisms that link foreclosures to crime.

Methods. To estimate the causal relationship between foreclosures and localized crime, we use detailed foreclosure and crime data at the blockface level in Chicago and a difference-in-difference estimation strategy.

Results. Overall, mortgage foreclosures increase crime on blockfaces. Foreclosures have a larger impact on crime that occurs inside residences than on crime in the street. The impact of foreclosures on crime location varies by crime type (violent, property, and public order crime).

Conclusions. The evidence supports the two main mechanisms that link foreclosure activity to local crime. The investigation of the relationship by crime location suggests that foreclosures change the relative attractiveness of indoor and outdoor locations for crime commission on the blockface, and the increase in reported disorder due to foreclosures provides suggestive evidence that foreclosures lead to weakened social controls among neighbors.

*Corresponding author

INTRODUCTION

In the wake of the housing crisis there is growing concern that increased mortgage foreclosures may lead to physical deterioration of buildings and increased vacancy rates in neighborhoods, undermining neighborhood social controls, and causing increases in local crime. While some recent research suggests that increased mortgage foreclosures in micro-neighborhoods¹ cause modest increases in crime (Ellen, Laco, and Sharygin, 2013; Cui, 2010), this paper considers whether foreclosures lead to increased crime on a block, as well as the mechanisms through which foreclosures affect neighborhood crime. To shed light on mechanisms, we investigate whether and how foreclosures shift the location and type of criminal activity by changing the relative attractiveness to potential offenders of one location versus another. For instance, the presence of a vacant, foreclosed building may make it more likely that a drug dealer will sell drugs in a building rather than on the street. As a result, crime occurring inside residences (and in vacant buildings in particular) and on the street may increase by different magnitudes. In addition, we consider whether foreclosures affect resident reports of disorder. Using richly detailed foreclosure, 311, and crime data geo-coded to the blockface (a street segment in-between the two closest cross-streets), we estimate the impact of foreclosures on the location of crime within blockfaces.

This research focuses on Chicago, Illinois. Like many areas of the country, housing prices in Chicago reached a peak in 2006, and declined through 2011.² In September 2011, 8.7 percent of the mortgages in the Chicago metropolitan area were in foreclosure, giving Chicago the 11th

¹ The term “micro-neighborhood” is used to describe units of geography below the Census tract level, the area generally used as a proxy for a neighborhood. In this paper, we use the blockface – a street segment in-between the two closest cross-streets – as a measure of the “micro-neighborhood.”

² Source: FHFA Quarterly Housing Price Index.

highest foreclosure rate among the 100 largest metropolitan areas in the country.³ Recent media reports claim that foreclosed and abandoned buildings in Chicago attract criminal activity including gang activity, drug use, and burglaries, in addition to graffiti, and theft of copper pipes and radiators (Knight and O’Shea, 2011). This study takes an empirical look at how foreclosures have changed patterns of crime in Chicago.

BACKGROUND: THEORY AND LITERATURE REVIEW

Existing Evidence

A growing literature has identified a relationship between mortgage foreclosure and crime at the neighborhood level (Baumer, Wolff, and Arnio, 2012; Ellen, Laco, and Sharygin, 2013; Goodstein and Li, 2009; Katz, Wallace, and Hedberg, 2013; Teasdale, Clark, and Hinkle, 2012; Immergluck and Smith, 2006; Stucky, Ottensmann, and Payton, 2012). Actually proving a causal link between foreclosures and neighborhood crime is more challenging. A few papers have used longitudinal data to try to identify a causal relationship. Two recent studies in Chicago come to different conclusions about the relationship between foreclosures and crime. Kirk and Hyra (2012) find no impact of foreclosures occurring between 2002 and 2009 on crime. Williams, Galster, and Vernon (2013) find a short-term impact of foreclosures on property crime, but no effect on violent crime. In both these studies, the use of large units of geography – community areas which comprise approximately 10 Census tracts each – may mask significant micro-neighborhood level impacts.

A few studies use smaller levels of geography. Stucky et al. (2012) investigate the relationship by splitting Indianapolis, IN up into a grid of cells, and using a geographic unit of

³ Source: Analysis of LPS Applied Analytics data by Local Support Initiatives Corporation (LISC). Percent of all mortgages in the foreclosure inventory in September 2011. Mortgages in the foreclosure inventory include those in foreclosure and bankruptcy foreclosures prior to auction or trustee sale.

analysis created out of 1000 foot squares of cells, and annual measures of crime and foreclosure. They find that properties that are bank-owned or owned by HUD appear to increase some crime types (rape, assault, and burglary), but not others. However the grid squares do not necessarily reflect actual neighborhoods and the use of annual data implicitly assumes that foreclosures that have gone to auction have a one-year impact, and fails to account for the length of the foreclosure process or the timing of the relationship between foreclosures and crime. Further, while the authors use a negative binomial fixed effects estimator, they only account for time-invariant characteristics of the grid squares and are unable to account for time-varying trends in the surrounding neighborhood that likely affect both foreclosures and crime. Focusing on Glendale, AZ, Katz et al. (2013) consider how monthly measures of the number of properties that become REO affect crime at the census block level from 2003 to 2008. The authors find short-term effects for all types of crime following REO, but are not able to investigate the effects on crime during the foreclosure process (between the notice of foreclosure and auction sale), therefore they might understate the relationship between foreclosures and crime. Finally, Ellen, Lacoé and Sharygin (2013) analyze blockfaces and find evidence that an increase in foreclosure notices on a blockface leads to additional crimes in New York City.

While these studies collectively show that foreclosures can invite crime, they provide little insight into possible mechanisms. For one, the research on foreclosures and crime to date has not distinguished (either theoretically or empirically) between crimes that occur inside homes versus those that take place outside. Indeed, the distinction between crimes that occur inside homes versus on the street has only been made by a limited number of researchers. In their seminal work on routine activity theory, Cohen and Felson (1979) find differences between victimization at home, on the street, and elsewhere when calculating risk rates of victimization

based on the number of hours spent in those locations. Research on spatial displacement investigates whether police interventions lower crime or just push it to nearby streets, but do not specify whether these interventions displace crime indoors (Weisburd, Wycoff, Ready, Eck, Hinkle, and Gajewski, 2006). In a study of violence among women in indoor and outdoor prostitution venues in Chicago, Raphael and Shapiro (2004) find different types of crime victimization by indoor and outdoor location. Still, as Eck and Weisburd (1995) point out, “Most studies can’t distinguish between offenses at a facility and those on the surrounding block,” nor can they determine whether crime was committed inside a residence, or on the street.

Theory & Mechanisms

The two most prominent theories of criminal behavior that seek to explain where and when crime occurs are routine activity theory and social disorganization theory. Routine activity theory suggests that crime occurs when three factors come together at a particular time and place: likely offenders, suitable targets, and the absence of capable guardians (Cohen and Felson, 1979). The theory asserts that physical characteristics of buildings, streets, and neighborhoods, paired with the patterns of use of these places, affect whether and where crime will occur. A body of research addresses how the built environment, including non-residential uses such as schools, businesses, and parks, affect disorder and crime in neighborhoods (Bernasco and Block, 2009; Booth, 1981; Eck and Weisburd, 1995; Kurtz, Koons and Taylor, 1998; McCord, Ratcliffe, Garcia and Taylor, 2007; Stucky and Ottensmann, 2009; Wilcox, Quisenberry, Cabrera and Jones, 2004). Although not specifically situated within the routine activity literature, empirical evidence on how land use affects crime provides additional insight into how the design and use of physical space contributes to the presence of likely offenders and suitable targets (i.e.

commercial business areas with access to public transit have higher daytime foot traffic, increasing the pool of potential victims and offenders).

While routine activity theory focuses on how the physical environment shapes social interactions, the related social disorganization theory emphasizes how neighborhood social and demographic characteristics, in particular, residential instability, low socioeconomic status, and ethnic heterogeneity, challenge the ability of neighborhood residents to organize themselves successfully against disorder, contributing to higher crime rates (Shaw and McKay, 1969 [1942]). Several related concepts have been developed and applied to further test how neighborhood factors affect crime, including informal social control, social interaction/social ties, and collective efficacy (summarized by Sampson, Morenoff and Gannon-Rowley, 2002). Further, several studies identify a reciprocal effect of social control and disorder, in which neighborhoods lacking strong cohesion and informal social control experience greater disorder, which causes residents to move, further degrading the ability of the remaining community to protect against crime (Dugan, 1999; Steenbeek and Hipp, 2011; Xie and McDowall, 2008).

Mortgage foreclosures have the potential to change both the physical space and the social composition of the neighborhood, as suggested by routine activities theory and social disorganization theory. A foreclosed property may increase crime by providing a new target for crime. The property, particularly if left vacant, may be a primary target for the theft of copper piping and vandalism or a haven for other types of crimes that might otherwise occur on the street, such as prostitution or drug use. In this way, crime may be displaced from the street or other locations inside foreclosed buildings. Foreclosures can also increase vacancy rates as lenders take over properties from delinquent borrowers. These changes may make the foreclosed building or the street itself a more “suitable” target for crime and may also send a signal to

offenders that residents are not closely monitoring their communities (i.e., there is a lack of capable guardians). Therefore, an increase in crime occurring inside buildings following a foreclosure may be evidence that foreclosed or vacant buildings are more suitable targets for crime. In this paper, we use the location of crime and timing of the foreclosure process to gain insight into this potential mechanism.

Foreclosures may also increase crime by weakening social control among neighborhood residents, decreasing the community's ability to defend against crime. When residents move because of a foreclosure and when homes sit vacant for extended periods, the number of capable guardians on the street is reduced. In addition, when owners know they are likely to lose their home, they may become less invested in the community and less engaged in social activities. Similarly, heightened turnover in a neighborhood may reduce social cohesion. Unmaintained lawns, broken windows, and other signs of disrepair and disorder can signal to offenders that the likelihood of getting caught committing a crime in the neighborhood is lower on this block, compared to nearby blocks. This externality effect of foreclosure can extend beyond the foreclosed building itself and increase crime along the entire blockface. To test this potential mechanism, we investigate the relationship between foreclosures and resident complaints about physical disorder in the neighborhood using data on 311 calls. An increase in resident complaints following a foreclosure on a blockface may be a signal of weakening social control in the neighborhood. In this paper we overcome some of the limitations of previous studies to investigate how foreclosure activity affects the location and type of criminal activity in micro-neighborhoods in Chicago, and to investigate potential mechanisms that underlie this relationship.

RESEARCH DESIGN

This paper addresses two central research questions. First, do foreclosures cause changes in micro-neighborhood crime in Chicago? Second, through which mechanisms do foreclosures affect crime? At very small levels of geography, it can be a challenge to control for characteristics of the area that may contribute to foreclosure activity and crime. Adapting the model presented in Ellen, Lacoë, and Sharygin (2013), we use fine spatial and temporal fixed effects to control for micro-neighborhood characteristics and localized time trends that may confound the relationship between foreclosures and crime on the blockface. Intuitively, the approach compares changes in crime levels on a blockface that experiences an increase in foreclosure activity, to changes in crime levels on surrounding blockfaces in the same Census tract that did not experience the same jump in foreclosure activity. Specifically, we estimate the following baseline model:

$$y_{bnt} = \alpha + \beta_1 X_{bnt} + T_{nt} + B_b + \varepsilon_{bnt},$$

where y_{bnt} is the level of crime (by crime type) on the blockface, b , within neighborhood, n , in a given quarter, t .⁴ The variable of interest is X_{bnt} , the number of foreclosures starts on the blockface in past four quarters. Blockface fixed effects, B_b , control for time invariant characteristics of blockfaces. In addition, we control for quarterly time trends at the level of the neighborhood to control for neighborhood-level factors that are changing over time, which might affect both foreclosures and crime (such as changes in employment, population change, or population demographics). Separate models are estimated by crime type (total, violent, property,

⁴ We do not have population or housing unit counts at the blockface level that vary over time, therefore we use crime levels, not rates. We use a quarterly model of the impact of foreclosure starts on crime, instead of an annual model, which is most common in the literature. A quarterly model allows us to observe more closely the timing of the foreclosure notice and changes in crimes that occur during the foreclosure process (a process which takes an average of one year to complete in Chicago). Measuring crime at a small unit of geography requires the use of a large enough time period to observe variation in crime within a geographic unit, however using a measure of time smaller than the quarter would result in many blockface observations with zero crimes.

and public order). Standard errors are clustered at the Census tract level. While the main reported results are from ordinary least squares (OLS) regressions, the findings are robust to estimation with a negative binomial estimator.⁵

As detailed below in the Data and Measures section, we categorize crimes by type using the Uniform Crime Report definitions for major Part I violent and property crimes. Although the crimes categorized as “violent” include a range of different offenses – homicide, robbery, rape, and assault – we are unable to look at these crimes separately because of the relative infrequency with which they occur at the blockface level. We recognize that isolating effects for specific crime types below the UCR categorizations could provide additional insight into the relationship between foreclosures and crime, but we believe that the greater contribution of the analysis is explaining how these dynamics work at very localized levels of geography where we can most confidently control for time-invariant characteristics of the blockface and other potential confounding factors in the surrounding neighborhood.

The findings of this study can help to identify which mechanisms are at play in the relationship between foreclosures and crime within neighborhoods. We estimate models of the impact of foreclosure on crime by crime location (street, residence, abandoned/vacant building, and other locations) using location codes provided by the police department in order to investigate whether the location of crime provides evidence of shifting crime targets on the blockface. Then, we use a measure of 311 calls to the city to estimate models of the impact of

⁵ Negative binomial results are discussed in the Results section. The most controlled OLS models include both blockface fixed effects and tract*year*quarter fixed effects, which we believe provide the strongest controls for other factors that may influence crime and foreclosure patterns at the blockface level. We are not able to estimate negative binomial models with two high dimensional fixed effects; therefore we present the OLS results in the main body of the paper.

foreclosures on residential reports of disorder and test whether foreclosures increase perceived physical disorder on blockfaces which may precede increases in crime.

DATA AND MEASURES

The analysis investigates the heterogeneity of the impact of foreclosures on neighborhood crime using multiple measures of crime. The crime data come from the Chicago Police Department and include geographic coordinates, date and time, crime descriptions, and information about the location in which the offense occurred. Records from 2007 through 2011 are used to construct quarterly counts of total, violent, property, and public order crime at the level of the blockface. Violent and property crime counts are defined using the Uniform Crime Report categories.⁶ Foreclosure activity may also affect less serious criminal behavior, such as graffiti, drug use and sales, and prostitution. These lower level offenses are grouped into a “public order” category that includes criminal damage, narcotics, criminal trespass, prostitution, weapons violations, and liquor law violations.⁷ While total crime declined in Chicago between 2007 and 2011, the rate of decline was steeper for public order crime (27.9 percent decrease) than for property or violent crime (6.8 percent and 17.4 percent decreases, respectively)

The Chicago crime data also include the location of each crime, e.g., on a sidewalk or in a store. The specific location of a crime – whether it is indoors or outdoors – may have different implications for the neighborhood and for policing strategy. Further, foreclosures may directly affect crime in abandoned or vacant buildings, if foreclosures increase the number of vacancies on a blockface. We estimate the impact of foreclosures on crimes that occur in four mutually exclusive locations: in the street or on a sidewalk, inside residences, inside vacant or abandoned

⁶ Violent crimes: homicide/murder, felony assault, robbery, and criminal sexual assault. Property crimes: Burglary, theft, motor vehicle theft, and arson.

⁷ Public order crimes include: simple assault, battery, criminal damage, criminal trespass, liquor law violation, narcotics, obscenity, offense involving children, prostitution, public peace violation, sex offense, weapons violation.

buildings, and in all other locations.⁸ Figure 1 shows that the distribution of crime locations varies by crime type. For instance, the majority of violent crimes occur on the street.

[Figure 1 here]

The foreclosure data include all notices of foreclosure filed between 2000 and 2012 in Chicago from Record Information Services. Similar to the nationwide trend, the peak in foreclosure filings in Chicago occurred between 2007 and 2008. Illinois is a judicial foreclosure state, and according to court procedure the foreclosure process takes approximately 9 months from filing to eviction, unless the borrower protests the foreclosure in court, extending the process. For properties entering foreclosure in Chicago between 2007 and 2011, the average time to reach the conclusion of the process, be it a short sale, sale at auction to a third party, or bank-ownership (REO), was just over one year (376 days).⁹ Based on the average length of the foreclosure process in this sample of foreclosures, the primary independent variable used in this analysis is the number of foreclosure starts in the past four quarters. This measure captures the stock of properties in the foreclosure process in a given quarter.

⁸ Street crimes include those occurring in the following locations: street, sidewalk, parking lot/garage (non-residential), alley, park property, CHA parking lot/ground, residential yard, residential driveway, vacant lot/land, cemetery, porch, yard, parking lot, vacant lot, CHA parking lot, driveway, school yard. Crimes inside residences include those occurring in the following locations: apartment, basement, residence, residence porch/hallway, or residence garage. "Other locations" where crimes take place include "other" (3.6% of total crimes), parking lot/garage(non-residential) (2.8% of total crimes), school public building (2.2% of total crimes). The following places represent less than 2% of the total each, including: vehicle non-commercial, small retail store, restaurant, department store, grocery food store, gas station, CTA platform/ train, commercial/business office, CHA parking lot/apartment/property, bar /tavern, public school grounds, bank, drug store, hospital, construction site, place of worship, hotel/motel, government building, convenience store, private school, nursing home, etc.

⁹ A large, but declining, share of foreclosure notices in Chicago ultimately go to auction: 61 percent of foreclosures initiated in 2007 went to auction, as compared to 46 percent of those initiated in 2009, and only 15 percent of those initiated in 2011. The share of foreclosures that go to auction in 2011 may be an underestimate, because our foreclosure outcome data only go through the first quarter of 2012. However, in Chicago most foreclosures are resolved within one year therefore the number of foreclosure observations that are truncated in our data should be relatively small.

The measure of resident reports of disorder are from 311 calls made to the City of Chicago about graffiti, street light outages, pot holes, tree debris, garbage maintenance, rodents, vacant buildings, and abandoned vehicles. The majority of the 311 data is available beginning in January 1, 2011. We construct a measure of resident reported disorder by aggregating the total number of calls by blockface and quarter.

Geographic Unit of Analysis

Despite the fact that Chicago had the fourth highest violent crime rate among the nation's 20 largest cities in 2011, crime declined between 2007 and 2011, the period of heightened foreclosure activity.¹⁰ Yet upon closer inspection, the citywide crime rate masks considerable variation in the crime decline at lower levels of geography. Table 1 summarizes the crime decline at varying levels of geography using the same data source, and shows wide variation in the magnitude and direction of the change in crime depending on the level of geography employed. Police districts, which are large (23 total in the city), all experienced a decrease in crime between 2007 and 2011, with the decrease ranging from 14 percent to 25 percent. However, at the Census tract level (865 tracts in the city), the largest decrease was a 98 percent decrease in crime, while other tracts experienced *increases* in crime as large as 130 percent.

[Table 1 here]

At the blockface level (118,276 blockfaces in the city), the smallest level of geography investigated here, we see even more variation. A full 20 percent of blockfaces experienced increases in crime, 31 percent experienced decreases in crime, and 49 percent experienced no

¹⁰ The UCR Violent Crime Rate per 100,000 in 2011 for Chicago was 991 (omitting sexual assault), compared to other cities in which sexual assaults/rapes are included.

change at all. The substantial sub-city variation in the crime decline begs the question – has the housing crisis played a role in changing crime patterns within these micro-neighborhoods?

Many past researchers have emphasized the empirical and theoretical significance of the choice of geographic unit of analysis (Braga et al., 2011; Kirk and Laub, 2010). The existing studies of foreclosures and crime rely on a range of units of analysis. Most authors make assumptions in their adoption of a particular geographic unit – for instance, that a county experiences uniform change in unemployment, foreclosures, and crime across neighborhoods, that a Census tract accurately reflects a neighborhood boundary, or that a foreclosure affects all properties equally within a ring of arbitrary distance – that may not align with the theoretical mechanisms at play. Spatial heterogeneity within geographic units like Census tracts may mask significant findings on the micro-level, leading researchers to promote the use of smaller geographies, such as the blockface (Smith et al., 2000; Spellman, 1993; Taylor, 1997). Specifically, recent research has identified significant variation in crime across street blocks in Seattle (Groff, Weisburd and Yang, 2010).

In this study the spatial unit of analysis is the blockface, a street segment in between the two closest cross streets. The blockface-level dataset was created by first generating a reference map of blockfaces for the city of Chicago and then geo-coding each foreclosed property and crime to a blockface.¹¹ The crime and foreclosure counts are aggregated to the blockface by quarter. On average, there were 0.86 crimes on a blockface in a given quarter in Chicago, ranging from an average of nearly 1 in 2007, to 0.76 in 2011, and the average number of foreclosure starts in the

¹¹ To geo-code intersection crimes we draw 40 foot buffers around each intersection, and assign crimes that fall within those buffers to each blockface that touches the intersection.

previous four quarters is 0.13 foreclosures (Table 2). Consistent with most existing research, Census tracts are used to proxy for the larger neighborhood surrounding a blockface.

[Table 2 here]

Figure 2 presents the mean number of crimes in a blockface-quarter for blockfaces with different levels of foreclosure activity. For all crime types, blockfaces with more foreclosure activity experience higher average crime. This pattern holds for crimes that occur on the street, inside residences, in vacant buildings, and in other locations (Figure 3). Even though street crimes make up a larger share of total crimes, on blockfaces with the most foreclosure activity (3+ foreclosures in a quarter) crime inside buildings appears to be just as prevalent as crime outside on the street. In addition, the average number of 311 complaints increases with the number of foreclosures on the blockface (Table 3).

[Figures 2 & 3 here]

[Table 3]

Reporting

A major consideration in crime research is the quality and reliability of crime data. The data used in these analyses are crimes reported to the Chicago Police Department. Crimes that are not reported to the police, therefore, are not reflected in the data. Patterns of crime reporting are known to differ by crime type, with better reporting of crimes that have clear victims (i.e. homicides) or incentives for reporting (i.e. motor vehicle theft for insurance purposes), and less reliable reporting for lower-level crimes that may go unobserved (such as drug crimes or prostitution). Patterns of crime reporting may also differ by crime location – crimes occurring

inside residences may be less likely to be reported to police than crimes that occur on the street. Crimes that occur inside vacant or abandoned buildings may be the least likely to be reported to police. While there is little that can be done empirically to adjust for the reliability of the crime data, we can make some assumptions about how much crime reporting varies *within* a blockface over time. If blockfaces that experience foreclosure actually experience a concurrent decrease in crime reports (because of residential turnover), any increases in crime found here are likely underestimates of the full effect of foreclosure on crime. Further, we control for quarterly time effects at the neighborhood level to capture reporting issues within precincts. A fuller discussion of reporting issues is found in the Discussion section.

RESULTS

Overall, we find that foreclosures increase crime on blockfaces in Chicago. The first set of results in Table 4 present coefficients from the baseline model.¹² The coefficients on the foreclosure starts measure are positive and significant, and robust to the addition of blockface fixed effects and controls for precinct and neighborhood time trends. The first specification presents the raw relationship between foreclosure starts and total crime. The model is strengthened by the addition of quarter fixed effects to control for citywide time changes in the housing market and in crime patterns (column 2), blockface fixed effects to control for time-invariant characteristics of the blockface (column 3), and precinct-level quarterly time effects to capture changes in policing policy or issues with data reporting at the precinct level (column 4). The preferred specification in column 5 includes both blockface fixed effects and neighborhood*quarter fixed effects which control for quarterly crime variation within census tracts. In this model, an additional foreclosure start on a blockface in the past year is associated

¹² The foreclosure start measure is cumulative over the past year, because that was the average time to resolution for the foreclosure starts between 2007 and 2011.

with 0.028 additional crimes in that quarter. This represents a 3.2 percent increase from the mean number of crimes per blockface-quarter of 0.86.¹³

[Table 4 here]

Consistent with previous research in New York City (Ellen, Lacoë, and Sharygin, 2013), foreclosures in Chicago appear to increase violent and public order crime on the blockface, but to have little effect on property crime. Table 5 shows results by crime type using the blockface fixed effects specification that controls for neighborhood time trends. An additional foreclosure start increases violent crime by 0.01 crimes, representing a 14.1 percent increase in blockface violent crime (column 2), and increases public order crime by 0.019 crimes, a 4.6 percent increase in public order crime (column 4). The effects of foreclosures on total, violent, and public order crime appear to be concentrated on blockfaces with multiple foreclosures (Table 6). Blockfaces with three or more foreclosure starts in the past year experience average increases in violent and public order crime of greater than 6 percent from the blockface mean.

[Tables 5 & 6 here]

Foreclosures may not only affect overall levels of crime but they may influence where crimes occur. For instance, if a property going through foreclosure becomes a more attractive or suitable target for crime, we might expect to see more crimes occur inside buildings on blockfaces with foreclosures. Table 7 provides estimates of the relative impact of foreclosures on crime on the street, inside a residence, in vacant buildings, or in another location, controlling for total crime as

¹³ Effect sizes are calculated as the share of the population mean of the dependent variable represented by the coefficient. For example, the estimate of 0.028 is 3.2% of the mean number of crimes per blockface-quarter of 0.86.

an independent variable.¹⁴ On average, there is a small significant increase in crime inside residences following a foreclosure, and a small decrease in crime in “other locations.” Crime in vacant buildings increases most in percentage terms (15.6%) following a foreclosure filing, although the coefficient falls just below significance (perhaps not surprising given that crimes in vacant buildings are much rarer than crimes in the other locations). In sum, foreclosure activity appears to have a positive impact on crime inside residences that is not entirely offset by decreases in crimes in other locations on the blockface. Foreclosure activity on a blockface alters the opportunities to commit crime inside versus outside, changing the potential risk-benefit calculation associated with criminal behavior. These results are robust to estimation with a negative binomial estimator (Table 8). The negative binomial results are highly significant and larger in magnitude, in part because they include blockface and quarter fixed effects (not tract-level quarter effects, which are difficult to estimate with a negative binomial specification).¹⁵

[Tables 7 & 8 here]

Analysis of the impact of foreclosures by both crime type *and* crime location uncovers additional variation. Three main findings emerge from the models presented in Table 9, which include controls for total blockface crime. First, the primary increases in crime occur inside residences. The coefficient on foreclosure starts is positive in the regression of violent crime indoors, suggesting an 8.4 percent increase from the blockface mean, although the estimate does not quite reach statistical significance (t-statistic of 1.88). The coefficients on foreclosure starts are also positive and significant in the regressions of property crime and public order crime

¹⁴ Measures of crimes on the street, residence, vacant and “other” locations are mutually exclusive; therefore the estimates present the relative increase in crime in the given location.

¹⁵ As discussed in Guimarães and Portugal (2009), there is no simple solution to estimating nonlinear models with two high-dimensional fixed effects (such as both blockface and tract*quarter fixed effects). While the authors develop a procedure for estimating linear models with one high-dimensional set of fixed effects, they only make suggestions as to how the method might be applied to non-linear models.

indoors. This may reflect a change in opportunity presented by the foreclosure for the commission of property and public order crime, shifting these crimes inside residences and away from the street or other locations.

[Table 9 here]

Second, although we find no overall impact of foreclosure on property crime, there is significant variation in the effect by crime location. On average, an additional foreclosure start appears to decrease property crime on the street (2.8 percent decrease from the blockface mean), and increase property crime indoors (2.9 percent increase from the blockface mean). In other words, foreclosures appear to increase property crime that occurs indoors such as stolen copper piping or other goods from inside the home, while they reduce property crimes on the street (i.e. motor vehicle theft). Even though the overall effect on property crime is null, a shift in the location of criminal activity occurs as a result of the foreclosure.

Third, the estimated relationships change when we look specifically at crimes that occur within vacant or abandoned buildings. Foreclosures are positively correlated with violent, property, and public order crime occurring in vacant buildings, although the coefficients lose significance in the models that control for total crime. Although we cannot detect a relative increase in crime in vacant buildings compared to crime in other locations on the blockface, perhaps due to the low frequency of these offenses, the effect sizes of the correlations are large and substantively interesting. While we cannot say definitively that foreclosures increase the number of crimes occurring in vacant buildings, theory would suggest that vacant buildings may both be a target for crime (vandalism, theft) and a haven for crime (prostitution, drug use and sales).

Finally, we also find an association between foreclosure starts and resident reports of neighborhood disorder (Table 10). In an OLS model with blockface fixed effects and neighborhood time trends, we find that when the number of foreclosures on the blockface increases, the total number of 311 calls made to the City of Chicago about problems such as vacant buildings, rodents, graffiti, and other types of physical disorder increase in the following quarter. The coefficient on 311 calls – 0.06 calls – represents a 6 percent increase from the overall blockface mean of 1.01 calls. This increase in calls may be evidence of a decline in social control within the neighborhood and increased physical and social disorder, which may lead to increased crime on the blockface.

[Table 10 here]

DISCUSSION

Overall, an increase in the number of properties that receive foreclosure notices appears to increase total, violent, and public order crime on blockfaces in Chicago. We also find evidence to support two main mechanisms that link foreclosure activity on the blockface to local crime. The investigation of the relationship by crime location suggests that foreclosures change the relative attractiveness of indoor and outdoor locations for crime commission on the blockface, and the 311 model provides suggestive evidence that foreclosures lead to weakened social controls among neighbors.

In support of the first mechanism, estimates suggest that foreclosures increase crime that occurs inside residences, with null or negative effects on crime outside on the street or in other locations. Second, although there is a null overall effect of foreclosures on property crime, we find that foreclosures shift the location of property crimes. Specifically, property crime on the street decreases on a blockface after a foreclosure, while property crime inside residences

increases. Finally, foreclosures are also associated with substantively large (but weakly estimated) effects on crime within vacant buildings. Taken together, these results indicate that overall impact estimates mask the changing dynamics of crime on blockfaces in Chicago that experience foreclosure activity.

Next, we also find support for the theory that foreclosures increase crime due to the erosion of social control within a neighborhood. By investigating the relationship between foreclosure starts and a measure of disorder – 311 calls placed to city agencies – we find that foreclosures have a significant, positive effect on reported disorder on the blockface. Increased physical and social disorder may lead to more serious crime, by sending a signal to potential offenders that the neighborhood is less well-protected against crime than nearby areas. This analysis provides evidence that multiple mechanisms may contribute to the increase in crime that result from heightened foreclosure activity in micro-neighborhoods.

The limitations of this study warrant discussion. The primary limitation is potential bias in reported crime. Such under-reporting should lead us to under-state the impact of foreclosures on crime. Residential turnover caused by foreclosure may result in vacant buildings and fewer residents to report local crime. If crimes go unreported, the increases in crime found here are likely underestimates of the true impact of foreclosure. Second, crimes that occur indoors are less likely to be reported because passerby do not witness them, therefore estimates of the impact of foreclosure on crimes inside residences are also likely to be underestimates. It is more difficult to observe and police crimes that occur indoors, and police rely more heavily on citizen reports

which are fewer where foreclosures are abundant and many homes go to auction, revert to REO status, and sit vacant.¹⁶

Further, crimes in vacant buildings may be the least likely to be reported. Since we do not know for certain which foreclosures result in vacancy, we cannot pinpoint whether foreclosure leads to an increase in crime in the foreclosed building itself. However, we expect that the impacts of foreclosures on crime in vacant buildings may also be understated.

Even given these limitations, this paper offers insight into how foreclosure activity shapes and changes the composition and location of criminal activity within micro-neighborhoods. The identification strategy compares blockfaces over time, isolating the effect of a change in foreclosure activity on crime on a single blockface while controlling for other time varying factors in the area that may cause both foreclosures and crime to increase. Even with the large suite of controls included in the models, we identify that foreclosures cause significant increases in crime of non-trivial magnitudes. We also find support for several mechanisms, suggesting that foreclosures affect both the physical and social aspects of the blockface in ways that may attract crime.

POLICY IMPLICATIONS

As we have shown in Chicago, increased foreclosure activity on a blockface changes the perceived costs and benefits of committing crimes on that blockface, relative to nearby blockfaces. As a result, violent and public order crime increase, and the locations in which crime

¹⁶ Criminological research has long identified issues with reporting lower-level offenses, such as public order crime. Due to the high frequency of occurrence of public order crimes and the lack of incentive for reporting (such as insurance payments), public order crimes may be more likely to be under-reported. However, in some instances, police may target neighborhoods for raids of drug sales, prostitution, gambling, etc., and these “proactive” crime reports may inflate the number of public order crimes during specific quarters or in certain neighborhoods. However, we are not concerned with bias generated by public order crime reporting because we have no reason to believe that such under- or over-reporting would be systematically different on blockfaces with high levels of foreclosure.

is committed shift, with a greater increase in crime inside residences, as opposed to on the street. In addition, properties going through foreclosure increase reported physical disorder on the blockface. These findings contribute to the growing evidence of neighborhood spillover effects of mortgage foreclosures. In addition to detrimental effects on property values, housing formation, and educational outcomes for children, heightened foreclosure activity increases crime in micro-neighborhoods.

These patterns have real implications for policing and housing policy. Crimes committed on the street are more likely to be witnessed by passerby, to be known to the public, and to affect the feelings of safety and security of residents in the neighborhood. Foreclosures increase crime inside residences even though crimes occurring inside may be less likely to be reported, and as a result, offenders less likely to be apprehended. Foreclosures are weakly associated with increases in violent, property and public order crime in vacant buildings.

We find evidence that foreclosures affect the relative attractiveness of locations in which to commit crime, as well as the level of reported disorder on the blockface. Both of these mechanisms suggest that foreclosures change the physical appearance of a property or street, or the perception that the space is unguarded, making it a more inviting place to commit crimes. Increases in crime indoors suggest that foreclosures make indoor locations more attractive locations for public order and property crimes relative to the street. The decrease in property crimes on the street also suggests that offenders are selecting to commit these types of crimes indoors in the presence of a foreclosure instead of on the street. Further, the substantively large increases in crime within vacant buildings provides additional support for the direct effect of foreclosures on crime, if one believes that foreclosed properties are the most likely to be vacant.

There also appear to be some indirect effects of foreclosure on neighborhood crime, as evidenced by overall increases in violent crime on blockfaces that experience foreclosure, but little significant effect on the location of violent crimes within blockfaces. This may be the result of changes in the social makeup of the neighborhood. Foreclosures may weaken social control mechanisms in the neighborhood, causing increases in disorder, as the results of our model of 311 calls suggest. This increased disorder, coupled with residential turnover and periods of vacancy which may result in fewer neighbors keeping an eye on the neighborhood, further weaken social controls and may contribute to the increases in violent crime that we observe.

Successful policy solutions will take into account the multiple ways foreclosures change the physical form and social cohesion of neighborhoods. Specifically, policies combatting the negative impacts of foreclosure should focus on limiting periods of vacancy within neighborhoods, either by supporting homeowners in foreclosure with options to stay in their home and maintain an ownership stake in the property, or by quickly turning the home over to new residents. This research also suggests that lengths should be taken to secure buildings that are currently in the foreclosure process that might already be vacant, to make them less attractive targets for crime. This might mean physically securing entrances, windows, and yards, or by maintaining the property so it becomes a less visible target. Reaching out to residents in surrounding buildings and encouraging them to report any and all criminal activity in the area of the foreclosure may help stimulate the neighborhoods social control networks, and also improve reporting in areas that have experienced residential turnover and vacancy. Finally, increasing police presence in areas where foreclosure activity is concentrated may change the impression that areas hard hit by foreclosures are more lenient and accepting of criminal behavior.

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FIGURES

Figure 1

Share of Crimes that occur on the Street, inside a Residence, in a Vacant Building, or in Another Location, by Crime Type (2007-2011)

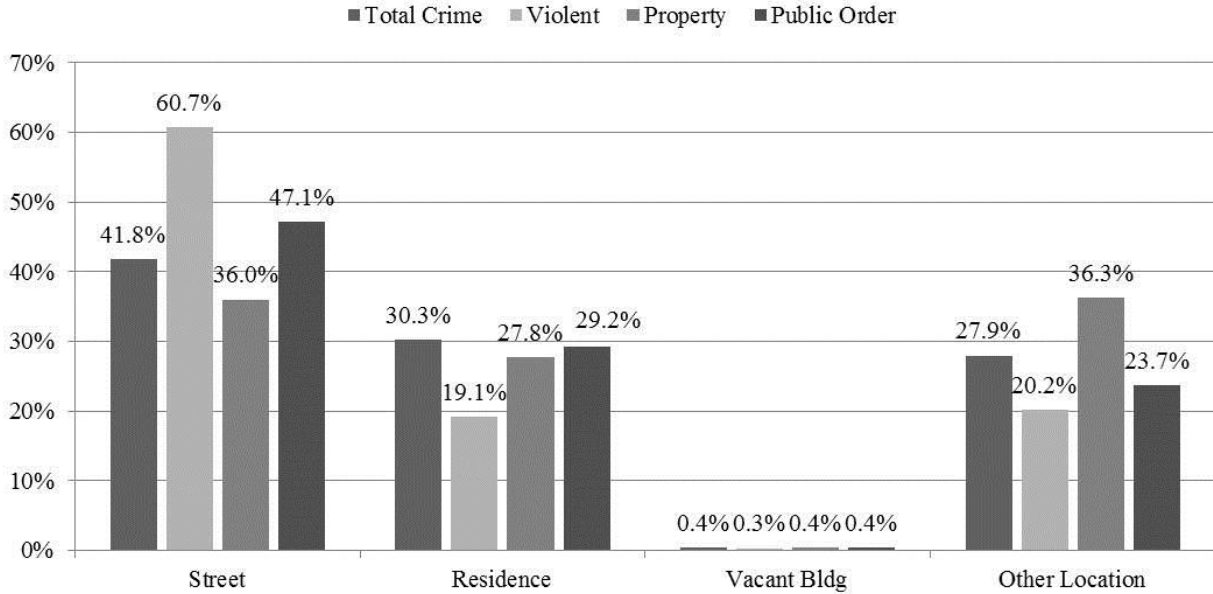


Figure 2

Average Blockface-Quarter Crime Levels by Number of Foreclosures & Crime Type (2007-2011)

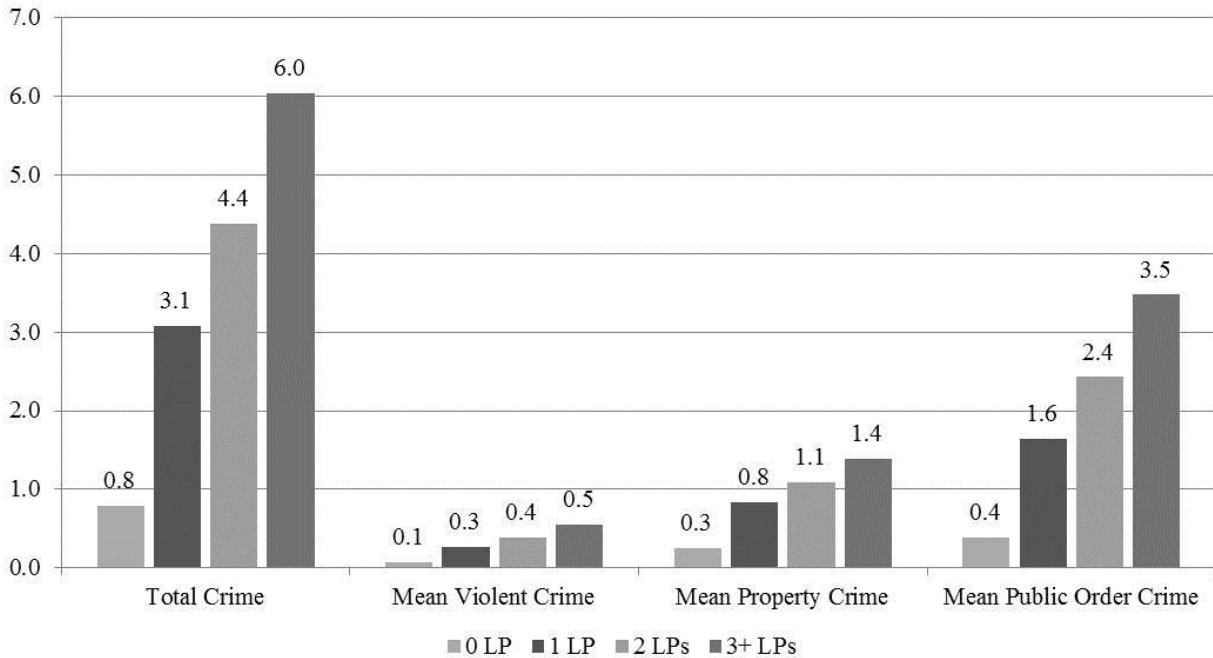
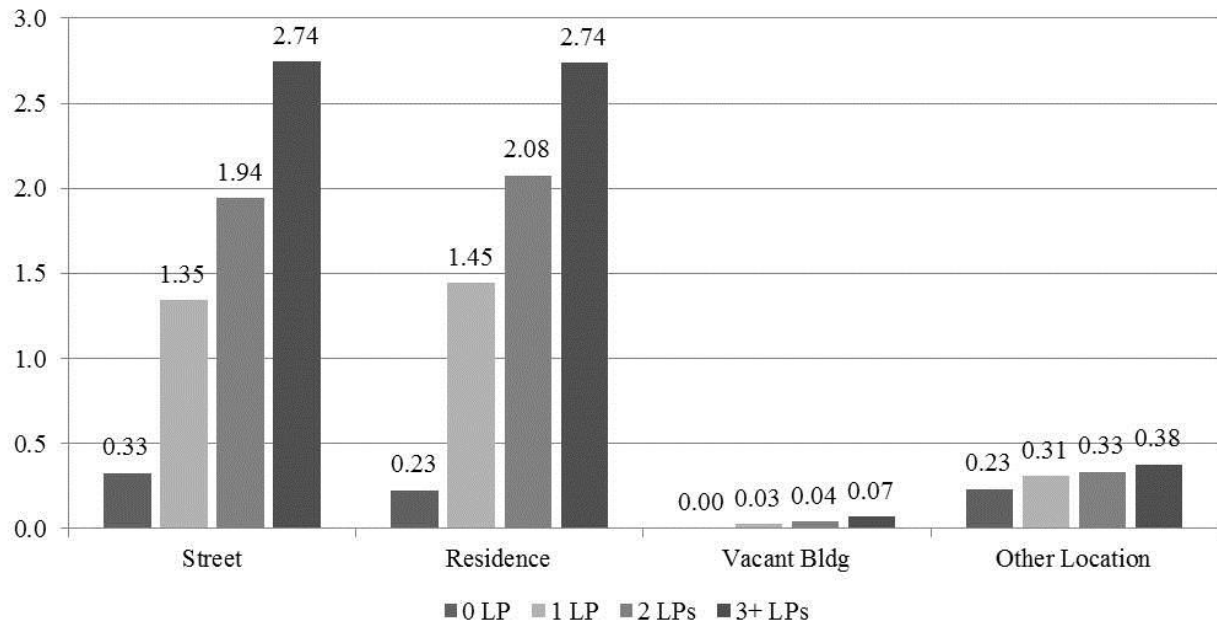


Figure 3

Average Blockface-Quarter Total Crime Levels by Number of Foreclosures and Crime Location (2007-2011)



TABLES

Table 1. Measuring the Crime Decline at Various Levels of Geography (Percentage Change in Total Crime, 2007-2011)

Geography	Observations	Minimum	Maximum	Mean	50th Pctile
Police Districts	23	-25%	-14%	-20%	-21%
Wards	51	-72%	-5%	-21%	-20%
Precincts	64	-34%	0%	-18%	-20%
Police Beats	284	-83%	25%	-20%	-21%
Census Tracts	865	-98%	130%	-20%	-22%
Blockfaces	118,276	-100%	4900%	12%	0%

Table 2. Mean Foreclosures and Crimes by Year

Blockface-Quarter Averages	Year					Total
	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>	
Foreclosure Measure						
Foreclosure starts	0.10	0.14	0.15	0.15	0.13	0.13
Crime Measures						
Total crime	0.95	0.93	0.86	0.81	0.76	0.86
<i>Crime Type</i>						
Violent crime	0.08	0.08	0.07	0.07	0.06	0.07
Property crime	0.28	0.29	0.27	0.27	0.26	0.27
Public order crime	0.49	0.46	0.41	0.38	0.35	0.42
<i>Crime Location</i>						
Street	0.40	0.39	0.35	0.34	0.32	0.36
Residence	0.29	0.29	0.27	0.25	0.24	0.27
Other Location	0.26	0.25	0.23	0.21	0.20	0.23
Vacant building	0.004	0.004	0.005	0.006	0.002	0.004

Table 3. Average Blockface-Quarter 311 Complaints by Complaint Type and Foreclosure Level (2011)

Type of Service Request	<i>Foreclosure Starts</i>				Total
	0	1	2	3+	
Total 311 Calls	0.94	3.70	4.58	5.57	1.01
Graffiti	0.31	0.92	1.06	1.19	0.33
Street/Alley Lights Out	0.16	0.82	1.04	1.32	0.17
Pot Holes	0.16	0.46	0.50	0.69	0.17
Tree Debris/Trim	0.12	0.31	0.40	0.38	0.12
Garbage Cart Maintenance	0.09	0.62	0.84	1.10	0.10
Rodents	0.07	0.34	0.40	0.44	0.07
Vacant/Abandoned Buildings	0.02	0.17	0.25	0.23	0.03
Abandoned Vehicles	0.02	0.08	0.09	0.23	0.02

Table 4. Impact of Foreclosure Starts on Total Crime (2007-2011)

<i>Models</i>	(1) <i>Raw</i>	(2) <i>Quarter FE</i>	(3) <i>Blockface FE</i>	(4) <i>Precinct*Quarter</i>	(5) <i>Tract*Quarter</i>
Foreclosures	1.171*** (0.00575)	1.177*** (0.00575)	0.0364*** (0.00512)	0.0306* (0.0122)	0.0291*** (0.00632)
Observations	1755279	1755279	1755279	1754959	1755279
R-squared	0.023	0.024	0.663	0.663	0.667
Quarter FE	No	Yes	Yes	No	No
Blockface FE	No	No	Yes	Yes	Yes
Precinct*Quarter FE	No	No	No	Yes	No
Tract*Quarter FE	No	No	No	No	Yes

Clustered standard errors in parentheses

* p<0.05 ** p<0.01 *** p<0.001

Table 5. Impact of Foreclosures Starts on Crime, by Crime Type (2007-2011)

<i>Crime Type</i>	(1) <i>Total</i>	(2) <i>Violent</i>	(3) <i>Property</i>	(4) <i>Public Order</i>
Foreclosures	0.0291*** (0.00632) <i>3.4%</i>	0.00498*** (0.00141) <i>6.9%</i>	0.00295 (0.00228) <i>1.1%</i>	0.0194*** (0.00497) <i>4.6%</i>
Observations	1755279	939879	1401579	1535239
R-squared	0.667	0.393	0.658	0.613
Blockface FE	Yes	Yes	Yes	Yes
Tract*Quarter FE	Yes	Yes	Yes	Yes

Clustered standard errors in parentheses. Effect sizes in italics.

* p<0.05 ** p<0.01 *** p<0.001

Table 6. Impact of Foreclosure Starts on Crime, by Crime Type, Categorical Models (2007-2011)

<i>Crime Type</i>	(1) <i>Crime</i>	(2) <i>Violent</i>	(3) <i>Property</i>	(4) <i>Public order</i>
1 Foreclosure	0.00136 (0.00859) <i>0.2%</i>	0.000958 (0.00257) <i>1.3%</i>	0.00394 (0.00374) <i>1.4%</i>	-0.00399 (0.00650) <i>-0.9%</i>
2 Foreclosures	0.0156 (0.0160) <i>0.9%</i>	0.0100* (0.00408) <i>6.9%</i>	-0.00258 (0.00700) <i>-0.5%</i>	0.00608 (0.0120) <i>0.7%</i>
3+ Foreclosures	0.119*** (0.0259) <i>4.6%</i>	0.0137* (0.00541) <i>6.3%</i>	0.00936 (0.00962) <i>1.1%</i>	0.0855*** (0.0202) <i>6.8%</i>
Observations	1755279	939879	1401579	1535239
R-squared	0.667	0.393	0.658	0.613
Blockface FE	Yes	Yes	Yes	Yes
Tract*Quarter FE	Yes	Yes	Yes	Yes

Table 7. Impact of Foreclosure Starts, on Total Crime by Location (2007-2011)

<i>Crime Location</i>	(1) <i>Street</i>	(2) <i>Residence</i>	(3) <i>Vacant</i>	(4) <i>Other Location</i>
Foreclosures	0.00180 (0.00272) <i>0.5%</i>	0.00692* (0.00287) <i>2.6%</i>	0.000659 (0.000421) <i>15.6%</i>	-0.00872** (0.00275) <i>-3.8%</i>
Total Crime	0.326*** (0.0194)	0.289*** (0.0372)	0.00534*** (0.000680)	0.385*** (0.0537)
Observations	1755279	1755279	1755279	1755279
R-squared	0.848	0.857	0.198	0.891
Blockface FE	Yes	Yes	Yes	Yes
Tract*Quarter FE	Yes	Yes	Yes	Yes

Clustered standard errors in parentheses. Effect sizes in italics.

* p<0.05 ** p<0.01 *** p<0.001

Table 8. Negative Binomial Models, Crime by Type and Location (2007-2011)

	(1)	(2)	(3)	(4)
<i>A. Crime Type</i>	<i>Total</i>	<i>Violent</i>	<i>Property</i>	<i>Public Order</i>
Foreclosures	0.0119*** (0.00122)	0.0111*** (0.00333)	0.00631** (0.00203)	0.0129*** (0.00162)
Constant	1.834*** (0.00804)	1.755*** (0.0380)	1.750*** (0.0147)	1.340*** (0.0101)
Observations	1636379	809139	1274699	1397319
Log likelihood	-1445055.7	-308487.7	-773450.2	-961612.0
Chi-squared	17668.6	3366.0	6198.6	12967.0
Blockface FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes
	(1)	(2)	(3)	(4)
<i>B. Crime Location</i>	<i>Street</i>	<i>Residence</i>	<i>Vacant</i>	<i>Other Location</i>
Foreclosures	0.00570*** (0.00169)	0.0121*** (0.00165)	0.0104 (0.00975)	0.00614 (0.00353)
Constant	1.647*** (0.0123)	1.637*** (0.0145)	-0.408*** (0.0999)	1.316*** (0.0137)
Observations	1495259	977259	109720	911660
Log likelihood	-960562.3	-672465.8	-24509.6	-504289.0
Chi-squared	15982.8	4008.4	1015.4	3456.2
Blockface FE	Yes	Yes	Yes	Yes
Quarter FE	Yes	Yes	Yes	Yes

Standard errors in parentheses

* p<0.05 ** p<0.01 *** p<0.001

Table 9. Impact of Foreclosure Starts on Crime, by Type and Location (2007-2011)

A. Violent Crime				
<i>Crime Location</i>	(1) <i>Street</i>	(2) <i>Residence</i>	(3) <i>Vacant</i>	(4) <i>Other Loc.</i>
Foreclosures	-0.000154 (0.000639) <i>-0.35%</i>	0.00117 (0.000622) <i>8.43%</i>	0.000102 (0.000102) <i>37.35%</i>	-0.00112** (0.000400) <i>-7.88%</i>
Total Violent	0.591*** (0.00791)	0.194*** (0.00416)	0.00434*** (0.000567)	0.211*** (0.00670)
Observations	939879	939879	939879	939879
R-squared	0.747	0.420	0.082	0.500
Blockface FE	Yes	Yes	Yes	Yes
Tract*Quarter FE	Yes	Yes	Yes	Yes
B. Property Crime				
<i>Crime Location</i>	(1) <i>Street</i>	(2) <i>Residence</i>	(3) <i>Vacant</i>	(4) <i>Other Loc.</i>
Foreclosures	-0.00281** (0.000948) <i>-2.82%</i>	0.00226* (0.00111) <i>2.90%</i>	0.000299 (0.000252) <i>18.34%</i>	0.000249 (0.000938) <i>0.26%</i>
Total Property	0.280*** (0.0124)	0.301*** (0.0433)	0.00594*** (0.000701)	0.413*** (0.0524)
Observations	1401579	1401579	1401579	1401579
R-squared	0.673	0.762	0.123	0.899
Blockface FE	Yes	Yes	Yes	Yes
Tract*Quarter FE	Yes	Yes	Yes	Yes
C. Public Order Crime				
<i>Crime Location</i>	(1) <i>Street</i>	(2) <i>Residence</i>	(3) <i>Vacant</i>	(4) <i>Other Loc.</i>
Foreclosures	0.00302 (0.00215) <i>1.53%</i>	0.00447* (0.00207) <i>3.55%</i>	0.000266 (0.000317) <i>12.34%</i>	-0.00776*** (0.00216) <i>-8.22%</i>
Total Public Order	0.382*** (0.0298)	0.217*** (0.0275)	0.00521*** (0.000632)	0.396*** (0.0553)
Observations	1535239	1535239	1535239	1535239
R-squared	0.805	0.722	0.161	0.818
Blockface FE	Yes	Yes	Yes	Yes
Tract*Quarter FE	Yes	Yes	Yes	Yes

Clustered standard errors in parentheses. Effect sizes in italics.

* p<0.05 ** p<0.01 *** p<0.001

Table 10. Impact of Foreclosure Starts on 311 Complaints (2011)

(1)

<u>Total 311 calls</u>	
Foreclosures	0.0601* (0.0261) <i>5.9%</i>
Observations	473100
R-squared	0.703
Blockface FE	Yes
Tract*Quarter FE	Yes

Standard errors in parentheses. * p<0.05 ** p<0.01. Effect sizes in italics.