

**The Disparate Neighborhood Impacts of the Great Recession:
Evidence from Chicago**

ABSTRACT

We advance scholarship about how macroeconomic forces differentially manifest themselves across local spaces by developing a holistic conceptual framework and empirical analyses involving multilevel change modeling. Unlike prior work, we examine differential rates of change in neighborhood indicators. We illustrate our approach with Chicago data measuring the crime, housing, and economic domains of neighborhood quality-of-life over the 2000-2009 period. We find that the local dynamic manifestations of macroeconomic cycles were far more nuanced than have been previously observed. Neighborhood indicators moved along distinct trajectories, sometimes but not necessarily tracking each other or the overall business cycle, and they changed with varied intensities. The Great Recession of 2006-2009 had disparate negative impacts on lower-income and minority-occupied neighborhoods' local job opportunities, home prices, and home foreclosures, though this was not true for credit or crime indicators. Credit indicators performed geographically much differently than in the prior Chicago recession.

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BACKGROUND

Documenting and explaining multidimensional changes in urban neighborhoods has been of longstanding interest to urban geographers on both substantive and methodological grounds. Substantively, there is longstanding evidence that the neighborhood constitutes a crucial component of residential satisfaction (Birch et al., 1979; Galster and Hesser 1981) and determinant of housing values. Thus, any forces that lead to changes in the quality of life experienced in the neighborhood and/or demand by the market as a whole for properties in the neighborhood will be of paramount importance to residents and property owners alike (Grigsby et al., 1987). Lately this importance has typically been expressed in worried overtones, as the so-called “Great Recession” has left many neighborhoods reeling from well-publicized spikes in unemployment, crime, and foreclosed homes.

There have been previous claims that economic forces operating at large geographic scales have differential impacts across smaller-scale spaces and, in particular, these impacts are disproportionately more negative for communities dominated by low-income and/or minority populations; e.g. Squires (1982); Kasarda (1985); Wilson (1987). As such, one can think of these geographic effects in terms analogous to the legal concept of “disparate impact:” a superficially neutral, non-discriminatory policy, practice (or in this case, macroeconomic event) has statistically disproportionate negative consequences for a vulnerable or legally protected class of individuals.

There are two, not mutually exclusive pathways through which disparate small-scale spatial impacts of large-scale economic forces might transpire: *contextual* and *compositional* differences across space. The local context might differ in terms of its institutions, infrastructure, access, or behavioral tipping points for households and investors in ways that render them more sensitive to altered macro-forces. From this perspective, these contextual features would penalize any type of household who might be unfortunate enough to reside there. On the other hand, there may be certain groups who, due to aggregate characteristics of their individual members, will be rendered more vulnerable to the altered macro-forces. From this perspective, these neighborhood compositional features would penalize places with concentrations of this type of vulnerable household.

Regardless of the underlying causal pathways, the quantitative examination of neighborhood dynamics in response to macroeconomic shocks is a complex endeavor on methodological grounds. While increased availability of small-area data and technological advances in GIS have enabled development of rich panel databases of neighborhood indicators, researchers and practitioners have reported on the “levels” of these indicators, and how these levels have changed over time (Sawicki and Flynn, 1996). While this approach is instructive to those focused on the intensity of a particular aspect of neighborhood quality or those whose goal is to identify “problem” conditions for a particular neighborhood, it is limited if one is more interested in elucidating the temporal dynamics of neighborhoods. Gaining a deeper understanding calls for analytic methods that are better suited for exploring this realm. In this paper we introduce one such method—*multilevel change modeling*—and demonstrate its power in a particular geographic application: City of Chicago neighborhoods during the business cycle of the last decade.

Specifically, our empirical analysis focuses on examining neighborhood indicator *trajectories*, defined as the *rate of change*, as distinct from the more typical focus on indicator *trends*, defined as the *amount of change*. The shift in focus to trajectories from trends is necessary for an investigation of dynamics, as it allows identification of differences and similarities in how neighborhoods are changing that may be obscured due to differences in *levels*. That is, two neighborhoods may be changing at similar rates (i.e., share common trajectories) but the similarities may not be apparent from a conventional trend analysis due to the differences in initial level of the condition between the two neighborhoods (e.g., one neighborhood started at a very high level while the second started at a very low level).

In this paper we demonstrate the value of multilevel change modeling in an illustrative neighborhood trajectories analysis of how Chicago quality-of-life dynamics manifested themselves geographically over the course of the last decade's business cycle and how they varied among neighborhoods classified into different types. The natural experiment that this severe "boom and bust" macroeconomic cycle from 2000-2009 represents allows us to investigate three research questions. First, over the last decade, how do the trajectories of Chicago neighborhood indicators representing crime, housing, and economic domains of quality-of-life vary across phases of the business cycle? Second, do these trajectories of neighborhood indicators vary significantly across five different types of Chicago neighborhoods distinguished by socioeconomic, racial/ethnic, and housing stock characteristics? Third, if so, do trajectory differences suggest that lower-income and predominantly minority-occupied neighborhoods were hurt more by the Great Recession?

In brief, we find that neighborhood indicators moved along distinct trajectories, sometimes but not necessarily tracking each other or the overall business cycle, and they changed with varied intensities. The intensity of these temporal changes distinctly

varied across five types of Chicago neighborhoods distinguished by their economic and racial-ethnic composition and characteristics of their housing stock. We find evidence that the Great Recession of 2006-2009 had disparate negative impacts on lower-income and predominantly minority-occupied neighborhoods' local job opportunities, home prices, and home foreclosures, though this was not true for credit and crime indicators.

We hope that this paper contributes to the scholarly literature in conceptual, methodological, and substantive ways. Conceptually, we develop the first holistic model in which the disparate impacts of recessions on lower-income, minority neighborhoods can be understood and potential causal pathways elucidated comprehensively. Methodologically, we are the first to apply multilevel change modeling techniques to an analysis of neighborhood dynamics. Substantively, our nuanced evidence about how the Great Recession affected Chicago neighborhoods substantially augments the scant empirical evidence in this realm.

Our paper is organized as follows. We begin by advancing our holistic conceptual framework for how the recent economic downturn affects urban neighborhoods and why these effects are likely to be geographically differentiated across neighborhoods. Second, we review the scant prior empirical scholarship related to macroeconomic forces' disparate impacts on urban neighborhoods. Third, we introduce our empirical work by describing the sources and nature of our longitudinal data for the city of Chicago, how we defined, standardized and adjusted neighborhood indicators, and the cluster analysis we employed to ascertain five distinct neighborhood groups in Chicago. Fourth, we explain our trajectory-based approach for understanding neighborhood dynamics: multilevel change modeling. Fifth, we examine our quality-of-life indicator trajectories during the last decade, comparing their volatility and tracking of the business cycle. Sixth, we examine differences among indicator trajectories across neighborhood groups to see the potential disparate impact of the "Great Recession" —

the economic downturn which started with the collapse of the housing market in 2006. We discuss key findings and offer conclusions in the final sections.

THE URBAN GEOGRAPHY OF DISPARATE IMPACTS: A CONCEPTUAL FRAMEWORK

Our conceptual framework is portrayed diagrammatically in Figure 1. We focus on two elements of the Great Recession—housing and economic—both of which have two key constituents. The housing component was characterized by: (1) an unsustainable home price inflation bubble, followed by a price collapse in virtually all U.S. metropolitan areas; and (2) easy mortgage credit provided in a “permissively underwritten” (if not downright predatory) fashion, followed by difficult-to-obtain mortgage credit for all but the most flush, credit-worthy loan applicants. The economic component was characterized by: (1) weakened demand for labor, which lowered the incomes of millions of households through unemployment, underemployment, and lower wages; and (2) fiscal strains on local (municipal, county) budgets, typically resulting in layoffs and wage reductions for public service employees and slashes in public services. We recognize that the housing and economic components of the recent business cycle (as well as their constituent parts) are intrinsically interrelated; we separate them here only for clarity and suggest their interconnections with double-headed arrows in Figure 1.

In concert, these housing and economic forces massively boosted the number of home foreclosures. Many homeowners found that their falling household incomes could no longer support their mortgage payments and/or local taxes, especially if these mortgage payments were proffered initially on subprime or predatory terms. Others found that collapsing prices rendered them “under water” with outstanding mortgage balances exceeding the current value of the home, and exercised their “rational default”

option. The net effect of these foreclosures was to decrease the number of owner-occupiers within the existing housing stock, with concomitant increases in the number of vacant properties (real-estate/lender-owned, government-owned, and private speculator-owned) and absentee-owned, renter-occupied properties (see Figure 1).

[Figure 1 about here]

The rise in vacant, foreclosed properties and the associated fall in homeownership rates in a neighborhood yield many negative impacts for neighborhoods. We can expect aggregate quality of homes to fall as: (1) their owner-occupants' incomes fall and (2) absentee owners maintain properties at lower standards than owner-occupants, all else equal (Galster, 1987). In some weak-market cases, vacant properties may be stripped of their resalable components, yielding a structure so badly damaged that there is no financially feasible recourse but to abandon it (Galster, Cutsinger and Malega, 2008). More foreclosed properties, in turn, will likely increase the number of crimes nearby (Ellen, Lacoë, and Sharygin 2011; Immergluck and Smith 2006b; Harding, Rosenblatt and Yao 2009; Cui 2010; Goodstein and Lee 2010; Katz, Wallace and Hedburg 2011). Falling disposable incomes of individual households coupled with falling population densities may lead to the closing and/or moving "downmarket" of the local retail sector serving the effected neighborhood. These collective changes to the neighborhood will lower the quality of its residential and economic life in aggregate; see Figure 1.

The causal process does not stop here, but feeds back in several ways. The reduced quality of life in the effected neighborhood may alter the structure of demand for it if its relative place in the metro-wide hierarchy of neighborhood shifts. As housing sales prices and rents drop relatively to reflect the fallen quality of life, altered in- and out-mobility processes likely transpire. Current households who feasibly can move to superior neighborhoods may choose to do so. Households with incomes lower than the

prior residents' may find it feasible to move in. At the same time, households that previously would have chosen this neighborhood as "the best they could afford" may look elsewhere. These mobility processes on net yield a process of downward income succession (Grigsby et al., 1987), which reinforces the initial decline in the neighborhood's income profile produced by the recession. The decline in multiple dimensions of the neighborhood's quality of life, in conjunction with downward income succession, further depresses property values in the area, eroding equity of home owners still further. The lower income profile of residents and lower aggregate assessed values of residential and non-residential properties (through reductions both in the number of properties and in the values of extant ones) erodes the tax base of the local political jurisdiction, forcing it into still more challenging fiscal plights.

The model in Figure 1 provides several points of entry providing a rationale for why recessions may have disproportionate impacts on lower-income, minority communities. We believe that the result is produced by a combination of (1) *composition*: the magnitudes of the housing and economic impacts are greater on the residents here; and (2) *context*: the aggregate responses to a given magnitude of impact on the residents are greater here. In other words, part of the explanation is tautological: those neighborhoods will be hit hardest where their residents have been hit hardest. But part of the explanation is behavioral: some neighborhoods are more vulnerable to decline for any given hardship inflicted upon its residents.

As for the former, there is strong evidence that the intensity of subprime and predatory lending—and, as a result, foreclosures—was greater in low-income and minority communities (Goldstein, 2007; Squires, 2011). Moreover, Hoynes, Miller and Schaller (2012) found that, as in previous downturns, the latest recession hit black and Hispanic workers and those with the least education hardest. Given patterns of

segregation by ethnicity, race and occupation, these facts would predict disparate geographic impacts on the basis of compositional effects alone.

As for the latter, contextual effects, low-income and minority communities are more likely to be vulnerable to threshold points that, when passed, trigger substantial degrees of decline. In these neighborhoods rental property markets may even in the best of times be barely lucrative enough for owners to stay in business; any downturn in revenues can lead to abandonment (Galster, Cutsinger and Malega, 2008). An analogous argument can be made for marginally profitable local retailers: any further declines in the trade are population and/or their disposable income may trigger business failure or relocation. Moreover, these neighborhoods may have originally had relatively small shares of homeowners and residents in professional-managerial occupations; any further declines may trigger catastrophic falls in collective efficacy and local institutional supports (Galster, Quercia and Cortes, 2000). Spatial concentration of foreclosures may also reach a threshold point where any additional foreclosures yield substantially greater upsurges in crime (Ellen, Lacoé, and Sharygin 2011). Thus, in low-income, minority neighborhoods in inferior positions in the metropolitan hierarchy there may be multiple dimensions of their residential and economic quality of life that decline disproportionately as a consequence of a macroeconomic shock.

THE URBAN GEOGRAPHY OF DISPARATE IMPACTS: PRIOR SCHOLARSHIP

The first empirical works to probe this disparate spatial impact proposition rigorously were the related studies by Galster and Mincy (1993) and Galster, Mincy and Tobin (1997), which examined decadal changes in census tract poverty rates between 1980 and 1990 across all U.S. metropolitan areas. They stratified tracts by dominant racial group to assess how a variety of metro-wide economic forces may have affected the strata differentially. They found that although most poverty growth in predominantly black-occupied tracts occurred in metropolitan areas with greater shares of employment in manufacturing, whatever losses of manufacturing jobs that were evinced in a given metropolitan area penalized such neighborhoods disproportionately. They probed this evidence of disparate racial impact further and found that it was associated with black neighborhoods' propensity for location in counties with larger shares of employment in manufacturing and in central cities (i.e., contextual effects), and not characteristics of black populations (i.e., compositional effects). Unfortunately, these studies were limited by the unavailability of inter-census data, and thus were only able to explore neighborhood impacts of longer-term trends, not shorter-term business cycles.

Hackworth (2001) was the first study to employ annual observations of neighborhood indicators to examine the impact of the early 1990s recession. He focused on New York City's gentrification processes and broader patterns of property investment. He performed no statistical analyses, instead plotting time series graphs and maps of a variety of housing market indicators and drawing conclusions by inspection. He found substantial spatial variability in responses to the recession. Specifically, housing demolitions in northeastern Brooklyn, northern Manhattan, and portions of southern Bronx evinced sizable increases during the recession that were

quickly reversed as business conditions improved. By contrast, demolitions decreased in much of central Queens as the recession took hold. However, other indicators of housing market activity showed little sensitivity to the business cycle (e.g., vacancy rates) whereas others (e.g., tax delinquencies) were pro-cyclical yet were not differentiated spatially. Overall, Hackworth concluded that inner-core housing markets were more sensitive to downturns in the local economy. Though he did not correlate changes in neighborhood indicators to socioeconomic or racial characteristics of neighborhoods, examination of his maps suggests that the recession had disparate negative spatial impacts on lower-income, predominantly minority-occupied neighborhoods, and those that were in the process of gentrification.

Ong et al. (2003) examined annual measures of retail jobs, home values, income and school free lunch program participation across 53 community planning areas Los Angeles County during the business cycle of the 1990s. The cyclical volatility of home values proved the greatest; that of retail sales proved the smallest. Like Hackworth (2001), they plotted trends and mapped these values but extended the literature by regressing observed changes in the levels of their indicators on neighborhood poverty rates and measures of racial/ethnic composition. They also found substantial spatial variations in how indicators responded to the recession, with the sensitivity of lower-income neighborhoods appearing over twice as large, though the pattern of response according to racial/ethnic differences was less clear-cut. The first three indicators above changed over time in line with the business cycle, but the last (not surprisingly) proved counter-cyclical because its benefits were means-tested. They concluded that the business cycle had disparate impacts on poorer Los Angeles neighborhoods' employment, income and home values.

Thus, the scanty existing literature investigating the short-term spatial effects of recessions indicates that the negative effects of a downturn are more pronounced in

economically disadvantaged and minority-occupied neighborhoods, at least for most of the limited number of neighborhood indicators investigated. This conclusion should be treated cautiously, however, because of serious methodological and substantive limitations. First, it is based on evidence from the 1990s business cycle in two idiosyncratic cities. Second, few neighborhood indicators have been utilized. Third, and perhaps most critically, the empirical methods employed to assess disparate impact may have produced misleading results. Inasmuch as poorer and predominantly minority-occupied neighborhoods typically represent extreme values of *levels* of neighborhood indicators, regression to the mean may produce greater observed *amount of change* in these indicators over time that have little to do with disparate impact of business cycles. We argue that disparate impact is more appropriately measured by examination of neighborhood trajectories (i.e., rates of change)

Our empirical research aims to contribute to strengthening and expanding the literature in four ways. First, we explore the most recent business cycle's effects on Chicago, a city with a distinct economic base from New York or Los Angeles (Doussard, Peck, and Theodore, 2009). Second, we employ a wide range of neighborhood indicators, including several never-before utilized in the exploration of disparate spatial impacts: crime, home foreclosures, and mortgage and retail lending. Third, instead of *ad hoc* geographic categorizations, we conduct a cluster analysis to identify *a priori* groups of neighborhoods differing in socioeconomic status, race/ethnicity and housing stock characteristics. Fourth, we estimate for the first time in this literature multilevel change models to analyze trajectories of our neighborhood indicators for each of our neighborhood groups. This method allows for both a more precise estimation of overall effects on a group of neighborhoods and assessment of variation among the neighborhoods within a group.

DATA AND MEASURES

Geographic Unit of Analysis

In 2003, the MacArthur Foundation of Chicago funded an ambitious initiative to improve conditions in distressed urban neighborhoods: the New Community Program (NCP). A 10-year, \$47 million effort, NCP is a comprehensive effort to engage community-based groups to attack multiple problems simultaneously — in education, workforce development, housing, social services, and public policy. Managed by the Local Initiatives Support Corporation of Chicago (LISC/Chicago), NCP focuses its efforts on 14 neighborhood areas in Chicago with varying challenges. Inasmuch as the research reported here was completed as part of a larger evaluation of NCP, we collected data corresponding to the geographies of the 14 NCP neighborhoods, plus the remaining 66 Community Areas specified by the City of Chicago. We emphasize that although these geographic units are relatively large (typically several census tracts), they have longstanding social meaning in Chicago; see Figure 2 for a map of these areas.

[Figure 2 about here]

In this study we use data provided by the Metro Chicago Information Center. MCIC obtained data from a variety of secondary sources, transformed them to create counts and sums for the Census tracts within Chicago, aggregated them to create measures at we hereafter call the “neighborhood” level, and then standardized them to adjust for different neighborhood population sizes.¹ These data sources and resultant indicators are described below.

Crime Data and Indicators

Data originate from crimes reported by the Chicago Police Department for the period 1991 to 2009, classified using the Uniform Crime Report (UCR) typology. Each record reflects a police report of an incident, which may include multiple crimes.² Reports were geo-coded, aggregated to the neighborhood level then standardized across neighborhoods by dividing by population in 10,000s. Crime rates were divided into two types: property (arson, auto theft, burglary, and larceny-theft) and violent (assault, murder, rape, and robbery).

We recognize that these data have shortcomings. As they originate from police reports, unreported crimes are not included; the underreporting rate is likely neither random nor constant across neighborhoods, though the evidence is mixed (Baumer, 2002; Goudriaan, Wittebrood and Nieubeerta, 2006). Moreover, the accuracy with which the Chicago Police Department publishes crime statistics may also vary over the course of the business cycle and associated city fiscal strains. Nevertheless, these are the sorts of crime data that have been employed in prior scholarship and are likely the only ones available publicly.

Housing and Mortgage Market Data and Indicators

There is a long research tradition in real estate economics which uses home values (usually measured as sales prices) as a primary indicator of neighborhood quality. Specifically, price differentials which remain after accounting for the home's structural features represent capitalization of the entire package of location-specific amenities. A related strategy, commonly used when information regarding individual home characteristics and sales data are unavailable or too cumbersome, regards home

sales as an indicator of capital flows into a neighborhood. With this approach, both the volume of sales and the average purchase price are informative indicators for relative comparisons between neighborhoods. The sum of the purchase prices can be thought of as the total capital flow from in-moving, home-buying residents; increases in this flow represent a higher valuation and/or desirability for the neighborhood. Additionally, increasing average prices signal growing capital gains by homeowners, a potentially important source of family wealth.

Here we measure this dimension via indicators constructed from administrative data collected under the auspices of the federal Home Mortgage Disclosure Act (HMDA), which includes information on the location and buyer characteristics of home purchase loan applications and originations reported by certain lending institutions.³ Using these data, we constructed an indicator reflecting overall market activity: total dollar value of originated home purchase loans per single-family, owner-occupied housing unit. From these data we also specified the mean home loan dollar amount, which provides information comparable to the average sales price or home value described above (Galster, Hayes and Johnson, 2005). Note that the base loan data for both indicators apply to single-family and small multi-unit dwellings (i.e., dwelling units containing 1 to 4 units) for the time period 1992-2009.

Counts of completed foreclosures on single-family homes for the years 1998 to 2009 originated from administrative records kept by the Cook County Circuit Clerk's Office. Foreclosure completions count of the number of forecloses whose resolution was an auction of the property in question (foreclosure filings that are resolved in other ways are not classified as completed).⁴ We aggregated counts to the neighborhood level, summed for the calendar year, and standardized by the number of single-family, owner-occupied dwellings, in 10,000s. Unfortunately, completed foreclosure indicators

do not give a precise estimate of when a foreclosed property becomes vacant and then (possibly) is occupied again.

Economic Activity Data and Indicators

Commercial development activity is difficult to track. One source that is increasingly used is administrative data on business lending reported by certain lending institutions under the auspices of the federal Community Reinvestment Act. These data contain information about small business loans — that is, business loans of \$1 million or less (not necessarily the same as loans made to small businesses), including the amount of the loan and a few characteristics of the loan recipient and can be used to gauge, to some limited degree, the flows of commercial capital into the neighborhood. We employed two indicators constructed from these data: the number of loans and the total dollar value of loans; the neighborhoods' commercial land area is used as the standardization factor. Commercial land area was obtained from an aerial survey commissioned by the Chicago Metropolitan Agency on Planning in 2000. The annual time series is available from 1996 to 2009.

Indicators of employment and jobs are rarely included in neighborhood analysis of quality-of-life due to a lack of data; until recently, this type of data was even rarer than data pertaining to commercial development. However, the Census Bureau Local Employment Dynamics (LED) program has developed and released a data product, "OnTheMap" which includes employment and jobs counts for very low levels of geography. From these data we constructed an indicator: the number of employed residents per 10,000 working-age population. The time series is available from 2002 to 2009.

Descriptive statistics (based on the 2002-2009 period of common data availability) of the neighborhood indicators we employ in our analysis below are presented in Table 1.

[Table 1 about here]

Neighborhood Groups

In our analyses we examine potential differences in quality-of-life indicator dynamics across different neighborhood contexts. To accomplish this categorization we undertook a cluster analysis of the 80 aforementioned Chicago neighborhoods, based on a large number of indicators conceptually related to the “market strength” of the area. These indicators measured both 2000 levels of and pre-2000 changes in indicators of: median income, racial ethnic composition, mortgage market activity and housing stock characteristics. A listing of all variables used in the clustering and their mean values is presented in Appendix Table 1. We applied several clustering algorithms and found that they all led us to specify a five-fold typology⁵:

Chicago Neighborhood Groups

Group I	Moderate income, predominately black residents; housing is mostly owner-occupied, single-family units
Group II	Moderate income, predominately white residents – about one quarter of whom are foreign-born; with a mix of single-family and multi-unit owner-occupied dwellings
Group III	Moderate income, predominantly Hispanic residents – almost 40% are foreign-born; housing is mostly smaller multi-unit dwellings, split between owner-occupiers and renters
Group IV	Low income; variety of racial and ethnic predominance; housing is mostly renter-occupied, large multi-unit dwellings
Group V	High income; variety of racial and ethnic predominance; housing is mostly large multi-unit dwellings, with more renters than owners

The neighborhood groups are primarily distinguished by the income level and predominant race/ethnicity of the neighborhood residents. Details about differences in all clustering variables are provided in Appendix Table 1. For example, Chicago neighborhoods where the average (mean) household income is around the city average (i.e., middle and working class neighborhoods) are split by race/ethnicity between three

groups. Neighborhoods with predominantly black residents are in Group I, those with predominantly white residents are in Group II, and neighborhoods where a large proportion of the residents are Hispanic are in Group III. The other two groups contain the neighborhoods where the average incomes are below (Group IV) and above (Group V) the city average. The neighborhoods in Groups IV and V constitute a more diverse set of neighborhood racial/ethnic types (some with one group predominating, others more mixed) compared to the first three groups.

The neighborhoods in the five groups also differ in terms of their housing configuration. Two of the moderate income groups — neighborhoods with predominantly black residents (Group I) and those with predominantly white residents (Group II) — consist of mostly owner-occupied housing. Most of the residences in the Group I neighborhoods are single family dwelling units, while those in Group II are a mix of single-family and large (five or more) multi-unit buildings. The other moderate income group, neighborhoods with a considerable proportion of Hispanic residents (Group III), is split between rental and owner-occupied housing, the majority of which are small (two to four) multi-unit buildings. Finally, the low income (Group IV) and high income (Group V) neighborhood groups have similar housing configurations — large, multi-unit buildings where the majority of residents are renters.

Each group of neighborhoods is somewhat spatially contiguous; see the map in Figure 2. The high income neighborhoods (Group V) are clustered around the central business district of the city (known as the Loop) — this neighborhood group includes all of Central Chicago as well as North Side and West Side neighborhoods that border Chicago's downtown. The low income neighborhoods (Group IV) are mostly in Chicago's South Side, although a few are in the West Side. The spatial distribution of the moderate income neighborhood groups reflects the historical population distribution of Chicago, with the neighborhoods having a predominately white population (Group II)

in the North Side, those with predominately black populations (Group I) in the South Side, and those with a relatively high concentration of Hispanics (Group III) in the West Side.

ANALYSIS METHOD: MULTILEVEL CHANGE MODELING

We specify a multilevel change model to analyze trajectories of our neighborhood indicators. This model decomposes the longitudinal trend by specifying it as a function of time with two parameters: a starting level (intercept) and a rate of change (slope, the trajectory upon which we focus). In addition, this method allows for estimation of trajectories for the city overall and groups of neighborhoods, and an assessment of their variation among individual neighborhoods. This method provides a more precise estimation of overall and group trajectories because the inter-neighborhood variation is explicitly included in the model (i.e., each neighborhood has its own trajectory) and variation in levels is modeled separately from variation in amount/direction of change (i.e., each neighborhood has separate slope and intercept parameters).⁶

Multilevel models, also known as hierarchical linear models (HLM), are generally referred to as change models when applied to longitudinal data such as ours. The basic characteristic of these models is the inclusion of random neighborhood effects, to account for the influence of neighborhoods on their repeated observations.⁷ These random neighborhood effects indicate the degree of variability in the change model main effects that exists within the population of neighborhoods. They also help remove potential bias due to selection on geographic unobservables that otherwise might distort our conclusions about disparate impact.

Suppose the outcome of interest (y) is hypothesized to have a linear, additive change process, which could be represented as:

$$y_{it} = \alpha_i + \beta_i x_{it} + \varepsilon_{it}$$

where y_{it} is the level for neighborhood i at time t , x_{it} is the measure of time for neighborhood i at time t , α_i and β_i are the intercept and slope parameters for neighborhood i (i.e., the starting level and amount of change per unit change in x_{it}), and ε_{it} is the residual (error) for neighborhood i . The intercept and slope are random variables (i.e., the random effects), with their variation across neighborhoods modeled as:

$$\alpha_i = \alpha + \mu_{\alpha i}$$

and

$$\beta_i = \beta + \mu_{\beta i}$$

where α and β represent the fixed effects for the intercept and slope (somewhat analogous to the mean of the random effects) and $\mu_{\alpha i}$ and $\mu_{\beta i}$ represent the random variation of neighborhoods. Substituting the fixed effects equations into the first yields the combined model:

$$y_{it} = \alpha + \beta x_{it} + \mu_{\alpha i} + \mu_{\beta i} x_{it} + \varepsilon_{it}$$

To fit this model, two fixed effects (α and β) and four variance/covariance parameters are estimated: the residual variance ($\text{var}(\varepsilon_{it})$), the slope and intercept variance ($\text{var}(\mu_{\alpha i})$ and $\text{var}(\mu_{\beta i})$), and the covariance between the slope and intercept ($\text{cov}(\mu_{\alpha i}, \mu_{\beta i})$).

For each of our quality-of-life indicators we estimate separate multilevel change models for three time periods (2000-2002, 2003-2005, 2006-2009) which roughly correspond to the phases of the economic cycle over the past decade; the first and third period correspond to a recessionary economy in Chicago, while the second period was an expansionary economy. Since the time periods are fairly short the models are simple, consisting of two parameters: the initial, or starting, level (intercept) and the rate

of change (slope). The latter parameters are of most interest here, as they indicate both the intensity and direction of the trajectories.

In the results that follow, we first will examine the slope parameters (measures of trajectory), comparing intensity and direction in each of the three time periods. This will permit the assessment of the relative volatility of the indicators and their responses to cyclical economic changes. This examination essentially establishes a descriptive portrait of Chicago neighborhoods during the tumultuous 2000s. Next, we will examine *inter-neighborhood group variation* in the slope parameters across the three time periods, exploring the extent to which trajectory variation is associated with neighborhood context (i.e., group) and, if so, whether the Great Recession had more harmful impacts on neighborhood groups with greater concentrations of minority and low-income households.

RESULTS: A PORTRAIT OF THE 2000S BUSINESS CYCLE SEEN THROUGH CHICAGO NEIGHBORHOOD INDICATOR TRAJECTORIES

Now that we have defined our neighborhood indicators, neighborhood groups, and analytical method, we begin reporting our results by describing how the business cycle of the last decade manifested itself across the terrain of Chicago. Figure 3 shows the estimated rates of change expressed as a percentage of the initial levels of the indicators (i.e., slopes divided by intercepts reported in Table 2), which can be interpreted as the annual percentage change.

[Table 2 and Figure 3 about here]

The first thing that Figure 3 reveals is the comparative volatility of indicators, period-to-period. The completed foreclosures indicator clearly has the most volatile trajectory, with the largest relative rates that change direction dramatically from period to

period. In contrast, the crime indicators are the least volatile, having a consistent direction and intensity level in each of the three periods. The other indicators have intermediate degrees of volatility: each changes direction at least once across the three periods comprising the business cycle and the intensity (i.e., magnitude of the rate of change) fluctuates from period to period.

The second thing that Figure 3 reveals is how different indicators differentially track the business cycle. The foreclosure indicator is pro-cyclical – positive during recessionary periods (2000-2002, 2006-2009) and negative during expansionary periods (2005-2009), as would be expected. The same can be said for the employment rate, though we only have data for the latter two periods. By contrast, the mean home loan amounts trajectory has a counter-cyclical pattern over the last two periods. Since the level of home lending activity was declining during the 2006 to 2009 period (as indicated by the negative trajectory for total amount of home purchase loans; see Table 2), the positive trajectory for the mean home purchase loan amount indicator most likely reflects the shifting composition of borrowers who were able to secure credit during this period (i.e., only those select borrowers with excellent credit ratings and relatively substantial assets were able to secure loans, and they bought an atypical selection of more-expensive homes). The two crime indicators declined in all periods and thus were not cyclical at all. The last two indicators, small business loans and mean home purchase loans, evinced idiosyncratic cyclical patterns.

The total dollar amount of small loans to businesses, which might be expected to have a trajectory more in sync with the economic cycle, had a positive rate of change in the first period, changed directions during the mid-decade recovery period, and then became more negative (as expected) in the third period. It is possible that the 2003-2005 trajectory reflects dynamics related to the mortgage market: rampant housing speculation siphoned capital out of business lending pools. On the other hand, recall

that the universe for this measure is loans of one million dollars or less; the negative rates of change observed here represent a decrease in the total value of these loans, but not necessarily all loans to businesses. Given what is known about the availability of credit during these two periods, discussed earlier, it seems unlikely that the negative rate of change for small business loans reflects an overall decline of capital flows to businesses, particularly for the middle period (2003-2005). While a negative rate is more probable for the third period, particularly given the unprecedented tightening of all credit markets after the collapse of the housing market, it is possible that the negative rate seen here overstates the intensity of the trajectory.⁸

Finally, consider the distinctive differences in direction and intensity of change for the total home purchase amount indicator across the periods. This indicator showed surprising growth during the first recessionary period (2000-2002), but not the second (2006-2009). The increase of the growth rate during the first half of the decade indicates loosening of credit markets and economic expansion. For this particular expansion period, it also reflects the formation of the housing bubble; the rapid rate of decline seen in the third period reflects the situation after the bubble collapsed.

RESULTS: IMPACTS OF THE GREAT RECESSION ON DIFFERENT CHICAGO NEIGHBORHOOD GROUPS

Comparing the indicator trajectories across neighborhood groups suggests that the effects of the Great Recession indeed varied substantially across Chicago; see Table 3A-E. To aid in drawing lessons from the cross-neighborhood patterns these tables reveal, we have extracted the slope coefficients (trajectories) estimated for the Great Recession period and summarized them in Table 4. Following each trajectory estimate we provide a parenthetical term indicating whether it represented the worst (1)

or least (5) impact across the five neighborhood groups for the given indicator. We also highlight in bold all trajectories that were inferior to (i.e., less advantageous than) the overall city trajectory.

[Table 4 about here]

Several indicators reflect the expected disparate impact patterns. Despite the recession, employment rates in the white, moderate income (Group II) and high income (Group V) neighborhoods continued to grow (0.4% and 0.3% annually, respectively), whereas they declined in minority, moderate income neighborhoods (Groups I and III) and low income neighborhoods (Group IV). Similarly, mean home purchase loan amounts demonstrated the most inferior performance in these same three groups. The worst two upsurges in completed foreclosure rates occurred in moderate income, Hispanic (Group III) and low income (Group IV) neighborhoods. Foreclosure rates spiked the least (only 4.7%) in upper income neighborhoods (Group V). The foregoing results all are consistent with our expectation (summarized in Figure 1) that less economically advantaged neighborhoods and/or those with larger shares of racial/ethnic minorities suffer disproportionately during an economic downturn in terms of local job opportunities, home prices, and home foreclosures.

However, the conventional expectation was not met for the credit market indicators – total dollars of lending in both the housing and commercial markets. Though both indicator trajectories were strongly negative in all neighborhood groups after 2005, the decline was more pronounced in higher income *and* lower income neighborhoods. By contrast, moderate income neighborhoods (regardless of their racial-ethnic composition) experienced less-pronounced declines in mortgage lending. In the case of small business lending, the moderate income, white neighborhoods (Group II) suffered the second-steepest trajectory of decline (75.6%).

In the case of crime there also were no patterns of disparate impacts. This is not surprising because, as noted above, crime was not cyclical during this period; it continued its distinct downward trend in macroeconomic good times and bad alike.⁹ Thus, there was no recessionary impact to be differentially distributed across space. Our multilevel growth model estimated that the lowest-income neighborhood group (IV) showed the largest annual post-2005 rates of decline in both property and violent crimes and the moderate-income, predominantly white-occupied neighborhoods (Group II) evinced the only positive growth rate for property crimes (3.2%) and the smallest rate of decline in violent crime (-1.9%) during the Great Recession. We suspect that this trajectory variation had nothing to do with macroeconomic forces but instead was an artifact of an equilibrium process whereby temporary factors may inflate or deflate crime levels for short periods but levels eventually return to some steady state.¹⁰ This is consistent with the findings of a supplementary analysis¹¹ in which we found strong negative correlations between the starting level of crime and the subsequent change in crime (-.48 for property crime and -.81 for violent crime for the 2006-2009 period for Chicago overall). In particular, it is perhaps not surprising that crime declined so rapidly in low-income Group IV because it began with the highest level of violent crime and second-highest level of property crime (see intercepts reported in Table 3). Analogously, moderate-income, white Group II evinced the lowest starting levels of property and violent crime, so they might be expected to decline at a smaller rate there.

DISCUSSION

Comparing the 2000-2002 and 2006-2009 trajectories indicates a critical difference between how the two recessions of the 2000s manifested themselves in Chicago overall. In the recession at the start of the decade, the housing market was

affected by the weak overall economic conditions, but nevertheless showed a positive rate of change in mortgage flows, as was typical for most previous recessions in the United States. In contrast, the latter recession originated in a collapsed housing market in which consumer spending once bolstered by debt based on illusory home capital gains evaporated, and mortgage credit significantly contracted subsequently.

These two differences in the nature of the last two recessions yielded some interesting differences in disparate impact patterns; cf. Tables 4 and 5. Table 5 presents information in a comparable format as Table 4, except for the 2000-2002 recession. What is apparent is that the expected patterns are more broadly observed in the earlier recession (employment rates cannot be compared due to lack of 2000-2002 data). The aforementioned patterns of disparate impact for mean home purchase loans and foreclosures are replicated for the earlier recession, though the magnitudes of the foreclosure trajectory differences are starker in the former period. Low income neighborhoods (Group IV) evinced a whopping 248.9% increase, followed in order by moderate income black (Group I) and Hispanic (Group III) neighborhoods.

Even more dramatically, the patterns for credit flows (home purchase and small business loan dollars) are reversed between the two recessions. During the 2000-2002 recession our estimated trajectories strongly showed the expected pattern of disparate impacts, with moderate income black (Group I) and Hispanic (Group III) neighborhoods having the worst and second-worst impacts.

What these comparative findings imply is that the Great Recession was unusual not only in its severity but in its consequences for credit flows across urban space. In an earlier recession that was not led by the bursting of an easy-credit-fueled housing bubble (and subsequent tightening of credit), all economic and housing indicators analyzed followed trajectories in ways we would have predicted on the basis of our conceptual model summarized in Figure 1. By contrast, the over-reaction of extremely tight credit

instituted by the nearly collapsed financial sector during the Great Recession appears to have been applied more even-handed geographically, perhaps even punishing white, upper income Chicago neighborhoods proportionately more. Of course, where mortgage loans have continued to trickle is to buyers in these same advantaged neighborhoods, as evinced by the relatively robust continued growth in mean mortgage values (our proxy for home values) there.

[Table 5 about here]

The final item worth further discussion is our result pertaining to home foreclosures, which demonstrated strong patterns of disparate impact during both Chicago recessions analyzed. Not only were the overall *levels* of foreclosure rates higher in Chicago's lower-income, minority-occupied neighborhoods, but the *growth* of the problem during the downturns was also higher in such places. This implies that, should the wave of foreclosures continue in the future as expected (Saulney 2012), the inter-neighborhood gaps in the intensity of this problem will grow. It also implies that more less-advantaged neighborhoods will exceed the thresholds at which foreclosures start to create more crime nearby (Ellen, Lacoë, and Sharygin 2011). This lends further testimony to the mounting evidence concerning the unfairly distributed toll imposed by the United States' latest dalliance with weakly regulated financial markets (Immergluck and Smith 2006a, b; Kingsley, Price and Smith 2009; Harding, Rosenblatt and Yao 2009; Cui 2010; Goodstein and Lee 2010; Katz, Wallace and Hedburg 2011).

CONCLUSIONS AND IMPLICATIONS

In this paper we have tried to strengthen and expand the scant literature on how macro-scale economic forces play out differentially across small-scale geographies. We have for the first time developed a holistic conceptual framework and employed

multilevel change modeling of an unprecedented variety of neighborhood indicators for the purposes of this investigation. Specifically, we have investigated how the business cycle swings of the last decade were manifested across Chicago neighborhoods in terms of indicator trajectories related to three key domains of quality of life: crime, housing, and economy.

Our first conclusion is that, consistent with Hackworth (2001) and Ong et al. (2003), various neighborhood indicators moved along distinct trajectories, not necessarily tracking each other or the overall business cycle, and they changed with varied intensities. Most of the trajectory variation was due to differences in the intensity of the rates of change rather than their direction. Neighborhood context, as captured by the five groups delineated by our cluster analysis, was strongly associated with trajectory variation. Among the indicators examined, foreclosures were the most volatile and procyclical, responding strongly and in concert to macro-level forces but mediated at the neighborhood level. Crime was the least volatile, non-cyclical indicator, with a somewhat constant negative trajectory across variation in economic conditions. Mean home purchase loan amount operated as a moderately volatile, countercyclical indicator.

Our second conclusion is that, consistent with our conceptual framework, the Great Recession of 2006-2009 had disparate negative impacts on lower-income and minority-occupied neighborhoods as measured by several housing and economic indicators. This conclusion again comports well with those forwarded by Hackworth (2001) regarding New York City and Ong et al. (2003) regarding Los Angeles a decade earlier. Comparative trajectories of mean home purchase loans (our proxy for home values), completed foreclosures and employment all evinced the anticipated patterns of disparate impacts. Total credit flows (total home purchase and small business loans) and crime rates did not, though we suspect the latter is an anomalous result associated with the idiosyncratic dynamics of crime. Our probe of the exceptional results of credit

flows revealed a different pattern than was demonstrated during the prior recession of 2000-2002, which we attributed to the fundamental differences in the origins of these two recessions.

Of course, our study addressed the dynamics of one city, and certainly the paradigmatic nature of Chicago as a “city of neighborhoods” suggests that it is not necessarily representative (Sampson, 2011). We thus would urge replication of our multilevel change modeling approach in different urban geographies. If, indeed, the conclusion of disparate impacts of business cycles on disadvantaged neighborhoods can be generalized, it holds broad implications for urban social problems, politics and policy makers. As the nation’s macroeconomic woes ensue they will disproportionately penalize our cities’ most vulnerable neighborhoods, pushing more of them over the threshold of spiraling downward decay and social disorder (Galster, Querica and Cortes, 2000; Galster, 2002; Galster, Cutsinger and Malega, 2008). Whether these communities, their residents, and the cities of which they are a part can recover from these blows should be of major concern and sustained attention.

REFERENCES

Baumer, E. P. (2002), "Neighborhood Disadvantage and Police Notification by Victims of Violence," *Criminology*, 40: 579–617.

Birch, David and 7 others (1979). *Behavioral Foundations of Neighborhood Change*. Cambridge, MA: Joint Center of Housing Studies.

Cui, Lin (2010) *Foreclosure, Vacancy and Crime*. Pittsburgh, PA: University of Pittsburgh, Department of Economics working paper, Oct.

Doussard, Marc, Jamie Peck and Nic Theodore (2009) "After Deindustrialization: Uneven Growth and Economic Inequality in 'Postindustrial' Chicago," *Economic Geography* 85(2): 183-207.

Ellen, Ingrid, Johanna Lacoé, Claudia Sharygin (2011) *Do Foreclosures Cause Crime?* NY: New York University, Wagner School-Furman Center working paper, May.

Galster, George (1987) *Homeowners and Neighborhood Reinvestment*. Durham: Duke University Press.

Galster, George (2002) "An Economic Efficiency Analysis of Deconcentrating Poverty Populations," *Journal of Housing Economics* 11 (4): 303-329.

Galster, George, Jackie Cutsinger and Ron Malega (2008) "The Costs of Concentrated Poverty: Neighborhood Property Markets and the Dynamics of Decline," pp. 93-113 in

Nicolas Retsinas and Eric Belsky, eds. *Revisiting Rental Housing: Policies, Programs, and Priorities*. Washington, DC: Brookings Institution Press, 2008

Galster, George, Jackie Cutsinger and Up Lim (2007) "Are Neighborhoods Self-Stabilizing? Exploring Endogenous Dynamics" *Urban Studies* 44 (1): 1-19.

Galster, George, Chris Hayes, and Jennifer Johnson (2005) "Identifying Robust, Parsimonious Neighborhood Indicators," *Journal of Planning Education and Research* 24 (3): 265-280.

Galster, George and Garry Hesser (1981) "Residential Satisfaction: Contextual and Compositional Correlates," *Environment and Behavior* 13:735-758.

Galster, George and Ronald Mincy (1993) "Explaining the Changing Fortunes of Metropolitan Neighborhoods, 1980-1990," *Housing Policy Debate* 4 (3): 303-354.

Galster, George, Ronald Mincy, and Mitchell Tobin (1997) "The Disparate Neighborhood Racial Impacts of Metropolitan Restructuring," *Urban Affairs Review* 32 (6): 797-824.

Galster, George, Roberto Quercia and Alvaro Cortes (2000) "Identifying Neighborhood Thresholds: An Empirical Exploration," *Housing Policy Debate* 11 (3): 701-732.

Goldstein, Ira (2007) *Lost Values: A Study of Predatory Lending in Philadelphia*. Philadelphia: The Reinvestment Fund.

Goodstein, Ryan and Yan Lee (2010.) *Do Foreclosures Increase Crime?* Washington, DC: Federal Deposit Insurance Corp., Center for Financial Research Working Paper 2010-05.

Goudriaan, H., Wittebrood, K., and Nieubeerta, P. (2006). "Neighbourhood Characteristics and Reporting Crime: Effects of Social Cohesion, Confidence in Police Effectiveness and Socio-Economic Disadvantage." *British Journal of Criminology* 46: 719–742.

Grigsby, William, Morton Baratz, Duncan MacLennan and George Galster (1987). *The Dynamics of Neighborhood Change and Decline*. London: Pergamon Press.

Hackworth, Jason (2001). "Inner-city real estate investment, gentrification, and economic recession in New York City," *Environment and Planning A* 33: 863 – 880.

Harding, David, Eric Rosenblatt and Vincent Yao (2009) "The Contagion Effect of Foreclosed Properties," *Journal of Urban Economics* 66 (3): 164-178.

Immergluck, Dan and Geoff Smith (2006a) "The External Costs of Foreclosure: The Impact of Single-Family Mortgage Foreclosures on Property Values," *Housing Policy Debate* 17(6): 57-79.

Immergluck, Dan and Geoff Smith (2006b) "The Impact of Single-Family Mortgage Foreclosures on Neighbourhood Crime," *Housing Studies* 21 (6): 851-866.

Kasarda, John (1985) "Urban Change and Minority Opportunities," pp. 33-67 in *The New Urban Reality*, ed. by P. Peterson. Washington, DC: Brookings Institution.

Katz, Charles, Danielle Wallace and E.C. Hedburg (2011) "A Longitudinal Assessment of the Impact of Foreclosure on Neighborhood Crime," *Journal of Research in Crime and Delinquency*, published online Dec. 26, 2011; doi: 10.1177/022427811431155.

Kingsley, G. Thomas, David Price and Robin Smith (2009) *Impacts of Foreclosures on Families and Communities*. Washington, DC: The Urban Institute; available at <http://www.urban.org/publications/411910.html>

Lim, Up and George Galster (2009) "The Dynamics of Neighborhood Property Crime Rates," *Annals of Regional Science* 43 (4): 925-945.

Ong, Paul, James Spencer, Michela Zonta, Todd Nelson, Douglas Miller and Julia Heintz-Mackoff. (2003) *The Economic Cycle and Los Angeles Neighborhoods; 1987-2001*. Report to the John Randolph Haynes and Dora Haynes Foundation submitted by The Ralph & Goldy Lewis Center for Regional Policy Studies, UCLA School of Public Policy and Social Research.

Sampson, R. J. (2011). *Great American City: Chicago and the Enduring Neighborhood Effect*. Chicago: University of Chicago Press.

Saulney, Susan (2012) "When Living in Limbo Avoids Living on the Street," *New York Times*, March 4: A11.

Sawicki, David S., and Patrice Flynn (1996) "Neighborhood indicators: A review of the literature and an assessment of conceptual and methodological issues," *Journal of the American Planning Association* 62 (2): 165-83.

Squires, Gregory (1982) "Runaway Plants, Capital Mobility, and Black Economic Rights," pp. 62-97 in *Community and Capital in Conflict*, ed. by J. Raines, L. Berson, and D. Gracie. Philadelphia: Temple University Press.

Squires, Gregory. (2011) "Segregation as a Driver of Subprime Lending and the Ensuing Economic Fallout," pp. 277—288 in Robert Silverman and Kelly Patterson (eds.), *Fair and Affordable Housing in the U.S.* Leiden, NL: Brill.

Wilson, William J. (1987) *The Truly Disadvantaged*. Chicago: University of Chicago Press.

Table 1
Chicago Neighborhood Indicators Analyzed:
Citywide Averages and Standard Deviations, 2002-2009

Indicator	Mean	Std. Dev.
Property crime reports per 10,000 persons	476.24	44.36
Violent crime reports per 10,000 persons	141.36	15.79
Home purchase loan amounts (\$ in thousands) per owner-occupied, single-family housing units	29.83	9.69
Mean Home purchase loan amounts (\$ in thousands) per loan origination	215.53	32.41
Completed foreclosures per 10,000 owner-occupied, single-family housing units	154.63	51.53
Business loan amounts (\$ in thousands) per square mile of commercial land area	33289.38	5217.38
Resident workers per 10,000 working-age persons	4234.34	375.42

SOURCE: Authors' analysis of data assembled by Metro Chicago Information Center.

Table 2
Estimated Neighborhood Indicator Trajectories, Chicago Overall, by Period

	2000 to 2002		2003 to 2005		2006 to 2009	
	Intercept	Slope	Intercept	Slope	Intercept	Slope
Property crime rate	610.8 *** (57.0)	-34.3 *** (7.6)	545.0 *** (42.9)	-26.2 *** (4.0)	498.7 *** (39.9)	-13.6 *** (4.4)
Violent crime rate	190.2 *** (17.7)	-6.5 *** (2.2)	161.8 *** (14.0)	-4.3 *** (1.3)	157.6 *** (14.1)	-9.4 *** (1.7)
Completed foreclosures	227.5 *** (39.4)	86.6 *** (18.3)	401.4 *** (65.8)	-99.8 *** (17.8)	105.1 *** (13.8)	25.3 *** (4.3)
Total home purchase loan \$	40.1 *** (9.3)	6.0 *** (1.4)	60.4 *** (12.2)	15.7 *** (4.3)	89.3 *** (16.5)	-19.9 *** (3.3)
Mean home purchase loan \$	139.4 *** (5.3)	12.6 *** (0.9)	182.0 *** (6.6)	-2.6 *** (0.7)	189.0 *** (5.9)	8.5 *** (2.0)
Total small business loan \$	322.1 *** (85.6)	25.3 *** (5.9)	451.5 *** (86.4)	-21.8 *** (6.8)	457.3 *** (85.8)	-58.9 *** (12.0)
Employed resident rate	NA	NA	42.9 *** (0.8)	-0.2 (0.2)	40.8 *** (1.0)	-0.0 (0.5)

NOTES: Indicator trajectories were estimated using multilevel change models. Parameters shown above are the fixed effects. Statistical significance levels: *** = 1 percent; ** = 5 percent; * = 10 percent.

Table 3A
Estimated Neighborhood Indicator Trajectories, Group I, by Period

	2000 to 2002		2003 to 2005		2006 to 2009	
	Intercept	Slope	Intercept	Slope	Intercept	Slope
Property crime rate	620.2 *** (50.2)	-20.3 (13.0)	603.9 *** (40.7)	-24.5 ** (9.1)	580.6 *** (30.4)	-12.1 (7.6)
Violent crime rate	236.2 *** (16.7)	3.2 (4.3)	230.0 *** (17.1)	-1.8 (3.3)	244.7 *** (17.0)	-9.5 ** (4.0)
Completed foreclosures	215.3 *** (25.9)	77.3 *** (12.7)	445.7 *** (47.3)	-101 *** (16.7)	173.2 *** (24.2)	8.3 (17.7)
Total home purchase loan \$	4.5 *** (0.4)	0.2 (0.3)	6.1 *** (0.6)	2.4 *** (0.4)	10.9 *** (1.5)	-3.2 *** (0.5)
Mean home purchase loan \$	95.7 *** (5.0)	2.6 (2.2)	115.0 *** (4.7)	-2.2 * (1.1)	131.9 *** (9.7)	8.4 (8.6)
Total small business loan \$	106.1 *** (18.4)	7.0 (5.4)	138.6 *** (26.9)	-4.7 (10.1)	158.6 *** (26.0)	-29.2 *** (7.2)
Employed resident rate	NA	NA	38.0 *** (0.7)	-0.8 (0.6)	35.7 *** (1.2)	-0.2 (1.1)

(continued)

Table 3B
Estimated Neighborhood Indicator Trajectories, Group II, by Period

	2000 to 2002		2003 to 2005		2006 to 2009	
	Intercept	Slope	Intercept	Slope	Intercept	Slope
Property crime rate	335.9 *** (22.2)	-13.2 *** (3.4)	300.2 *** (21.0)	-11.7 ** (4.7)	263.1 *** (17.9)	3.2 (6.1)
Violent crime rate	64.3 *** (8.9)	-4.0 ** (1.6)	54.7 *** (6.7)	-2.7 ** (1.1)	49.5 *** (6.2)	-1.9 *** (0.6)
Completed foreclosures	65.3 ** (28.6)	4.4 (12.2)	73.7 *** (12.7)	-18.5 *** (4.3)	22.3 *** (5.1)	19.1 *** (3.0)
Total home purchase loan \$	28.8 *** (7.6)	4.8 ** (2.2)	43.3 *** (12.1)	8.3 *** (2.1)	49.6 *** (12.8)	-10.2 *** (2.3)
Mean home purchase loan \$	155.1 *** (6.7)	15.5 *** (1.3)	205.2 *** (8.5)	-3.8 *** (1.3)	198.3 *** (8.2)	9.3 *** (2.1)
Total small business loan \$	346.9 *** (49.8)	42.6 ** (15.9)	553.2 *** (69.7)	-42.7 *** (14.3)	546.5 *** (72.0)	-75.6 *** (13.1)
Employed resident rate	NA	NA	48.1 *** (1.0)	-0.0 (0.3)	44.4 *** (1.8)	0.4 (1.6)

(continued)

Table 3C
Estimated Neighborhood Indicator Trajectories, Group III, by Period

	2000 to 2002		2003 to 2005		2006 to 2009	
	Intercept	Slope	Intercept	Slope	Intercept	Slope
Property crime rate	462.6 *** (29.2)	-16.5 ** (7.5)	429.8 *** (30.6)	-33.9 *** (5.5)	362.1 *** (24.5)	-8.7 ** (3.3)
Violent crime rate	117.9 *** (14.8)	-0.4 (2.2)	104.1 *** (12.6)	-4.6 * (2.6)	97.3 *** (11.9)	-3.9 *** (1.4)
Completed foreclosures	117.5 ** (45.6)	40.3 * (22.6)	218.8 ** (76.4)	-62.4 ** (26.1)	52.1 *** (17.3)	49.9 *** (5.7)
Total home purchase loan \$	14.4 *** (1.6)	2.2 *** (0.5)	23.4 *** (2.9)	6.1 *** (1.7)	29.1 *** (4.8)	-8.3 *** (1.4)
Mean home purchase loan \$	128.2 *** (6.4)	15.5 *** (1.8)	179.7 *** (9.0)	-4.2 ** (1.7)	187.1 *** (7.9)	-1.6 (4.6)
Total small business loan \$	135.5 *** (18.6)	14.8 (9.0)	231.7 *** (24.2)	-5.8 (6.9)	186.8 *** (21.0)	-21.8 *** (4.7)
Employed resident rate	NA	NA	41.7 *** (2.0)	-1.1 *** (0.2)	37.8 *** (1.8)	-0.6 (0.7)

(continued)

Table 3D
Estimated Neighborhood Indicator Trajectories, Group IV, by Period

	2000 to 2002		2003 to 2005		2006 to 2009	
	Intercept	Slope	Intercept	Slope	Intercept	Slope
Property crime rate	731.2 *** (66.4)	-42.2 *** (12.6)	658.6 *** (52.5)	-24.6 ** (10.4)	625.3 *** (49.4)	-32.1 *** (6.9)
Violent crime rate	374.9 *** (39.3)	-18.8 *** (6.8)	302.6 *** (28.5)	-7.1 (4.3)	290.4 *** (29.3)	-22.0 *** (4.8)
Completed foreclosures	584.8 *** (117.6)	248.9 *** (56.3)	1028 *** (191.7)	-254 *** (54.4)	234.9 *** (34.8)	33.7 * (18.9)
Total home purchase loan \$	23.2 *** (3.5)	7.5 *** (2.3)	46.7 *** (8.5)	20.6 *** (5.7)	116.9 *** (27.4)	-35.2 *** (9.1)
Mean home purchase loan \$	120.8 *** (8.9)	11.9 *** (2.3)	158.8 *** (9.4)	-2.5 (1.7)	180.3 *** (11.4)	8.9 (7.2)
Total small business loan \$	120.3 *** (19.7)	21.5 (19.2)	216.6 *** (41.1)	5.1 (9.0)	248.5 *** (42.2)	-34.3 ** (14.6)
Employed resident rate	NA	NA	36.8 *** (0.8)	-0.1 (0.3)	36.2 *** (1.1)	-0.0 (0.6)

(continued)

Table 3E
Estimated Neighborhood Indicator Trajectories, Group V, by Period

	2000 to 2002		2003 to 2005		2006 to 2009	
	Intercept	Slope	Intercept	Slope	Intercept	Slope
Property crime rate	1398 ** (435.2)	-134 ** (53.4)	1116 *** (308.4)	-62.3 *** (16.2)	1012 *** (285.5)	-28.9 (32.2)
Violent crime rate	166.6 *** (40.1)	-10.8 (7.7)	128.6 *** (25.5)	-5.4 (3.2)	121.6 *** (28.5)	-10.3 * (5.2)
Completed foreclosures	47.1 ** (15.9)	29.5 *** (8.0)	87.7 *** (23.3)	-24.9 (15.2)	17.3 * (7.6)	4.7 (5.5)
Total home purchase loan \$	222.5 *** (60.7)	22.6 * (12.5)	304.0 *** (72.2)	65.7 * (37.2)	379.5 *** (94.1)	-59.3 *** (17.1)
Mean home purchase loan \$	230.9 *** (11.6)	16.6 *** (3.2)	284.0 *** (15.9)	2.7 (3.5)	279.0 *** (19.1)	24.0 ** (11.0)
Total small business loan \$	1453 * (763.1)	32.1 (35.9)	1654 * (716.8)	-84.3 * (40.1)	1705 ** (693.8)	-188 ** (88.7)
Employed resident rate	NA	NA	52.5 *** (1.4)	1.9 ** (0.8)	55.8 *** (4.2)	0.3 (3.3)

NOTES: Indicator trajectories were estimated using multilevel change models. Parameters shown above are the fixed effects. Statistical significance levels: *** = 1 percent; ** = 5 percent; * = 10 percent.

Table 4
Comparative Neighborhood Indicator Trajectories across Groups, Chicago 2006-2009
[bold = inferior to Overall; rank shown parenthetically, with 1=most inferior performance, 5=least]

	Overall	I	II	III	IV	V
Property crime rate	-13.6	-12.1 (3)	3.2 (1)	-8.7 (2)	-32.1 (5)	-28.9 (4)
Violent crime rate	-9.4	-9.5 (3)	-1.9 (1)	-3.9 (2)	-22.0 (5)	-10.3 (4)
Completed foreclosures	25.3	8.3 (4)	19.1 (3)	49.9 (1)	33.7 (2)	4.7 (5)
Total home purchase loan \$	-19.9	-3.2 (5)	-10.2 (3)	-8.3 (4)	-35.2 (2)	-59.3 (1)
Mean home purchase loan \$	8.5	8.4 (2)	9.3 (4)	-1.6 (1)	8.9 (3)	24.0 (5)
Total small business loan \$	-58.9	-29.2 (4)	-75.6 (2)	-21.8 (5)	-34.3 (3)	-188 (1)
Employed resident rate	-0.0	-0.2 (2)	0.4 (5)	-0.6 (1)	-0.0 (3)	0.3 (4)

NOTES: Indicator trajectories were estimated using multilevel change models, as reported in Tables 2, 3A-E.

Table 5
Comparative Neighborhood Indicator Trajectories across Chicago Neighborhood Groups, 2000-2002
[bold = inferior to Overall; rank shown parenthetically, with 1=most inferior performance, 5=least]

	Overall	I	II	III	IV	V
Property crime rate	-34.3	-20.3 (3)	-13.2 (1)	-16.5 (2)	-42.2 (4)	-134 (5)
Violent crime rate	-6.5	3.2 (1)	-4.0 (3)	-0.4 (2)	-18.8 (5)	-10.8 (4)
Completed foreclosures	86.6	77.3 (2)	4.4 (5)	40.3 (3)	248.9 (1)	29.5 (4)
Total home purchase loan \$	6.0	0.2 (1)	4.8 (3)	2.2 (2)	7.5 (4)	22.6 (5)
Mean home purchase loan \$	12.6	2.6 (1)	15.5 (3)	15.5 (3)	11.9 (2)	16.6 (5)
Total small business loan \$	25.3	7.0 (1)	42.6 (5)	14.8 (2)	21.5 (3)	32.1 (4)

NOTES: Indicator trajectories were estimated using multilevel change models, as reported in Tables 2, 3A-E; employed resident rates are omitted since data unavailable for this period.

Figure 1
Conceptual Framework for Disparate Impacts of Macroeconomic Forces

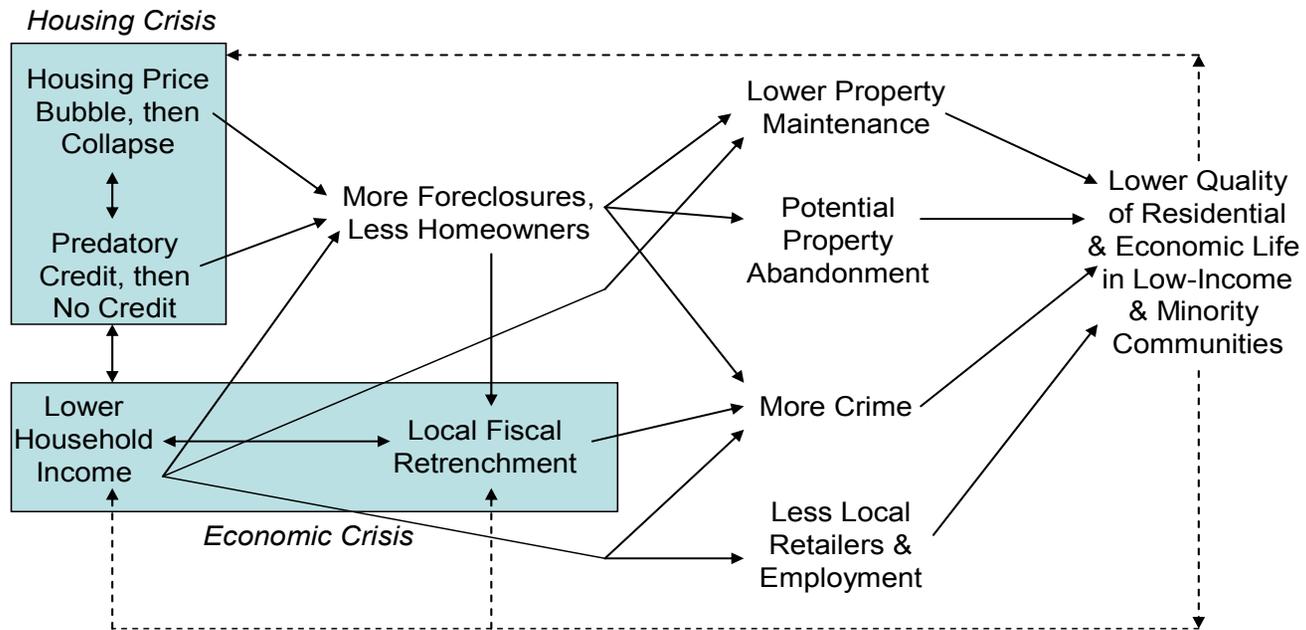
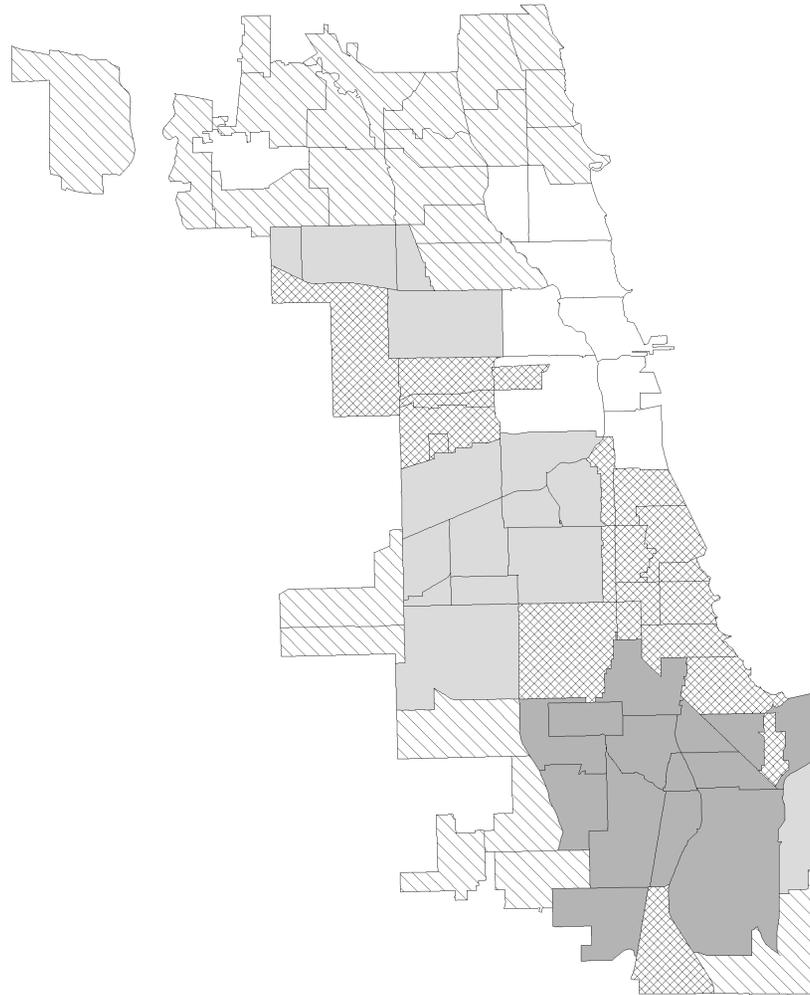
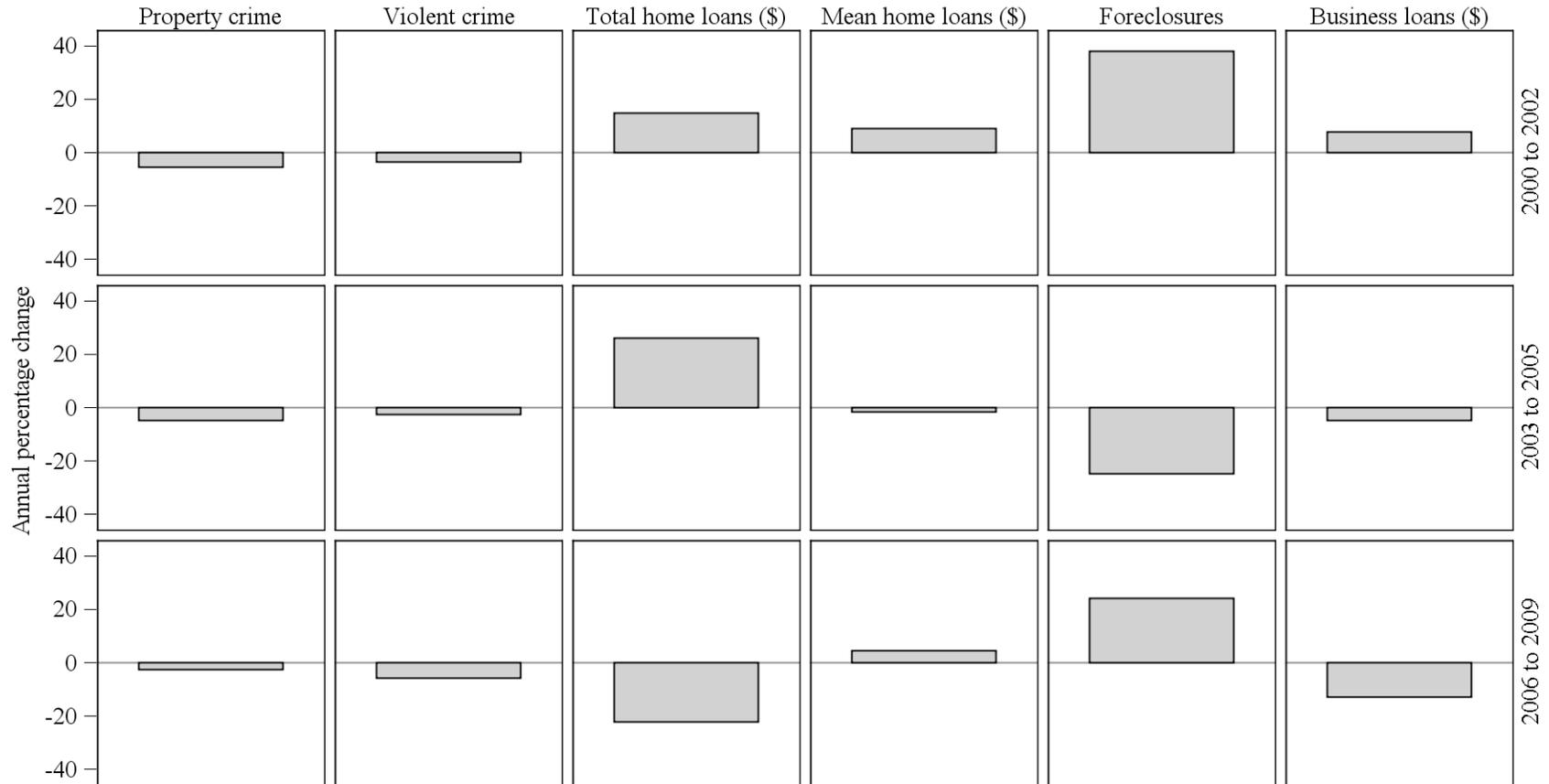


Figure 2
Community Areas and Five Neighborhood Clusters in Chicago



Neighborhood Group: I II III IV V

Figure 3
Chicago Neighborhood Indicator Trajectories*, by Period



SOURCE: Authors' analysis of data assembled by Metro Chicago Information Center.

* annual average rate of change based on information in Table 2; information on employed residents omitted since not available all periods

Appendix Table 1

Mean Characteristics of Chicago Neighborhoods, by Group,

Characteristic used in Cluster Analysis [year 2000 unless noted otherwise]	All	Neighborhood Group				
		I	II	III	IV	V
<u>Population and households</u>						
Population change, 1990-2000 (%)	3.6	-5.0	5.6	20.4	-9.7	13.7
Population age 55+ change, 1990-2000 (%)	-6.8	11.2	-10.5	-13.3	-12.5	1.2
Black (%)	42.7	90.9	10.7	8.8	84.2	20.4
Hispanic (%)	21.0	5.3	21.0	61.4	4.4	12.2
Foreign-born (%)	18.6	3.6	26.9	37.0	6.5	13.8
Less than high school education (%)	29.3	25.3	22.0	45.7	34.6	13.5
Unemployed civilian labor force (%)	6.8	8.4	3.8	5.8	10.9	4.7
Living in poverty (%)	20.9	19.9	10.6	17.4	38.1	16.7
Household poverty (%)	19.6	18.6	10.1	16.7	36.0	14.4
Households receiving public assistance (%)	8.5	11.0	3.2	5.9	17.1	3.8
Households with earnings (%)	77.1	76.6	80.7	80.9	67.1	84.8
Mean annual household income (\$)	45,90					
	49,646	8	57,022	45,826	34,491	78,646
Households with single mothers (%)	11.6	15.2	5.0	9.0	21.7	4.8
Moved in last five years (%)	57.1	68.7	57.7	56.0	57.0	38.8
<u>Housing units (%)</u>						
Rentals	47.6	36.8	39.1	44.6	63.5	56.6
Vacant	8.7	7.5	4.2	7.0	15.6	10.0
Multi 2 to 4	31.4	25.8	22.9	51.0	33.9	22.7
Multi 5 or more	32.9	15.9	30.4	11.9	49.8	65.0
Built in last 5 years	2.6	0.9	1.7	2.0	3.0	8.4
<u>Housing market</u>						
Single-family home purchase loans (N)	2,313	476	1,830	1,127	1,713	10,471
Change in number of loans, 1995-2000 (%)	74.6	27.9	43.7	9.2	138.2	207.0
Single-family home loan mean amount (\$)	140	97	155	128	119	232
Change in mean loan amount, 1995-2000 (%)	36.0	33.5	36.3	34.5	36.8	40.4
Filed foreclosures (N)	310	265	89	177	763	161

Characteristic used in Cluster Analysis [year 2000 unless noted otherwise]	All	Neighborhood Group				
		I	II	III	IV	V
Change in filed foreclosures, 1998-2000 (%)	36.0	25.5	10.2	35.8	59.0	73.8
Completed foreclosures (N)	226	222	69	126	563	49
Change in number of completed foreclosures (%)	51.5	67.9	23.5	54.6	92.0	-0.6

SOURCE: MDRC analysis of data assembled by Metro Chicago Information Center (MCIC).

NOTES: Shown above is the mean (average) across neighborhoods for the indicated characteristics. Unless otherwise indicated, the reference period for measurement is 2000. The percentage of individuals and households living in poverty is defined using income thresholds set by the Office of Management and Budget that vary by family size.

Endnotes

1 The Census tract designations used for these transformations are the definitions created after the 2000 decennial Census; data collected or assembled using earlier designations was transformed to the 2000-era designations using the relational matrices published by the US Census Bureau. For most of the neighborhoods, the definitional boundaries align with tract boundaries such that the neighborhood-level measure is the aggregation of the tract-level measure. In cases where this is not true, the tract values were apportioned between multiple neighborhoods based on the distribution of the tract's population between the multiple neighborhoods.

2 With multiple incidents the report is classified in the UCR category of the most serious crime (generally, the crime with the highest potential penalty). Note that these are police reports and do not reflect later adjudication of the incident (e.g., an assault recorded on the initial report as a criminal act later adjudicated as justifiable self-defense is still included).

3 HMDA data are used instead of sales price data due to the relatively longer time series available; HMDA data was available starting in 1992 while the sales price data was only available as two, incongruent time series that covered a more limited period. The HMDA and sales price data exhibited the same trends for the times in which we had overlapping coverage. Galster, Hayes, and Johnson (2005) demonstrated the value of HMDA data as a source for constructing neighborhood indicators.

4 Both filed and completions data exclude ownership transfers that occur as the result of financial distress (short sales or deed-in-lieu-of-foreclosure transactions).

5 Details of the cluster analysis procedures, indicator variables employed, and allocations of particular neighborhood to cluster groups are available from the authors.

6 This is a more refined way of dealing with "abnormal" spikes/troughs in longitudinal trajectories, which examination of our data indicate are focused on specific neighborhoods rather than across the entire sample.

7 The multilevel model random effects are different from the random effects commonly used in econometric time series models. In the multilevel formulation, the random effects are equivalent to main effects, with the descriptor "random" referring to the nature of the neighborhoods (i.e., they are theoretically drawn at random from some larger population). In contrast, the econometric random effects describes the effect of individual differences (i.e., random disturbance), which is necessary to account for to generate unbiased estimates for the main effects.

8 The trend and trajectory seen for Chicago and its neighborhoods is consistent with data reported by the FFIEC regarding national trends in these loans. An additional explanation for the results reported here is the cut-off point for reporting; that is, due to inflation and other trends in business capitalization, one million dollars may no longer reflect the high point for the types of loans the data collection program was intended was track.

9 There are several potential explanations for this long-term decline, including reductions in the pool of teenagers, stabilization of local drug markets, mandatory prison sentencing requirements, and new policing strategies.

10 This was the conclusion of Galster, Cutsinger, and Lim (2007) and Lim and Galster (2008) in their analyses of neighborhood crime dynamics. Note that this argument cannot be made in the aforementioned case of foreclosures because in general there was a positive correlation between starting levels and rates of change: .80 for Chicago overall.

11 Correlations are available upon request.