Article

Urban Studies

Urban Studies
1–18

DOI: 10.1177/00420980211070405
journals.sagepub.com/home/usj
SAGE

Exodus in the American metropolis: Predicting Black population decline in Chicago neighbourhoods

Michael Snidal
Columbia University, USA

Magda Maaoui
Columbia University, USA

Tyler Haupert
New York University Shanghai, China

Abstract

Urban population decline in the largest metropolitan regions of the United States is now explained almost exclusively by a 'Black exodus'. In Chicago, competing 'push' explanations have been put forth to explain Black population loss in urban neighbourhoods, including housing instability, cost of living, unemployment and crime. However, no study to date estimates the predictive power of each of these factors. This article seeks to answer the research question: which neighbourhood characteristics predict Black exodus in Chicago? We explore relationships between Black population loss in Chicago and a comprehensive range of metrics representing economic and social conditions. A fixed-effects multivariate panel regression is specified for the years 2010 to 2018 at the census tract level and cross-checked with bivariate Granger causality tests. We find that foreclosure filings predict Black population decline, and suggest that government prioritise foreclosure relief policies to stem Black exodus.

Keywords

Black exodus, demographics, ethnicity, housing, method, migration, neighbourhood change, race

Corresponding author:
Michael Snidal, Urban Planning, Columbia University, 116th Street & Broadway, New York, NY 10027-6902, USA.
Email: mjs2267@columbia.edu

摘要

美国最大大都市地区的城市人口下降现在几乎完全可以用“黑人外流”来解释。在芝加哥，人们针对城市街区中黑人人口的流失提出了相互竞争的“推动”解释，包括住房不稳定性、生活成本、失业和犯罪。然而，迄今为止没有任何研究对每一个此等因素的预测能力进行过估计。本文试图回答这样一个研究问题：在芝加哥，哪些街区特征预示着黑人的外流？我们研究芝加哥黑人人口流失与代表经济和社会状况的、全面的各项指标之间的关系。我们在人口普查区一级确定了 2010 年至 2018 年期间的固定效应多元面板回归，并用双变量格兰杰因果检验进行了交叉校验。我们发现止赎申请预示着黑人人口的减少，并建议政府优先考虑止赎救济政策以阻止黑人外流。

关键词

黑人外流、人口统计学、民族、住房、方法、移民、街区变化、种族

Received November 2020; accepted November 2021

Introduction

Scholarly research on urban population decline has traditionally focused on ‘white flight’ and its explanations. However, central city population loss in the major metropolitan regions of the United States is now explained almost exclusively by a ‘Black exodus’. ‘Nowhere has Black exodus gained more attention than in Chicago, which lost over 350,000 net Black residents between 1980 and 2015 (US Census)’ - does US Bureau of the Census Nowhere has Black exodus gained more attention than in Chicago, which lost over 350,000 net Black residents between 1980 and 2015 (US Census). The mainstream press has advanced a host of ‘push’ factors leading Black households to exit neighbourhoods, including housing instability, cost of living, lack of employment opportunities, crime and neighbourhood inequality (Glanton, 2019; Hobson et al., 2019; Loury, 2018; Saunders, 2019). To shed light on these media representations, this is the first econometric analysis to assess which of these factors signal Black population decline.

We examine the relationship between Black population decline in Chicago neighbourhoods and metrics representing foreclosures, mortgage activity, median household rent, small-business lending, unemployment, labour force participation, median income, poverty, high school dropout rate, inequality and violent crime.

We specify a fixed-effects time series regression to determine the relationship between Black population decline and these predictive metrics between 2010 and 2018. Time-series regression results offer evidence of causal relationships between certain variables and Black population change but cannot untangle the temporality of the relationships or whether Black population change evolves in a path-dependent, self-predicting manner. We address these challenges by employing a series of bivariate Granger causality tests to check the direction of relationships.

Modelling reveals that foreclosures best predict Black population loss in Chicago. Therefore, we discuss foreclosure prevention policies that may help prevent Black exodus. Finally, we suggest avenues for future research and recommend Granger testing as an innovative way to check for robustness between relationships and plan for neighbourhood change.

Background

An exodus of Black residents from central city neighbourhoods has been remaking the composition of America since the 1970s and continues largely unabated today (Frey, 2018). There is a deep historical literature outlining the forces behind the 'Great Migration': the resettlement of over six million African Americans from the rural South to the urban centres of the North and the West that occurred between approximately 1915 and 1970 (Lemann, 2011; Wilkerson, 2011). Likewise, there is extensive scholarly debate on the causes of 'white flight' (Boustan, 2010; Frey, 1979; Galster, 1990; Marshall, 1979). While a handful of works document Black suburbanisation and reverse migration processes (Falk et al., 2004; Stack, 1996; Wiese, 2004), these works explain Black exit from urban neighbourhoods primarily as the result of 'pull' processes. This is the first peer-reviewed study examining push factors that explain Black population decline at the neighbourhood level.

Black exodus: The numbers

Chicago's population has declined by over 650,000 since 1970. Most of this loss has stemmed from high poverty Black communities (McDonald, 2018).[1] Figure 1 documents overall Black population change by Chicago census tract for the 2009–2018 study period. Black population decline is highest in residential neighbourhoods on the south and west sides of the city. Generally, these neighbourhoods suffer from lower quality of life and neighbourhood indicators including racial segregation, poverty, unemployment, high crime and foreclosures.[2] This supports the notion that neighbourhood-level push factors play an important role in Black exodus.

Explanations for Black exodus

Early Black exit from the neighbourhoods of the Great Migration is frequently attributed to Civil Rights legislation[3] and described as a continuation of previous Black migration patterns within city boundaries, where older white communities became places of increased and segregated Black development. However, early departures may also have reflected the poor quality of life of inner-city neighbourhoods. The disappearance of industrial jobs coupled with segregation and displacement from urban renewal led to extreme poverty and unemployment for working-class Blacks, while national economic prosperity led to a new white-collar Black middle class in search of better housing. As Wiese (2004: 211) summarises: 'fueled by rising incomes, growing population, deterioration, and demolition at the urban core, Black neighborhoods "spilled over" into the surrounding ring'.

Wiese describes Black suburbanisation in the 1990s as a search for quality housing, work, neighbourhood amenities and schools but also indicates that these moves were motivated by factors pushing families from the city, particularly violent crime. Black suburbanites across the nation identified urban crime as a principal motivation for outmigration in the 1990s (Wiese, 2004: 265). During this decade, Chicago's crime was 50% higher than in the mid-1980s and three times higher than in the 1970s (Reardon, 1993). In a survey of 3000 people who left Chicago in 1992, 'the desire for a safer place to live' was the leading response for why people chose to relocate (Reardon, 1993). Alternatively, Pattillo-McCoy (2000) suggests that Black suburbanisation in this period was the continued expansion of middle-class neighbourhoods restricted by racial residential segregation.

These examinations of Black suburbanisation do not account for continued exodus

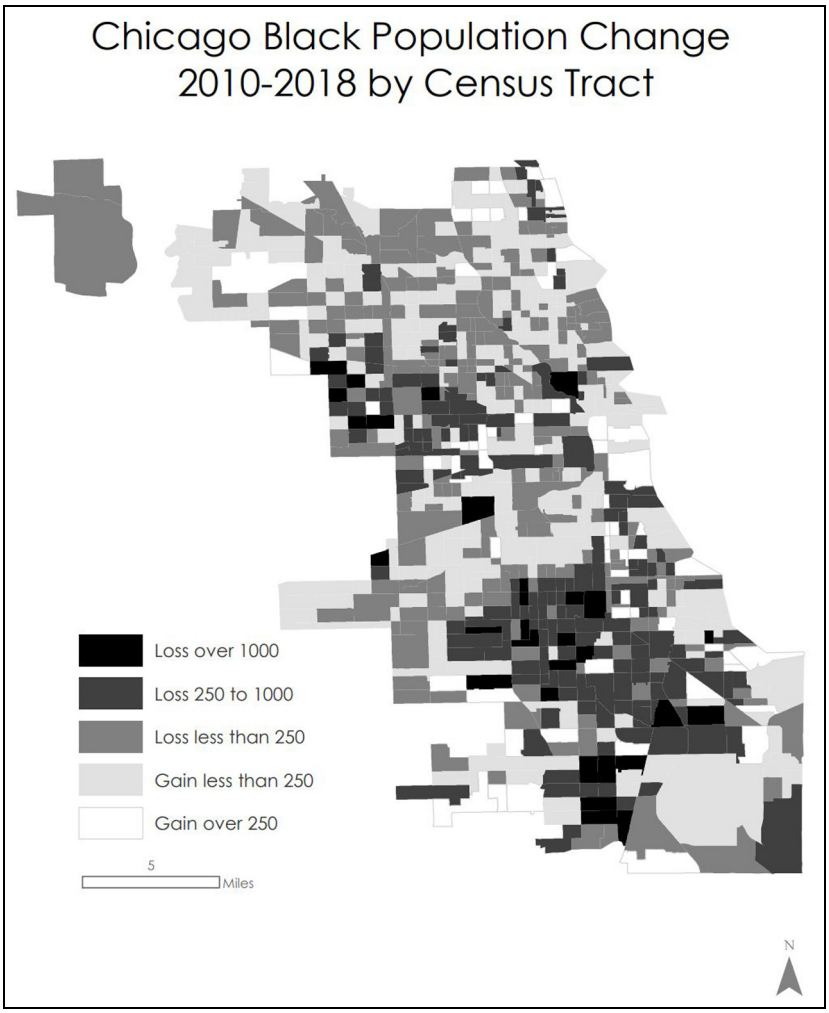

Figure 1. Chicago Black population change 2010-2018.

in the 21st century. Moreover, they focus primarily on outcomes around segregation and economic opportunity in the suburbs. They mention but do not investigate the forces motivating Black exit from urban cores. This is in sharp contrast to a large body of historical literature and scholarly debate regarding push factors motivating 'white flight' that we review below.[4] Studies on the causes of a 'reverse great migration', where Blacks have left metropolitan regions of the North altogether, also focus primarily on the pull factors attracting Blacks back to the South. Stack (1996) describes joblessness and urban decay in a 'Call to Home' but gives pre-eminence to the determination to build community, participation and success in the South. Likewise, Falk et al. (2004) define Black outmigration by its receiving end in the 'Land of Promise'.

In Chicago, a host of local newspapers, websites, blogs and radio stations have

increasingly investigated the forces motivating Black households to leave neighbourhoods and the implications for a municipality that would be growing if not for Black population loss. A *Chicago Tribune* article asks: 'If Chicago is a black political mecca, why are African Americans leaving the city in droves?' (Glanton, 2019). A *Chicago Sun Times* headline reads: 'Chicago is losing its black middle class. Can it get it back?' (Ramos, 2018). An article in the *Chicago Reader* (Saunders, 2019) asks if 'Chicago's legacy of segregation [is] causing the Great Reverse Migration'. Finally, a WBUR radio hour special debates: 'Thousands of African Americans are leaving Chicago each year. Why?' (Hobson et al., 2019).

These publications – and myriad others – hypothesise the forces behind Black population decline. These include pull factors such as weather, economic opportunities, cultural ties and networks attracting Black residents to the suburbs and the South. However, they also stress neighbourhood-level factors that are pushing Black families to leave, including disinvestment, lack of affordable housing, unemployment, racial and economic inequality, poor schools, and crime. For example, the *Chicago Tribune* (Lee, 2016) interviews former residents of Chicago's Southside as part of a series on Black exodus. Interviewees emphasise better jobs, warmer weather and cheaper housing but they also stress housing insecurity, lack of grocery stores, crumbling infrastructure and crime in their decision to leave. A *New York Times* article, which investigates Chicago's Black population loss on the precipice of the City electing the second Black mayor in its history, suggests that 'gang violence, miserable job prospects and shuttered schools [are] some of the still-being-identified forces … that are pushing black Chicagoans to pack up and get out' (Davey, 2019).

An analysis of Chicago's population decline by the Chicago Metropolitan Agency for Planning (CMAP, 2018) finds that most Black residents who have left the region (unlike white or Asian residents) were unemployed at the time of their exit – suggesting that lack of job opportunities may also be central to their moves. A report entitled *Between the Great Migration and Growing Exodus* takes the most exhaustive look at Black population decline in Chicago to date. The report finds that Black population shifts in Chicago are correlated with levels of racial inequality around unemployment and wage gaps (Scarborough et al., 2020). Our study builds on these media investigations and this early quantitative analysis, with the first econometric evaluation of what characteristics predict Black population decline in Chicago neighbourhoods.

Conceptual and methodological precedent

While no existing peer-reviewed research systematically evaluates explanations for Black population loss, studies on 'white flight' offer conceptual precedent to isolate push factors that predict it. Furthermore, studies on the causes of neighbourhood change offer a novel econometric method to predict Black exodus at the neighbourhood level.

Following white flight studies, we conceptualise exodus as an outcome of two distinct phases – (1) the decision to move, and (2) the choice of destination. This analytical framework originates from a deep literature on immigration theory formalised by Lee (1966) and is grounded in principles of utility maximisation and rational choice: migration is the result of negative ('push') and positive ('pull') factors.[5] Using this framework, Frey (1979) examines whether integration with Black families or deteriorating housing and economic conditions predict white flight. Likewise, Galster (1990) and Boustan (2010)

estimate effects of racial integration on white turnover. These studies offer precedent to assess the individual weight of push factors in predicting moves while acknowledging that pull factors also influence exit.

A major limitation of white flight studies is their inability to locate causal direction between variables. The neighbourhood change literature, which frequently examines how indicators of well-being and quality of life affect mobility and population dynamics, provides us with a method to overcome this. Until recently, neighbourhood change forecasting – like white flight analysis – has been limited by its use of cross-sectional data, leaving studies unable to determine the direction of causal relationships (Hipp, 2010; Williams et al., 2013). However, two recent studies address this limitation. First, a study by Hipp (2010), examining the relationship between crime rates and a variety of neighbourhood structural characteristics, employs a cross-lagged model to assess the direction of cause and effect. Second, a study by Williams et al. (2013) uses Granger causality tests on year over year data to determine the direction of causation between several neighbourhood characteristics and neighbourhood decline. Long used to assess economic relationships on the national (Narayan and Smyth, 2005; Sant'Anna and Kachova, 2020) and international (Kónya, 2006) scales, Granger testing is well suited to identify time-variant neighbourhood-level relationships.

Following Williams et al. (2013), we develop a series of multivariate regression models to predict neighbourhood-level Black population loss and then check the direction of the relationships using Granger tests. As narratives for Black exodus, in contrast to those for white flight, do not stress racial motivations for household exits, we use variables from the neighbourhood change literature that concern housing, economic and social characteristics. This approach allows us to comprehensively assess the predictors of Black population decline and guide recommendations to planners and policy makers looking to improve the quality of life in places experiencing Black exodus.

These literatures also inform our hypothesis. White flight studies find that economic and housing characteristics contributed to central city exits (Boustan, 2010; Frey, 1979; Galster, 1990). Neighbourhood change research finds that there may be a link between housing vacancy and Black mobility (Han, 2017; Silverman et al., 2013); that increased levels of unemployment and foreclosures may be significantly associated with future rates of population decline (Schuetz et al., 2008; Williams et al., 2013); and that foreclosures are the best predictor of neighbourhood decline (Williams et al., 2013). Therefore, we hypothesise that unemployment and foreclosures predict Black exodus.

Theoretically speaking, there is good reason to suspect these may best forecast population decline. Individuals and households are often directly tied to a neighbourhood via their job and their home. Foreclosures are unique in this regard; they guarantee that an individual or household must move (the only question is to where). We expect other variables, like crime, to have slower and less direct effects.

Data

Our study period is 2010–2018. Census tracts, which generally have a population of between 1200 and 8000 people (United States Census Bureau, 2021), serve as proxies for neighbourhoods. We choose this period to avoid the impact of the 2005–2008 subprime lending boom and the beginning of the subsequent foreclosure crisis and to leverage the American Community Survey's (ACS) yearly population change and demographic data.

The dependent variable, Black population change, is constructed using ACS data.[6] We calculate year-on-year change in total Black population from 2009 to 2018. We examine independent variables of unemployment, labour force participation, small-business lending, foreclosures, mortgage activity, median household rent, median income, poverty, high school dropout rate, inequality and violent crime. Unemployment data comes from the ACS, which calculates the proportion of those aged 16–64 who are in the labour force but without a job.[7] The proportion of adults in the labour force, net of those in institutional settings, is also collected and calculated using ACS data. For sensitivity and to account for the possibility of female members of households not working by choice, we also compute a labour participation statistic for the male population only. This did not improve model fit or alter results.

Following Williams et al. (2013), the annual US dollar amount of Community Reinvestment Act (CRA)-eligible small business loans is collected from the Federal Financial Institutions Examinations Council (FFIEC, 2019) and included as a proxy for the strength of local business activity. We aggregate CRA lending to the Community District level and standardise rates per acre of commercial land – which is determined using surveys commissioned by the Chicago metropolitan Agency on Planning (CMAP).

Mortgage originations and foreclosure filings per 100 residential parcels are obtained at the Community District level by the Institute for Housing Studies at DePaul University (2019).[8] This mortgage data was originally collected under the auspices of the Home Mortgage Disclosure Act (HMDA) and made public by the FFIEC. The foreclosure data was originally collected by the Cook County Circuit Court and made public by the County Assessor's Office. Median household rent is collected at the census tract level from the ACS.

Adult poverty level and median household income by census tract are also obtained from the ACS. Violent crimes including homicides, assaults, robberies and rapes are provided at the block level by the Chicago Police Department. A count of crimes per year is aggregated by census tract and normalised by census tract population.[9] Income inequality is incorporated using census tract-level Gini index scores from the ACS. We also considered measures for high school dropout rate and childhood poverty. These variables were not statistically significant and did not improve model fit, and the results are substantively identical without them.

Finally, we obtain ACS data for Black population change and total population change as well as year-on-year population averages and rates of change for whites, Hispanics and Asians, to confirm that findings are unique to African Americans rather than the result of general demographic shifts. All ACS census data was downloaded from Social Explorer (2019). We use the census tract crosswalk provided by the US2010 Project (2020; https://s4.ad.brown.edu/Projects/Diversity/Researcher/LTBDDload/DataList.aspx) and described by Logan et al. (2014) to calculate population change beginning in 2010.

Methodology

Studies of neighbourhood and population change are frequently limited by large temporal gaps in their study periods due to a reliance on decennial Census data (e.g. Coulton et al., 2012; Freeman, 2009) and their inability to disentangle the chain of causality between independent variables that are theoretically linked in a multi-time-period panel (Hipp, 2010; Williams et al.,

2013). To illustrate, suppose a panel regression finds that past small business activity predicts population loss. This is noteworthy but is insufficient for determining causality. It may also be the case that past information on population loss predicts business activity, or that population loss predicts future population loss without the inclusion of small business activity, bringing the temporal, cause–effect relationship into question. In brief, there may be mutual causality between two variables, or a dependent variable may be self-predicting. We address this limitation by adding Granger causality tests.[10]

We specify our linear panel regression with fixed effects as follows:

$$Y_{it} = \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} \ldots + \alpha_i + u_{it}$$

where Y_{it} represents the dependent variable, Black population change, i represents census tract and t represents time period. Each X_{it} represents one independent variable, with $\beta_{1,2,3}$, etc. serving as the coefficient for that independent variable, α_i represents the unknown intercept for each census tract, and u_{it} represents the error term. This panel regression is specified with robust standard errors clustered at the census tract level to account for heteroskedasticity and serial correlation. To address spatial autocorrelation, a contiguity matrix using first-order neighbours is used to develop a spatially lagged variable for each year of the dependent variable. In other words, the model controls for the possibility that Black population change may be spatially dependent across census tracts.

We then specify a series of bivariate Granger causality panel regressions using the xtgcause command designed by Lopez and Weber (2017).[11] This test is an adaptation of the original Granger causality test (Granger, 1969) which was designed for cross-sectional data.[12] The Granger causality test supplements panel regression results by determining whether past values of each independent variable can, in a bivariate setting, be used to forecast or 'Granger cause' future results of Black population change. We first determine if past information about each independent variable 'Granger cause' Black population change, then determine whether past information on Black population change 'Granger cause' each independent variable. If a variable is found to forecast Black population change, but Black population change does not forecast changes to that variable in a separate test, then we can be satisfied with the temporal relationship. However, if an independent variable forecasts – but is also forecast by – Black population change then we reject our ability to determine which variable predicts the other. It is also possible that a variable neither 'Granger cause' nor is 'Granger caused' by Black population change. In this case, we cannot confirm that a causal relationship between the two variables exists – even if one was identified in the multivariate panel regression specified above.

Descriptive statistics

Observations with missing data points are removed. The resulting analytical sample includes 617 of Chicago's 802 census tracts, representing 2,133,924 of the city's 2,695,598 residents (79.16%) in 2010. Descriptive statistics for the sample are provided in Table 1.

Results

We find that Black population loss in Chicago is predicted by just one variable in our dataset: past foreclosures. Initial panel regression results suggest that median household income and poverty are also associated with future losses of Black population and that violent crimes are associated with future increases in Black population. However,

Table 1. Full analytical sample select descriptive statistics.

	Mean	*SD*	Min.	Max.
Black population change	−26.25	173.6	−1711	1237
Unemployment rate	15.6	10.07	0	59.5
Labour force participation	0.64	0.12	0.04	0.95
Small business loans per commercial acre (000s)	75.05	72.53	0.11	817.6
Foreclosures per 1000 residential units	2.11	1.49	0.1	6.9
Mortgages originated per 1000 residential units	7.89	4.26	0.6	23.6
Median household rent	963.18	254.58	245	2214
Percent adults in poverty	0.23	0.13	0	0.76
Violent crimes per capita	0.038	0.03	0.00	0.28
Gini Index	0.46	0.07	0.19	0.72
Median household income	45,449.07	23,546.82	6696	151,369
White population change	−1.23	125.99	−1286.73	1427
Hispanic population change	−0.81	161.68	−1378.46	1437.78
Asian population change	4.10	76.12	−907	983
Population	3437	1809	454	19,889

Note: $N = 4936$ Census tract years.

Granger causality testing calls these outcomes into question. Table 2 displays results from the panel regression. Positive coefficients indicate that an independent variable, lagged one year, is associated with an increase in Black population. Negative coefficients indicate that an independent variable, lagged one year, is associated with a decrease in Black population.

The lag term controlling for spatial autocorrelation of Black population change is not statistically significant. This suggests that census tracts experiencing Black population change do not predict future Black population change in contiguous census tracts. We consider the possibility that neighbourhoods experiencing foreclosures have compounding negative effects on nearby neighbourhoods by specifying a separate model with a spatially lagged variable for foreclosures.[13] This lag term also does not demonstrate statistical significance or alter the findings.

Models that specify other racial groups as the dependent variable of analysis indicate that the relationship between foreclosures and Black population change is unique. For example, violent crime and unemployment – not foreclosures – are associated with Hispanic population change. Considering that turnover of a neighbourhood may not be immediate, we specify models to lag racial control variables by one year. Finally, as variables like poverty and employment might have even more delayed impacts on population change, we specify additional models with control variables lagged for two or more years. In all models, the negative relationship between foreclosures and Black population change remains significant at the $p < 0.01$ level.[14]

Results from Granger tests are displayed in Table 3. Results display tests of the null hypothesis that the first variable listed does not 'Granger cause' the second variable. If the coefficient is larger than standard critical values (if $p \leqslant 0.05$), the null can be rejected and the first variable can be said to 'Granger cause' the second.

Foreclosures are found to predict Black population change but Black population change does not predict foreclosures, providing confidence in the directionality of these variables' relationship. In contrast, poverty rates, median household income and violent

Table 2. Panel regression results.

	Coefficient (Robust std. error)
Unemployment rate	−0.59 (0.60)
Labour force participation rate	14.40 (67.05)
Small business loans per commercial acre (000s)	−0.065 (0.061)
Foreclosures per 1000 residential units	−14.41*** (2.26)
Mortgages originated per 1000 residential units	−1.850 (1.75)
Median household rent	−0.036 (0.027)
Percent adults in poverty	−217.1*** (57.34)
Violent crimes per capita	3413*** (285.3)
Gini Index	−4.69 (70.32)
Median household income	−0.00116** (0.00)
White population change	−0.19*** (0.02)
Hispanic population change	−0.15*** (0.02)
Asian population change	−0.17*** (0.03)
Black population change spatial lag	−0.00879 (0.03)
Constant	156.4*** (1.68)
Observations	4936
Number of tracts	617

Notes: All independent variables are lagged one year except adult poverty, which is lagged two years. The model controls for total Black population and rate of total population change. Robust standard errors are clustered at the census tract level. $^{**}p < 0.05$. $^{***}p < 0.01$.

crime rates are not predictive of Black population change in this bivariate testing. We cannot reject the null hypothesis that these variables do not cause future changes in Black population.

Two other results from Granger testing are noteworthy. First, mortgage lending, which was not a significant predictor of Black population change in our panel regression, is found to predict future changes in Black population. However, past information on Black population change also predicts future changes in mortgage lending. This 'double positive' indicates mutual causality, calls into question the directional relationship between these two variables and aligns with the panel regression's finding of no significant relationship. Second, unemployment is found to predict Black population change in the Granger test but Black population change does not predict future changes in unemployment. Like the results regarding foreclosures, this means that unemployment 'Granger cause' Black population change. Likewise, labour force participation also 'Granger cause' Black population change. However, panel regression results did not identify unemployment or labour force participation as statistically significant predictors of Black population change. Therefore, the association found between these variables and Black population change does not maintain when accounting for additional covariates.

Discussion

Data constraints prevent us from assessing all popular explanations for Black exodus, such as school quality or deteriorating infrastructure, or capturing individual neighbourhood- and household-level push factors, such as demolition of public housing or closing of a school.[15] However, counter to some

Table 3. Granger causality cross-check.

(a)	(b)	(c)	(d)	(a)	(b)	(c)	(d)
Null hypothesis	Z-bar tilde	Probability	Causality observed?	Null hypothesis	Z-bar tilde	Probability	Causality observed?
Covariate → Black population change				*Black population change → Covariate*			
Unemployment does not Granger cause Black population change	2.7926	0.0052	Yes	Black population change does not Granger cause Unemployment	0.4372	0.662	No
Small-business lending does not Granger cause Black population change	−0.1431	0.8862	No	Black population change does not Granger cause Small-business lending	0.4526	0.6508	No
Labour force participation rate does not Granger cause Black population change	1.9902	0.0466	Yes	Black population change does not Granger cause Labour force participation rate	0.9923	0.321	No
Foreclosures do not Granger cause Black population change	3.7412	0.0002	Yes	Black population change does not Granger cause Foreclosures	−0.0685	0.9454	No
Mortgage lending does not Granger cause Black population change	4.5315	0.000	Yes	Black population change does not Granger cause Mortgage lending	1.9777	0.048	Yes
Median household rent does not Granger cause Black population change	1.6808	0.0928	No	Black population change does not Granger cause Median household rent	1.0459	0.2956	No
Poverty does not Granger cause Black population change	1.9147	0.0555	No	Black population change does not Granger cause Poverty	0.2706	0.7867	No
Violent crimes do not Granger cause Black population change	1.4138	0.1574	No	Black population change does not Granger cause Violent crimes	0.2796	0.7798	No
Inequality does not Granger cause Black population change	1.6665	0.0956	No	Black population change does not Granger cause Inequality	0.4217	0.6733	No
Median household income does not Granger cause Black population change	0.0939	0.9252	No	Black population change does not Granger cause Median household income	0.4217	0.6733	No

Notes: Z-bar tilde sign does not indicate positive/negative relationship. Threshold for causality is 0.05.

media narratives, we do not find that changes in unemployment, small-business lending, household rent, poverty, violent crime, inequality or income predict future decreases in Black population.[16]

Our finding that foreclosures predict future changes in Black population is supported by popular press narratives (e.g. Davey, 2019; Glanton, 2019; Hobson et al., 2019) as well as recent government and academic reports (Chicago Metropolitan Agency for Planning, 2018; Scarborough et al., 2020) which indicate that housing-related push factors may be contributing to Black exodus in Chicago. This result is also supported by the neighbourhood change literature which finds that Black household mobility is strongly influenced by housing-related motivators (e.g. Galster, 1990; Han, 2017; Silverman et al., 2013) and that foreclosures, in particular, are predictors of neighbourhood change and have been found to impact home prices, home-buying activity and economic activity (Schuetz et al., 2008; Williams et al., 2013). Finally, these findings are theoretically intuitive; foreclosures directly force individuals and households to move, which is not necessarily the case for the other variables examined.

Therefore, we focus on specific steps that local governments can take around foreclosure relief for Black households and neighbourhoods. This should be part of a comprehensive planning and policy agenda to improve quality of life for households in neighbourhoods experiencing Black population decline.

Recommendations around foreclosure relief

Black neighbourhoods – including those examined in this analysis – have long histories of high foreclosure rates (Kahrl, 2018), which have been linked to lower home values (Immergluck and Smith, 2006; Schuetz et al., 2008), decreased lending (Hammel and Nilsson, 2019) and neighbourhood decline (Williams et al., 2013). In addition to addressing these disparities and externalities, foreclosure prevention for Black neighbourhoods may assuage Black population loss tied to the loss of a home.

Schuetz et al. (2008) find that there may be a threshold at which foreclosures begin to negatively influence neighbourhoods at large, and therefore suggest targeting foreclosure prevention efforts in neighbourhoods that have not yet had large numbers of foreclosures to prevent spiralling. Similarly, Williams et al. (2013) propose that planners make use of geocoding and geographic information systems software to closely and regularly identify foreclosure events and trends. Immergluck (2008, 2009a, 2009b), who documents increased foreclosures in metropolitan regions with more Black residents, recommends planners use annual data from the HMDA to track subprime lending and identify future foreclosure hot spots.

National foreclosure prevention efforts have had debatable success to date (Gerardi and Li, 2010). However, community-level case management and counselling around foreclosures can reduce recidivism rates of mortgage payment delinquency (Quercia and Cowan, 2008); and payment reduction-based loan modifications can reduce the likelihood of foreclosure (Collins et al., 2015). Planners might engage in mortgage negotiations between delinquent borrowers and their lenders (again, see Immergluck, 2008, 2009a, 2009b). Allen (2011) proposes increased first-time-homebuyer classes to decrease foreclosure rates among Black households.

Recent foreclosure relief programmes may also offer guidance to reduce foreclosure-driven displacement of Black households. For example, the MacArthur Foundation committed US$68 million in outreach and counselling, financial products

and technical assistance to combat foreclosures in Chicago (MacArthur Foundation, 2010). A detailed review of the programme, including how specific components had effects on foreclosure rates, would offer policy makers a better understanding of what types of tools can be the most successful in keeping families above water. In 2013, Philadelphia implemented a 'LOOP' programme which caps a property's taxable value for up to 10 years for long-term homeowners who are below 150% of the area median income. While the effectiveness of this programme and similar tax exemption programmes is inconclusive to date (Ding and Hwang, 2020), they deserve deeper evaluation as strategies for foreclosure relief.

Lastly, a study on Black homeownership by the Urban Institute proposes several steps that governments can take to address foreclosures – which, the report notes, disproportionately affect African Americans. Recommendations include improving communication about tax exemption programmes, simplifying procedures around exemptions and payments, reducing penalties for overdue taxes and exploring revenue transfers to homeowners who have faced unjust property tax burdens due to segregationist and racist housing policies (Hedman and Pendall, 2018).

It is important to emphasise that foreclosures are likely to be caught up in broader regional and socio-economic dynamics. Foreclosure prevention recommendations must therefore be considered under the broader question of what contributes to higher rates of foreclosures for Black households and neighbourhoods – and what can be done to address this.

Future research

In addition to recommendations around foreclosure relief, we suggest continued examinations of Black exodus. First, we believe Chicago serves as a representative case study for Black exodus; it has a Black population distribution at the city and metropolitan level comparable to that in other major metropolitan areas in the North (McDonald, 2018). However, additional case studies are necessary to confirm our external validity.

Second, we test only push factors influencing Black exodus. Future research should examine the role of the characteristics of destination neighbourhoods in mobility decisions and incorporate regional and interregional analysis to this end. Relatedly, as this analysis does not determine individual- or household-level factors that push and pull, subsequent studies should consider household-level data/tracking of families. Given the complex decision making involved in why people move and relocate, this work might also incorporate qualitative interviews or field-based assessments in neighbourhoods experiencing Black population change.

Third, this study's modelling, and the findings that flow from it, operate under an assumption of linear relationships between time-series data. While we control for delayed effects, future analysis should test for multidirectional causal pathways leading to Black population change. For example, it is possible that lack of labour force participation leads to negative neighbourhood outcomes like loss of desirable commercial activity, which in turn, or via some other unidentified causal mechanism, stimulate foreclosures.[17] Subsequent studies might also attempt to incorporate the historical antecedents to Black population loss, including racial segregation, redlining, the concentration of poverty and racialised disinvestment.

Finally, Granger causality testing constitutes an innovative methodological approach to studying population change.

We recommend its continued implementation in studies across urban contexts and demographic groups. Identifying cause–effect relationships is a task often complicated by classic chicken-and-egg scenarios. Granger testing assists in identifying the direction of a relationship, allowing researchers to more accurately identify predictors of neighbourhood-level change.

Acknowledgements

The authors thank historian Kenneth T Jackson for encouraging this analysis and the Fulbright Foundation for awarding us the 2020 Arthur King Peters Memorial Travel Grant to present it.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

ORCID iDs

Michael Snidal https://orcid.org/0000-0003-2114-2764
Tyler Haupert https://orcid.org/0000-0003-3132-6540

Notes

1. See McDonald (2018) for a comprehensive review of demographic shifts in Chicago and its metropolitan region from 1970 to 2015.
2. Multiple sources. See Data section.
3. Federal legislation banning employment discrimination led to better Black wages and purchasing power. Fair housing legislation culminated in the Federal Fair Housing Act of 1968, the Home Mortgage Disclosure Act of 1975 and the Community Reinvestment Act of 1977 which prohibited discrimination by race in the sale or rental of housing.
4. See literature reviewed below, including Galster (1991), Logan and Schneider (1984), Long and DeAre (1981) and Massey and Denton (1988). For a historical account of the relationship between racial diversity and white suburbanisation, see Jackson (1987) or Sugrue (2014).
5. Numerous critiques have been levelled against 'push–pull' theory and its neoclassical foundations. See King (2012) for discussion.
6. There are two noteworthy data constraints regarding how we operationalise Black exodus. First, the United States Census Bureau (2018) recommends conceptualising ACS data, which represents five-year averages, as estimates. Count data is more accurately recorded in the Census Bureau's Population and Housing Units Estimates (PEP) pages. We use ACS data because we do not seek to predict specific counts of Black population loss or rely on methods that would benefit from operationalising Black population loss in count-based tiers/thresholds, and because the PEP pages do not provide yearly data. We conduct sensitivity analyses – operationalising Black population change with different methods and lagging independent variables by varying time periods – to partially account for this limitation. Second, net population loss serves as a reasonable proxy for Black exodus, but it does not distinguish whether population change is the result of internal relocation between city neighbourhoods, exogenous migration beyond city limits or new household sizes and birth rates.
7. While ACS unemployment estimates are often slightly inflated compared with the Bureau of Labour Statistics and Census Bureau's Current Population Survey estimates (see https://www.bls.gov/lau/maps/acsqa.htm), our inclusion of a measure of labour force participation is meant to ensure robustness of employment-related data.
8. Foreclosure filings may be more effectively incorporated at the census tract level to account for the geographically isolated effects of homes vacated post-foreclosure (Ellen et al., 2013) but this level of data is not readily available on an annual basis.

9. We considered using homicides alone as a proxy for neighbourhood crime rate. Aggregate crime measures have been criticised for reflecting unequal policing and arrest rates rather than actual crime. See Sharkey (2018: 11–13) on the preferred reliability of homicide data in the context of the United States' declining crime rates. However, using violent crime resulted in an improved model fit and reflects the array of crimes that residents may respond to when considering neighbourhood choices.
10. See Williams et al. (2013), including technical appendix, for detailed description of the Granger causality model.
11. Dumitrescu and Hurlin (2012) first provided a procedure to test for Granger causality in panel datasets, using Monte Carlo simulations to demonstrate that reliable measures of Granger causality are achievable even with small N and T samples.
12. As described in Lopez and Weber (2017), in order to adapt to a panel, rather than cross-sectional, setting, this adaptation of the Granger causality test runs a bivariate regression for each individual or unit (in our case, census tracts). Each of these regressions performs an F test assessing whether bivariate causality is present. These F tests produce a Wald statistic for each regression. Wald statistics for each unit in the panel are then averaged and converted to standardised *Z*-statistics, which are used to determine panel-level causality.
13. See Anenberg and Kung (2014), Bak and Hewings (2017), Gerardi et al. (2015) and Hartley (2014) for evidence that foreclosed properties negatively influence property values in nearby neighbourhoods.
14. All models, including those that incorporate high school dropout rate and childhood poverty, that consider only the male non-employment rate, that add a spatial lag term for foreclosures and that examine other racial groups as the dependent variables of analysis and lag variables for multi-year delayed effects, are available by request to the author.
15. Note: this is because panel regressions and Granger causality tests produce results suggestive of sample-wide variation rather than changes in particular census tracts. This limitation is true of much econometric analysis.
16. This may be due to their association with other variables – namely foreclosures – that were included in the panel regression but were absent in the bivariate Granger setting. See Ellen et al. (2013), Hipp et al. (2009) and Williams et al. (2013).
17. For example, see Bak and Hewings (2017) for the connection between disamenity effects and negative impacts on foreclosure in Chicago.

References

Allen R (2011) The relationship between residential foreclosures, race, ethnicity, and nativity status. *Journal of Planning, Education and Research* 31(2): 125–142.

Anenberg E and Kung E (2014) Estimates of the size and source of price declines due to nearby foreclosures. *American Economic Review* 104(8): 2527–2551.

Bak XF and Hewings GJD (2017) Measuring foreclosure impact mitigation: Evidence from the neighborhood stabilization program in Chicago. *Regional Science and Urban Economics* 63: 38–56.

Boustan LP (2010) Was postwar suburbanization 'white flight'? Evidence from the black migration. *The Quarterly Journal of Economics* 125(1): 417–443.

Chicago Metropolitan Agency for Planning (2018) *Labor force recovery has varied by race, ethnicity, with starkest difference for Blacks*. Report, CMAP, Chicago, IL, 6 December.

Collins JM, Reid CK and Urban C (2015) Sustaining homeownership after delinquency: The effectiveness of loan modifications by race and ethnicity. *Cityscape* 17(1): 163–188.

Coulton C, Theodos B and Turner M (2012) Residential mobility and neighborhood change: Real neighborhoods under the microscope. *Cityscape* 14(3): 55–89.

Davey M (2019) Seeking a new Mayor, Chicago sees many Black residents voting with their feet. *The New York Times*, 25 February. Available at: https://www.nytimes.com/2019/02/25/us/chicago-mayoral-election.html (accessed 16 July 2021).

Ding L and Hwang J (2020). Effects of gentrification on homeowners: Evidence from a natural experiment. *Regional Science and Urban Economics* 83: 103536.

Dumitrescu EI and Hurlin C (2012) Testing for Granger non-causality in heterogeneous panels. *Economic Modelling* 29(4): 1450–1460.

Ellen IG, Lacoe J and Sharygin CA (2013) Do foreclosures cause crime? *Journal of Urban Economics* 74: 59–70.

Falk WW, Hunt LL and Hunt MO (2004) Return migrations of African-Americans to the South: Reclaiming a land of promise, going home, or both? *Rural Sociology* 69(4): 490–509.

Federal Financial Institutions Examination Council (2019) Community Reinvestment Act: Aggregate reports by state. Available at: https://www.ffiec.gov/craadweb/aggregate.aspx (accessed 16 July 2021).

Freeman L (2009) Neighbourhood diversity, metropolitan segregation and gentrification: What are the links in the US? *Urban Studies* 46(10): 2079–2101.

Frey WH (1979) Central city white flight: Racial and nonracial causes. *American Sociological Review* 44(3): 425–448.

Frey WH (2018) *Diversity Explosion: How New Racial Demographics Are Remaking America*. Washington, DC: Brookings Institution Press.

Galster GC (1990) White flight from racially integrated neighbourhoods in the 1970s: The Cleveland experience. *Urban Studies* 27(3): 385–399.

Galster GC (1991) Black suburbanization: Has it changed the relative location of races? *Urban Affairs Quarterly* 26(4): 621–628.

Gerardi K and Li W (2010) Mortgage foreclosure prevention efforts. *Economic Review – Federal Reserve Bank of Atlanta* 95(2): 1–13.

Gerardi K, Rosenblatt E, Willen PS, et al. (2015) Foreclosure externalities: New evidence. *Journal of Urban Economics* 87: 42–56.

Glanton D (2019) If Chicago is a black political mecca, why are African-Americans leaving the city in droves? *The Chicago Tribune*, 8 April. Available at: https://www.chicagotribune.com/columns/dahleen-glanton/ct-met-chicago-black-political-mecca-dahleen-glanton-20190405-story.html (accessed 16 July 2021).

Granger CWJ (1969) Investigating causal relations by econometric models and cross-spectral methods. *Econometrica* 37(3): 424–438.

Hammel DJ and Nilsson I (2019) Mortgage foreclosures, race, and postrecession lending. *The Professional Geographer* 71(3): 536–550.

Han HS (2017) Neighborhood characteristics and resistance to the impacts of housing abandonment. *Journal of Urban Affairs* 39(6): 833–856.

Hartley D (2014) The effect of foreclosures on nearby housing prices: Supply or dis-amenity? *Regional Science and Urban Economics* 49: 108–117.

Hedman C and Pendall R (2018) *Rebuilding and sustaining homeownership for African Americans: Southeast Michigan housing features, brief 3*. Report, The Urban Institute, Washington, DC, 10 July.

Hipp JR (2010) A dynamic view of neighborhoods: The reciprocal relationship between crime and neighborhood structural characteristics. *Social Problems* 57(2): 205–230.

Hipp JR, Tita GE and Greenbaum RT (2009) Drive-bys and trade-ups: Examining the directionality of the crime and residential instability relationship. *Social Forces* 87(4): 1778–1812.

Hobson J, Bentley C and Hutchins M (2019) Thousands of African-Americans are leaving Chicago each year. Why? Radio hour, *WBUR*, 28 February. Available at: https://www.wbur.org/hereandnow/2019/02/28/chicago-african-americans-leaving (accessed 16 July 2021).

Immergluck D and Smith G (2006) The external costs of foreclosure: The impact of single–family mortgage foreclosures on property values. *Housing Policy Debate* 17(1): 57–79.

Immergluck D (2008) From the subprime to the exotic: Excessive mortgage market risk and foreclosures. *Journal of the American Planning Association* 74(1): 59–76.

Immergluck D (2009a) *Foreclosed: High risk lending, deregulation, and the undermining of America's mortgage market*. Ithaca, NY: Cornell University Press.

Immergluck D (2009b) The foreclosure crisis, foreclosed properties, and federal policy: Some implications for housing and community development planning. *Journal of the American Planning Association* 75(4): 406–423.

Institute for Housing Studies at DePaul University (2019) Housing market indicators data portals. Available at: https://www.housingstudies.org/data-portal/ (accessed 12 November 2021).

Jackson KT (1987) *Crabgrass Frontier: The Suburbanization of the United States*. New York, NY, and Oxford: Oxford University Press.

Kahrl AW (2018) Capitalizing on the urban fiscal crisis: Predatory tax buyers in 1970s Chicago. *Journal of Urban History* 44(3): 382–401.

King R (2012) Theories and typologies of migration: An overview and a primer. *Willy Brandt series of working papers in international migration and ethnic relations* 3/12. Malmö Institute for Studies of Migration, Diversity and Welfare, Malmö.

Kónya L (2006) Exports and growth: Granger causality analysis on OECD countries with a panel data approach. *Economic Modelling* 23(6): 978–992.

Lee ES (1966) A theory of migration. *Demography* 3(1): 47–57.

Lee W (2016) A crumbling, dangerous South Side creates exodus of black Chicagoans. *The Chicago Tribune*, 18 March. Available at: https://www.chicagotribune.com/opinion/commentary/ct-black-exodus-chicago-20160318-story.html (accessed 16 July 2021).

Lemann N (2011) *The Promised Land: The Great Black Migration and How It Changed America*. New York, NY: Vintage Books.

Logan JR and Schneider M (1984) Racial segregation and racial change in American suburbs, 1970–1980. *American Journal of Sociology* 89(4): 874–888.

Logan JR, Xu Z and Stults BJ (2014) Interpolating US decennial census tract data from as early as 1970 to 2010: A longitudinal tract database. *The Professional Geographer* 66(3): 412–420.

Long L and DeAre D (1981) The suburbanization of blacks. *American Demographics* 3(8): 16–21.

Lopez L and Weber S (2017) Testing for Granger causality in panel data. *The Stata Journal* 17(4): 972–984.

Loury A (2018) How the Great Migration to Chicago became the Great Black Exodus. *Chicago Sun Times*, 25 July. Available at: https://chicago.suntimes.com/2018/7/25/18401297/how-the-great-migration-to-chicago-became-the-great-black-exodus (accessed 16 July 2021).

MacArthur Foundation (2010) MacArthur commits $68 million to foreclosure prevention and mitigation in Chicago. Available at: https://www.macfound.org/press/press-releases/macarthur-commits-68-million-to-foreclosure-prevention-and-mitigation-in-chicago/ (accessed 16 July 2021).

McDonald JF (2018) Minority groups in the metropolitan Chicago housing market: 1970–2015. *Urban Studies* 55(11): 2431–2450.

Marshall H (1979) White movement to the suburbs: A comparison of explanations. *American Sociological Review* 44: 975–994.

Massey DS and Denton NA (1988) Suburbanization and segregation in US metropolitan areas. *American Journal of Sociology* 94(3): 592–626.

Narayan PK and Smyth R (2005) Electricity consumption, employment and real income in Australia: Evidence from multivariate Granger causality tests. *Energy Policy* 33(9): 1109–1116.

Pattillo-McCoy M (2000) The limits of out-migration for the black middle class. *Journal of Urban Affairs* 22(3): 225–241.

Quercia R and Cowan SM (2008) The impacts of community-based foreclosure prevention programs. *Housing Studies* 23(3): 461–483.

Ramos M (2018) Cook County's black population continues to decline. *The Chicago Sun Times*, 20 June. Available at: https://chicago.suntimes.com/2018/6/20/18315826/cook-county-s-black-population-continues-to-decline (accessed 16 July 2021).

Reardon P (1993) Second city to suburbs: More Chicagoans find it isn't their kind of town. *The Chicago Tribune*, 28 November: 1c.

Sant'Anna A and Katchova A (2020) Determinants of land value volatility in the US Corn Belt. *Applied Economics* 52(37): 4058–4072.

Saunders P (2019) Is Chicago's legacy of segregation causing a reverse Great Migration? *The Chicago Reader*, 24 January. Available at: https://chicagoreader.com/news-politics/is-chicagos-legacy-of-segregation-causing-a-reverse-great-migration/ (accessed 16 July 2021).

Scarborough W, Arenas I and Lewis AE (2020) *Between the great migration and growing exodus: The future of Black Chicago?* Report,

Institute for Research on Race and Public Policy, University of Illinois Chicago, Chicago, IL, 30 January.

Schuetz J, Been V and Ellen IG (2008) Neighborhood effects of concentrated mortgage foreclosures. *Journal of Housing Economics* 17(4): 306–319.

Sharkey O (2018) *Uneasy Peace: The Great Crime Decline, the Renewal of City Life, and the Next War on Violence*. New York, NY, and London: WW Norton.

Silverman RM, Yin L and Patterson KL (2013) Dawn of the dead city: An exploratory analysis of vacant addresses in Buffalo, NY 2008–2010. *Journal of Urban Affairs* 35(2): 131–152.

Social Explorer (2019) American community surveys (5-year estimates). Available at: https://www.socialexplorer.com/explore-tables (accessed 16 July 2021).

Stack C (1996) *Call to Home: African Americans Reclaim the Rural South*. New York, NY: Basic Books.

Sugrue TJ (2014) *The Origins of the Urban Crisis: Race and Inequality in Postwar Detroit – Updated Edition*. Princeton, NJ: Princeton University Press.

United States Census Bureau (2018) Understanding and using the American Community Survey data. Available at: https://www.census.gov/content/dam/Census/library/publications/2018/acs/acs_general_handbook_2018.pdf (accessed 16 July 2021).

United States Census Bureau (2021) Glossary. Available at: https://www.census.gov/programs-surveys/geography/about/glossary.html#par_textimage_13 (accessed 8 October 2021).

US2010 Project (2020) Diversity and disparities: Longitudinal tract database. Available at: http://www.s4.brown.edu/us2010/Researcher/Bridging.htm (accessed 12 November 2021).

Wiese A (2004) *Places of Their Own: African American Suburbanization in the Twentieth Century*. Chicago, IL, and London: University of Chicago Press.

Wilkerson I (2011) *The Warmth of Other Suns: The Epic Story of America's Great Migration*. New York, NY: Vintage Books.

Williams S, Galster G and Verma N (2013) Home foreclosures as early warning indicator of neighborhood decline. *Journal of the American Planning Association* 79(3): 201–210.