Are Foreclosures Contagious?
An Exploratory Space-Time Analysis
of Franklin County, Ohio, 2001-2008

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ABSTRACT
Significant foreclosure activity in a weak housing market area is a sign of trouble, suggesting potential subsequent neighborhood decline. This article focuses on an under-researched question of whether higher foreclosure rates in a neighborhood tend to spill over into adjacent neighborhoods. The authors detail exploratory spatial methods to identify where potential spillover effects occur: kernel density surfaces, space-time local indicators of spatial association (LISA) and LISA Markov. Using data for Franklin County, Ohio the authors find that foreclosure rate hotspots are concentrated in lower-income, more African-American central city areas. The majority of hotspots (around 90%) persist over time and space but about 10% of all hotspots are consistent with contagion effects between neighboring areas. Only 1-3% of neighborhoods experience spillovers as below-average to above-average cluster transitions. In general, contagion effects occur in areas with higher rates of African-Americans, poverty and lower median home values and incomes. However, the authors also observe a sub-trend suggesting possibly accelerated hotspot growth in otherwise comparable Caucasian areas.

Keywords: Foreclosures, Hotspots, Local Indicators of Spatial Association (LISA) Markov, Space-Time Analysis, Spatial Association, Spillover Effects

INTRODUCTION
The foreclosure crisis in the United States cannot only be linked to a global recession, involving the collapse of major financial institutions, but also to very localized destabilization of particularly low-income and African-American neighborhoods where high-risk mortgage lending was concentrated (Aalbers, 2009; Immergluck, 2009; Rugh & Massey, 2010). Throughout the U.S., the rate of mortgage foreclosures accelerated from 0.4% in 2000 to 1.27% in February 2011 (Mortgage Bankers Association, 2009). While on average about 14% of

DOI: 10.4018/jagr.2013100102
loans were in foreclosure or at least one payment past due in February 2011, a larger proportion of borrowers were affected by foreclosures in states such as California and Florida where the share of loans in foreclosure was 36% in February 2011, down from 39% a year earlier (Mortgage Bankers Association, 2011).

To mitigate at least some of the detrimental effects of the foreclosure crisis on homeowners and neighborhoods, federal, state, local and nonprofit programs have been put in place (Immergluck, 2008; Immergluck, 2009; Mallach, 2008). Most well known is President Obama’s Neighborhood Stabilization Program, adopted in 2008 to accelerate the purchase and redevelopment of foreclosed homes, and the Making Home Affordable Program. Other initiatives include policy efforts by the Federal Reserve and nonprofit mortgage counseling programs such as NeighborWorks America’s National Foreclosure Mitigation Counseling Program.

One of the arguments to legitimize these expenditures is that foreclosures are associated with negative externalities that destabilize the neighborhoods they are located in by reducing nearby home values and local tax revenues, and increasing blight and crime. In light of public investments in foreclosure response programs and the spatial concentration of foreclosures, the question arises about where to spatially target these investments most strategically in order to maximize neighborhood stabilization (Johnson et al., 2010). For instance, some research suggests that foreclosed homes should be purchased in foreclosure hotspot areas to prevent hotspot growth (Schintler et al., 2010).

This article contributes to research on foreclosure contagion effects that can inform more strategic spatial investments of foreclosure mitigation measures. Most existing studies define foreclosure contagion (or spillover) effects in terms of the effect that one or more foreclosure(s) have on the sales prices of nearby non-foreclosed properties (for an exception, see Schintler et al., 2010). In this article we instead ask whether above-average rates of foreclosures of single-family mortgages increase the likelihood of nearby subsequent foreclosures.

In other words, we focus on spatial contagion or spillover effects among foreclosures themselves, i.e. spillovers of foreclosures in a given area to those in neighboring areas. Further, much of the existing literature focuses on citywide price externalities. In this article, we conduct an exploratory space-time analysis of foreclosure-on-foreclosure spillovers that reveals the actual locations that are being “infected” by above average nearby foreclosure rates. Our methodology is relatively easy to replicate, with freely accessible public data (Newman, 2010; Immergluck, 2008) and free software tools. Hence it can serve as an additional tool for planners and housing policy analysts to develop foreclosure mitigation strategies.

**Foreclosure Contagion Effects: Theory and Evidence**

Our hypothesis that elevated foreclosure rates in one neighborhood result in an increase in foreclosure rates in nearby neighborhoods is framed by theories and evidence that foreclosure risk has been spatially concentrated. At a global level, the securitization of mortgages that were sold on secondary markets created a demand for subprime loans with much higher risk than conventional mortgages. This demand became relevant at the local level in the following way: Residential segregation created isolated niches where these riskier subprime, exotic, and zero-down-payment mortgage products were aggressively sold. This process of “reverse redlining” (Squires, 2005) concentrated foreclosure risk especially in lower-income African-American neighborhoods, and to a lesser extent, also in Hispanic neighborhoods (Rugh & Massey, 2010; Chan et al., 2010; Been, Ellen, & Madar, 2009; Ding et al., 2010; Vesselinov & Beveridge, 2010).

By the time the housing bubble burst, these areas with older, lower value housing stock were at the intersection of higher foreclosure risk and weaker housing markets, which – in contrast to areas with higher foreclosure risk and stronger housing markets – translated directly into higher concentrations of foreclosed
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