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**Article**

## Estimating the effect of mortgage foreclosures on nearby property values: A critical review of the literature

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FEDERAL RESERVE BANK OF ATLANTA

# Economic Review

Number 3, 2010

Estimating the Effect of  
Mortgage Foreclosures on  
Nearby Property Values:  
A Critical Review of the Literature

**W. Scott Frame**

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**FEDERAL RESERVE BANK OF ATLANTA**

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## Estimating the Effect of Mortgage Foreclosures on Nearby Property Values: A Critical Review of the Literature

**W. Scott Frame\***

In response to the wave of residential mortgage foreclosures in the past few years, federal, state and local government intervention programs have aimed to reduce the presumed social costs of foreclosures. Before the recent crisis, there was little economic research documenting foreclosure spillover effects.

This article takes a critical look at the recent literature that seeks to estimate the negative effects of residential mortgage foreclosures. This review suggests that foreclosed properties sell at a discount, likely because such properties are in worse condition than surrounding properties. What's more, very nearby foreclosures appear to depress the sales prices of nondistressed properties, but this effect diminishes rapidly over physical distance and time.

The author suggests that the considerable variation in foreclosure discount and spillover estimates that occurs from study to study may be related to data limitations (specific places and times) and poorly specified empirical models in some studies. He notes that studies using a repeat-sales approach seem to hold greater promise than those using hedonic regressions; the former approach is more likely to hold property and neighborhood characteristics constant and make it easier to examine multiple geographies and longer time periods.

JEL classification: G21, G28

Key words: residential mortgages, foreclosures, foreclosure spillovers, negative externalities

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# Estimating the Effect of Mortgage Foreclosures on Nearby Property Values: A Critical Review of the Literature

**W. Scott Frame**

*The author is a financial economist and policy adviser in the research department of the Atlanta Fed. He thanks Dan Immergluck, Kris Gerardi, Joe Tracy, and an anonymous reviewer for comments on a previous draft and Whitney Mancuso for research assistance.*

The United States has experienced a tremendous wave of residential mortgage foreclosures in recent years.<sup>1</sup> Based on data from the Mortgage Bankers Association, as of year-end 2006, just over a half million residential mortgages were in foreclosure, representing 1.2 percent of all such loans. Just three years later, as of year-end 2009, more than two million residential mortgages were being foreclosed upon, or 4.6 percent of all such loans.

In response to these developments, federal, state, and local governments have created programs aimed at keeping families in their homes and/or reducing the increased stock of vacant homes. Two prominent examples are the U.S. Treasury's Home Affordable Modification Program (HAMP) and Neighborhood Stabilization Program (NSP) grants distributed to states and some local governments through the U.S. Department of Housing and Urban Development (HUD). Such policy interventions may be justified on economic efficiency grounds if there are either (1) frictions preventing efficient renegotiations between lenders and delinquent borrowers or (2) social costs, or externalities, associated with foreclosures.

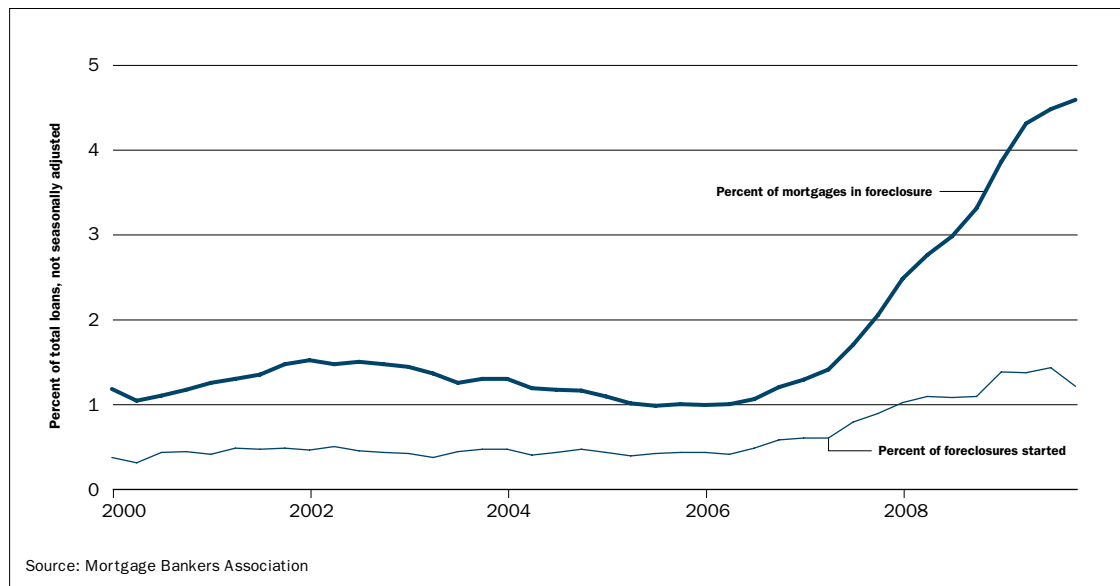
Recent papers by Cordell et al. (2009) and Gerardi and Li (2010) discuss potential barriers to efficient renegotiation of residential mortgages. By contrast, this article provides a critical review of the literature seeking to estimate foreclosure externalities. The article first provides some background information about the recent foreclosure wave and the associated public sector response. The discussion then summarizes the literature on "foreclosure discounts," which presumably must exist for foreclosures to have negative price effects on nearby properties. Next, I synthesize the empirical evidence measuring the effect of foreclosure on nearby property sales prices. Overall, the evidence is consistent with the existence of social costs related to foreclosure activity although the study identifies various methodological issues, data limitations, and curious results.

## Background

U.S. mortgage foreclosures began to rise in late 2006 at the same time that national house prices began to fall.<sup>2</sup> Figure 1 presents quarterly data on the percent of mortgages entering foreclosure (flow) and in the process of foreclosure (stock) for 2000 through 2009. While both foreclosure measures have markedly increased, the series have diverged in recent quarters because of expanding foreclosure timelines. Figure 2 illustrates temporal variation in house prices over the same 2000–9 period as measured by two popular indices—the Federal Housing Finance Agency (FHFA) and S&P/Case-Shiller. The latter series, which is clearly more volatile, having peaked higher and fallen farther, suggests that U.S. house prices have returned to 2003 levels.

The patterns in the national aggregates presented in Figures 1 and 2 are also observable when looking at state-level cross-sectional data. Figure 3 shows this by way of a scatter plot of the change in the stock of foreclosures and the change in the FHFA house price index between 2006

Figure 1  
**U.S. mortgage foreclosure rates**



and 2008. Clearly, the four so-called sand states (Arizona, California, Florida, and Nevada) have experienced both the most dramatic home price declines and foreclosure rate increases.

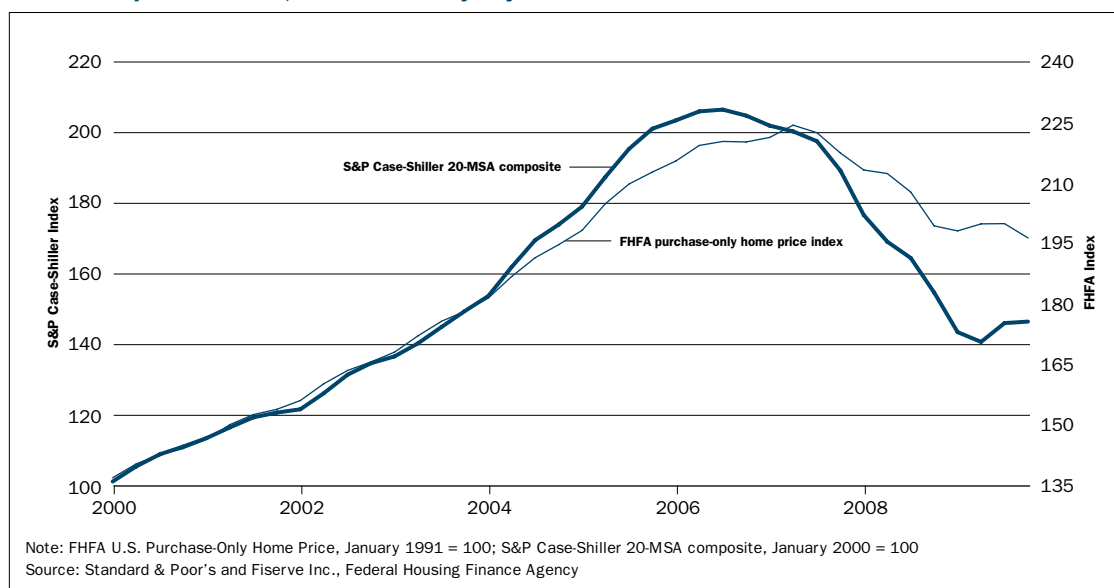
Foreclosures rise when house prices fall because homeowners begin to see their stock of home equity erode. Highly leveraged borrowers, or those with little equity at the time of the house price declines, begin sliding into a position of “negative equity,” or owing the lender more than the property is worth. CoreLogic estimates that as of year-end 2009, 11.3 million residential properties—representing 24 percent of all residential properties with mortgages—were in a negative equity position. Research has shown that a negative equity position is a necessary condition for mortgage default, although a second trigger like a shock to the borrower’s monthly income or expenses is generally required for a foreclosure to occur (see, for example, Foote, Gerardi, and Willen 2008).

The foreclosure process is costly to both borrowers and lenders and perhaps even society as a whole. Borrowers incur search costs and moving expenses, face family disruptions, and have difficulty accessing credit in the future. Lender costs include the shortfall between the ultimate sales price and the mortgage balance and carrying costs (for example, legal, property management, and sales expenses and forgone interest). Social costs associated with foreclosure may arise from both direct municipal expenses as well as any reduction in the value of nearby properties. These costs would seem to be especially acute for vacant properties, which are more likely to attract criminal activity (resulting in higher municipal costs) and be in worse physical condition (depressing property values).

Importantly, borrowers and lenders generally have an incentive to prevent the realization of private foreclosure costs through debt renegotiation although borrowers’ home equity position and cash flow as well as lender incentives shape the renegotiation process. Cordell et al. (2009) and Gerardi and Li (2010) provide detailed discussions of the economic issues surrounding residential mortgage renegotiations, such as forbearance plans and loan modifications, and identify potential barriers to efficient workouts. The U.S. Treasury’s Home Affordable Modification

1. Foreclosure is the legal process by which the mortgage lender repossesses a property from the borrower because of nonpayment, or default. This process can vary significantly from state to state.
2. Notably, after housing prices began falling and foreclosures rising, the U.S. economy entered a recession, which then likely began additional foreclosures and house price declines.

Figure 2  
**U.S. home price indexes, non-seasonally adjusted**



Program (HAMP) is a federal initiative aimed at reducing workout barriers and hence minimizing unnecessary foreclosures.

A less well-known federal program is more squarely focused on reducing the social costs associated with foreclosed properties. The U.S. Department of Housing and Urban Development's Neighborhood Stabilization Program (NSP) provides grants to state and local authorities to acquire land and property, demolish or rehabilitate abandoned properties, and provide down payment or closing cost assistance to low- and moderate-income families. The original NSP program (NSP1) was authorized by the Housing and Economic Recovery Act of 2008 and has awarded \$4 billion in grants to state and local governments. NSP2, which was created by the American Recovery and Reinvestment Act of 2009, provided an additional \$2 billion and established a technical assistance program that provides grants to private assistance providers to help municipalities improve their use of NSP funds.

The NSP is predicated on the belief that foreclosures in general and vacancies in particular can generate significant social costs in the form of increased municipal expenses and reductions in the value of nearby properties. Determining potential municipal expenses associated with foreclosures and vacancies is largely a survey exercise to tabulate the prices for various public services. Apgar and Duda (2005), for example, do this tabulation using information from Chicago. By contrast, estimates of the spillover effect of foreclosures on nearby property values require the use of multivariate regression techniques. Remarkably, prior to the foreclosure crisis, there had been little economic research connecting the incidence of foreclosure to nearby property values.

### **Foreclosure discounts: Do foreclosed properties sell for less?**

If foreclosed residential properties are to have a negative effect on the value of nearby properties, they themselves should trade at a discount. Our review of the foreclosure discount literature suggests that this is the case although estimates and interpretation vary.

There are three primary explanations for why a property foreclosure discount should exist: (1) systematic differences in property characteristics, (2) lower average property condition or quality, and (3) a liquidity discount. A thin empirical literature has generally sought to identify any such discount by estimating hedonic (log) sales price regressions that include a foreclosure indicator and a large number of control variables representing key property features (for example,

Figure 3  
Change in foreclosure rate and FHFA House Price Index by state, 2006Q1–2008Q4



lot size, the square footage and age of the home, and the number of bedrooms and bathrooms) and neighborhood characteristics. Notably, studies vary significantly in their coverage of property and neighborhood features—with the latter often simply proxied for using location indicators like ZIP code. Nevertheless, if one thought these property and neighborhood characteristics were well controlled for, any statistically and economically significant foreclosure discount could then presumably be ascribed to differences in property quality or liquidity. Note that, to date, there has been only limited investigation seeking to identify these two effects separately.

Two early studies of foreclosure discounts conditioned only on property characteristics. Shilling, Benjamin, and Sirmans (1990) estimate a 24 percent foreclosure discount for condominium sales in Baton Rouge, Louisiana, during 1985, while Forgey, Rutherford, and VanBuskirk (1994) similarly report a 23 percent discount for residential sales in Arlington, Texas, between July 1991 and January 1993. (Note that the coefficient estimates in this latter study are clouded by the fact that they attempted to control for neighborhood characteristics using actual ZIP codes rather than ZIP code dummies.) Carroll, Clauretie, and Neill (1997) study HUD home sales in Las Vegas between 1990 and 1993 and find no statistically significant foreclosure discount after controlling for various property characteristics and location using ZIP code indicators. This result is unusual relative to the other studies in this literature.

Two more recent studies using hedonic methods examine larger samples and richer sets of neighborhood characteristics. Sumell (2009) estimates a 50 percent foreclosure discount for property sales in Cuyahoga County, Ohio, between 2004 and 2006. Likewise, Campbell, Giglio, and Pathak (2009) report a 22 percent foreclosure discount for single-family properties in Massachusetts during 1987–2007. (Note that for this latter study, the hedonic characteristics were measured only in 2007.) Unlike these previous studies, Pennington-Cross (2006) uses a repeat-sales method that differences out (and hence assumes constant) property and neighborhood characteristics. Comparing the change in prices from initial purchase to real estate-owned (REO) sale for a nationwide sample of foreclosed homes in relation to their metro area house price index, the author also finds a cumulative appreciation discount of 22 percent.<sup>3</sup>

3. The author subsequently finds that this discount is positively related to loan size, time in REO, local house price movements, and being located in a judicial foreclosure state.



One plausible explanation for the existence of these (conditional) foreclosure discounts is that such homes are, on average, of lower quality. Distressed homeowners are less likely to maintain the property in both obvious and nonobvious ways, and this tendency will lead to a lemons discount. Two recent studies include indicators of observable subjective quality and find that foreclosed homes rated as fair or poor have larger-than-average foreclosure discounts (Clauretie and Daneshvary 2009; Sumell 2009). While a step in the right direction, controlling for property quality remains a significant challenge for this literature.

Related to the quality issue is occupancy status—that is, owner, renter, or vacant. Nonowner-occupied—and especially vacant—homes that are foreclosed upon are expected to be of lower quality. Knight (2002), Anglin, Rutherford, and Springer (2003), and Clauretie and Daneshvary (2009) all provide evidence supporting a vacancy discount. (The latter paper also finds evidence of a renter discount.) One suggestion here would be to also include interaction terms of occupancy status with foreclosure to distinguish an independent effect of occupancy status from the observable quality of the property.

It has also been suggested that the foreclosure discount may be due, in part, to certain sellers being willing to accept a lower price in order to sell faster and avoid holding costs (for example, property taxes, insurance, and maintenance). Notably, this explanation requires some “limit to arbitrage” opportunities since sales at below-market prices imply positive economic rents to intermediaries of foreclosed properties. Under this “liquidity hypothesis,” one would expect to see foreclosed properties have a shorter time on the market. (That said, there is also evidence that time on the market also sends a negative signal about quality, so one would need to be careful in specifying an empirical model.)

There may also be a cash discount insofar as this reduces uncertainty about the sale and economizes on certain closing costs. Forgey, Rutherford, and VanBuskirk (1994) and Clauretie and Daneshvary (2009) both provide some evidence for the existence of cash discounts for home sales. However, it’s not clear based on their specifications that this effect is any different for foreclosed properties. Again, the use of an interaction effect between cash and foreclosure indicators would be helpful.

Clauretie and Daneshvary (2009) report a conditional foreclosure discount of less than 10 percent after controlling for various property and neighborhood characteristics, property condition (quality), occupancy status, time on the market, and cash sales. While this study represents the most comprehensive analysis in terms of explaining residential sales prices using hedonic methods, the study is limited to data for Clark County, Nevada, between 2004 and 2007.

Overall, it seems likely that foreclosure discounts exist although the magnitude may vary significantly by location and time period. The estimated effects likely reflect a lemons discount, with foreclosed properties having lower observable and unobservable quality. It is also possible that some of the measured discount is related to the sellers of foreclosed properties being less patient than a typical homeowner. Future research should strive to identify the extent to which foreclosure discounts separately reflect quality differences or impatient sellers.

### **Foreclosure externalities: Do foreclosure discounts affect the value of nearby property?**

Given that foreclosed properties generally sell at a discount, a natural question arises as to whether these distressed properties, in turn, put downward sales price pressure on nearby properties, resulting in a negative externality. According to Lee (2008), three potential channels by which such spillover effects might occur are through poor property maintenance or negligence leading to blight, weak property appraisals based on comparables, and an increased supply of available properties for sale. Leonard and Murdoch (2009) further suggest that changes in nearby foreclosures foreshadow (negative) changes in neighborhood quality, leading to an expectations effect.

Several recent papers have documented a negative relationship between nondistressed residential sales prices and the number of nearby foreclosures using hedonic regressions that control



for various property and neighborhood characteristics. (One other study uses the repeat-sales method.) The studies also vary along other dimensions: the locations and time periods they evaluate, the definitions they use for “nearby” and “foreclosure,” and whether they account for the effect of multiple foreclosures.

Immergluck and Smith (2006) relate sales price data for 9,600 single-family properties in Chicago sold in 1999 to foreclosures in the two prior years; the study controls for a large number of property and neighborhood characteristics. The authors identify the number of foreclosures at distances of one-eighth mile (one block) and one-quarter mile (two blocks). The authors find that each foreclosure associated with a conventional loan within one-eighth mile is associated with a 0.9 percent to 1.1 percent property price decline, depending on whether or not the median house price in the census tract is controlled for or not. Foreclosures associated with conventional loans located one-eighth to one-quarter mile away from a sale are estimated to have only modest spillover effects (0.1 percent to 0.2 percent). Interestingly, foreclosures associated with government-guaranteed loans appear to have no effect on nearby sales prices. It is not clear why foreclosures associated with different types of loans should have differential effects; this difference merits further investigation.

Schuetz, Been, and Ellen (2008) study residential (single- and multifamily) property sales and foreclosure notices in New York City between 2000 and 2005. The authors identify properties with foreclosure notices nearby nondistressed sales in both physical space (within 250 feet, 250–500 feet, and 50–1,000 feet) and time (less than and greater than eighteen months). The authors find evidence of foreclosure spillover effects although, strangely, these measured effects appear to be larger for foreclosures located farther away in both physical space and time. Such nonintuitive results suggest that there may be some issues with the empirical specification—for instance, the authors control for very few neighborhood characteristics (borough and ZIP code indicators and physical distance to subway) and ignore recent house price movements.<sup>4</sup> The authors also provide some results suggesting that the negative price pressure associated with foreclosure notices is larger when there are more of them.

Mikelbank (2008) is the first to empirically separate the spillover effects of foreclosures from vacant/abandoned properties, using 2006 property data for Franklin County, Ohio. Intuitively, the author finds that the negative effect of vacancies is more severe than foreclosure but is concentrated nearby (up to 500 feet), while foreclosure-related effects are modest but persist over longer distances (up to 1,000 feet). An important strength of this paper is the ability to control somewhat for property quality in terms of condition and construction. The author includes limited neighborhood-level control variables (capturing trends in demand for owner-occupied housing) but does provide estimates using special econometric techniques designed to account for unobserved neighborhood characteristics. Nevertheless, the use of spatial error specification techniques has little effect on the estimated effects.

Leonard and Murdoch (2009) study sales of single-family homes in Dallas County, Texas, during 2006. Their hedonic price analysis is conditioned on a large number of property and neighborhood characteristics, including recent house price trends. The authors delineate nearby foreclosures in physical space according to the number located within 250, 500, 1,000, or 1,500 feet of the sale. The authors find that properties in some stage of foreclosure depress sales prices and that each foreclosure within 250 feet appears to have an effect of about –0.5 percent on sales prices. The results suggest that spillover effects may exist at modest levels (–0.1 percent) even farther out in physical space although interpretation is difficult given the model specification.

Rogers and Winter (2009) examine the effect of foreclosures on sales prices of nonforeclosed homes in St. Louis County, Missouri, between 1998 and 2007. Foreclosure effects are measured by rings that are jointly measured in both physical space (yards between the foreclosure and sale) and

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4. In one specification, the authors include postsale foreclosure notices as an additional neighborhood control.

time (months between the sale and foreclosure). The authors consistently find that foreclosures that are physically closer to a sale have negative price effects although (counterintuitively) the estimated effects are as strong or stronger two years after foreclosure than six months after foreclosure. The authors also find that the marginal impact of foreclosures decline as the number of foreclosures increases. One shortcoming of Rogers and Winter's analysis is the apparent lack of temporal control variables. Another weakness is a lack of neighborhood control variables although the authors do reestimate their empirical models using spatial generalized methods of moments (GMM) techniques that are intended to capture some of these effects. GMM estimation yielded results qualitatively similar to ordinary least squares (OLS), although quantitatively the measured effects were about one-half, suggesting that the lack of neighborhood control variables is an issue.

*The foreclosure process is costly to both borrowers and lenders and perhaps even society as a whole.*

Lin, Rosenblatt, and Yao (2009) explore property sales data for the Chicago MSA for 2003 and 2006 and delineate foreclosure spillover effects along physical and temporal dimensions. The authors find spillover effects for foreclosures located within ten blocks (physical distance) and five years (temporal distance), with a nearby foreclosure in a bad year (such as 2006) having a  $-8.7$  percent effect on nearby property values. Foreclosure spillover estimates for a good year (such as 2003) are found to be only half as large, thereby illustrating the importance of housing cycles. These effects are by far the largest estimated in this nascent literature, likely owing to limited hedonic property characteristics, the use of only ZIP code indicators for neighborhood characteristics, and the lack of control for local property price trends. Indeed, a literal interpretation of these results would suggest that the externalities may exceed the value of the foreclosed property itself.

Campbell, Giglio, and Pathak (2009) study twenty years of single-family property sales from Massachusetts (although with hedonic property and neighborhood characteristics measured exclusively as of 2007). The authors first estimate the effect of foreclosures on sales prices without controlling for either common (unobserved) shocks driving foreclosures and house prices or the reverse causality from house prices to foreclosures. This preliminary exercise suggests a 7–9 percent foreclosure discount. (This incredible result is consistent with the estimates provided by Lin, Rosenblatt, and Yao 2009.) However, using two different “differences-in-differences” approaches that aim to net out such confounding effects, the authors more plausibly estimate that foreclosures within 0.05 mile lower sales prices by about 1 percent.

As an alternative to a hedonic regression, Harding, Rosenblatt, and Yao (2009) use a repeat-sales approach that ostensibly holds the house and neighborhood characteristics constant. The authors relate the difference between the sales price of each residential property and the “expected price” based on a house price index to nearby foreclosure activity differentiated in physical space (0–300 feet, 300–500 feet, 500–1,000 feet, and 1,000–2,000 feet) and time (the stage in the foreclosure process). For a set of seven MSAs, they find that property sales located within 300 feet of a foreclosed property experience about a 1 percent discount per foreclosure. (Furthermore, the average discount falls to 0.5 percent at a distance of one-eighth mile [the same distance used by Immergluck and Smith 2006]). The authors also find that the peak discount occurs at the time of the foreclosure sale (before the REO sale); they attribute this peak to property neglect and uncertainty relating to the future owners.

Overall, the empirical evidence relating to foreclosure effects on nearby property sales prices suggests a discount. Moreover, such discounts likely dissipate quickly the farther away the foreclosed property is from the sale in space and time. Hedonic regressions—especially those with limited controls for property and neighborhood characteristics—likely suffer from omitted variables problems. Repeat-sales approaches may represent an improvement insofar as they do not require a rich set of property and neighborhood covariates. The results also highlight the importance of controlling for local house-price trends that influence the probability of default by

all mortgage borrowers. (Note that this control is especially important when studying the recent experience, which included a large number of borrowers taking extremely leveraged positions just prior to a nationwide house price decline.)

The measured spillover effects of foreclosure are likely due to the condition of the foreclosed property. In future research, it would be helpful to control for property quality and/or occupancy status since it is widely conjectured that vacant foreclosed properties are of especially low quality and attract other social problems. The remaining two other explanations for foreclosure spillovers (lowered appraisals as a result of a foreclosure sale being treated as a comparable and an increased supply of homes on the local market) have also not been formally investigated. The repeat-sales approach seemingly holds more promise than the hedonic approach because it does not require a large set of property and neighborhood covariates and can more easily be applied to many geographic areas and over longer time periods. However, the repeat-sales approach does require a long time series.

## Conclusions

The public sector has responded in various ways to the tremendous rise in mortgage foreclosures in recent years. The economic rationale for such interventions rests with the notion that there are social costs, or negative externalities, associated with such events. Remarkably, prior to the recent foreclosure crisis, there had been little economic research documenting foreclosure spillover effects although the literature has evolved rapidly since.

This critical review of the literature suggests that foreclosed properties sell at a discount, likely because such properties are in worse condition. Moreover, very nearby foreclosures appear to depress the sales prices of nondistressed properties although this effect decays rapidly in physical distance and time. That said, a good deal of variation occurs in estimates, with some being implausibly large likely because of poorly specified empirical models. Repeat-sales approaches also seem to hold greater promise than hedonic approaches because they are more likely to hold property and neighborhood characteristics constant and it is easier to examine multiple geographies and longer time periods.

A literature studying the effect of nearby foreclosures on property values has emerged over the past five years. While its results are compelling, it can certainly be improved and expanded. As a result, the next five years of research into this topic can be expected to be even more fruitful.

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