Risky Business –

An Econometric Analysis of the Relationship Between Subprime Lending and Neighborhood Foreclosures

By

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Executive Summary

The policy debates about subprime and predatory mortgage lending have often focused on the overcharges or abuses of individual borrowers on the one hand and the possible "unintended consequences" of increasing regulatory measures on the other. At the same time, one of the reasons community development and reinvestment groups became more involved in consumer lending regulations in the late 1990s was the association between subprime lending and problems of increased and spatially concentrated foreclosures. Community development groups were seeing decades of work in stabilizing communities undone by a surge in foreclosures and property abandonment. Foreclosures, especially in low- and moderate-income areas, turn what might be typically viewed only as a consumer protection problem in which an individual homeowner is overcharged or even loses her home, into a community development problem, in which increased foreclosures lead to property abandonment and blight and destabilize entire neighborhoods.

Using data from the Chicago metropolitan area, where consistent foreclosure data are available in electronic form, this study measures the quantitative relationship between the level of subprime lending in a neighborhood and foreclosure levels in a subsequent period, while controlling for changes in economic and demographic characteristics that might also affect foreclosure rates. While both promoters and critics of the current state of subprime lending markets are likely to agree that subprime loans have higher foreclosures, they are less likely to agree on how severe an effect subprime lending has on neighborhood foreclosure rates. While some studies have explored this issue via simple comparisons of subprime lending and foreclosure activity, none to our knowledge have systematically measured the discrete impact of subprime loans on foreclosures independent of other neighborhood characteristics and the effects of prime lending.

The findings of this study indicate that subprime lending was a dominant driver of the increased and highly concentrated neighborhood foreclosure levels of the late 1990s and through 2002. Responsible subprime lending may indeed bring important benefits to families that have difficulty obtaining credit elsewhere. However, this study shows that, after controlling for neighborhood demographics and economic conditions, subprime loans lead to foreclosures at twenty or more times the rate that prime loans do. These foreclosures have a heavy social cost that must be considered in regulatory policy-making. Some of the key results of the study include:

- Subprime lending has a substantial impact on neighborhood foreclosure levels. For every 100 additional subprime loans on owner-occupied properties made in a typical neighborhood from 1996 to 2001, there were an additional 9 foreclosure starts in the community in 2002 alone.[1] Nine foreclosure starts in a census tract in one year is a substantial increase. The average tract in the Chicago area had only about 11 foreclosures starts in 2002. Thus, this represents an increase of 76 percent in the foreclosure level.

- Non-owner-occupied subprime loans, although far fewer in number than those to owner-occupied properties, have an even higher propensity to lead to increased foreclosures. A tract with just 10 more such loans over the 1996 to 2001 period, other things being equal, would be expected to have more than 2.5 additional foreclosures in 2002.

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[1]The 100 loan figure is a reasonable one for discussion purposes. The average number of subprime loans per tract in the study was 114 over the 1996-2001 period, with a standard deviation of 105 loans.

- Prime lending has a minimal impact on the neighborhood foreclosure level and, in the case of refinances, prime lending actually reduces the level of expected foreclosures.

- The contribution of subprime home purchase loans to neighborhood foreclosures is 28 times that of prime home purchase loans. While a tract with 100 additional prime home purchase loans from 1996 to 2001 is expected to have only 0.3 additional foreclosures in 2002, a tract with 100 additional subprime home purchase loans is expected to have almost 9 additional foreclosures.

- In the case of refinance loans, a higher number of owner-occupied prime loans actually leads to *reduced* foreclosure levels. A tract with 200 more owner-occupied prime refinance loans during the 1996 to 2001 period is expected to have 1 fewer foreclosure in 2002. This finding argues strongly for a substantial substitution effect between prime and subprime refinance loans. That is, as prime loans increase, the potential market for subprime lenders may be diminished, thus crowding out such lenders.

- Subprime home improvement loans have the largest impact on foreclosures on a per-loan basis. A tract with 100 more subprime home improvement loans is expected to have an additional 9.5 foreclosures in 2002 while the corresponding effect for purchase loans is 8.9 and for refinance loans it is 7.8. However, because there are so many more subprime refinance loans, they account for a much larger share of foreclosures.

This study has a number of implications for regulatory policy in the arena of home lending. First, it makes a strong case that the magnitude of the effect of subprime lending on neighborhood foreclosures is very large. Given the impact of foreclosures on neighborhood vitality and stability, especially in modest-income neighborhoods where foreclosures more often lead to abandonment and blight, this cost of high-risk lending should be given more weight in policy discussions. This is especially true since much of this cost is borne by entire communities, and not just by the lender or borrower.

Foes of increased regulation of the subprime mortgage market often argue that increased regulation will result in higher borrowing costs for many and perhaps even reduce credit access for some. Some recent studies have warned of the potential costs of reducing credit availability as a result of increased regulations in places such as North Carolina (Elliehausen and Staten, 2002; Harvey and Nigro, 2002). Others have argued that any observed reductions in loan flow correspond to reductions in loans containing abusive lending practices (Quercia, Stegman, and Davis, 2003). Frequently lost in this debate, however, is any emphasis on the social costs involved in the high foreclosure levels present in an essentially unregulated subprime marketplace. Even if some worthy borrowers are prevented from obtaining credit due to increased regulation, the benefits of reduced foreclosures may justify such action. The substantial costs of high foreclosure levels—borne not only by parties to the mortgage transactions but also by entire neighborhoods and communities — might not be easily outweighed by marginally lower borrowing costs spread thinly across a broad set of borrowers.

Moreover, foreclosures are hardly the entire costs of overly risky and irresponsible subprime lending. Financial and emotional stress, excessive charges and fees, and other harms to borrowers must be considered. Certainly, many borrowers benefit from responsible subprime lending. The findings of this study, however, suggest that the negative spillovers occurring in the existing marketplace are substantial and that such spillovers must be more clearly considered in regulatory decisions.

Introduction

The policy debates about subprime and predatory mortgage lending have often focused on the abuses suffered by individual borrowers, on the one hand, and on the possible "unintended consequences" of increasing regulation of the subprime industry on the other. In considering policy in this area, participants in the policy process should be clear on the benefits and costs of different regulatory alternatives. The debate tends to hinge on protecting individual borrowers while not overly restricting the availability of credit. Often lost in this debate are the spillover costs presented by high-risk lending, what economists call "negative externalities." These are costs borne not by either the lender or the borrower but by parties "external" to the mortgage transaction. While borrowers certainly bear a good deal of the costs of foreclosures, in modest-income communities entire neighborhoods are harmed by foreclosures. They easily lead to boarded-up homes, abandonment and blight. The spatially concentrated increase of foreclosures that arise due to higher levels of subprime lending has an important economic and social spillover cost that should be a more central concern of policy making in this area.

While individual community development practitioners can point to anecdotal evidence of the link between subprime lending and increased foreclosures in their neighborhoods, and a few studies have documented an apparent relationship between subprime lending and foreclosures, this study goes considerably further. We develop a multivariate estimation of neighborhood foreclosure levels that allows us to develop a precise quantitative measure that relates subprime lending at the neighborhood level to neighborhood foreclosures. Understanding the magnitude of this relationship will allow policy-makers to give it the appropriate level of attention in considering policy-making in this area.

Policy Concerns About Subprime Lending

There are at least three somewhat interrelated reasons why community reinvestment advocates and policy-makers have expressed serious concerns about the explosion of subprime lending that has occurred since the early 1990s. First, because the market for home loans is extremely segmented by race, with minority neighborhoods served excessively by subprime lenders, homeowners in minority communities may be effectively steered toward higher-cost products. If minority communities are targets of higher-cost lenders and receive little attention from prime lenders, the odds of minority borrowers with good credit receiving higher-cost loans will be higher than that of white borrowers with good credit. A second concern – and a subject of a large part of recent policy debates – has to do with the rise of abusive or predatory practices that have been associated with the subprime industry. A third reason policy-makers are concerned about hypersegmented refinance markets is that the growth of subprime lending has been associated with a simultaneous rise in foreclosures. Moreover, the spatial concentration of subprime lending appears to have led to a concentration of subprime foreclosures in minority and modest-income neighborhoods, which in turn can have a devastating impact on their stability and development prospects.

The Pricing Issue

Various sources of data indicate that a substantial portion of subprime loans are priced in excess of what is merited by the risk involved. A study using an industry survey of mortgages with subprime

pricing found that almost 29 percent of subprime-priced loans had credit scores above 640, generally considered the point at which prime lenders become quite comfortable with loans (Phillips-Patrick et al., 2000). In examining 15,000 subprime mortgages originated by four financial institutions, Freddie Mac found that between 10 and 35 percent of borrowers who obtained mortgages in the subprime market could have qualified for a conventional loans (Freddie Mac, 1996). Freddie Mac also estimated that subprime borrowers who would have qualified for conventional loans paid mortgage rates on the order of one to two-and-one-half percentage points higher than they would have paid in the prime market. However, this does not take into account the higher up-front fees on most subprime loans. It is often up front fees, even more than excessive interest rates, that tend to be the source of a good deal of overcharging.

A study of home purchase loans conducted by an affiliate of the Mortgage Bankers Association found that the probability of a home purchase borrower receiving a subprime loan, controlling for credit history, location and other variables, increased by approximately one-third, from 0.8 percent to 2.5 percent, if the borrower was black (Pennington-Cross, Yezer, and Nichols, 2000). The loan sample in this study had relatively few subprime loans in it, but the increase was relatively substantial and statistically significant.

In an analysis of subprime lending in Chicago and Philadelphia, Calem, Gillen, and Wachter (2002) found that, after controlling for education, credit score, income, and housing stock characteristics, black neighborhoods still had much higher levels of subprime lending than white neighborhoods. For refinance loans, an all-black neighborhood was expected to have a subprime share that was twenty-four percentage points higher than an otherwise equivalent white neighborhood, even after controlling for the credit history of neighborhood residents. A larger study of ten metropolitan areas found similar results (NCRC, 2003). Even after controlling for housing turnover, age of housing stock, median income, percent of residents aged 65 and older, and the percent of residents with high risk credit scores, the percentage of residents who were black was a consistently strong determinant of subprime lending activity.

This dual market, caused in part by the aversion of many prime lenders to marketing and making loans in minority communities, can create a sense of futility among minority homeowners in considering banks and other prime lenders as potential sources of mortgage credit. Moreover, even among borrowers who do have impaired credit, the subprime market does not appear to be functioning in a way that serves the interests of borrowers. In Fannie Mae's 2001 National Housing Survey, only 34 percent of credit-impaired respondents were confident that they got the lowest cost mortgage available, compared to 68 percent of all homeowners surveyed (Fannie Mae, 2001). Thirty-two percent of credit-impaired homeowners, compared to ten percent of other all respondents, did not care whether they got the lowest cost mortgage. They were "just happy to be approved." Moreover, more subprime than prime respondents reported not knowing anything about their credit rating.

Predatory Practices beyond Excessive Pricing

Many major subprime lenders have been implicated in at least some instances of abusive lending. One former Chicago legal aid attorney recalled that, when looking at a list of the top 14 subprime refinance lenders in black Chicago neighborhoods, he noticed that his agency had identified specific cases of predatory lending involving each of them (Rheingold, Fitzpatrick, and Holfeld, 2001). A variety of loan terms and lending practices have been described as predatory or abusive, especially when

employed in high-cost or subprime loans.[5] Some of these practices, particularly loan terms such as prepayment penalties, are used in the prime market often without any detriment to the borrower. However, the use of such terms and practices in the subprime market is largely inappropriate. For example, debt-to-income ratios above 40-45 percent may be appropriate in some cases in the prime market, especially for borrowers with high incomes. A 50 percent debt-to-income ratio leaves 50 percent of income available for nonmortgage expenses, which is generally sufficient for high-income households, although perhaps still not an optimal situation. For most households with credit history issues, however, stretching the debt capacity to this degree is not considered responsible lending. Another example is a short-term (e.g., five-year) balloon loan in which payments may be reduced in the near term but then a very large payment comes due at the five-year maturity. A balloon payment for someone who can be expected to obtain refinancing rather easily in the foreseeable future may be appropriate. But for most subprime borrowers, using a balloon payment to lower monthly payments to the point of "affordability" will leave a balloon or escalating principal that the borrower will have great difficulty repaying.

An instance of predatory lending could involve just one predatory practice. More commonly, though, a number of practices occur simultaneously. Moreover, high-pressure or "push" marketing may be most effectively employed when targeting homeowners in vulnerable situations, including those with high levels of health-related or credit card debt. Those not in immediate financial distress are less susceptible to pressure tactics and are more likely to "shop around" for better alternatives.

The proportion of loans made by subprime lenders that contains abusive practices is the subject of some debate, but it is rare to find a case of a predatory lending that does not involve a subprime lender. Some evidence suggests that the proportion of subprime loans with at least one problematic feature may be quite large (Ernst, Farris and Stein, 2002). For example, estimates of the number of subprime loans containing prepayment penalties range from 43 percent to 80 percent, while estimates of the share of prime loans containing prepayment penalties are much lower—between 2 and 11 percent (Fannie Mae, 2001; U.S. Department of the Treasury and U.S. Department of Housing and Urban Development, 2000).

A couple of recent studies have surveyed recipients of subprime loans to understand the incidence of various predatory lending practices. In a study of 255 very high-costs loans in Dayton, Ohio, 75 percent were found to have prepayment penalties and 24 percent had balloon payments (Stock, 2001). The researchers also interviewed subprime borrowers who were in the process of foreclosure as well as those who were not. Thirty nine percent of respondents in foreclosure and thirty three percent of respondents not in foreclosure stated that the initial contact with the lender was initiated by the lender via phone or mail. Forty-five percent of foreclosure respondents and 24 percent of other respondents said that their loans' terms at closing were different than what had been discussed. Eighty-six percent of foreclosure respondents and 68 percent of nonforeclosure respondents who noted a difference in terms accepted the difference, perhaps due to pressure at the closing from the lender. And finally, 19 percent of nonforeclosure respondents and 42 percent of foreclosure respondents were encouraged to borrow more than they had intended. In California, researchers interviewed 125 subprime borrowers and found that 39 percent of subprime respondents said that the idea to take out a home-secured loan came from the lender-broker (Stein and Libby, 2001). They also found that 64 percent of respondents had refinanced their homes six times. Forty percent of the refinances had taken place within two years of the prior loan, a strong indicator of the predatory practice known as flipping. The researchers found that 38 percent of the subprime borrowers fit a "worst case scenario" characterized by a combination of onerous loan terms, high costs, and aggressive sales tactics.

Subprime Loans and Foreclosure

One of the reasons that subprime lending has been the subject of a good deal of advocacy and policy-making in recent years has to do with the problem of increased foreclosures. Foreclosures, especially in low- and moderate-income neighborhoods turn what might be typically viewed as a consumer protection problem, in which an individual homeowner is overcharged or even loses her home, into a community development problem, in which increased foreclosures lead to property abandonment and blight. In Chicago, for example, some of the most effective organizing and advocacy for state regulatory action on the predatory lending issue came from groups like Neighborhood Housing Services and the Southwest Organizing Project, which saw that increased foreclosures were threatening more than two decades of work in revitalizing and stabilizing their communities.

Defaults and, especially foreclosures, can entail significant costs and hardships not just for the families most directly affected, but also for surrounding neighborhoods and even the larger communities. McCarthy, Van Zandt, and Rohe (2000) describe how foreclosures can involve losing not only accumulated home equity and the costs associated with acquiring the home, but access to stable, descent housing. Moreover, foreclosures damage credit ratings, hurting the owners' prospects not only in credit markets but also in labor and insurance markets and in the market for rental housing. Moreno (1995) estimated average losses to the foreclosed family at $7,200. Cities, counties and school districts lose tax revenue from abandoned homes. In addition to the direct costs in dealing with abandoned properties and the public safety costs associated with them, there are potential spillovers on the property values and tax receipts from nearby properties. These spillover effects can be significant. Simons, Quercia, and Maric (1998) estimated that average sales prices fell $788 for each 1 percent increase in tax delinquencies in a one- to two-block area of a residence. For FHA foreclosures, Moreno (1995) estimated average city expenses of $27,000 and neighborhood expenses of $10,000. Moreover, these figures do not account for all of the social and psychic costs of foreclosures, either to the family or the community.

Subprime loans lead to delinquency and foreclosure at relatively high rates, especially among the higher-risk segment of the industry. A late 1990s industry survey of 27 larger subprime lenders indicated that 90 day delinquency rates for C- and D-grade refinance loans were 10 percent and 22 percent, respectively, compared to a rate of 0.25 percent for prime refinance loans (Phillips-Patrick et al., 2000). Even FHA loans, which have been persistently tied to foreclosure and blight problems in minority communities, had 90-day delinquency rates of less than 2 percent for refinance loans over the same period. The foreclosure rate for all subprime loans in this sample (including the 55 percent that were A- grade) was more than four times the FHA rate. The foreclosure rate for C and D loans is expected to be much higher. In this voluntary survey, almost 20 percent of subprime loans were C and D grade. However, the source of these data appears to be biased towards substantially underrepresenting higher-risk loans. Even more concerning is the fact that problems among subprime loans worsened considerably beginning in 2000 (Crews-Cutts, 2003). Rates of serious delinquency for subprime loans (of all grades) increased from less than five percent in early 2000 to more than eight percent by late 2001. Prime loan delinquencies were almost constant over this period, at around 1 percent, and FHA delinquencies rose much more slowly from about 3.5 to about 4.5 percent.

Because subprime lending—especially the higher risk segments known as B, C or D lending—is highly concentrated in certain types of neighborhoods, these neighborhoods bear a disproportionate share of subprime foreclosures. Moreover, many of the subprime lenders exhibiting the highest foreclosure rates are concentrated in certain areas, so that these areas are hit especially hard. The nature of residential sorting and the experience of the FHA program suggest that a lender may have a substantial but not

unreasonable foreclosure rate nationally and still have a foreclosure rate in certain neighborhoods that is exorbitant. Lenders may be able to tolerate foreclosure rates of two to five percent nationally and still be successful raising capital. These same lenders may have foreclosure rates of more than ten to fifteen percent in specific communities.

Foreclosures—particularly those leading to abandonment and blight—often have negative spillover effects, or externalities, that can be a key source of market failure. Because the negative social costs of these spatially concentrated foreclosures (abandonment, blight, crime, and lower neighborhood property values) are not captured in market transactions, the high foreclosure numbers can indicate that lending levels will be excessive even from an efficiency perspective. It is important to add that foreclosures in struggling, low- or moderate-income and minority neighborhoods may have greater negative impacts than those in middle- and upper-income areas. In the latter case, the foreclosures are less likely to lead to abandoned buildings, blight and crime.

At least five recent studies have identified some relationship between subprime lending and foreclosures at the neighborhood level (Collins, 2003; Greunstein and Herbert, 2000; National Training and Information Center, 1999; U.S. Department of Housing and Urban Development, 2000; Zimmerman, Wyly, and Botein, 2002). In Baltimore, while the subprime share of mortgages in the city was 21 percent in 1998 (presumably higher than in previous years), 45 percent of foreclosure petitions in that year were tied to subprime loans (U.S. Department of Housing and Urban Development, 2000). Subprime foreclosures accounted for 57 percent of all foreclosures in black Baltimore neighborhoods. In Atlanta, a study by Abt and Associates found that foreclosures attributed to subprime lenders accounted for 36 percent of all foreclosures in predominantly minority neighborhoods in 1999, while their share of loan originations was between 26 and 31 percent in the preceding three years (Greunstein and Herbert, 2000). In Essex County, New Jersey, researchers found that the percent of foreclosures attributed to subprime lenders increased from 19 percent in 1995 to 30 percent in 2000, though they also admitted that these figures substantially underestimated the subprime share of foreclosures (Zimmerman, Wyly, and Botein, 2002). By mapping foreclosures they were also able to identify that foreclosures were disproportionately concentrated in predominantly black neighborhoods

These studies generally tend to underestimate the proportion of foreclosures due to subprime originators and overestimate the proportion due to prime originators. Many subprime loans are sold to financial institutions identified by the U.S. Department of Housing and Urban Development as "prime" or are held in trusts at prime lending institutions (usually banks). The reverse does not tend to be the case; subprime lenders do not often buy loans from prime lenders and generally do not have trust capacity. Thus, foreclosures of subprime loans sold to prime lenders or trusts would list only the prime lender who currently holds the loan, not the originating subprime lender.

In the studies of Chicago, the authors were plagued by the same problem, but did obtain pricing data on a portion of the foreclosures. The National Training and Information Center (1999) found that foreclosures on loans with interest rates above comparable Treasury rates plus four percentage points (clearly subprime-priced loans) increased by 500 percent from 1993 to 1998. Many of these foreclosures were concentrated in minority neighborhoods. Collins (2003) found that loans by subprime lenders increased by 32 percent from 1996 to 2001, while foreclosures on loans priced 300 basis points or higher increased by 260 percent over the same period.

Establishing a Stronger Measure of the Relationship Between Subprime Lending and Foreclosures

Subprime loans are expected to entail at least marginally higher risks than prime loans, so somewhat higher foreclosure rates should be expected. The heart of many policy debates regarding subprime and predatory lending, however, is a question of how much additional risk should be tolerated. In order to inform this debate, we need better measures of the impact that subprime loans of various types (home purchase versus refinance, for example) have on neighborhood foreclosure levels. To do this we gathered computerized foreclosure data for the five-county metropolitan Chicago area, geocoded it to the census tract level, and compared it to lending data in the same area.[1]

We geocoded and analyzed foreclosure data from 1995 and 2002. These data represent foreclosure starts rather than completed foreclosures.[2] In many ways, this is a superior indicator of homeowner distress than completed foreclosures. Since property may be lost through offering deed-in-lieu of foreclosure, the number of completed foreclosures may underestimate the loss of homes due to loan distress. We also aggregated Home Mortgage Disclosure Act (HMDA) data in various ways for the years 1996 through 2001. Most importantly, conventional mortgages were defined as prime or subprime based on characteristics of the originating lender. While HMDA data do not capture all mortgages, they capture a large segment of the mortgage market.[3]

Before developing some relatively precise measures of the relationship between subprime lending and foreclosures, we first examine the broader patterns of the foreclosures. From 1995 to 2002, the Chicago area experienced tremendous growth in foreclosure starts. The total number of starts went from 7,433 in 1995 to 25,145 in 2002, an increase of 238 percent. What is particularly troubling about this trend is the disproportionate increase due to conventional, nongovernment-guaranteed loans. Historically, FHA loans, which account for the bulk of government-guaranteed loans, have had substantially higher foreclosure rates than conventional loans and have accounted for a very large and disproportionate share of foreclosures. Of course, as subprime loans (which comprise a portion of conventional loans) increased, more conventional loans foreclosure rates would be expected to increase to some degree. However, the nature of urban foreclosure problems has been fundamentally

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[1]This includes Cook, DuPage, Lake, Kane, and Will counties. These are the counties for which complete foreclosure data were available from the firm, Foreclosure Report of Chicago. Complete data were not available for McHenry County, the "sixth" county in the traditional six-county metropolitan definition. For each year, the foreclosure data were cleaned by removing certain multiple foreclosure entries at the same address over a very short period of time. For a number of foreclosure records, especially for those in DuPage, Kane, and Lake Counties in 2002, there was no recorded property type (i.e., single family, multi-family, commercial). In Cook and Will counties, where the vast majority of property types were known, the unknown property types were estimated based on the distribution of known properties. For DuPage, Kane, and Lake counties it was assumed that the vast majority of properties were single-family dwellings based on the data from 1995, where property type information was available. For these counties, a small percentage of foreclosures (typically less than 1%) were allotted as non-single family. Foreclosure data is available only at the individual property level. Each record had to be geocoded to determine its census tract. For each year, roughly 98 percent of addresses were able to be geocoded. The remaining two percent had addresses that could not be found. Foreclosure records that had no data on the type of original loan (i.e., conventional or FHA) were given a loan type based on the distribution of conventional and government foreclosures in a given tract.

[2]Collins (2003) found that 36 percent of foreclosures starts result in completed foreclosures in 2001. He also found the completed portion to be higher in a sample of lower-income neighborhoods.

[3]The largest incomplete segment in HMDA is the home equity loan market. Home equity loans that are used for home improvement may be reported to HMDA, but not necessarily. Moreover, other home equity loans are generally not reported under HMDA. The bulk of home purchase loans and a large majority of refinance loans are reported under HMDA however. Lenders are identified as specializing in subprime loans by the U.S. Department of Housing and Urban Development. Some "prime" lenders do originate some subprime loans and visa versa. While classifying loans by originating lender rather than loan characteristics has some limitations, it is a reasonable method of measuring subprime vs. prime loan shares in the analysis below.

transformed during the middle-to-late 1990s and into the new century. It is now the conventional mortgage market that accounts for the bulk of foreclosures.

Figure 1 shows that while government guaranteed foreclosures rose significantly between 1995 and 2002, from 3,387 to 6,932, conventional foreclosures skyrocketed from 4,046 to 18,213. The conventional loans increased at a rate (350 percent) more than three times the government-guaranteed rate (105 percent). As Figure 2 shows, the result is that, while conventional loans accounted for only slightly more than half of foreclosures in 1995, they accounted for almost three out of four just seven years later.

Foreclosures and Neighborhood Racial Composition

It is well established that subprime lending increased much more in minority than nonminority neighborhoods in the 1990s (Immergluck and Wiles, 1999). It is also well established that mortgage brokers have been implicated in many instances of abusive and irresponsible lending activity. Brokers act as a local intermediary between national lenders and borrowers. The nature of the broker market is such that there are many small brokers serving different geographic areas and many who focus on certain communities. The use of brokers, then, may segment the foreclosure patterns of a specific lender, with higher foreclosure rates resulting in areas served by less responsible or reputable brokers.

Thus, individual lenders may experience large spatial variations in loan performance within a metropolitan area. Moreover, broker-originated loans are twice as likely to be subprime than lender-originated loans (Kim-Sung and Hermanson, 2003). Among older borrowers, brokers are also more likely to lend to nonwhite borrowers. Sixty-two percent of older nonwhite borrowers received loans via brokers, while only 38 percent of older white borrowers did. Brokers are heavily associated with aggressive "push marketing." In their study of older borrowers, Kim-Sung and Hermanson (2003) found that 56 percent of borrowers with brokered loans reported that contact was initiated by the broker, while other borrowers reported that lenders initiated contact only 24 percent of the time. More than twice as many borrowers using brokers received loans with prepayment penalties (26 percent versus 12 percent), and significantly more brokered loans involved refinancing two or more times over a three year period. Borrowers with brokered loans were generally less satisfied with their loans and were less likely to feel that they received honest information. Brokers are generally regulated only by state regulators, and the degree of such oversight tends to vary from minimal to nonexistent.

Even lenders not using brokers may experience differentials in loan performance across neighborhood space. In particular, if lending policies are not well designed for lower-income borrowers, a lender may see higher foreclosures in lower-income neighborhoods. In addition, if markets function more poorly in particular geographic areas, then borrowers may be paying higher rates than they would otherwise. They might also accept structured or abusive loans at higher rates than in places where markets function better. These patterns can intensify the geographic concentration of foreclosures.

Figure 1
Increases in Foreclosure Starts by Conventional/Government-guaranteed
Type in the Chicago Metropolitan Area
1995 –2002
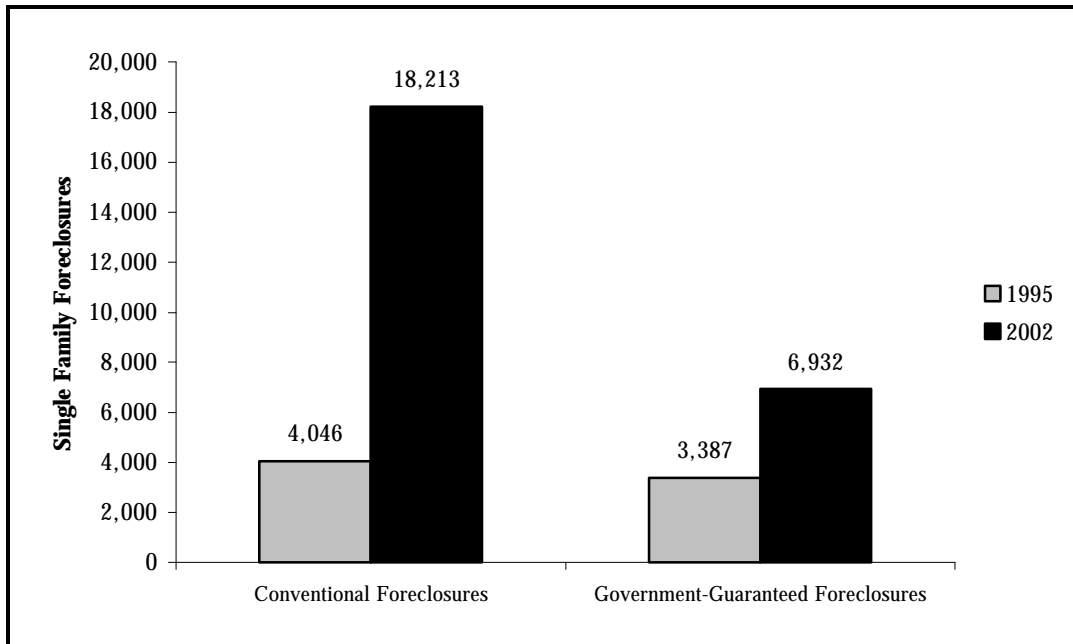
Figure 2
Share of Foreclosures by Government/Conventional Type
1995 -2002
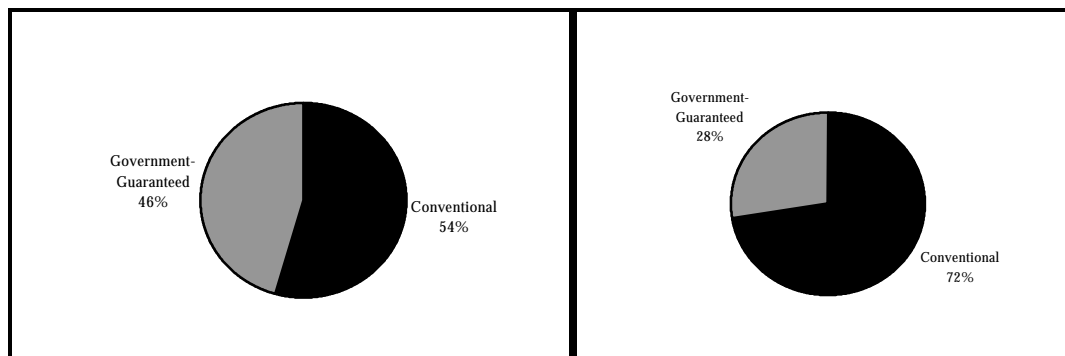
Figure 3 illustrates the large differences in the growth of foreclosures by neighborhood racial and ethnic composition. While conventional foreclosures increased dramatically in all neighborhood types, they increased considerably faster in neighborhoods with higher minority populations. Neighborhoods with minority populations of less than 10 percent in 2000 saw an increase in foreclosures of 215 percent, while neighborhoods with 90 percent or greater minority populations experienced an increase of 544 percent.

Figure 3
1995 – 2002 Increases in Conventional Foreclosures by
Neighborhood Racial Composition in 2000
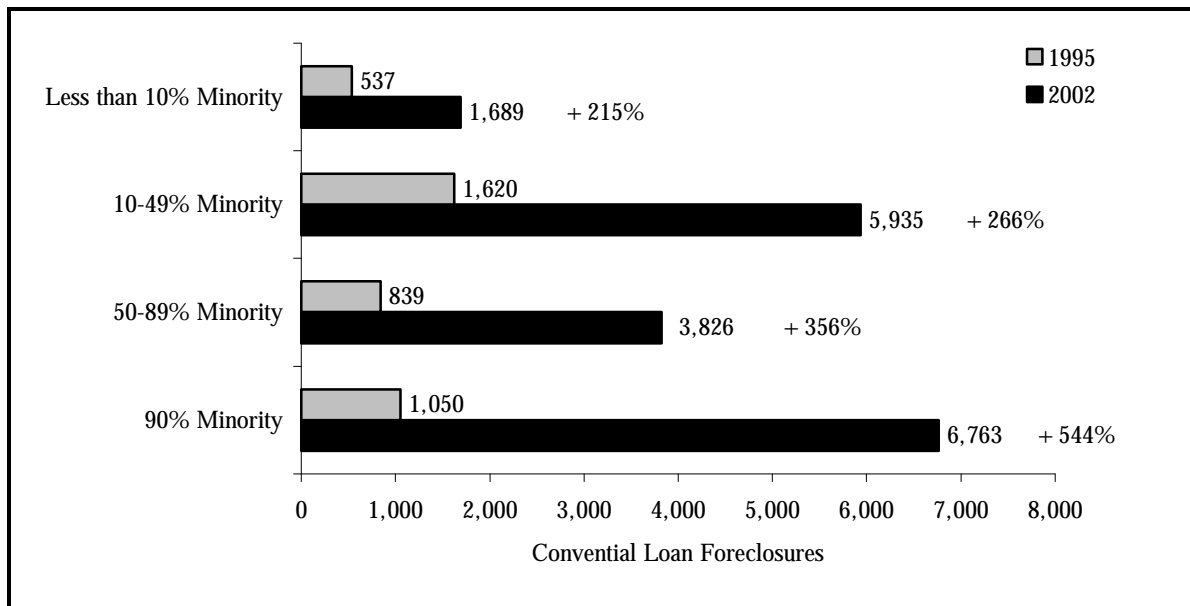
Figure 3 also indicates that neighborhoods with 90 percent or more minority residents in 2000 accounted for 40 percent of the 1995-2002 increase in conventional foreclosures.[4] These same tracts represented only 9.2 percent of the owner-occupied housing units in the region. Tracts with 50 percent or greater minority populations accounted for more than 61 percent of the increase in foreclosures.

Figures 4 and 5 illustrate the increase in foreclosures across the metropolitan area. While foreclosures increased everywhere, these figures show the concentration of the increase on the city's west and south sides, as well as in suburban communities in western and southern Cook County. Figure 5 also shows significant increases in foreclosures in areas that are 50 percent or greater minority including suburban communities such as Elgin and Aurora in northeast and southeast Kane County respectively, Waukegan and North Chicago in eastern Lake County, and the Joliet area in west central Will County. Some of the patterns in Figures 4 and 5 are due to the density of owner-occupied housing units in different communities. Where there are more homes, we would, other things being equal, expect to find more foreclosures.

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[4]The HMDA data used in this study are reported according to 1990 census tract boundaries. Therefore, it was necessary to obtain 2000 census data recalculated to 1990 tract boundaries for the purposes of matching the data with the 1990 boundaries. This data was procured from PCI Services, Inc., which provides this product for its CRA Wiz software, a program commonly used by financial institutions and bank regulators to analyze HMDA data.

Figure 4. Chicago Area Conventional Foreclsoures, 1995

Lake County

Cook County

Kane County

Chicago

DuPage County

One Dot = Two Foreclosures

Tracts 50% or Greater Minority*

*From 2000 Census

NORTH

Will County

10 Miles
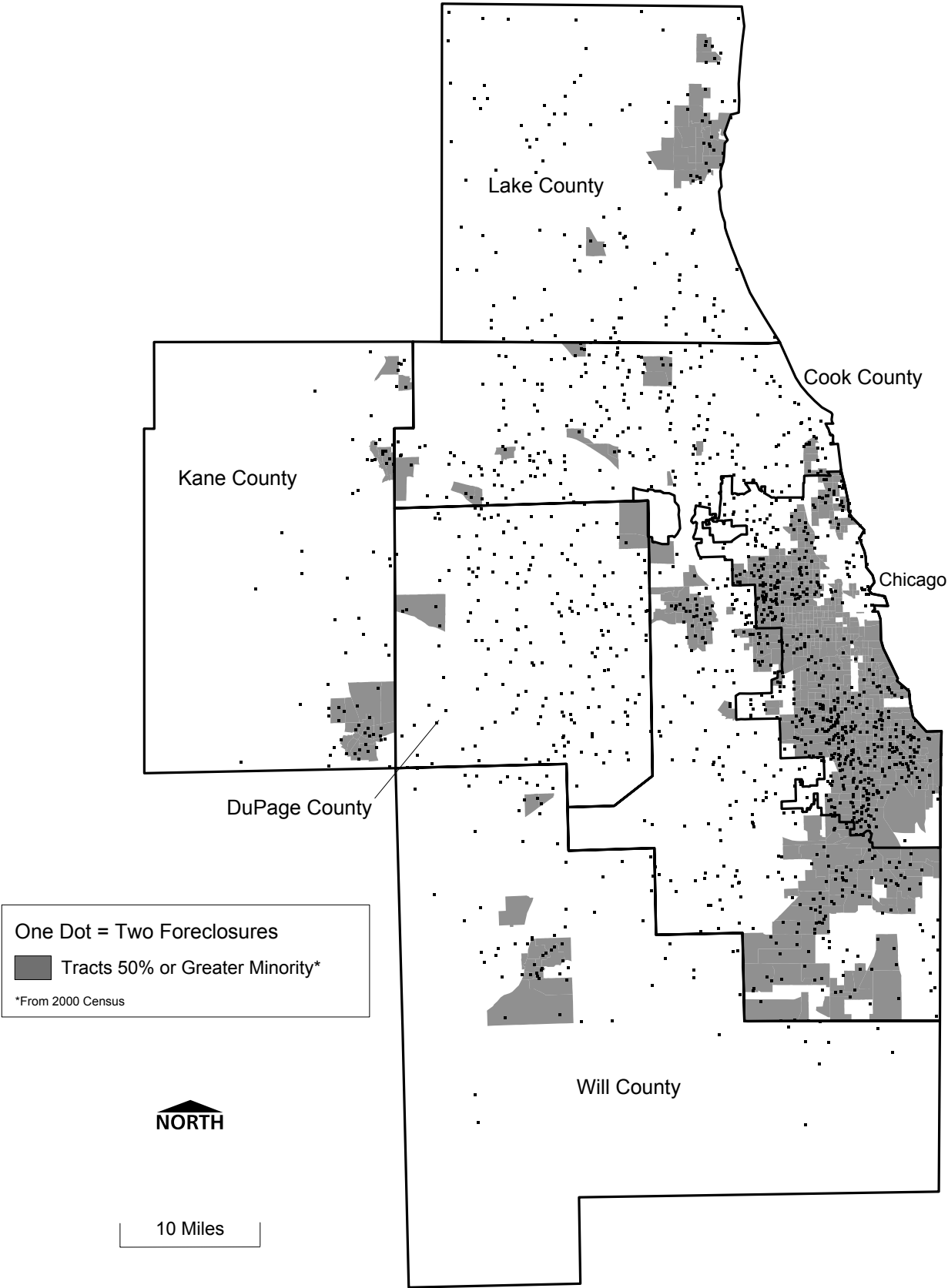
Figure 5. Chicago Area Conventional Foreclsoures, 2002

Lake County

Cook County

Kane County

Chicago

DuPage County

One Dot = Two Foreclosures

Tracts 50% or Greater Minority*

*From 2000 Census

Will County

NORTH

10 Miles
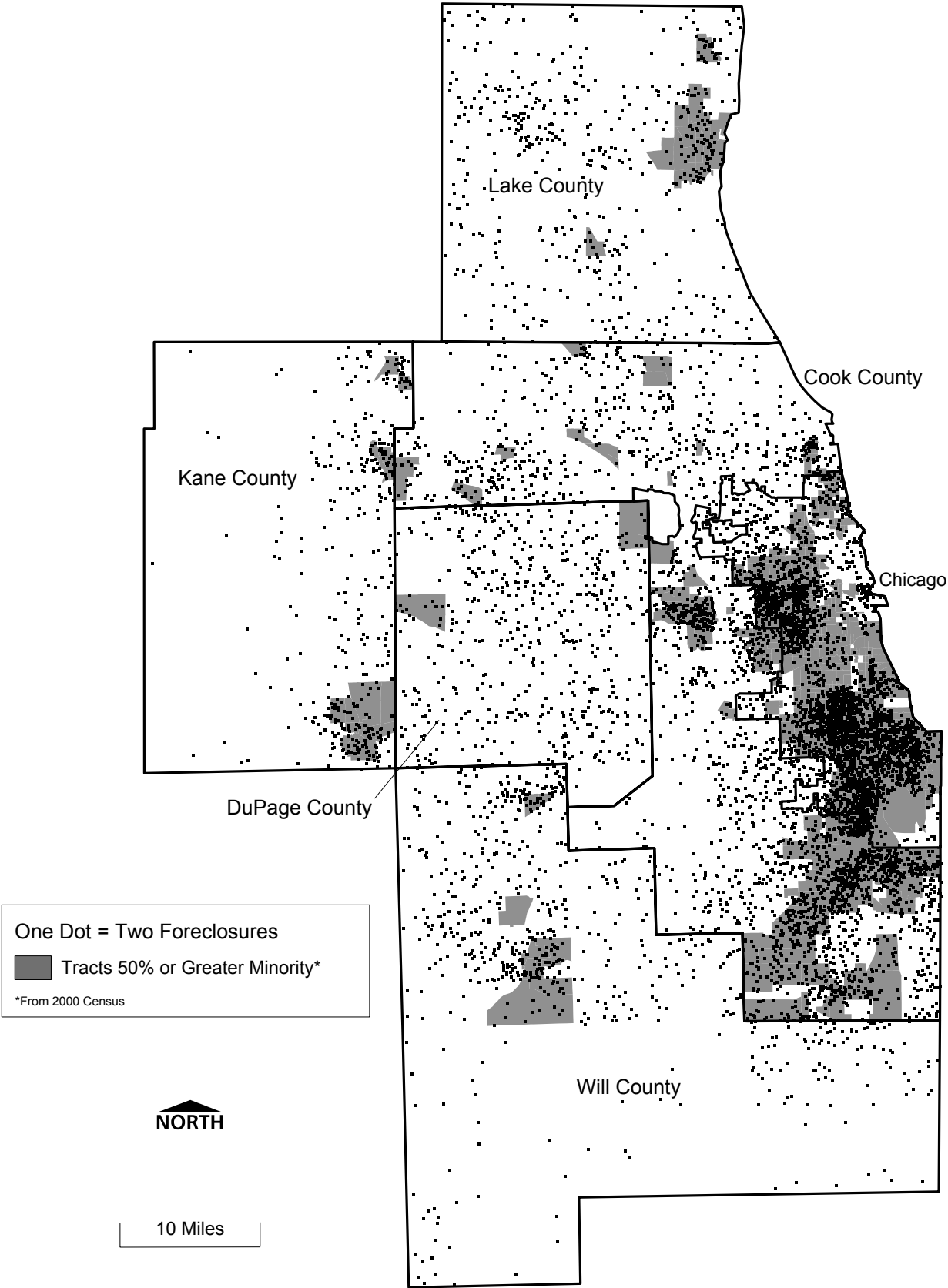
Figures 6 and 7 control for the number of owner-occupied housing units. They show the number of foreclosures in each year per 100 owner-occupied units. These maps are significant because they illustrate that the geographic disparity in the number of foreclosures per property increased dramatically from 1995 to 2002. In 1995, nearly 77 percent of tracts with over 25 owner-occupied units had less than 0.5 foreclosure per 100 owner-occupied units compared to 2002 where less than 33 percent of tracts fell into this category. More importantly, however, the number of tracts with extremely high concentrations of foreclosures per unit exploded from 1995 to 2002. In 1995, only 17 tracts had over 2.5 foreclosures per 100 owner-occupied units compared to 343 tracts in 2002, an increase of 1,918 percent. Most of these tracts are concentrated on Chicago's south and west sides and in south and west suburban Cook County. There are also high concentrations of foreclosures per housing unit in some collar suburban communities such as the Elgin and Aurora areas in Kane County, Waukegan and North Chicago in eastern Lake County, and the Joliet area in west central Will County.

The final map, Figure 8, plots the number of foreclosures in 2002 divided by the number of all types of conventional loans (home purchase, refinance, and home improvement loans) made between 1996 and 2001.Because the loans in the five or six years preceding 2002 are expected to be the primary source of most of the foreclosures in 2002, it is worth looking directly at this ratio. The more loans in a neighborhood, other things equal, the more foreclosures we should expect. Figure 8 shows that neighborhoods on the city's west and south sides, as well as in large parts of southern Cook County experienced very high foreclosure levels in 2002 even when controlling for preceding lending levels. Other parts of the metro area experiencing high levels of foreclosures per loan include western Cook and parts of the collar counties near Aurora, Elgin, Waukegan, and Joliet.

Analyzing the Link between Subprime Lending and Foreclosures

The availability of comprehensive foreclosure filing data at a neighborhood level allows us to relate subprime lending flows to increases in foreclosures. Before estimating a multivariate model to explain foreclosure increases, we begin by comparing foreclosure increases across two variables that we have prior expectations of affecting the number of foreclosures in a neighborhood. First, we would expect that neighborhoods in which a higher share of home loans are made by subprime lenders during the 1996 to 2001 period would have higher increases in foreclosures from 1995 to 2002. Second, we would expect, other things equal, that neighborhoods with larger numbers of loans of all types during this period would have larger raw increases in foreclosures. Loan activity in the intervening period is, in turn, dependent on the number of mortgageable properties, property turnover, and other factors.

Table 1 provides group means for sets of census tracts grouped by two categorical variables, one describing the subprime share of all loans and the other describing the aggregate lending level. To separate the effects that these two variables have on the change foreclosures, we look at both the "total" column and the "TOTAL" row. The "total" column indicates that, as the share of all loans (1996-2001) that are subprime increase, the average increase in foreclosures per tract from 1995 to 2002 increases substantially, from less than 5 to more than 17. The "TOTAL" row indicates that, in tracts with more loans made during the 1996-2001 period, the average increase in foreclosures does generally increase, although not entirely consistently.

Figure 6. Chicago Area Conventional Foreclosures per 100 Owner Occupied Housing Units, 1995

Lake County

Cook County

Kane County

DuPage County

Chicago

Will County

Foreclosures Per 100 Owner Occupied Housing Units*

- Over 2.5 and over (17 tracts)
- 1.5 to 2.49 (35)
- 0.5 to 1.49 (267)
- 0.01 to 0.49 (932)
- 0 (382)
- 25 or fewer Owner Occuied Housing Units in 2000 (79)

*2000 Housing unit data taken from PCI Transitional Census product for CRA Wiz

NORTH

10 Miles
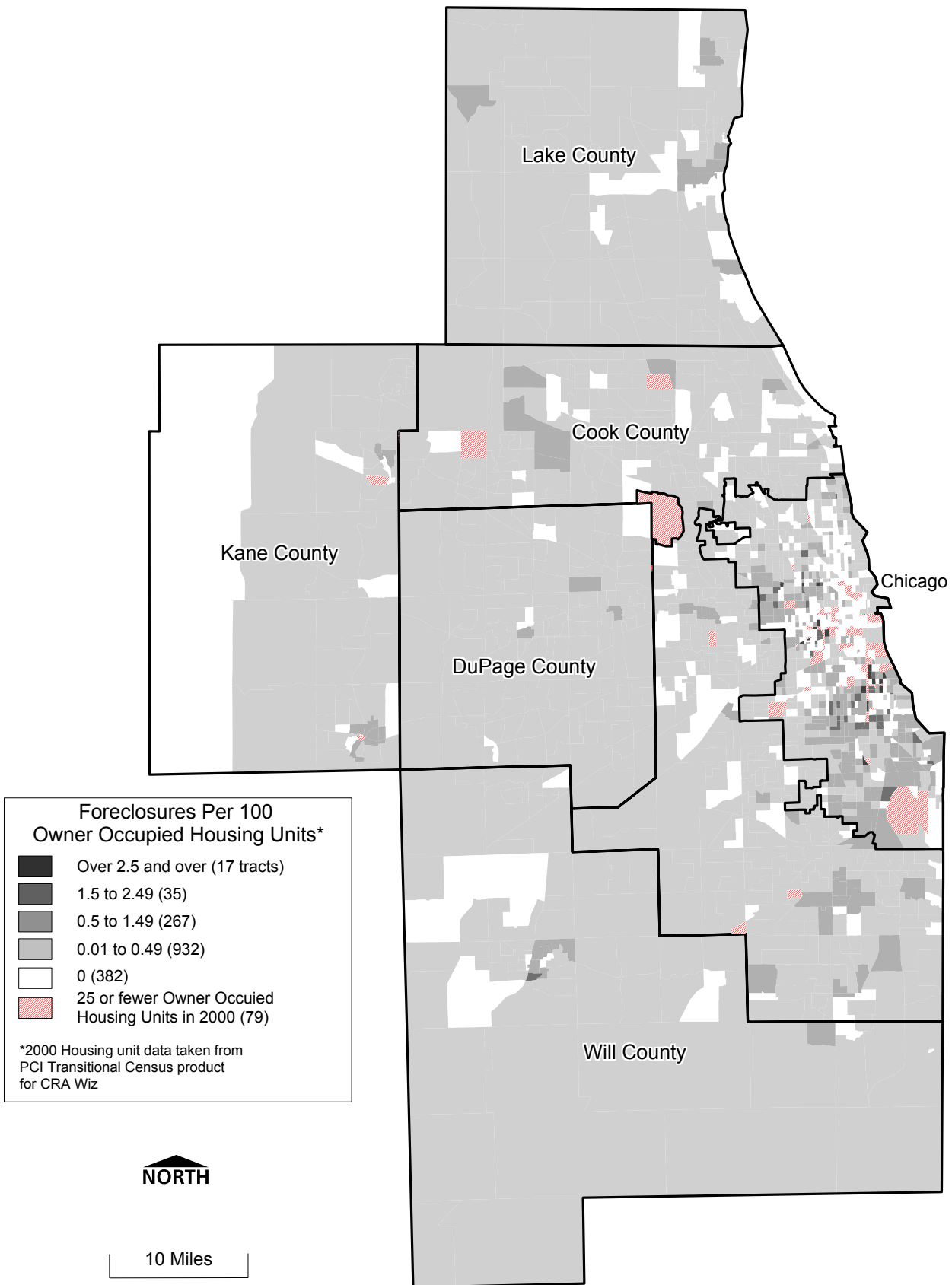
Figure 7. Chicago Area Conventional Foreclosures per 100 Owner Occupied Housing Units, 2002

Lake County

Cook County

Kane County

DuPage County

Chicago

Will County

Foreclosures Per 100 Owner Occupied Housing Units*

- Over 2.5 and over (343 tracts)
- 1.5 to 2.49 (131)
- 0.5 to 1.49 (598)
- 0.01 to 0.49 (463)
- 0 (98)
- 25 or fewer Owner Occuied Housing Units in 2000 (79)

*2000 Housing unit data taken from PCI Transitional Census product for CRA Wiz

NORTH

10 Miles
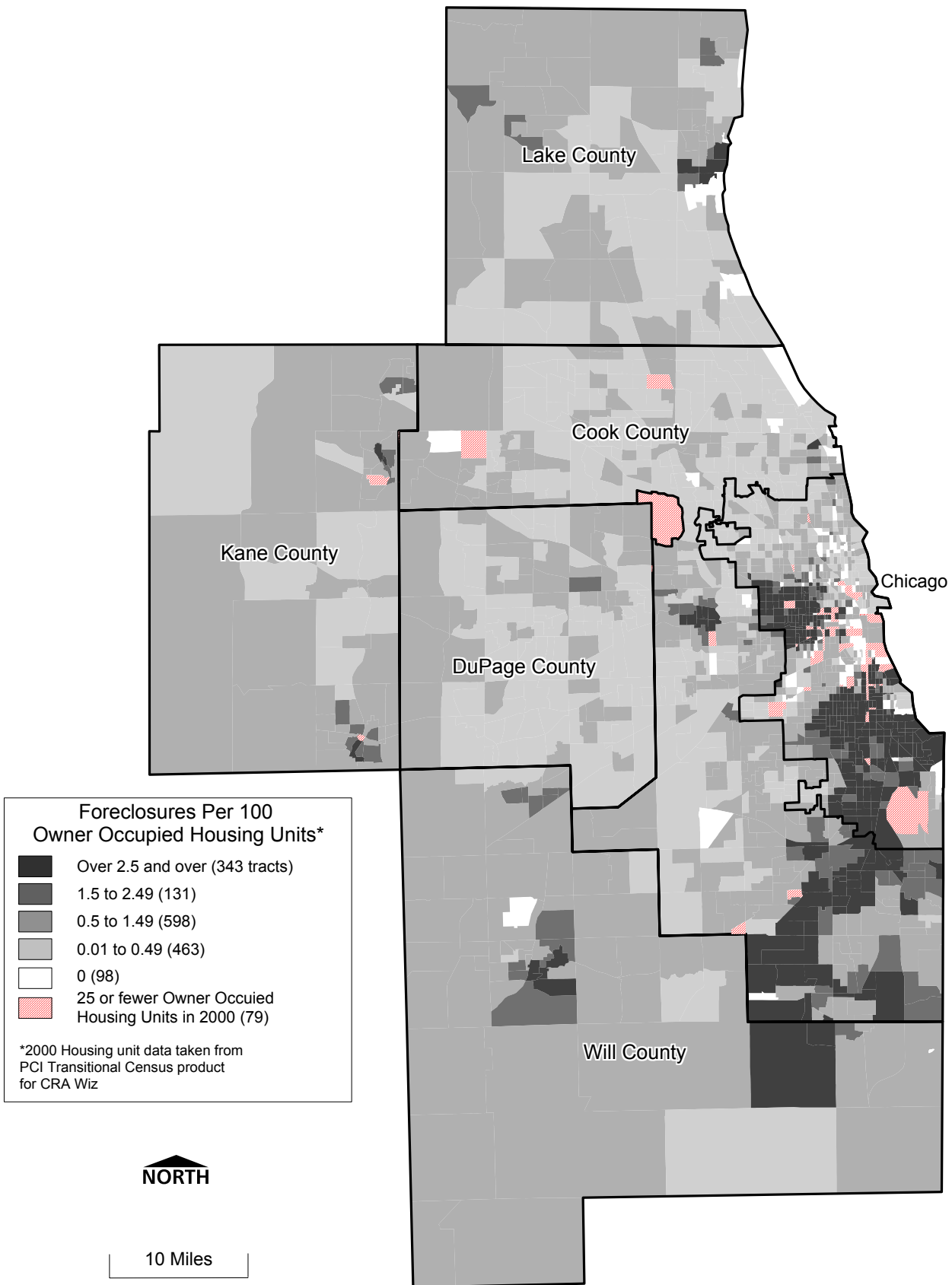
Figure 8. 2002 Chicago Area Conventional Foreclosures per 100 Single-Family Conventional Mortgages, 1996-2001

Lake County

Cook County

Kane County

DuPage County

Chicago

**Foreclosures (2002) per
100 Conventional Loans (1996-2001)**

- 2.5 and over (396 tracts)
- 1.5 to 2.49 (155)
- 0.5 to 1.49 (535)
- 0.01 to 0.49 (455)
- 0 (106)
- 25 or fewer Conventional Mortgages 1996 to 2001 (65)

Will County

NORTH

10 Miles

Table 1
Average Increase in Number of Foreclosures Per Tract, from 1995 to 2002,
By Lending Activity and Subprime Share, Five-County Chicago Area[5]

Percent of all loans that are subprime, 1996-2001	Total Lending Volume, 1996-2001					
	Very Low	Low	Moderate	High	Very High	Total
Less than 10%	0.3	1.1	2.2	3.3	8.4	4.5
10-24.9%	1.3	4.4	7.8	11.6	18.7	7.4
25-49.9%	4.5	15.1	24.3	35.7	47.0	16.5
50%+	7.0	22.0	38.6	68.9	149.6	17.2
TOTAL	3.4	8.3	10.4	8.7	11.2	8.4
Ratio of Increase in "50%+ " tracts to that in "Less than 10%" tracts	28	20	18	21	18	

By examining individual columns, the relationship between subprime share and increase in foreclosures is shown to be even stronger. Controlling for lending levels suggests that the effect of subprime share on foreclosure 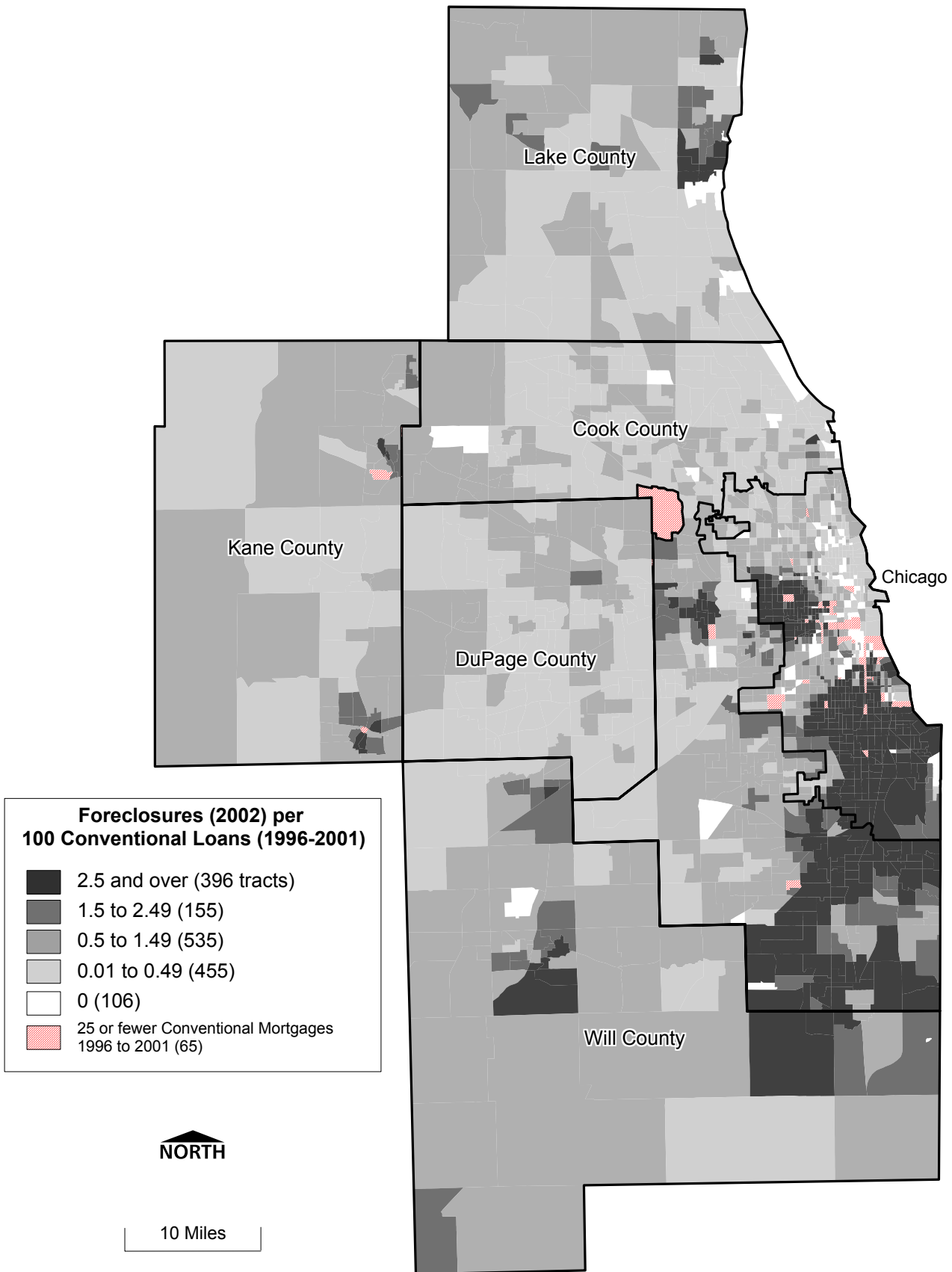increases is quite strong. In tracts with "Moderate" loan volume during 1996-2001, the average increase in foreclosures was just over 2 in tracts with less than 10 percent of loans that were subprime, but over 38 in tracts where over half the loans were subprime. In fact, for all but the tracts with "Very Low" lending volume, the ratio of the average increase for tracts with 50 percent or greater subprime share to the average for tracts with less than 10 percent subprime share is remarkably consistent. It varies only from 18 to 21. In the lowest-activity quintile, the ratio becomes quite a bit larger. Thus, the effect of subprime share on foreclosure increases is generally quite consistent when controlling for lending volume.

Multivariate Analysis of Foreclosures

The analysis in the preceding section suggests that subprime lending may explain a significant portion of the large increases in foreclosures in many neighborhoods. However, it does this somewhat crudely by roughly controlling for only the aggregate lending volume in the 1996-2001 period. It does not control for any other characteristics of the neighborhoods, including demographic and economic conditions, or changes in those conditions.

Our primary goal in this section is to identify the quantitative relationship between the level of subprime versus prime conventional lending and increased foreclosures, while controlling for changes in economic and demographic characteristics that might also affect foreclosure rates. While both promoters and critics of the current state of subprime lending markets are likely to agree that subprime loans have higher foreclosures, they are less likely to agree on how severe an effect subprime lending has on neighborhood foreclosure rates.

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[5]The categories for lending levels are quintiles. Twenty percent of tracts fall into each category. From 1996 to 2002, "Very Low" tracts had 0-249 mortgages originated; "Low" had 250-592; "Moderate" had 593-943; "High" had 944-1,461; "Very High" had over 1,461 mortgages originated.

Besides the level of overall lending and the extent of subprime versus prime lending, other factors that might be expected to affect foreclosure rates include the neighborhood unemployment rate and any change in unemployment; median income and changes in income; population and changes in population (including their effect on the overall health of the neighborhood); and median home value and changes in such values. There is not strong theoretical rationale for including racial or ethnic variables in a model for determining foreclosure rates. However, some observers may argue that, without controlling for race and ethnicity, any effect of subprime lending on foreclosures is partly due to the repayment behavior of minority households. Therefore, we incorporate race and ethnicity variables to provide a conservative measure of the effect of subprime lending on foreclosures – after controlling for neighborhood race and ethnicity.[6] We also incorporate variables indicating changes in racial and ethnic composition.

To identify the significance of different neighborhood-level factors on the number of foreclosures in the neighborhood in 2002, we begin with the following model:

$$F_{2002} = F_{1995} + OOPL_{1996\text{-}2001} + OOSL_{1996\text{-}2001} + NOOPL_{1996\text{-}2001} + NOOSL_{1996\text{-}2001} + Zj_{1990} + Zj_{1990/2000}$$
(1)

Where variables are defined as follows:

F_{2002} is the number of foreclosures in the tract in 2002, the ending year.

F_{1995} is the number of foreclosures in the tract in 1995, the initial year.

$OOPL_{1996\text{-}2001}$ is the number of owner-occupied prime loans made in the intervening period, 1996 to 2001.

$OOSL_{1996\text{-}2001}$ is the number of owner-occupied subprime loans made in the intervening period, 1996 to 2001.

$NOOPL_{1996\text{-}2001}$ is the number of non-owner-occupied prime loans made in the intervening period, 1996 to 2001.

$NOOSL_{1996\text{-}2001}$ is the number of non-owner-occupied subprime loans made in the intervening period, 1996 to 2001.

Zj_{1990} is a set of other independent variables providing important characteristics of the neighborhood derived from 1990 census data, including the unemployment rate, population, median home value, median income, percent black and percent Hispanic.

$Zj_{1990/2000}$ is a set of independent variables indicating changes in the Z variables from 1990 to 2000, again from census data.

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[6]Controlling more directly for the race and ethnicity of borrowers would be another way of measuring individual demographic effects on foreclosure. However, the substantial underreporting of race and ethnicity data in HMDA data makes this impractical, especially at the neighborhood level.

Table 2 gives summary statistics, including mean and standard deviation, for each of the independent variables as well as the dependent variable, F_{2002}. It also provides the simple Pearson correlation coefficient between each independent variable and the dependent variable. Note that, as one might expect, there is a substantial correlation between the initial and ending levels of foreclosures. However, there is an even stronger correlation between 2002 foreclosures and the number of owner-occupied subprime loans (0.72) and non-owner-occupied subprime loans (0.90). Notice that prime lending activity is also positively related to the extent of foreclosures. This is somewhat expected as both are driven, in part, by the number of homes in the neighborhood. Moreover, since loans older than five to seven years are less likely to go into foreclosure, recent lending volume – even among prime lending activity – might be expected to increase foreclosure activity. The simple correlations between 2002 foreclosures and the other independent variables are not very strong.

Table 3 gives the results of estimating equation (1) above via ordinary least squares regression.[7] The results show that coefficients on the subprime loan variables are highly statistically significant. Moreover, the coefficients and standardized coefficients are substantial. A tract with 100 additional owner-occupied subprime loans during the 1996-2001 interim period, other things being equal, is expected to have 9 additional foreclosures in 2002. Given a mean of 11.4 foreclosures among all tracts in 2002, this is a substantial effect.[8] Non-owner-occupied subprime loans have an even higher propensity to lead to increased foreclosures. A tract with just 10 more such loans over the interim period, other things being equal, would be expected to lead to have more than 2.6 additional 2002 foreclosures. However, since there are far fewer non-owner-occupied subprime loans than owner-occupied ones, they account for less of the total increase in foreclosures, as indicated by the smaller standardized coefficient.

Note that the number of prime loans, either owner-occupied or non-owner-occupied, is not a statistically significant predictor of foreclosures. In fact, the coefficient on owner-occupied prime loans is actually negative, suggesting that more of such loans may actually reduce foreclosures, perhaps by crowding out the supply of subprime loans. (More on this in the next section.)

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[7]Ordinary least squares regression is not the ideal regression technique for estimating this relationship, due to the fact that the dependent variable, foreclosures, is not normally distributed. This is largely due to the presence of tracts with zero foreclosures. However, those tracts only comprise about 6 percent of the tracts in the regression. Typically, the most appropriate methods for modeling count or incidence data are either Poisson or "negative binomial" regression techniques. Poisson regression is not appropriate in this case because the data are "overdispersed." That is, the variance of the dependent variable significantly exceeds the mean. (Additional diagnostics were run to determine that the Poisson technique was not appropriate.) The overdispersion means that the best method for estimating these models of foreclosure counts is the negative binomial approach. However, the interpretations of the magnitude of the effects are less straightforward than those of the OLS estimations relied on here. A negative binomial regressions was estimated for the basic model used here, and the findings are generally quite consistent with the OLS results in Table 3, though the magnitudes of the effects cannot be directly compared due to the use of a substantially different method. A negative binomial estimation corresponding to Table 3 is included in the Appendix.

[8]The standardized coefficient confirms the importance of this effect. A standard deviation increase in owner-occupied subprime loans in the interim period (105 loans), results in an increase of 0.73 standard deviation increase in the dependent variable (which yields 9.11 foreclosures).

Table 2
Summary Statistics and Correlations with Dependent Variable for
Regressions Explaining 2002 Foreclosure Levels

	Mean	Standard Deviation	Correlation vs. Conventional Foreclosures 2002
Conventional Foreclosures 2002*	11.39	12.55	1.00
Conventional Foreclosures 1995*	2.55	2.55	0.60
Owner-Occupied (OO) Prime Conventional Loans 1996-2001	871.80	978.70	0.29
Owner-Occupied (OO) Subprime Conventional Loans 1996-2001	114.48	104.65	0.72
Non-owner-occupied (NOO) Prime Loans 1996-2001	36.02	36.15	0.18
Non-owner-occupied (NOO) Subprime Loans 1996-2001	7.84	11.26	0.90
1990 Unemployment Rate	5.48%	4.41%	-0.17
Change in Unemployment Rate (%-point)	-0.52%	3.47%	0.27
1990 Population	4,325.11	2,371.95	-0.04
Change in Population (%)	12.20%	79.55%	0.00
1990 Median Home Value	$113,700	$79,424	0.19
Change in Median Home Value (%)**	76.21%	92.23%	0.40
1989 Median Family Income	$41,231	$19,638	0.36
Change in Median Family Income (%)**	51.68%	76.94%	-0.21
1990 Percent Black	24.44%	37.44%	-0.25
Change in Percent Black (%-point)	1.72%	7.97%	-0.09
1990 Percent Hispanic	12.69%	20.34%	0.03
Change in Percent Hispanic (%-point)	5.27%	11.80%	-0.12

N= 1578

*Conventional means all foreclosures on non-government-guaranteed loans. Foreclosures of unknown type (conventional vs. government-guaranteed) were allocated to the conventional category based on the distribution of known government and conventional foreclosures in the tract.

** Nominal changes, not adjusted for inflation.

Table 3
Estimating the Impact of Subprime and Prime Lending on
Neighborhood Foreclosures, Regression I: Aggregate Loans

Dependent Variable: Conventional Foreclosures, 2002

	Coefficient	Standard Error	Standardized Coefficient	Sig. Level
(Constant)	0.019744	0.714216		0.9779
Conventional Foreclosures, 1995	**0.132067**	**0.065916**	**0.026851**	**0.0453**
Owner-Occupied (OO) Prime Conventional Loans 1996-2001	-0.000272	0.000212	-0.021230	0.1992
Owner-Occupied (OO) Subprime Conventional Loans 1996-2001	**0.087091**	**0.002277**	**0.726141**	**0.0000**
Non-owner-occupied (NOO) Prime Loans 1996-2001	0.005551	0.004370	0.015986	0.2042
Non-owner-occupied (NOO) Subprime Loans 1996-2001	**0.257737**	**0.018294**	**0.231194**	**0.0000**
1990 Unemployment Rate	0.115795	0.060681	0.040648	0.0565
Change in Unemployment Rate (%-point)	0.031482	0.043595	0.008697	0.4703
1990 Population	**-0.000295**	**7.72E-05**	**-0.055840**	**0.0001**
Change in Population (%)	0.001189	0.001579	0.007533	0.4518
1990 Median Home Value	-5.55E-06	2.84E-06	-0.035140	0.0504
Change in Median Home Value (%)	-0.001910	0.001454	-0.014030	0.1892
1989 Median Family Income	1.26E-05	1.34E-05	0.019689	0.3470
Change in Median Family Income (%)	0.000416	0.001732	0.002552	0.8101
1990 Percent Black	0.005142	0.007484	0.015341	0.4921
Change in Percent Black (%-point)	**0.127778**	**0.017291**	**0.081126**	**0.0000**
1990 Percent Hispanic	**-0.028985**	**0.008177**	**-0.046970**	**0.0004**
Change in Percent Hispanic (%-point)	-0.004007	0.011615	-0.003770	0.7301

R-squared = 0.866

N = 1,578

Significant at 0.05 to 0.10 = underline
                       0.01 to 0.05 = bold
                       Less than 0.01 = bold and underline

Other factors that are significant include the initial, 1995 level of foreclosures (significant at just under p= 0.05), the initial 1990 unemployment rate, the initial population, the initial home value, the initial percent Hispanic, and the change in percent black. However, none of these factors approach the level of importance of the subprime lending variables in determining the foreclosure level. This can be seen by comparing standardized coefficients, which measure the impact of a one-standard deviation change in the independent variable on the dependent variable.

Breaking Out Loans by Purpose

In order to better understand which sorts of loans are contributing to large foreclosure increases, it is helpful to break out the loans by purpose. This also allows us to compare the effect of suprime prime lending on foreclosures while controlling for loan purpose. This is important because the purposes of subprime loans tend to be quite different from those of prime loans. For example, the portion of subprime loans that are refinance loans tends to be higher, at least in higher interest rate environments, than is the case for prime loans. The composition of prime loans is much more sensitive to interest rates, because low rates have a tremendous positive effect on refinancings.

Table 4 provides the results of an expanded regression model by replacing each of the two owner-occupied loan variables with a set of three variables, breaking out home purchase, home improvement, and refinance loans. It shows that, unlike the simpler regression in Table 3, the level of owner-occupied prime lending is a statistically significant factor in determining 2002 foreclosures.

Consistent with intuition, the regression results show that tracts with larger numbers of prime home purchase and prime home improvement loans do have somewhat higher foreclosure levels, other things equal. With home purchase loans, for example, as more people buy homes in an area and turnover rates increase, we would expect, other things equal, to see foreclosure rates increase. Long-time residents of the neighborhood have lower loan-to-value ratios and may have even paid off their homes. Loans tend to default in the first five-to-seven years after a home is purchased rather than later.

However, the coefficients reveal that, for loans of the same purpose, the propensity for subprime loans to result in foreclosures is many orders of magnitude greater than is the case for prime loans. In the case of home purchase loans, the subprime coefficient is more than 28 times as large as the prime coefficient. While a tract with 100 additional prime home purchase loans from 1996 to 2001 is expected to have only 0.3 additional foreclosures in 2002, other things being equal, a tract with 100 more subprime home purchase loans is expected to have almost 9 additional foreclosures.

In the case of refinance loans, the number of owner-occupied prime loans is actually expected to lead to *reduced* foreclosure levels. A tract with 200 more owner-occupied prime refinance loans during the 1996 to 2001 period, other things being equal, is expected to have 1 less foreclosure in 2002. The standardized coefficient is substantial at − 0.209, so that a standard deviation increase in owner-occupied prime refinance loans corresponds to 2.6 fewer foreclosures in 2002.

Table 4
Estimating the Impact of Subprime and Prime Lending on
Neighborhood Foreclosures, Regression II: Loans by Purpose

Dependent Variable: Conventional Foreclosures, 2002

	Coefficient	Standard Error	Standardized Coefficient	Sig. Level
(Constant)	-0.947688	0.735210		0.1976
Conventional Foreclosures 1995*	**0.182822**	**0.066249**	**0.037171**	**0.0059**
OO Prime Conventional Home Purchase Loans 1996-2001	**0.003097**	**0.000987**	**0.112589**	**0.0017**
OO Prime Conventional Home Improvement Loans 1996-2001	**0.017565**	**0.005440**	**0.093918**	**0.0013**
OO Prime Conventional Refinance Loans 1996-2001	**-0.005429**	**0.001073**	**-0.208928**	**0.0000**
OO Subprime Conventional Home Purchase Loans 1996-2001	**0.089114**	**0.009281**	**0.169269**	**0.0000**
OO Subprime Conventional Home Imp Loans 1996-2001	**0.095488**	**0.020380**	**0.119733**	**0.0000**
OO Subprime Conventional Refinance Loans 1996-2001	**0.078215**	**0.005462**	**0.453386**	**0.0000**
Non-owner-occupied (NOO) Prime Loans 1996-2001	-0.000929	0.004627	-0.002675	0.8409
Non-owner-occupied (NOO) Subprime Loans 1996-2001	**0.265033**	**0.018444**	**0.237739**	**0.0000**
1990 Unemployment Rate	**0.129968**	**0.060274**	**0.045623**	**0.0312**
Change in Unemployment Rate (%-point)	0.038196	0.043263	0.010552	0.3774
1990 Population	**-0.000228**	**8.43E-05**	**-0.043060**	**0.0069**
Change in Population (%)	0.000749	0.001573	0.004749	0.6338
1990 Median Home Value	-5.5E-06	2.99E-06	-0.034807	0.0663
Change in Median Home Value (%)	-0.001573	0.001445	-0.011556	0.2767
1989 Median Family Income	**3.02E-05**	**1.42E-05**	**0.047284**	**0.0337**
Change in Median Family Income (%)	0.001082	0.001729	0.006635	0.5315
1990 Percent Black	0.005798	0.007535	0.017298	0.4417
Change in Percent Black (%-point)	**0.121623**	**0.017967**	**0.077218**	**0.0000**
1990 Percent Hispanic	**-0.025740**	**0.008244**	**-0.041709**	**0.0018**
Change in Percent Hispanic (%-point)	-0.005458	0.011580	-0.005130	0.6375

R-squared = 0.867

N = 1,578

Significant at 0.05 to 0.10 = underline
              0.01 to 0.05 = bold
              Less than 0.01 = bold and underline

This finding, combined with the large standardized coefficient on owner-occupied subprime refinance loans (0.453), suggests a substantial substitution effect between prime and subprime refinance loans. That is, as prime loans increase, the potential market for subprime lenders may be diminished, thus crowding out such lenders. This is consistent with the evidence finding that substantial numbers of subprime loans go to borrowers worthy of prime loans as well as the related research showing that credit scores do not explain the very high rates of subprime lending in minority neighborhoods. Even without a negative coefficient of prime loans, such crowding-out may be occurring, but this finding makes a stronger case for this relationship.

The results in Table 4 also show that the different types of subprime loans have somewhat different impacts on foreclosures. Subprime home improvement loans have the largest impact on foreclosures on a per-loan basis. A tract with 100 more subprime home improvement loans is expected to have an additional 9.5 foreclosures in 2002, other things equal, while the corresponding effect for purchase loans is 8.9 and for refinance loans it is 7.8. However, because there are so many more subprime refinance loans, they contribute much more in the aggregate to foreclosures. Thus, a standard deviation increase in owner-occupied subprime refinance loans is expected to result in a 0.453 standard deviation increase in 2002 foreclosures, or about 5.7 foreclosures. A standard deviation increase in subprime home purchase loans, by contrast, is expected to result in an increase of about 2.1 foreclosures, while a standard deviation increase in subprime home improvement loans is expected to result in 1.5 foreclosures.

Conclusions

The findings of this study clearly indicate that subprime lending is a dominant driver of the increased and highly concentrated neighborhood foreclosure levels of the late 1990s and through 2002. Responsible subprime lending may indeed bring important benefits to families that have difficulty obtaining credit elsewhere. However, this study shows that, after controlling for neighborhood demographics and economic conditions, subprime loans lead to foreclosures at twenty or more times the rate that prime loans do. This is a heavy social cost. For every 100 subprime loans made in a typical neighborhood from 1996 to 2001, there resulted an additional 9 foreclosures in the community in 2002 alone. Nine foreclosures in a census tract in one year is a substantial increase. The average tract in the Chicago area had only about 11 foreclosures in 2002. This represents an increase of 76 percent in the foreclosure level.

Prime lending, on the other hand, had minimal impact on the foreclosure level and, in the case of refinance lending, prime lending actually reduces the level of foreclosures expected. If anything, this analysis is likely to underestimate the impact of subprime lending on neighborhood foreclosures in neighborhoods that are particularly vulnerable. Residents of lower income and minority communities are less likely to be able to avoid foreclosure via borrowing from friends and relatives or increasing earnings by having a spouse increase working hours. Therefore, interactions between subprime lending and economic or minority variables are possible and, if they could be implemented, might suggest even stronger effects in disadvantaged neighborhoods.[9]

This study has a number of implications for regulatory policy in the arena of home lending. First, it makes a strong case that the magnitude of the effect of subprime lending on neighborhood foreclosures is very large. Given the impact of foreclosures on neighborhood vitality and stability, especially in

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[9]Limitations on the size of the data set and variable interactions preclude meaningful testing of these interactions.

modest-income neighborhoods where foreclosures more often lead to abandonment and blight, this cost of high-risk lending should be given more weight in policy discussions. This is especially true since much of this cost is borne by entire communities, not just by the lender or borrower.

Foes of increased regulation of the subprime mortgage market often argue that increased regulation will result in higher costs of borrowing for many borrowers and perhaps even reduce credit access for some. However, the social costs involved in substantially higher foreclosures in many struggling neighborhoods might not be easily outweighed by marginally lower borrowing costs spread thinly across a broad set of borrowers. Even if some worthy borrowers are prevented from obtaining credit due to increased regulation, the benefits of reduced foreclosures may justify such action. Moreover, foreclosures are hardly the entire costs of overly risky and irresponsible subprime lending. Financial and emotional stress, excessive charges and fees, and other harms to borrowers must be considered. Certainly, many borrowers benefit from responsible subprime lending. The findings of this study, however, suggest that the negative spillovers occurring in the existing marketplace are substantial and that such spillovers must be more clearly considered in policy-making.

References

Calem, Paul, Kevin Gillen, and Susan Wachter. 2002. "The Neighborhood Distribution of Subprime Mortgage Lending." Unpublished manuscript. October.

Collins, Michael. 2003. "Chicago's Homeownership Preservation Challenge: Foreclosures," presentation. Washington: Neighborhood Reinvestment Corporation. February.

Crews Cutts, Amy and Robert A. Van Order. 2003. "On the Economics of Subprime Lending." McLean, VA: Freddie Mac.

Elliehausen, Gregory and Michael Staten. 2002. "Regulation of Subprime Mortgage Products: An Analysis of North Carolina's Predatory Lending Law." Credit Research Center Working Paper No. 66. October.

Ernst, Keith, John Farris, and Eric Stein. 2002. "North Carolina's Subprime Home Loan Market and Predatory Lending Reform." Durham: Center for Responsible Lending. August.

Fannie Mae. 2001. *2001 National Housing Survey.* Washington, D.C.: Fannie Mae.

Freddie Mac. 1996. *Automated Underwriting: Making Mortgage Lending Simpler and Fairer for America's Families.* Washington, D.C.: Freddie Mac. September.

Greunstein, Deborah and Christopher Herbert. 2000. *Analyzing Trends in Subprime Originations and Foreclosures: A Case Study of the Atlanta Metro Area,* Abt Associates, February.

Harvey, Keith, and Peter Nigro. 2002. "Do Predatory Lending Laws Influence Mortgage Lending? An Analysis of the North Carolina Predatory Lending Law." September. Unpublished paper.

Immergluck, Daniel and Marti Wiles. 1999. *Two Steps Back: Predatory Lending, the Dual Mortgage Market, and the Undoing of Community Development.* Chicago: Woodstock Institute.

Kim-Sung, Kellie and Sharon Hermanson. 2003. "Experiences of Older Refinance Mortgage Loan Borrowers: Broker- and Lender-Originated Loans." Washington, D.C.: AARP Public Policy Institute. January.

McCarthy, George, Shannon Van Zandt, and William Rohe. 2001. The Economic Benefits and Costs of Homeownership: A Critical Assessment of the Research. Washington, D.C.: Research Institute for Housing America. Working Paper 01-02. May.

Moreno, A. 1995. The Cost-Effectiveness of Mortgage Foreclosure Prevention. Minneapolis: Family Housing Fund.

National Community Reinvestment Coalition. 2003 *The Broken Credit System: Discrimination and Unequal Access to Affordable Loans by Race and Age.* Washington, D.C.: National Community Reinvestment Coalition.

National Training and Information Center. 1999. *Preying on Neighborhoods: Subprime Mortgage Lenders and Chicagoland Foreclosures*, September.

Pennington-Cross, Anthony, Anthony Yezer, and Joseph Nichols. *Credit Risk and Mortgage Lending: Who Uses Subprime and Why?* Washington, D.C.: Research Institute for Housing America, Working Paper 00-03.

Phillips-Patrick, Eric Hirschhorn, Jonathon Jones, and John LaRocca. 2000. What About Subprime Mortgages? *Mortgage Market Trends* 4, no. 1 (June). Washington, D.C.: Office of Thrift Supervision Research and Analysis.

Quercia, Roberto, Michael Stegman, and Walter Davis. 2003. "The Impact of North Carolina's Anti-Predatory Lending Law: A Descriptive Assessment." Chapel Hill: Center for Community Capitalism, University of North Carolina at Chapel Hill. June 25.

Rheingold, Ira, Michael Fitzpatrick, and Al Hofeld, Jr.. 2001. "From Redlining to Reverse Redlining: A History of Obstacles for Minority Homeownership in America." *Clearinghouse Review*. 34 no. 9/10 (January/February): 642-654.

Simons, R. A., R. G. Quercia, and I. Maric. 1998. "The Value of Residential Construction and Neighborhood Disinvestment in Residential Sales Price." Journal of Real Estate Research 15(1-2):147-61.

Stein, Kevin, and Margaret Libby. 2001. S*tolen Wealth: Inequities in California's Subprime Mortgage Market.* San Francisco: California Reinvestment Committee. November.

Stock, Richard D. 2001. "Predation in the Subprime Lending Market: Montgomery County. Dayton, Ohio: Center for Business and Economic Research, University of Dayton. Project 1097. October.

U.S. Department of Housing and Urban Development. 2000. *Unequal Burden in Baltimore: Income and Racial Disparities in Subprime Lending.* Washington, D.C.: U.S. Department of Housing and Urban Development.

U.S. Department of Treasury and U.S. Department of Housing and Urban Development. 2000. *Curbing Predatory Home Mortgage Lending.* Washington, DC. June.

Zimmerman, Ken, Elvin Wyly, and Hilary Botein,. 2002. *Predatory Lending in New Jersey: The Rising Threat to Low-Income Homeowners.* Newark: New Jersey Institute for Social Justice, February.

Appendix

**Using Negative Binomial Regression to Confirm the Relationship
Between Subprime Lending and Foreclosure Patterns**

Because the foreclosure data are incidence data and because there tend to be a significant number (although not very large as a percentage) of tracts with either zero or very few foreclosures, ordinary least squares is not ideally suited for estimating equation (1) or its variations. The two primary methods for estimating relationships where the dependent variable is a count or incidence variable are Poisson regression and negative binomial regression. The presence of "overdispersion" in the data means that the Poisson technique is not appropriate. The disadvantage of the negative binomial technique is that the results are not as easily interpretable as the OLS results. The goal here is, however, to determine whether the ordered logistic results are generally consistent with the OLS results, if not completely comparable. If so, this there is little cause for concern over the general validity of the OLS results.

The key results of Table A.1 are generally consistent with Table 3. Subprime owner-occupied lending has a large effect on foreclosures. The results cannot be compared directly, because the two methods measure the relationship differently. However, the magnitude of the subprime loan effect remains a great deal larger than the prime loan effect. (In Table 3, the prime loan effect was actually slightly negative, though still very small and statistically insignificant.)

The second column in Table A.1 provides the "exponentiated" values of the coefficient estimates.[10] In negative binomial regression, one way to interpret the results is to recognize that the exponentiated coefficients are the proportional increase in the expected value of the dependent variable due to a one-unit change in the independent variable. Thus, an increase of one subprime loan from 1996 to 2001 is expected to result in an 0.2878 percent more foreclosures in 2002. Thus, a tract with 100 more subprime loans in this period is expected to see 28.78 percent more foreclosures, other things equal. Conversely, a tract with 100 more prime loans is expected to see only 1.29 percent more foreclosures, for a difference in proportional effect of more than 22 times. More variables are statistically significant in Table A.1 than in Table 3. However, the signs of the coefficients are quite consistent. Thirteen of the seventeen coefficients have the same sign. Of the four variables that have coefficients with different signs in the two regressions, three are statistically insignificant in at least one regression. One notable difference in the results is that, in Table A.1, owner-occupied prime loans have a positive, statistically significant effect on foreclosures, albeit a very small one, while in Table 3, the sign is negative but not statistically significant.

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[10] To exponentiate a coefficient means to take e (=2.718) raised to the value of the coefficient.

Table A.1

Negative Binomial Regression Results for Estimating Tract Foreclosure Level

Dependent Variable = Foreclosures in 2002

	Coefficient (B)	Exp(B)	Standard Error	Significance Level
Constant	**1.259352**	**3.523138**	**0.093013**	**0.0000**
Conventional Foreclosures, 1995	0.006253	1.006272	0.007064	0.3602
Owner-Occupied (OO) Prime Conventional Loans 1996-2001	**0.000120**	**1.000120**	**0.000027**	**0.0000**
Owner-Occupied (OO) Subprime Conventional Loans 1996-2001	**0.002874**	**1.002878**	**0.000253**	**0.0000**
Non-owner-occupied (NOO) Prime Loans 1996-2001	**0.003235**	**1.003240**	**0.000509**	**0.0000**
Non-owner-occupied (NOO) Subprime Loans 1996-2001	**0.010889**	**1.010949**	**0.001959**	**0.0000**
1990 Unemployment Rate	0.004082	1.004090	0.007621	0.5103
Change in Unemployment Rate (%-point)	0.002061	1.002063	0.005891	0.6560
1990 Population	**0.000058**	**1.000058**	**0.000009**	**0.0000**
Change in Population (%)	-0.000176	0.999824	0.000285	0.5859
1990 Median Home Value	**-0.000004**	**0.999996**	**0.000000**	**0.0000**
Change in Median Home Value (%)	**-0.001829**	**0.998173**	**0.000229**	**0.0000**
1989 Median Family Income	**0.000009**	**1.000009**	**0.000002**	**0.0000**
Change in Median Family Income (%)	0.000172	1.000172	0.000230	0.3108
1990 Percent Black	**0.006583**	**1.006605**	**0.000905**	**0.0000**
Change in Percent Black (%-point)	**0.017459**	**1.017612**	**0.001877**	**0.0000**
1990 Percent Hispanic	**-0.004197**	**0.995812**	**0.001047**	**0.0000**
Change in Percent Hispanic (%-point)	**0.007080**	**1.007105**	**0.001483**	**0.0000**

N= 1,578

Deviance/DF 1.1440
Pearson Chi-Square/DF 0.9462
Log Likelihood 32,519

Significant at   0.05 to 0.10 = underline
                    0.01 to 0.05 = bold
            Less than 0.01 = bold and underline

Woodstock Institute

Woodstock Institute, a Chicago nonprofit incorporated in 1973, works locally and nationally to promote sound community reinvestment and economic development in lower-income and minority communities. It collaborates with community organizations, financial institutions, foundations, government agencies, and others to promote its goals.

The Institute engages in applied research, policy analysis, technical assistance, public education, and program design and evaluation. Its areas of expertise include: CRA and fair lending policies, financial and insurance services, small business lending, community development financial institutions, and economic development strategies.

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