The Post-Foreclosure Experience of U.S. Households in the Current Housing Market Downturn

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Abstract

The flood of foreclosures on residential mortgages in the past several years has had a significant impact on household finances, housing markets, and financial markets. To date, however, little is known about what happens to the borrower's household after their mortgage has been foreclosed. In this paper, we study the post-foreclosure experience of U.S. households using a unique dataset based on the credit reports of a large panel of individuals to from 1999 to 2010. We examine the effect of foreclosure on housing consumption, including changes in household size and composition, homeownership, and neighborhood characteristics. We compare these outcomes to households with similar demographic, geographic, and economic characteristics but that did not experience a foreclosure.

[1] The analysis and conclusions set forth are those of the authors and do not indicate concurrence by other members of the research staff or the Board of Governors.

Introduction

With foreclosures on residential mortgages soaring to historic highs, information about the post-foreclosure experience of former borrowers is crucial to our understanding of how the current housing downturn has affected the economy. In particular, where these households move and how they finance their subsequent housing consumption has important implications for housing market outcomes such as vacancy rates, homeownership rates, and house prices. For example, if post-foreclosure households tend to rent their subsequent housing, the flood of foreclosures could signal a substantial increase in the demand for rental units. Since rental and owner-occupied housing units tend to be different types of structures in the US, this shift in demand alter the type of residential structures in the economy. Beyond its impact on housing markets, foreclosures can affect personal finance, family structure, employment opportunities, the quality of schooling available to the children of the former borrowers, and many other dimensions of an individual's economic and social welfare.

Despite its importance, most of the existing literature on foreclosure focuses on its causes (e.g. Pence 2006 and Foote, Gerardi, and Willen 2008), mortgage renegotiation and modification (e.g. Adelino, Gerardi, and Willen 2009 and Haughwout, Okah, and Tracy 2009), and the effect of foreclosure on property values and neighborhoods (e.g. Immergluck and Smith 2005, Campbell, Giglio, and Pathak 2009, and Harding, Rosenblatt, and Yao 2009). To date, we have limited knowledge of the post-foreclosure experience of former borrowers beyond anecdotal evidence because most existing datasets are not suited to examine this issue.[2] For example, loan-level data such as the CoreLogic and Lender Processing Services do not collect any information after the loan is terminated. Available panel studies of individuals and households usually do not

[2] For example, Armour (2008) reports the potential adverse effect of foreclosures on children and teenagers. Been and Glashausser (2009) cite a number of media reports about the problems facing the tenants of foreclosed rental properties. Christie (2010) discusses the impact of foreclosure on credit score in a CNNMoney.com article.

report data on foreclosures, and are frequently too small to study detailed questions about migration adequately.[3]

Recently, researchers have started to collect local data to study post-foreclosure household outcomes. For example, Been et al. (2010) describe the characteristics of students and schools affected by foreclosures in New York City. To our best knowledge, Brevoort and Cooper (2010), who examine the effect of foreclosure on credit scores, provide the only study using a nationally representative sample to examine the consequences of mortgage foreclosure. We use the same dataset to investigate various aspects of post-foreclosure housing consumption, including household formation, homeownership, and neighborhood choice.

To obtain a counterfactual of what would have happened to foreclosed homeowners had they not experience a foreclosure, we construct a comparison group with similar initial characteristics that did not experience a foreclosure. Specifically, we match individuals that experience a foreclosure to other homeowners of a similar age that have a similar initial credit score and mortgage balance, and initially lived in the same Census tract, ZIP code, or county.

We begin by studying the probability of moving after a loan enters the foreclosure processes, which we call a "foreclosure start." We find that foreclosure starts increase the probability of moving significantly for the subsequent two years. A little more than half of individuals have not moved even two years after the foreclosure start, suggesting that about half of foreclosure starts do not result in eviction or the property being sold. In these cases, it is likely that the foreclosure was never completed. Foreclosure starts in judicial states or in areas with rapid house price appreciation are less likely to result in migration.

[3] The Panel Study of Income Dynamics added a question to their 2009 survey about whether the lender has started the foreclosure process, but only 39 households answered "yes" to this question and it will be years before the complete post-foreclosure experience can be analyzed with this dataset.

We next examine the household characteristics of post-foreclosure individuals. Post-foreclosure individuals are more likely than the comparison group to experience changes in household composition. However, such changes do not result in different average household sizes across the two groups. Additionally, we find suggestive evidence that post-foreclosure individuals are somewhat more likely to move in with their parents.

We then investigate the tenure choice of post-foreclosure individuals. Not surprisingly, former borrowers are much less likely to have a mortgage two years after the foreclosure start. Although a majority of these individuals still live in single-family housing units, a significantly larger fraction of post-foreclosure individuals move from single-family units to high rises relative to the comparison group. Similar to their experience in the mortgage market, post-foreclosure individuals also tend to face reduced access to other credit markets such as credit cards and auto loans.

To examine where post-foreclosure individuals move, we look at migration distance and neighborhood characteristics measured by block and block group level data from the 2000 Census. Post-foreclosure migrants are more likely to move within a state or MSA relative to the comparison migrants. In addition, post-foreclosure individuals are more likely to move to denser areas with a lower homeownership rate, a higher fraction of female-headed households, smaller houses, shorter commute time, and lower income, although the magnitude of these differences is small. By contrast, we find no difference between the post-foreclosure and comparison groups in neighborhood measures of education attainment, racial and ethnic composition, house value, or rent. Taken together, the evidence suggests that post-foreclosure individuals move to rental units in denser urban areas, but the new neighborhoods do not seem to be of much lower quality.

The rest of the paper proceeds as follows. The next section outlines a theoretical framework linking foreclosure to housing consumption decisions. We then introduce the data that we analyze in this paper and explain our empirical strategy. The following section presents our findings, and the final section concludes and discusses areas for future research.

Theoretical Framework

To understand the effects of foreclosure on household outcomes, it is helpful to consider two related questions. First, what are the factors that lead to foreclosure and do these factors have any persistent effects on household decisions? Second, does the foreclosure itself affect household behavior independently of any shocks that may have caused the household to default on their mortgage?

The first question can be addressed in the context of a model of mortgage default. When borrowers have positive home equity, default and foreclosure should not happen in theory because borrowers can sell their home or refinance their mortgage.[4] Thus, studies on mortgage default decisions have largely focused on borrowers with little or negative home equity. The canonical default model popularized by Kau, Keenan, and Kim (1994) treats the mortgage contract as a put option and shows that a borrower will default when the home value falls sufficiently below the amount of the mortgage. As pointed out by Vandell (1995), however, such option-theoretic models ignore the transaction costs associated with default as well as adverse income shocks that may cause borrowers with non-positive equity to become insolvent and induce default. Empirical studies that incorporate these factors typically find that default

[4] In practice, we do observe default and foreclosures among borrowers with substantial home equity. These defaults are likely due to idiosyncratic circumstances, such as illness or divorce.

costs and negative income shocks are much more important than house prices in driving borrowers' default decisions (see Foote et al. 2008 and Bhutta et al. 2010).

If the negative shocks that precipitate mortgage default have a permanent effect on household income, the post-foreclosure experience of a household could reflect these adverse factors.[5] For example, the former borrower could decide to reduce housing consumption by moving to a lower-quality residence or a worse neighborhood with fewer amenities. The former borrower could also defray housing expenses by increasing the number of income-earning adults in their household. An example of this choice, popularized by anecdotes in the media, is that the former borrower might move in with friends or family members who already own their home.[6]

The second question addresses the causal impact of the foreclosure and can best be considered in the context of credit constraints. A foreclosure remains on an individual's credit report for seven years, and lenders likely view this event as raising the probability that the individual will default on future loans. Thus, the foreclosure can reduce access to credit. Deaton (1992) shows that credit-constrained households consume less when credit constraints bind. Even when the constraint does not bind in a given time period, Hayashi (1987) shows that the prospect of a binding credit constraint in the future will reduce household consumption relative to an environment without credit constraints. Thus, by restricting access to credit, foreclosure can reduce household consumption even absent a negative income shock. As in the case of a negative income shock, this reduction in housing consumption could manifest in moving to a lower-quality house, a worse neighborhood, or to consuming less housing per adult. Of course,

[5] Studies such as von Wachter, Song, and Manchester (2008), Sullivan and von Wachter (2009), and Kahn (2010) show that negative shocks in the labor market may have long-term impacts on workers.
[6] For example, Luo (2010) reports a story of three generations of one family living in the same house after job losses and foreclosure.

the negative effect of foreclosure on housing consumption through the credit constraint channel would be mitigated if the price of housing falls.

In summary, both frameworks suggest that former borrowers should consume less housing after a foreclosure. Credit constraints imply that foreclosure will directly cause a reduction in housing consumption, while the negative shocks that lead to foreclosure might also reduce housing consumption if they persist. In the empirical analysis that follows we will not be able to distinguish between the direct effects of foreclosure and the indirect effects of adverse factors that cause foreclosure. However, since both effects should reduce housing consumption, we will frame the post-foreclosure outcomes that we examine in the context of housing consumption decisions.

Data Description

The analysis in this study is based on credit report data from the FRBNY Consumer Credit Panel. The panel comprises a nationally representative 5 percent random sample of US individuals with credit files, and all of the household members of those 5 percent. In all, the data set includes files on more than 15 percent of the adult population (aged 18 or older), or approximately 37 million individuals in each quarter from 1999 to the present. The underlying sampling approach ensures that the panel is dynamically updated in each quarter to reflect new entries into and exits out of the credit markets, with young individuals and immigrants entering the sample and deceased individuals and emigrants leaving the sample at the same rate as in the population of individuals with credit files. In each quarter, the records of all other household members who shared a primary individual's mailing address were also included. Even though all individuals included in the database are anonymous, the panel allows one to track individuals

and households consistently over time. In addition to the computation of nationally representative estimates of individual and household level debt and credit in each quarter, the panel therefore permits a rich analysis of the dynamics of consumer debt and related policy issues at both the individual and household levels.

Since the FRBNY Consumer Credit Panel data are collected at the borrower level, they offer a more comprehensive perspective on mortgage debt than is available in standard loan-level datasets. In addition to detailed data on all debts secured by residential real estate, the panel includes information on individuals' and households' other loans, such as credit cards, auto loans and student loans. More general information available in the panel include the residential location of the borrower at the census block level, the individual's year of birth, the individual's credit experience such as foreclosure, bankruptcy and collection, as well as a consumer credit score that is comparable to the well known FICO score.[7] More details regarding the sample design and data content can be found in Lee and van der Klaauw (2010).

The credit bureau data are uniquely suited to studying the post-foreclosure experience of households because of the detailed information on mortgage loan history and because the panel follows individuals rather than loans. In addition, the large size of the sample and the detailed geographic identifiers allow us to examine residential migration patterns in detail. Another feature of this dataset is that it is updated on a more-timely basis than other large, nationally representative datasets, which is useful for studying the ongoing effects of the current wave of foreclosures. Because the credit bureau dataset is very large and our research questions can be

[7] Census block is the most detailed geographic unit in the Census data. According to the 2000 Census, there are 5.3 million unique blocks in the US, and the median block has 25 residents and 11 housing units. Our analysis sample contains 1.3 unique blocks, and the median block in our sample has 74 residents and 28 housing units.

addressed using annual data, we limit our sample to the third quarter of each year from 1999 through 2010.[8]

One of the key variables in the credit bureau data that we use in this paper is the foreclosure indicator. This variable indicates a foreclosure start, which is the point at which the lender sends a Notice of Default to a delinquent borrower. We do not observe foreclosure completion, i.e. whether or not the property is sold at a foreclosure auction, in the data. To the extent that the lender and the borrower may work out a deal through refinancing or loan modification, a homeowner might not move after a foreclosure start. Another issue with the foreclosure indicator in the credit bureau data is that it is recorded at the individual level instead of at the loan level. If a borrower owns multiple properties, it is not clear whether the foreclosed property is the one in which they reside. A foreclosure is less likely to result in a change in household consumption if it occurs on an investment property rather than an owner-occupied property. More generally, the dataset does not include an owner-occupancy indicator. We limit our sample to individuals with only one large mortgage prior to the foreclosure start in order to reduce the likelihood that the foreclosed property is an investment property.[9]

Figure 1 shows the number of new foreclosure starts filed each year in the credit bureau data.[10] The number of foreclosure starts increased notably during the 2001 recession, but the rise in foreclosure starts was much more striking during the 2007-2009 period when house prices

[8] Ideally, we would like to use the fourth quarter of each year because the four-quarter periods would correspond to a calendar year. However, at the time of writing this draft we only have the data up to 2010:Q3. Thus, we use the third quarter of each year to incorporate the most recent available data.

[9] Specifically, we first drop individuals with more than 2 first mortgages prior to the foreclosure start. We also drop individuals with 2 first mortgages prior to the foreclosure start if the smaller mortgage is more than half the size of the larger mortgage. We do not drop all individuals with two mortgages because we do not want to exclude borrowers with junior liens. These restrictions exclude about 12 percent of foreclosed individuals. We do not place any restriction on the number of home equity loans (HELs) or home equity lines of credit (HELOCs) that borrowers may have.

[10] Because the foreclosure flag corresponds to an individual rather than a specific mortgage loan, we observe a different number of foreclosure starts than recorded by loan-level datasets since one individual may have multiple mortgages and one mortgage can also be taken out jointly by multiple individuals.

dropped precipitously and the unemployment rate approached 10 percent. Because the housing market changed so dramatically during our sample period, in most of our analysis we report statistics separately for cases where the foreclosure start occurs before 2006 and where the foreclosure start occurred in 2006 or later.

Empirical Strategy

Individuals who experience a foreclosure are a small fraction of all homeowners with a mortgage, and they tend to be different from the general population of mortgage borrowers along many dimensions. For example, the type of individual that experiences a foreclosure may be more economically vulnerable than the typical borrower, even before the foreclosure occurs. Consequently, comparing post-foreclosure individuals with the typical homeowner may exaggerate the negative effect of a foreclosure. To construct an appropriate counterfactual, we use a matching strategy to identify a group of individuals with similar characteristics as foreclosed individuals prior to the foreclosure.

We construct the comparison group using data from the year prior to when a foreclosure start is initiated. For example, for an individual who first receives a foreclosure start in 2006, we form a comparison group based on his or her characteristics in 2005. The characteristics that we consider are age (using the categories 18-24, 25-34, 35-44, 45-54, 55-64, 65 and above), credit score (using the categories less than or equal to 400, 401-450, 451-500, 501-550, 551-600, 601-650, 651-700, 701-750, and above 750), address type (i.e. street address or high rise), and mortgage balance quartile.[11] We then search for all individuals within the same Census tract whose characteristics in 2005 fall into the same cell but who never had a foreclosure during the

[11] About 10 percent of foreclosed individuals had no mortgage in the initial period and are excluded from our analysis. The absence of a mortgage could be due to reporting error or the lag between when the foreclosure start was actually filed and when the foreclosure start was reported to the credit bureau.

entire sample period. If we cannot match the foreclosure individual to anyone in the same Census tract, we broaden the geographic area to ZIP code. If we still cannot find a suitable match, we broaden the geographic area further to county. Approximately 10 percent of foreclosed individuals are matched at the Census tract level, 20 percent are matched at the ZIP code level, and 45 percent are matched at the county level.[12] The remaining 25 percent of foreclosed individuals do not have matches even at the county level and are excluded from our analysis.

We also implement several data cleaning procedures in our matching algorithm. For example, about 1 percent of foreclosed individuals experienced more than one foreclosure between 1999 and 2010. We exclude these individuals because it is difficult to determine which foreclosure might have led to any given outcome. To avoid having one individual serve as the comparison for different foreclosed borrowers in different years, we remove the person from the pool of potential matches once he is matched to one foreclosed individual. These data cleaning procedures do not change our results substantively, but they help avoid complications in computing certain statistics and standard errors. In addition, because individuals with the same address are regarded as the same household in the credit bureau data, irregularities in the address data such as missing apartment numbers can cause all individuals in the same multi-family building to be classified as being in the same household. To reduce measurement error in studying household formation, we limit our sample to households with at most 4 adult members at any given time.[13] Following the standard procedure in matching estimation, we weight observations to give equal weight to the foreclosed and comparison individuals. For example, if

[12] We exclude matches when a foreclosed individual is matched to more than 500 comparison individuals as they reside in very large counties and the economic condition may vary significantly within the county. On average, each foreclosed individual is matched with 2 control individuals within the same Census tract or the same ZIP code and 5 control individuals in the same county.

[13] Results are similar when we change the threshold to 6 adult members per household.

a matched group has two foreclosed individuals and 5 comparison individuals, we give each foreclosed individual a weight of 0.5 and each comparison individual a weight of 0.2.

Table 1 compares the initial characteristics of the foreclosed individuals with their counterparts in the comparison group in the year prior to foreclosure. The average age, credit score, fraction living in a single-family structure, and median mortgage balance are almost identical for the foreclosed individuals and the comparison group. These similarities are not surprising since we formed the comparison group using these variables. Foreclosed individuals are more likely to be delinquent on their mortgages, which is not surprising since they subsequently received a notice of default. Foreclosed individuals are less likely than the comparison group to have credit card accounts or auto loans, and they are also less likely to be delinquent on these other debts conditional on having such loans.[14] As shown later in the paper, although the foreclosed and comparison groups do not look identical along all dimensions, controlling for the initial characteristics that differ across the two groups does not make any noticeable difference to our empirical findings.

Results

As discussed above, we expect foreclosure to result in reduced housing consumption. In the context of the FRBNY consumer credit data, this reduced consumption should manifest in larger household size, a higher propensity to live in rental and multi-family housing, and in migration to lower quality neighborhoods. We will examine each of these hypotheses in turn. First, however, we will examine the probability of moving after a foreclosure start to provide insight into which foreclosure starts are completed and how long it takes for the completion to

[14] Because we match post-foreclosure individuals with comparison individuals based on their credit score in the initial period, it is unsurprising that the comparison individuals are more likely to be delinquent on other types of debt since they are less likely to delinquent on mortgage.

occur. We will use migration as a proxy for foreclosure completion, an important aspect of our analysis since we would not expect housing consumption to change for borrowers who manage to avoid foreclosure through refinancing or loan modification.

Post-Foreclosure Migration

Figure 2 shows the fraction of individuals that live in a different Census block than in the initial year when they are matched (for foreclosed individuals, this is the year prior to the foreclosure start). Note that even though we match individuals based on their characteristics in year 0, the mobility rates of the post-foreclosure and comparison groups in years before year 0 are almost identical. Such similarities reassure us that the comparison group provides a good counterfactual for the post-foreclosure individuals.

Twenty-three percent of individuals move within the year of the foreclosure start, suggesting that some foreclosures occur fairly quickly.[15] By contrast, only 11 percent of the comparison group had moved within this time frame.[16] The gap between the post-foreclosure and comparison group widens in the first and second years after foreclosure, and then stabilizes at about 24 percentage points. In the 3-year period from the year prior to the foreclosure start to the second year afterward, nearly half of the post-foreclosure individuals had moved, compared to only one quarter in the comparison group. Although the probability of moving continues to rise following the second year after foreclosure, it moves up by about the same amount for the comparison group. Therefore, this increase is likely due to other reasons such as life-cycle

[15] We do not observe whether post-foreclosure migration is the result of eviction from the property, the result of a short sale, or possibly even the result of a traditional sale. Any of these outcomes could be the result of mortgage default.

[16] According to the Current Population Survey, a frequently-used dataset to measure migration, 12 percent of the adult population from 2000 to 2010 had changed residences within the past year.

events or employment changes, rather than foreclosure. Consequently, we infer that most foreclosures are completed within two years after the notice of default.

Next, we use regression analysis to examine whether the differential migration propensity between the post-foreclosure and comparison groups are due to foreclosure or to unobserved characteristics of the two groups. Table 2 reports the results of regressing the probability of having moved from the year prior to the foreclosure start to the second year afterward on an indicator for having received a notice of default. Consistent with the figure, individuals who receive a foreclosure start are 24 percentage points more likely to have moved (column 1), a migration rate that is double that of the comparison group. Although this estimate is based on a simple linear probability model, results are similar if we use a probit specification. Controlling for initial age, credit score, mortgage balance, address type, year, and geography does not change this result since we matched the foreclosure and comparison individuals along these dimensions. The estimated migration differential is also similar if we add controls for credit inquiry, credit card and auto loan balances, and delinquency status in the year prior to foreclosure (column 2), even though these characteristics differ between the two groups.

Because the comparison group was formed based on tract, ZIP code or county boundaries and neighborhood characteristics can vary within these areas, we also try controlling for block fixed effects. The difference in migration rates between foreclosure and comparison individuals is larger in locations with at least one foreclosed and comparison individual per block, but controlling for block fixed effects in this sample does not reduce the difference between the two groups (columns 3 and 4).[17]

[17] Observations in this subsample where we can control for block fixed effects are mostly from recent years and foreclosure stricken areas. In other words, these observations are more likely to be in periods and locations with large house price declines. As shown later in the paper, house price declines may induce higher mobility rate after foreclosure starts since borrowers can no longer refinance their mortgages or work out alternative deals with their

A number of researchers have found that state laws make it more difficult for lenders to foreclose in states where the foreclosure process is required to go through the courts, leading to differences in mortgage default probabilities (see Ghent and Kudlyak 2010). Columns 5 and 6 of Table 2 show that the difference in migration between the foreclosure and comparison groups is larger in non-judicial states. This result is consistent with the notion that requiring court approval lengthens the foreclosure process and prevents some foreclosures from being completed, thereby reducing the probability that a foreclosure start will cause a borrower to move.

Although entering the foreclosure process clearly raises the probability of migration, about half of post-foreclosure borrowers had not moved within two years after their property had entered the foreclosure process. We interpret this result as showing that many borrowers are able to refinance their loan or find other methods to become current without being evicted or selling the property. Indeed, conversations with industry analysts suggest that only about half of foreclosure starts are completed. A Furman Center report (2010) also finds that only half of foreclosure starts in New York City completed the foreclosure process. Consistent with the notion that the post-foreclosure non-migrants refinanced, the gap in migration rates between the post-foreclosure individuals and the comparison group is much larger in the 2006-2008 period, when refinancing was likely more difficult due to the housing market contraction (columns 7 and 8). Specifically, post-foreclosure borrowers were 19 percentage points more likely to move 2 years after the foreclosure start in the pre-2006 period, compared to 28 percentage points in later years.

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lenders. Therefore, the difference in migration rates between the foreclosure and comparison individuals is larger in columns (3) and (4) than those shown in columns (1) and (2).

To investigate further, we examine the interaction between house prices and the effect of foreclosure on the probability of moving. We measure house prices at the ZIP code level using indexes published by CoreLogic. These indexes are monthly repeat sales indexes on single-family houses covering about 6000 ZIP codes. We regress the probability of moving within two years after the foreclosure start on a foreclosure indicator, the cumulative house price appreciation during the two years prior to foreclosure, and the interactions between foreclosure and the house price appreciation measure. The regression also includes state-year fixed effects to control for unobserved differences across locations and over time. Column (1) of Table 3 shows that foreclosed individuals are less likely to move in ZIP codes where house price appreciation is higher, consistent with the hypothesis that mortgages are more likely to be refinanced or modified after a notice of default if house prices have been moving up. The magnitude of our estimate suggests that a 10 percentage point increase in house price appreciation during the two years prior to foreclosure reduces the probability of moving by 0.04 percentage points, or 13 percent from the baseline average. In columns (2) and (3), we also use county- and MSA-level house price appreciation as robustness checks and we find similar results. Thus, borrowers living in areas with high house price appreciation are less likely to be forced to move and alter their housing consumption after their loan enters foreclosure.

Having established that foreclosure raises the probability of migration for the two years following a notice of default, in the remainder of our analysis we will focus on the 3-year period from the year prior to foreclosure start to the second year afterward. We limit the post-foreclosure sample to individuals who moved during this period because the foreclosure process was likely not completed for borrowers who did not move, and foreclosure is not likely to have a

large effect on housing consumption decisions if it is not completed.[18] Except when noted, we include individuals in the comparison group whether they moved or not, since the decision to move and consequent housing consumption decisions should reflect the economic or life-cycle factors that are common to both the post-foreclosure and comparison individuals. Because we have shown that controlling for observables does not make any appreciable difference in the propensity to migrate, for most of our analysis we will focus on the raw differences between the outcomes of the post-foreclosure and comparison groups.

Household size and composition

One obvious measure of housing consumption is household size; post-foreclosure borrowers can reduce their housing expenditures by moving in with more income-earning adults. However, Table 4 shows that average household size does not change noticeably after a foreclosure, in either absolute magnitude or relative to the comparison group.[19] More individuals move into larger households than the comparison group, but more individuals reduce their household size as well. Furthermore, these differences result from including non-movers in the comparison group; migrants in the comparison group tend to increase and decrease their household size to the same extent as post-foreclosure migrants.

Although the number of adults per household does not change in a meaningful way after foreclosure, it is possible that other aspects of household composition are affected. Indeed, in the later period only 17 percent of the post-foreclosure individuals live with the same household members, compared to 46 percent in the comparison group. Conditional on experiencing no

[18] We also exclude foreclosure individuals who move after the notice of default but retain the old mortgage since this may indicate that the borrower is an investor or the foreclosure is not completed.
[19] In results not shown, changes in household size for the two groups are similar when comparing households with the same initial household size. Households with a single adult tend to become larger, while households with 3 or 4 adults tend to shrink, likely due to mean reversion.

change in household size, 85 percent of the comparison individuals also do not experience a change in household composition (i.e. they live with the same individuals). In contrast, less than half of the post-foreclosure individuals who maintain the same household size live with the same individuals as in the year prior to foreclosure.

Moreover, post-foreclosure migrants may be more likely to move in with their parents who can help support them financially, whereas other migrants may move in with a spouse or roommate. We assess this hypothesis by examining the fraction of individuals who live with an adult at least 20 years older. As shown in Table 4, this fraction increases by 3 percentage points for the post-foreclosure group in the later period and falls by 1 percentage point for the comparison group. Therefore, post-foreclosure migrants are slightly more likely to move in with older individuals. However, this difference is fairly small—the 4 percentage point gap that arises between the two groups is only one eighth of the standard deviation of the fraction of individuals that live with an adult at least 20 years older.

Homeownership and access to credit

Another important aspect of housing consumption is homeownership. Owner-occupied properties are more likely than renter-occupied units to be single-family structures, and in general single-family housing units tend to be larger and higher quality than multi-family. Even within the category of single-family structures, owner-occupied units tend to be larger and higher quality.[20]

[20] The 2007 American Housing Survey has a summary measure of housing quality based on a host of survey questions. Based on this measure, 96 percent of single-family units and 90 percent of multi-family units are rated as adequate. Among single-family units, 97 percent of owner-occupied units and 92 percent of renter-occupied units are rated as adequate.

We do not observe housing tenure in the FRBNY Consumer Credit Panel, so we use the presence of a mortgage to proxy for homeownership. Table 5 shows that post-foreclosure borrowers are much less likely to have a mortgage than the comparison group, and this difference widens in the later period. The post-foreclosure individuals are also less likely to live with other household members who have a mortgage, a result that makes sense if the foreclosed property was jointly held by multiple household members. All together, in the later period only 17 percent of the post-foreclosure individuals lived in a household where at least one person had a mortgage, compared to 82 percent of the comparison group. Thus, post-foreclosure individuals are much less likely to live in owner-occupied units.

The higher probability of living in rental housing suggests that post-foreclosure borrowers are less likely to live in single-family structures. Indeed, the fraction of individuals that live in a single-family unit (which includes townhouses and small multi-family buildings) instead of a high-rise apartment building falls notably after foreclosure (see Table 5). In the 2006-2008 period, 22 percent of post-foreclosure borrowers switched from single-family to a high-rise apartment building, compared to 3 percent of the comparison group. Even conditional on living in a high-rise, post-foreclosure borrowers seem much less likely to live in a condominium or co-op unit, which tend to be higher quality than rental apartments. Among individuals who live in a high-rise in the 2006-2008 period, only 1 percent of post-foreclosure borrowers had a mortgage, compared to 62 percent of the comparison group.

Related to the ability to obtain new mortgages after foreclosure, Table 6 shows that access to other credit markets also decline for post-foreclosure individuals relative to the comparison group.[21] For example, in the later period the average credit card limit is reduced by

[21] One may be surprised to see that credit score is higher two years after than the year prior to the foreclosure start. This is mainly because foreclosed individuals have very low credit score to begin with. As explained in Cooper and

more than half for post-foreclosure individuals, compared to only 16 percent for the comparison individuals. As a result, the utilization rate (defined as the balance-to-limit ratio) on credit card accounts increases for post-foreclosure individuals relative to the comparison group. While the supply of credit to post-foreclosure individuals contracts sharply, the demand for credit among these former borrowers does not seem to decline more than the comparison group. The fraction of individuals with consumer-initiated credit inquiry, a rough measure of credit demand, falls by about 25 percent for both the post-foreclosure and comparison groups.

Migration distance and neighborhood characteristics

In addition to household formation and tenure choice after foreclosure, migration distance and neighborhood characteristics are also indictors of changes in housing consumption. In this section, we exploit the detailed geographic identifiers provided in the FRBNY consumer credit panel to investigate these two aspects of the post-foreclosure experience.

Table 7 compares the migration distance of the post-foreclosure individuals to that of the movers in the comparison group. We exclude non-movers from the comparison group in order to focus on how foreclosure affects neighborhood choice conditional on having decided to move. In the recent period, the post-foreclosure individuals appear to move a shorter distance than the comparison movers. For example, only 13 percent of post-foreclosure individuals move across state borders, compared to 18 percent among the movers in the comparison group. Similarly, 19 percent of the post-foreclosure individuals and 24 percent of the comparison movers move to a different metropolitan area. We also find that post-foreclosure individuals are less likely to move across school districts, although the magnitude of this difference is very small. In general,

Brevoort (2010), although credit score recovery is much slower for prime borrowers (defined as 660 or above), over 60 percent of subprime borrowers saw their credit score recover within two years of the quarter in which their mortgage entered foreclosure.

the shorter migration distance of post-foreclosure individuals suggests that these individuals may be constrained by employment or school enrollment concerns. The difference between the post-foreclosure and comparison individuals is smaller in the early period than in the recent period, perhaps because the underlying forces that drive mortgage default and foreclosure have changed over time.

In Table 8, we limit our sample to individuals who move across blocks and block groups and compare the change in neighborhood characteristics, measured at the block and block group level in the 2000 Census, for both the post-foreclosure and comparison groups.[22] Not only are these characteristics likely correlated with the quality of an individual's housing unit, but they also signal the quality of neighborhood amenities.

We start by examining the characteristics of the Census block, which is small enough that variation of housing characteristics within the block is likely small (as mentioned above the median block in our sample has 28 housing units). Consistent with the homeownership outcomes discussed above, post-foreclosure borrowers tend to move to denser neighborhoods with less owner-occupied housing (see Table 8). The fraction of female-headed households, a measure likely correlated with low income, edges up slightly for post-foreclosure migrants, but by only a very small amount. However, the fractions of black and Hispanic residents do not change much, as might be expected if post-foreclosure individuals were moving to very urban neighborhoods.

Next we examine characteristics of the block group, defined as a cluster of census blocks having the same first digit of their identifying number within a census tract. The median block

[22] Since the pre- and post-foreclosure characteristics are both measured at the same point in time, our analysis is not confounded by any potential effect of migrants on the neighborhood. It is possible that some neighborhoods changed appreciably over the course of our sample period, which would introduce some noise into these measures. However, we have no reason to suspect that the degree of noise would be different for the post-foreclosure and comparison groups.

group in our sample has 475 housing units, so it still defines a relatively small area. Table 8 shows that post-foreclosure migrants tend to move to block groups with a slightly smaller number of rooms per housing unit and median income. Post-foreclosure migrants also reduce their average commute time a bit more than the comparison migrants. However, these differences are minor. For example, average block group income falls by 3-6 percent for post-foreclosure borrowers relative to the comparison group. This relative decrease is tiny compared to the standard deviation of income across block groups, which is about 47 percentage points. We also find no important differences in the composition of educational attainment, median house value, or median rent. Consequently, it does not appear that post-foreclosure borrowers are moving to much worse neighborhoods.

While Table 8 shows that post-foreclosure borrowers do not tend to move to worse neighborhoods on average, it is possible that some individuals do end up in a significantly lower-quality area. To investigate this possibility, we calculate the fraction of individuals that move to a substantially worse neighborhood, as measured by various block and block group characteristics. A slightly greater fraction of post-foreclosure borrowers move to a neighborhood with substantially lower income, fewer rooms per housing unit, or a substantially higher fraction of black, Hispanic or female-headed households. However, the fraction of individuals moving to a neighborhood with substantially lower house value or rent is the same for the post-foreclosure and comparison migrants. These results are similar to the means and medians shown in Table 8, and reinforce the conclusion that there are no large and meaningful differences in the neighborhood choices of post-foreclosure migrants. Such results may seem somewhat at odds with the marked changes in homeownership and structure type reported above, given that rental and multifamily structures tend to be in more urban, lower income neighborhoods. It is possible

that post-foreclosure migrants seek out rental units in neighborhoods comparable to their previous neighborhood.

Conclusion

Even though the wave of mortgage defaults has been an important topic for several years, researchers and policy makers are armed with little information on what happens to households after they experience a foreclosure. This paper aims to provide evidence on post-foreclosure housing consumption outcomes, including household formation, homeownership, and neighborhood characteristics. Some of our findings confirm common beliefs. For example, post-foreclosure individuals experience more changes in household composition and are a bit more likely to move in with older individuals (possibly their parents) to reduce housing costs. Most post-foreclosure borrowers do not have a mortgage and have less access to the credit market. Consistent with a change in tenure from home ownership to renting, post-foreclosure households are also likely to move to denser, more-urban neighborhoods. By contrast, some of our findings are more surprising. For example, about half of foreclosure starts do not result in ultimate eviction or selling of the property even two years after the notice of default. The average household size of post-foreclosure individuals does not seem to change relative to the comparison group. Among post-foreclosure migrants, many aspects of neighborhood quality are not much worse than those of migrants in the comparison group.

Our theoretical framework suggests that all else equal, a foreclosure should reduce one's housing consumption. However, the empirical evidence shown in this paper suggests that the reduction in housing consumption after foreclosure is quite limited beyond transitioning from

being a homeowner to being a renter. Several factors may potentially explain why we find less reduction in housing consumption in our data than expected.

First, to the extent that some borrowers default on their mortgages strategically, their housing consumption may not change much after foreclosure. However, given the existing literature showing that most of mortgage defaults are driven by large negative shocks (Foote et al. 2008 and Bhutta et al. 2010), strategic defaulters are unlikely to be the main reason why we find limited evidence on reduction in housing consumption after foreclosure.

Second, it is possible that our finding of similar neighborhood choices among post-foreclosure and comparison group migrants is because we measure these neighborhood characteristics at aggregated levels (i.e. Census block and block group) rather than at the individual level. While this argument may be relevant for some locations, we believe that the typical block and block group is small enough that within-block or within-block group heterogeneity in these neighborhood characteristics is relatively minor.

Third, the theoretical framework assumes that house prices remain constant. During the recent housing downturn, most measures of national house prices dropped by about 30 percent. Declining housing costs may mitigate the negative effect of foreclosure on housing consumption because the same quantity of housing can be obtained for a smaller expenditure. However, we do not find post-foreclosure migrants move to substantially worse neighborhoods even during the 2000-2005 period when house prices were rising, on average. Thus, house price movements may not be the main reason why we find limited evidence on reduction in housing consumption after foreclosure.

Given that most of mortgage defaults are triggered by negative shocks and post-foreclosure individuals have less access to the credit market, our finding that post-foreclosure

migrants do not move to neighborhoods with markedly lower house value, rent, or other amenities suggest that households may reduce non-housing consumption instead. The nature of our data does not allow us to explore this possibility, and the field would benefit from studies that use alternative data to shed light on the consumption of non-housing goods after foreclosure.

Although we have taken a first step in providing systematic evidence on housing consumption decisions among post-foreclosure households, many other interesting and important questions relevant to foreclosed individuals remain unanswered. For example, do children in post-foreclosure households perform worse in schools? Are employment opportunities reduced or expanded after a foreclosure forces a change in residential location? How do foreclosures on landlords' mortgages affect renters? Although our data are not well suited to address these questions, we hope that they will be addressed in future research.

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Figure 1. Number of New Foreclosure Starts by Year

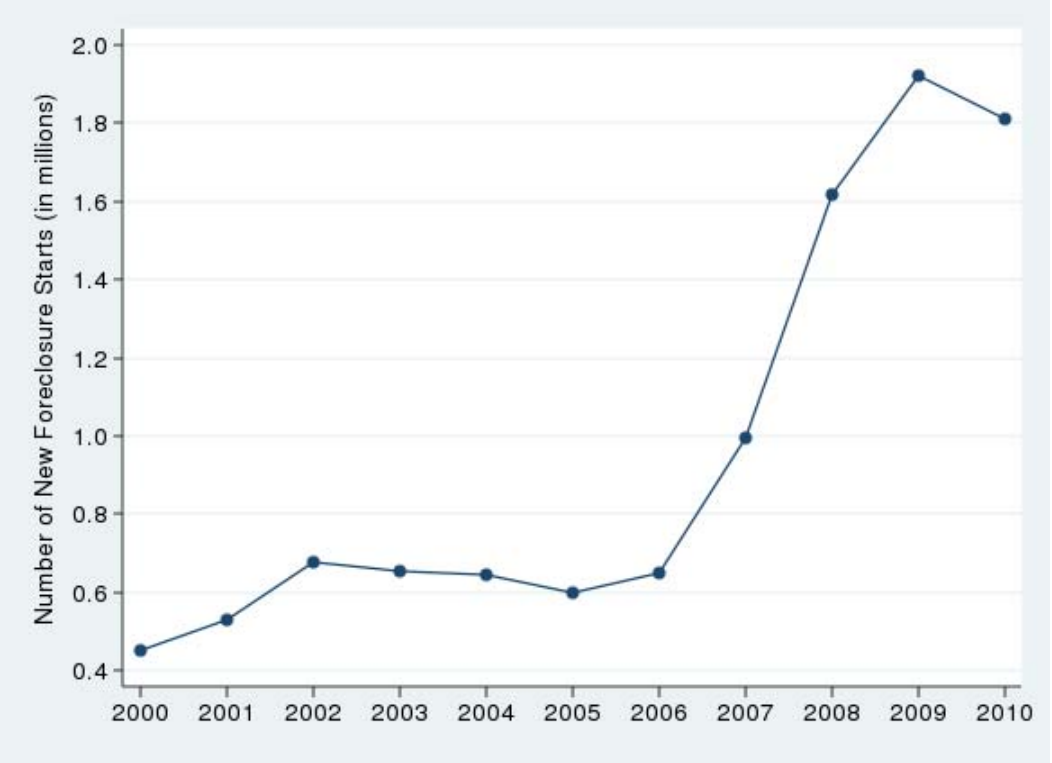

Figure 2. Fraction of Individuals Living in a Different Census Block than in the Year when They are Matched (Year 0)

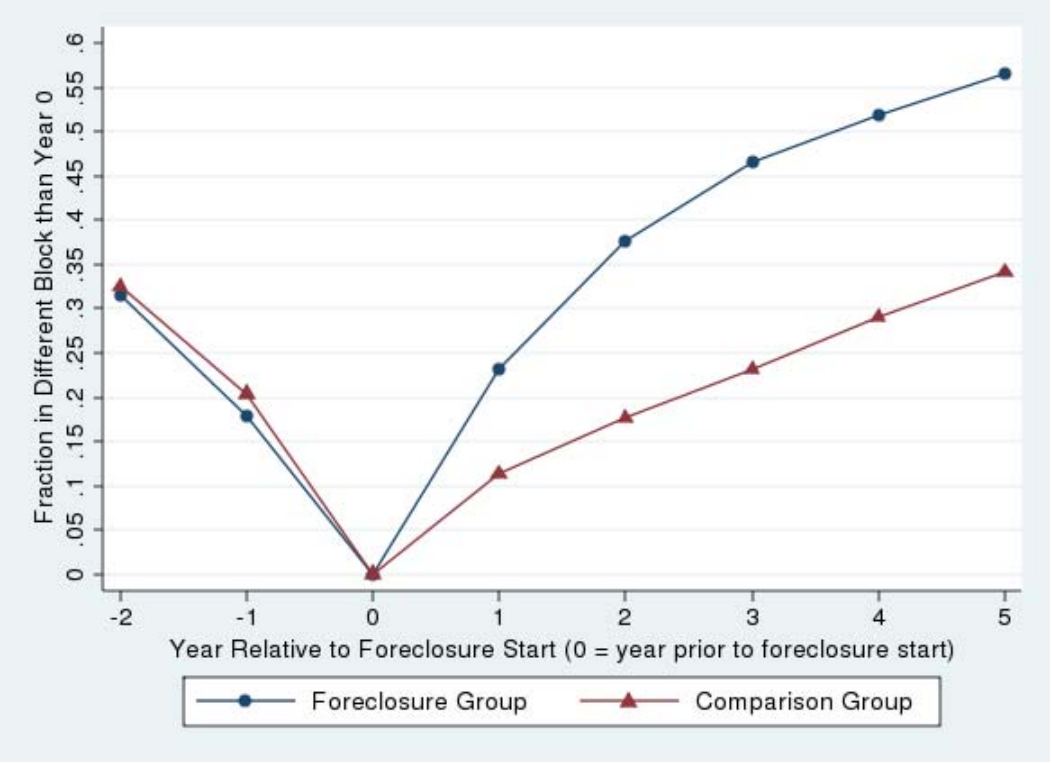

Table 1. Comparison of Foreclosure Sample and Comparison Group In the Year Prior to Foreclosure

	1999-2004		2005-2007	
	FC=0	FC=1	FC=0	FC=1
Mean risk score	539	536	572	568
Median risk score	537	533	568	563
Mean age	42.3	42.3	42.2	42.2
Mean household size	2.18	2.13	2.31	2.28
Mean mortgage balance	99,210	101,448	183,393	196,023
Median mortgage balance	85,895	85,727	146,000	146,255
Mean household mortgage balance	109,916	112,345	201,220	221,155
Median household mortgage balance	90,262	89,974	152,000	153,604
Fraction 30-60 days late on mortgage	0.15	0.36	0.14	0.31
Fraction 90+ days late on mortgage	0.04	0.18	0.03	0.14
Fraction with credit card	0.84	0.69	0.84	0.73
Mean credit card balance	9,183	7,039	10,492	8,366
Median credit card balance	4,621	3,037	4,790	3,276
Fraction 30-60 days late on credit card	0.17	0.12	0.14	0.10
Fraction 90+ days late on credit card	0.32	0.38	0.25	0.27
Fraction with auto loan	0.48	0.42	0.55	0.52
Mean auto loan balance	15,905	15,479	18,922	20,435
Median auto loan balance	13,283	12,771	15,410	15,600
Fraction 30-60 days late on auto loan	0.12	0.18	0.10	0.14
Fraction 90+ days late on auto loan	0.06	0.10	0.05	0.08
Fraction with credit inquiry in past 12 months	0.85	0.85	0.87	0.90
Fraction living in single-family structures	0.95	0.95	0.95	0.95
N (unweighted)	284,300	62,855	224,342	61,619

Note. Year in column heading refers to the year prior to foreclosure. FC=1 are individuals who experienced a foreclosure start. FC=0 are individuals in the comparison group. Mortgage, credit card, and auto loan balance and delinquency status are conditional on having such accounts.

Table 2. Probability of Moving between Year Prior to Foreclosure Start and Second Year After Foreclosure Start

	Full Sample		Block FE		Non-Jud	Jud	2000-2005	2006-2008
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Foreclosure start	0.235**	0.242**	0.321**	0.323**	0.256**	0.204**	0.186**	0.283**
	(0.008)	(0.008)	(0.027)	(0.031)	(0.005)	(0.011)	(0.009)	(0.012)
Controls of matching criteria		X						
Other controls		X						
Block fixed effects				X				
Adjusted R^2	0.061	0.148	0.109	0.268	0.071	0.048	0.037	0.090
N	596,148	596,148	5,164	5,164	359,063	237,085	319,044	277,104

Note. Controls of matching criteria include age group, risk score category, mortgage balance category, address type, year fixed effects, and tract/ZIP code/county fixed effects. Other controls include whether have credit card, credit card balance category, whether have auto loan, auto loan balance category, mortgage delinquency status, credit card delinquency status, and auto loan delinquency status. Standard errors in parenthesis are clustered at the state level. * significant at 0.05 level and ** significant at 0.01 level.

Table 3. Local House Price Appreciation and Mobility Outcome after Foreclosure Start

	ZIP HPI	County HPI	MSA HPI
	(1)	(2)	(3)
Foreclosure start	0.277**	0.277**	0.280**
	(0.009)	(0.008)	(0.009)
Cumulative HPA in the two years prior to foreclosure start	0.067	0.070	0.030
	(0.038)	(0.046)	(0.039)
(Foreclosure start)*(Cumulative HPA)	-0.369**	-0.393**	-0.293**
	(0.043)	(0.049)	(0.034)
State*Year fixed effects	X	X	X
Adjusted R^2	0.076	0.075	0.082
N	485,124	581,273	352,168

Note. Standard errors in parenthesis are clustered at the state level. * significant at 0.05 level and ** significant at 0.01 level.

Table 4. Household Size and Composition

	2000-2005				2006-2008			
	FC=0		FC=1		FC=0		FC=1	
	Before	After	Before	After	Before	After	Before	After
Average household size	2.16	2.30	2.13	2.23	2.30	2.31	2.25	2.27
Fraction that decrease household size	--	0.21	--	0.32	--	0.21	--	0.33
Fraction with same household size	--	0.42	--	0.27	--	0.51	--	0.28
Fraction that increase household size	--	0.32	--	0.37	--	0.23	--	0.35
Fraction living with same household members	--	0.36	--	0.19	--	0.46	--	0.17
Among households of same size, fraction living with same household members	--	0.78	--	0.46	--	0.85	--	0.46
Fraction living with an adult >= 20 years older	0.11	0.10	0.12	0.14	0.12	0.11	0.12	0.15
N (unweighted)	115,600	115,600	23,524	23,524	108,346	108,346	25,300	25,300

Note. Before = year prior to foreclosure and after = 2 years after foreclosure. FC=1 are individuals who experience a foreclosure start and move. FC=0 are individuals in the comparison group (whether they moved or not). Year in column heading refers to the year of the foreclosure start.

Table 5. Homeownership

	2000-2005				2006-2008			
	FC=0		FC=1		FC=0		FC=1	
	Before	After	Before	After	Before	After	Before	After
Fraction Primary Individual with mortgage	1	0.68	1	0.06	1	0.77	1	0.02
Fraction any HH Member with a mortgage	1	0.76	1	0.20	1	0.82	1	0.17
Fraction living in a single-family structure	0.94	0.94	0.94	0.77	0.95	0.94	0.95	0.76
Fraction transitioning from SF to high-rise	--	0.04	--	0.21	--	0.03	--	0.22
Fraction of high-rise dwellers primary individuals with a mortgage	1	0.42	1	0.02	1	0.62	1	0.01
N (unweighted)	115,600	115,600	23,524	23,524	108,346	108,346	25,300	25,300

Note. Before = year prior to foreclosure and after = 2 years after foreclosure. FC=1 are individuals who experience a foreclosure start and move. FC=0 are individuals in the comparison group (whether they moved or not). Year in column heading refers to the year of the foreclosure start.

Table 6. Access to Credit

	2000-2005				2006-2008			
	FC=0		FC=1		FC=0		FC=1	
	Before	After	Before	After	Before	After	Before	After
Risk score	542	600	538	572	579	611	575	580
Fraction with credit card	0.84	0.74	0.73	0.62	0.85	0.69	0.78	0.54
Average credit card limit	12,461	11,651	10,116	4,914	17,655	14,881	13,451	6,182
Average credit card balance	9,155	6,338	7,476	3,404	10,645	8,226	8,448	4,640
Average credit card utilization rate	0.78	0.67	0.78	0.75	0.69	0.65	0.71	0.74
Fraction with auto loan	0.49	0.47	0.48	0.40	0.56	0.48	0.60	0.45
Average auto loan balance	16,086	17,947	15,992	14,682	19,073	16,678	21,020	13,331
Fraction with credit inquiry in past 12 months	0.86	0.81	0.88	0.79	0.88	0.68	0.93	0.70
N (unweighted)	115,600	115,600	23,524	23,524	108,346	108,346	25,300	25,300

Note. Before = year prior to foreclosure and after = 2 years after foreclosure. FC=1 are individuals who experience a foreclosure start and move. FC=0 are individuals in the comparison group (whether they moved or not). Year in column heading refers to the year of the foreclosure start. Credit card limit, credit card balance, credit card utilization rate, and auto loan balance are conditional on having such accounts.

Table 7. Percent of Migrants by Distance of Move

	2000-2005		2006-2008	
	FC=0	FC=1	FC=0	FC=1
Inter-State	0.18	0.16	0.18	0.13
Within-State, Inter-County	0.21	0.20	0.21	0.21
Within-County, Inter-Tract	0.54	0.57	0.50	0.57
Within-Tract, Inter-Block	0.08	0.07	0.11	0.08
Inter-MSA	0.22	0.20	0.24	0.19
Inter-School District	0.59	0.57	0.60	0.58
N (unweighted)	31,199	11,886	20,721	10,896

Note. FC=1 are individuals who experience a foreclosure start and move. FC=0 are individuals in the comparison group who move.

Table 8. Change in Neighborhood Characteristics
(comparing movers to movers)

	2000-2005				2006-2008			
	FC=0		FC=1		FC=0		FC=1	
	Before	After	Before	After	Before	After	Before	After
Block housing unit density	1.40	1.18	1.28	1.44	1.09	1.20	1.09	1.36
Block population density	3.41	2.79	3.27	3.36	2.71	2.78	2.88	3.24
Block fraction owner	0.73	0.73	0.73	0.64	0.76	0.72	0.75	0.64
Block fraction married couple households	0.55	0.57	0.54	0.51	0.58	0.58	0.57	0.53
Block fraction female-headed households	0.27	0.26	0.28	0.30	0.25	0.25	0.26	0.28
Block fraction black	0.15	0.12	0.16	0.15	0.11	0.10	0.12	0.11
Block fraction Hispanic	0.15	0.13	0.15	0.14	0.15	0.13	0.17	0.17
Block group average number rooms	5.50	5.60	5.47	5.35	5.60	5.57	5.53	5.32
Block group average commute time	26.6	26.7	26.8	26.3	27.2	26.7	27.4	26.7
Block Group fraction less than high school	0.19	0.17	0.20	0.19	0.17	0.17	0.19	0.19
Block Group fraction high school	0.27	0.28	0.28	0.28	0.26	0.26	0.28	0.27
Block Group some college	0.30	0.30	0.30	0.30	0.31	0.31	0.31	0.30
Block Group college+	0.24	0.25	0.22	0.23	0.25	0.27	0.22	0.24
Average Block Group median income	49,049	50,921	47,514	46,553	53,222	53,325	50,262	48,929
Median Block Group median income	46,200	47,869	44,583	43,011	50,341	50,217	47,464	46,023
Average Block group median house value	129,869	136,459	124,437	126,316	149,537	154,418	136,253	140,043
Median Block group median house value	112,400	118,700	107,300	109,600	127,200	130,500	117,300	121,700
Average Block group median rent	626	622	609	602	663	654	640	639
Median Block group median rent	586	579	569	563	618	605	596	603
Fraction change in fraction black > 0.1	--	0.12	--	0.15	--	0.12	--	0.13
Fraction change in fraction hispanic > 0.1	--	0.13	--	0.15	--	0.14	--	0.18
Fraction change in fraction female hh > 0.1	--	0.27	--	0.33	--	0.29	--	0.33
Fraction change in ln(income) < -0.25	--	0.25	--	0.30	--	0.28	--	0.30
Fraction change in ln(house value) < -0.25	--	0.24	--	0.27	--	0.27	--	0.26
Fraction change in ln(rent) < -0.25	--	0.26	--	0.25	--	0.27	--	0.26
Fraction change in ln(rooms) < -0.25	--	0.15	--	0.18	--	0.17	--	0.20
N (unweighted)	29,023	29,023	11,184	11,184	18,732	18,732	9,914	9,914

Note. Before = year prior to foreclosure and after = 2 years after foreclosure. FC=1 are individuals who experience a foreclosure start and move across block (for block-level characteristics) and block groups (for block group-level characteristics). FC=0 are individuals in the comparison group who move across block (for block-level characteristics) and block groups (for block group-level characteristics). All neighborhood characteristics are measured in the year 2000.