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Abstract

The deep housing market recession from 2008 through 2010 was characterized by a steep rise in the number of foreclosures. The average length of time from the onset of delinquency through the end of the foreclosure process also expanded dramatically. Although most individuals undergoing foreclosure were experiencing serious financial stress, the extended foreclosure timelines enabled them to live in their homes without making mortgage payments until the end of the foreclosure process, thus providing temporary income and liquidity benefits from lower housing costs. This paper investigates the impact of extended foreclosure timelines on borrower performance with credit card debt. Our results indicate that a longer period of nonpayment of mortgage expenses results in higher cure rates on delinquent credit cards and reduced credit card balances. Thus, foreclosure process delays may have mitigated the impact of the economic downturn on credit card default, suggesting that improvement in credit card performance during the postcrisis period would likely be slowed by the removal of the temporary liquidity benefits as foreclosures reach completion.

Keywords: mortgage default, foreclosure, foreclosure delay, credit card default

JEL Codes: G28, G21, G02

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Foreclosure Delay and Consumer Credit Performance

I. Background and Research Objectives

The deep housing market recession from 2008 through 2010 was characterized by a steep increase in the number of foreclosures. Foreclosure timelines — the length of time from the initial mortgage delinquency through the end of the foreclosure process — also expanded significantly, averaging up to three years in some states. This paper investigates whether these lengthened foreclosure timelines provided an income and liquidity benefit that households tapped into to improve their payment performance on nonmortgage consumer debt.[1]

Between 2007 and 2012, the typical length of time between the onset of borrower delinquency and completed foreclosure rose dramatically, with the extended foreclosure timelines concentrated among states that follow judicial foreclosure processes.[2] Cordell, Geng, and Goodman (2015) apply a survival model to adjust for the censored timelines of loans still in the foreclosure or property liquidation process. They find that the expected timeline from onset of delinquency to property liquidation for loans entering foreclosure between 2005 and 2007 was 25 months in judicial states and 19 months in nonjudicial states. The timelines increased to around 45 months in judicial states and 25 months in nonjudicial states for loans entering foreclosure in or after 2009.

The lengthening foreclosure timelines generated a substantial foreclosure backlog. Figure 1 shows the number of foreclosure starts annually from 2000 to 2012 along with the peak number of homes in foreclosure as observed monthly for each of these years.[3] The total number of U.S. foreclosure filings rose sharply beginning in 2007 and peaked in 2009, but the number of homes in the foreclosure pipeline continued to rise into 2010 and declined more slowly than did the number of filings, reflecting the extended foreclosure processes.[4]

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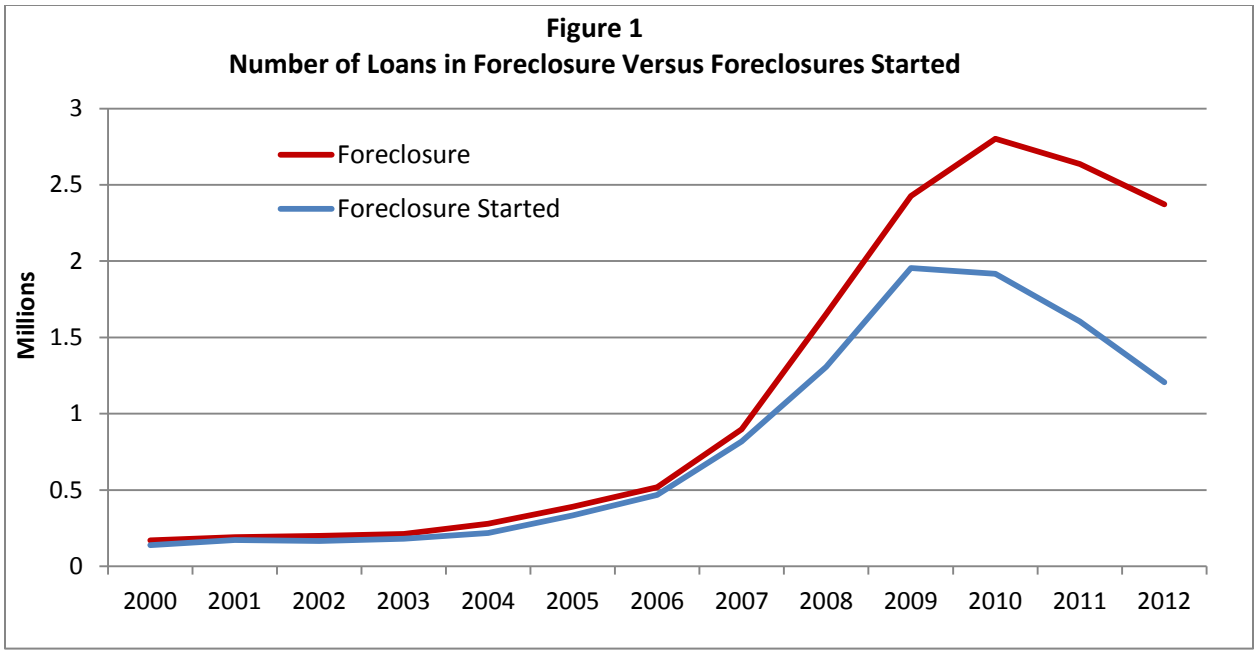
[1] The term *income benefit* here refers to the standard *income effect* from a fall in commodity price. In effect, a household undergoing foreclosure and no longer making mortgage payments is facing a temporary decline in housing costs.

[2] The states having a judicial foreclosure process are CT, DE, FL, IA, IL, IN, KS, KY, LA, ME, ND, NE, NJ, NM, NY, OH, OK, PA, SC, SD, VT, and WI.

[3] Figure 1 is based on foreclosure data compiled by RealtyTrac.com. Our empirical analysis relies primarily on loan-level mortgage data from the Black Night Financial Services McDash (Black Knight McDash) database, which is insufficiently populated pre-2004. Thus, the RealtyTrac.com data may provide more reliable time series dating back to 2000, although overall trends are similar to those observed in the Black Knight McDash data.

[4] The total number of foreclosure filings includes refiling after withdrawal or rejection of an initial filing, which may occur because of legal technicalities or obstacles or after a loan modification. In some states, primarily those with longer, judicial foreclosure processes, the total number of foreclosure filings continued to rise through 2012, likely



Source: RealtyTrac.com*:* 2011 and 2012 Year-End U.S. Foreclosure Market Reports

Foreclosure delays may provide a financial benefit to defaulted mortgage borrowers. While households are in the foreclosure pipeline, they typically are not making mortgage payments and have temporary relief from property taxes and some maintenance costs.[5] There are, however, potential costs associated with foreclosure delay. There may also be costs to neighborhoods because there are reduced incentives for households undergoing foreclosure to invest in maintenance.

This paper examines whether foreclosed borrowers with longer foreclosure timelines use the income and liquidity benefit to mitigate delinquency or pay down balances on nonmortgage household debt as opposed to simply ratcheting up consumption. As highlighted in several previous studies, such as Jagtiani and Lang (2011), the mortgage crisis period was characterized by changing priorities in consumer debt payments, such that households began to prioritize nonmortgage over mortgage debt when faced with difficulty in making some debt payments. The lengthened foreclosure timelines may have contributed to this changing prioritization. We are unaware of any prior research that investigates

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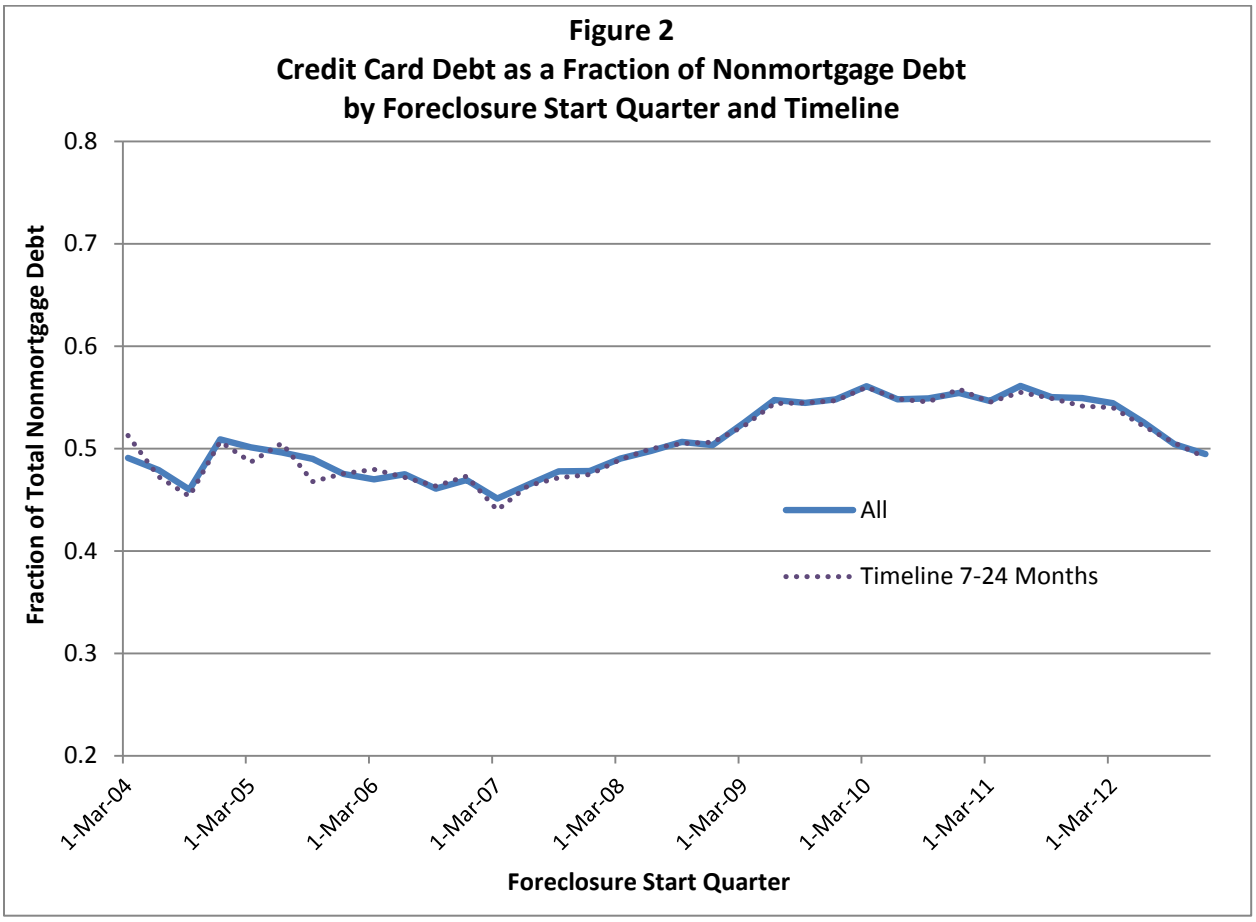
because of refiling. For example, foreclosure filing rates rose about 50 percent from 2011 to 2012 in New Jersey, Florida, Connecticut, and Indiana and by about 33 percent in Illinois and New York.

[5] Although relief from housing payments adds to household liquidity, not making mortgage, property tax, and maintenance payments has costs. The borrower may need to put up a legal defense to maintain occupancy, in which case there may be legal expenses. Cordell et al. (2015) describe the added losses to lenders given foreclosure delays. Also, reduced maintenance may lead to unanticipated, unavoidable repair costs. Such costs may limit the impact of longer foreclosure timelines on the borrower's performance with credit card or other consumer debt.

the impact of a foreclosure delay on nonmortgage consumer credit performance, the objective of this paper.

Specifically, we investigate how households undergoing foreclosure perform in repayment of credit card debt, which is of particular interest because card debt comprises about half of nonmortgage consumer debt during the period of study, the single largest category of such debt (Figure 2). Moreover, the revolving nature of credit card debt, including relatively low minimum monthly payments, tends to make borrower repayment performance sensitive to marginal changes in borrower liquidity.

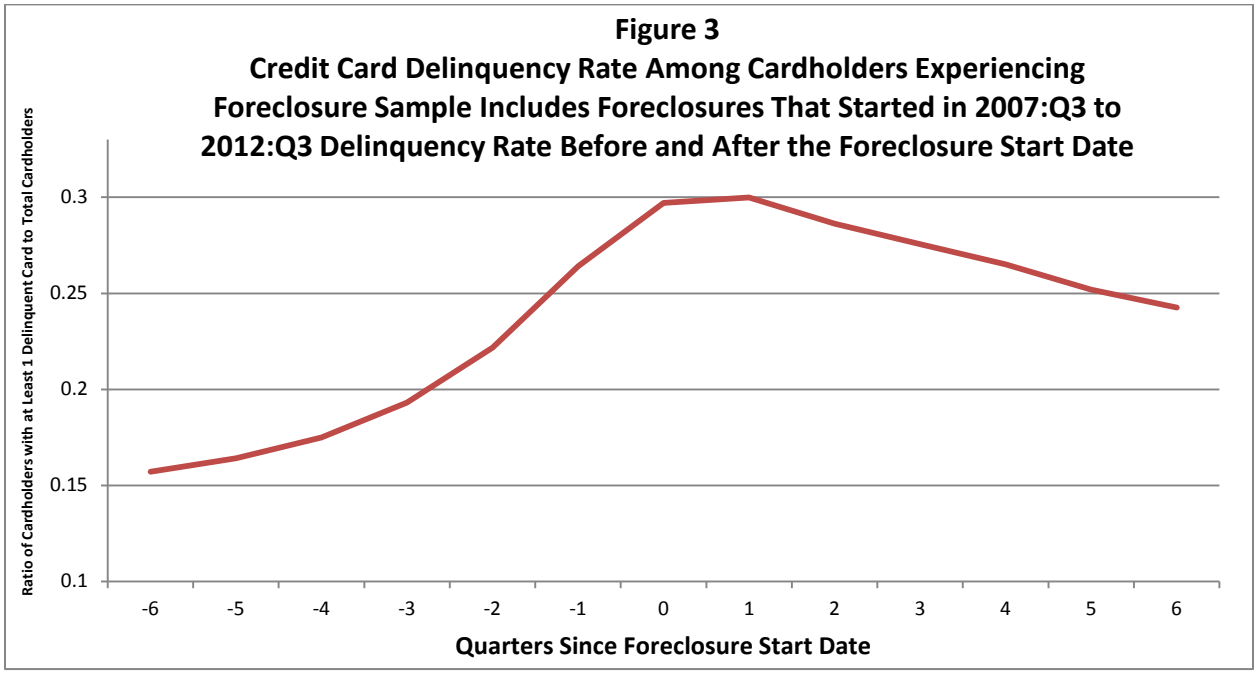
Figure 2
Credit Card Debt as a Fraction of Nonmortgage Debt by Foreclosure Start Quarter and Timeline



Source: Authors' calculations using merged data from the Black Knight Financial Services McDash and Federal Reserve Bank of New York (FRBNY) Consumer Credit Panel/Equifax databases

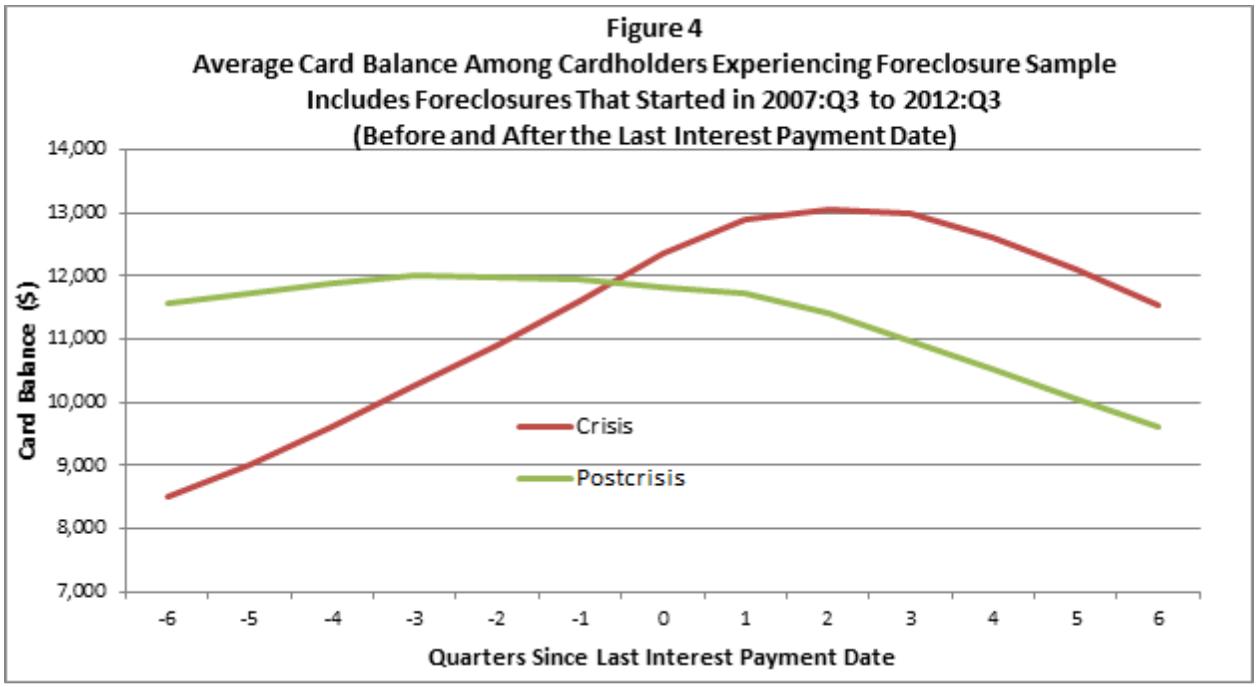
Our analysis indicates that households experiencing a longer foreclosure process are more likely to pay down their credit card debt and cure their delinquent cards (i.e., return to a current status). In other words, these households are more likely to improve their overall balance sheets than are households with shorter foreclosure timelines.

Preliminary evidence of such a relationship is seen in the simple plot in Figure 3, which shows payment performance on credit card debt before and after the start of a foreclosure process for mortgage borrowers experiencing a foreclosure, based on consumer credit records. The relationship is shown for foreclosures that occurred after the onset of the mortgage crisis in the third quarter of 2007 through the third quarter of 2012, a period that was characterized by lengthy foreclosure timelines and weak economic conditions. The plot shows, by month, the proportion of borrowers with a home in foreclosure who were delinquent (60 days or more past due) on at least one credit card, relative to the start date of the foreclosure process.



Source: Authors' calculations using merged date from the Black Knight Financial Services McDash and FRBNY Consumer Credit Panel/Equifax databases

That borrowers with delinquent mortgages were in overall financial distress is evident from the rising incidence of delinquency on credit cards in the months leading up to the foreclosure start date. However, card delinquency declined after the initiation of foreclosure and as the time since foreclosure start lengthened, consistent with a liquidity benefit from mortgage payment relief during the foreclosure process. Moreover, as shown in Figure 4, average credit card balances declined for borrowers involved in a foreclosure process during the mortgage crisis period (third quarter of 2007 through fourth quarter of 2009) and thereafter.



Sources: Authors' calculations using merged data from the Black Knight Financial Services McDash and FRBNY Consumer Credit Panel/Equifax databases

The remainder of this paper more fully investigates the hypothesis that temporary relief from paying mortgage expenses may be used to mitigate delinquency on other consumer debt (specifically, credit card debt) or to pay down credit card balances. Our findings indicate that households do not consume all the benefits of temporary relief from housing expenses; instead, they use that temporary relief to cure delinquent credit card debt and reduce their credit card balances.[6]

Our empirical findings indicate that, first, longer foreclosure timelines are associated with a higher percentage of financially distressed mortgage borrowers curing their seriously delinquent credit card debt. Second, with longer foreclosure timelines, mortgage defaulters are better able to reduce their loan balance on credit cards. Third, we also find that longer timelines, which are associated with a larger amount of financial relief, are associated with a borrower's increased ability to remain current on credit card debt after the foreclosure ends.

II. Previous Research on Foreclosure Timelines

Previous studies have examined the causes of delays in the foreclosure process during the crisis period and have identified various factors, including the effects of varying regulations across states and

[6] Our findings are consistent with work by Ambrose, Buttimer, and Capone (1997), who find that credit scores of consumers who foreclosed in the 1990s tend to recover after the foreclosure.

documentation issues with distressed mortgage loans. Regulations such as the *right-to-cure law* would block lenders from starting foreclosure proceedings for a set period after a borrower defaults on a loan, thus extending the foreclosure timeline. In addition, the *judicial-review right* allows for a judicial review of a foreclosure, which is available in 20 states (called judicial states). This delays the foreclosure process because the review tends to halt the foreclosure filings and imposes a waiting period of at least 90 additional days for filing subsequent foreclosures. In contrast, in *power-of-sale* states, lenders are allowed to foreclose without judicial supervision.

Gerardi, Lambie-Hanson, and Willen (2013) examine the same states before and after the imposition of these laws, controlling for state effects and time trends. They find that in the short run, both the right-to-cure law and judicial foreclosure have a significant impact on extending foreclosure timelines. In particular, judicial intervention increases the number of persistent delinquencies, whereby borrowers in judicial foreclosure states are less likely to cure delinquent mortgage debt.

Pence (2006) examines the impact of foreclosure laws on availability of mortgage credit and finds that defaulter-friendly foreclosure laws are associated with a 4 percent to 6 percent decrease in mortgage loan size. This suggests that defaulter-friendly foreclosure laws reduce the supply of mortgage credit to borrowers at the time of loan origination. Similarly, lenders may respond to higher risks associated to foreclosure laws by charging higher interest rates, requiring larger down payments, or both, as documented by Jones (1993).

The foreclosure delays observed during the crisis period were also driven by problems of improper documentation associated with the huge volume of mortgages originated and securitized during the housing market boom and the unprecedented volume of foreclosures. Problems with mortgage documentation and mortgage processes resulted in many of the largest mortgage servicers instituting foreclosure moratoria in the fall of 2010 that lasted for several months, delaying mortgage foreclosures and increasing the backlog.

Allen, Peristiani, and Tang (2015) find that about 22 percent (about $25 billion) of subprime loans that were originated in Florida from 2004 to 2008 were in limbo as of December 2010.[7] They attribute the cause of the "limbo loan" phenomenon (both the likelihood of being in limbo and the length of time spent in limbo) to documentation issues rather than foreclosure capacity bottlenecks or other constraints.

[7] *Limbo loans* are defined as mortgage loans that have been delinquent for extended periods of time but have not progressed to any form of resolution, such as property sale, refinancing, modification, or foreclosure.

Regardless of the causes of the widespread delays in foreclosures in the wake of the housing market collapse, these delays may provide temporary income and liquidity benefits from lower housing expenditures.[8] Jagtiani and Lang (2011) provide evidence from the period of the financial crisis that many borrowers who strategically defaulted on their first-lien mortgages had access to sufficient liquidity to keep current on auto loans and home equity lines of credit (HELOCs). Lee, Mayer, and Tracy (2013) argue that, because many borrowers with delinquent first-lien mortgages were remaining current on their HELOCs, HELOC defaults can be expected to rise as these households reach the end of the foreclosure process.

Zhu and Pace (2015) attempt to estimate the relationship between foreclosure delay and decision to default on a mortgage by using loan-level data on securitized mortgages originated between 2005 and 2007.[9] The data track repayment performance of the loans through December 2009. Zhu and Pace find that foreclosure delays have a substantial impact on borrowers' decisions to default, whereby longer foreclosure timelines are associated with a greater likelihood of default.[10] They also find that default decisions are particularly sensitive to the expected foreclosure duration, particularly for mortgages with high loan-to-value figures at origination. They suggest that the savings a household may accrue from the time spent in foreclosure affect the household's financial decisions. In particular, increased foreclosure timelines contribute to rising mortgage defaults caused by an expectation of liquidity benefits.

Our analysis further explores the link between foreclosure timelines and financial decisions by examining the impact of time in foreclosure on consumers' overall credit performance. We expect to observe that mortgage defaulters improved their credit performance (and reduced their financial distress) with other financial products during the rent-free (and mortgage payment–free) period and for some time thereafter.

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[8] There are also potential substantial costs associated with foreclosure delay. For example, Gerardi, Rosenblatt, Willen, and Yao (2015) find that lengthening foreclosure timelines have exacerbated the negative impact of mortgage distress and adversely impacted neighborhood home prices.

[9] Zhu and Pace (2015) used loan-level data from Blackbox Logic's BBx database, which covers 90 percent of nonagency residential securitized deals, including prime, Alt-A, and subprime.

[10] The impact of postdefault experience on the decision to default has been examined along several other dimensions. Ghent and Kudlyak (2011) find that mortgage borrowers are less likely to default in recourse states (where mortgage lenders have the right to pursue a borrower's other assets if the property collateral is not sufficient to cover the mortgage amount), controlling for degree of negative equity. In addition, mortgage lenders were more likely to pursue alternatives to foreclosure in the recourse states. Mayer, Morrison, Piskorski, and Gupta (2014) and Jagtiani and Lang (2011) find that access to loan modification programs impacts the costs and benefits associated with mortgage delinquency and thereby influences default behavior.

III. The Data

Our sample consists of mortgage borrowers who experienced a full foreclosure process, with the foreclosure initiated in the first quarter of 2004 through the fourth quarter of 2012 and completed by the second quarter of 2014. Thus, the sample incorporates foreclosures occurring before the crisis (2004–2006) and during the recent moderate recovery (starting in 2011), as well as the crisis period in between. In exploring the relationship between foreclosure timelines and credit card performance, we use merged loan-level mortgage data and consumer credit panel data along with county-level and zip code-level economic data. Details on each of these data sets are presented in this section.

Loan-Level Mortgage Data. We rely on monthly mortgage performance data collected from the 10 largest servicers by Black Knight Financial Services McDash (Black Knight McDash). Although the data (by Black Knight McDash estimate) account for approximately 75 percent of all mortgages in the U.S. as of year-end 2010, coverage for subprime mortgages in the Black Knight McDash database is more limited compared with prime and Alt-A mortgages. We include only first-lien mortgages originated in 2000 or later, for a total sample consisting of about 150.4 million mortgages.

The Black Knight McDash data provide the last interest payment date (after which the consumer fell behind on scheduled interest payments) and the foreclosure start and end dates of mortgages that enter into delinquency and subsequent foreclosure.[11] These data also provide various loan and borrower characteristics, including origination date; original loan amount; and state, county, and zip code location of the property.

Credit Bureau Data. We also use two data sets of anonymized credit bureau information provided by Equifax. The first is from the FRBNY Consumer Credit Panel/Equifax. This is a set of consumer credit characteristics, updated quarterly, for a 5 percent random sample of individuals living in the U.S. who have a Social Security number and at least one account or public record (e.g., a bankruptcy filing) reported to the credit bureau. The data set includes a consumer credit score (the Equifax Risk Score); information on the individual's mortgage loans, including date of origination and original loan amount; aggregated information from the consumer's credit record (such as numbers of accounts of various types); and age (date of birth) of the consumer. Appended to these data is additional information obtained from Equifax by the Federal Reserve Bank of Philadelphia that describes

[11] There may be more mild instances of delinquency in which consumers maintain interest payments but fall behind on scheduled principal payments. These situations are more likely to result in rescheduling of the mortgage payments than a foreclosure situation.

each of the consumer's open credit card accounts (up to 10), including balances, payment status, and date the accounts were opened.[12] The latter information is updated semiannually.

The Merging Process. We merge the Black Knight McDash and the combined Equifax databases based on the origination mortgage loan amount (exact dollar amount), the zip code location of the property (in Black Knight McDash) or the zip code of the borrower (in Equifax), the origination date (month and year) of the mortgage, and the mortgage's delinquency status. There are four primary steps in the merging process.

First, we restrict the merge to first-lien mortgages in each data set, and we exclude consumers in the FRBNY Consumer Credit Panel/Equifax who have multiple first-lien mortgages. The latter exclusion is applied because the FRBNY Consumer Credit Panel/Equifax database reports the zip code associated with the borrower, which is likely to be different from the property zip code reported in the Black Knight McDash database.[13] Therefore, we exclude consumers with multiple first-lien mortgages in the FRBNY Consumer Credit Panel/Equifax database to reduce the likelihood of an improper match.[14]

Second, we conduct an initial merge without considering the delinquency or foreclosure status of the mortgage. This initial merge results in 5.3 million loans from the Black Knight McDash database matched uniquely to one or more consumers in the Equifax data, corresponding to a match rate of 3.5 percent for the original Black Knight McDash sample. Because the FRBNY Consumer Credit Panel/Equifax sample is a 5 percent random selection from the Equifax universe, this match rate is equivalent to a 70 percent success rate.

The initial merge also generates some nonunique matches in which more than one loan from the Black Knight McDash database matches to the same Equifax record or when the same loan from the Black Knight McDash database matches to different individuals in the Equifax data set. Nonunique matches can occur when two similar homes in the same zip code were sold in the same month, or (in the case of a single loan in Black Knight McDash assigned to different individuals in Equifax) it can be due to joint ownership.

[12] Open accounts have a date of last activity in the prior six months and positive balances.

[13] We use the zip code from the FRBNY Consumer Credit Panel/Equifax database corresponding with the quarter in which the mortgage first appears in the Equifax database. The first available quarter is generally within one or two quarters following the open date.

[14] In the FRBNY Consumer Credit Panel/Equifax database, 14.3 percent of individuals who are delinquent on a mortgage have two or more mortgages and thus are excluded by this criterion. We also note that of the overall percentage of the population of individuals with a mortgage (delinquent or not), 12.1 percent have two or more mortgages.

Third, we restrict attention to loans in the Black Knight McDash data set that were involved in a foreclosure process at some point, refine the match by comparing the delinquency status of the mortgages from the two data sources, and exclude remaining cases involving nonunique matches. Of the initial matched sample, we identify 414,618 loans in Black Knight McDash database that have been through a foreclosure process at some point during the life of the loans, of which 305,507 loans are uniquely matched to an individual in the Equifax data. Through the additional process of matching delinquency status, we reduce the incidence of nonuniqueness and gain an additional 58,861 uniquely matched loans, leaving a sample of 364,368 foreclosed loans in the Black Knight McDash database uniquely matched to an individual in the Equifax database.[15]

Finally, we restrict the sample to loans associated with a foreclosure start date between January 2004 and December 2012, a foreclosure end date no later than June 2014, and a foreclosure end type other than a servicing transfer.[16] The final sample contains 292,577 mortgages uniquely merged to an individual credit record in the Equifax database.[17]

There are advantages and disadvantages to using the merged data set. A large number of observations are lost because of the inability to identify a unique mortgage within the Black Knight McDash data to associate with a mortgage in the FRBNY Consumer Credit Panel/Equifax data. Moreover, although Black Knight McDash may cover as much as 75 percent of the entire mortgage market, there is a possibility of making a false match, such as when two similar homes in the same zip code were sold in the same month to two different buyers. An important advantage of using the merged data set is that we can observe the relationship between credit card performance (observed in the FRB Philadelphia Consumer Credit Panel/Equifax data set) and the foreclosure timeline (observed in the Black Knight McDash data) at the loan level. In addition, the merged data set allows our analysis to include loan-level characteristics from the Black Knight McDash database along with loan and borrower characteristics available only in the FRBNY Consumer Credit Panel/Equifax database.

Analysis Data Sets. Within the merged data set, we delineate three different subsamples for our analysis. The first is for the analysis of the likelihood of curing delinquent card debt during the

[15] With this refinement, the match rate rises to 3.8 percent.

[16] We did not include foreclosures before 2004 because the earlier data are less comprehensive. Also, we omitted foreclosures with start dates in 2013 or later because of the insufficient length of the observed performance period after the initiation of the foreclosure.

[17] Restricting the foreclosure start dates to those in the first quarter of 2004 through the fourth quarter of 2012 leaves 360,804 mortgages. Of these, 328,883 complete the foreclosure process in the second quarter of 2014 or earlier, with 292,577 having a foreclosure end type other than servicing transfer.

foreclosure period. The second is for the analysis of the change in card balances during the foreclosure period. The third is for the analysis of performance with credit card debt after foreclosure ends. Details are provided in the presentation of each respective empirical analysis.

The foreclosure period is defined as the entire period from the last interest payment date, which precedes the start of foreclosure (because lenders file for foreclosure only after multiple months of delinquency) to the end of the foreclosure process. A foreclosure process frequently terminates with legal ownership of the property transferred to the lender, at which point the loan is replaced as an asset on the balance sheet of the lender by the property that served as collateral, termed "real estate owned" or REO. However, the foreclosure process may terminate in other ways as well, such as by a property sale or liquidation that does not involve a transfer of ownership to the lender (such as short sale or third-party sale) or by cure of the delinquency and resumption of mortgage payments on the part of the borrower.

Thus, the foreclosure timeline as defined here includes the period of delinquency leading up to the lender's initial foreclosure filing plus the full time between the start and end of foreclosure, despite how the termination occurred. This timeline corresponds to the full period over which the borrower would be making no (or almost no) mortgage payments and consequently has improved liquidity.[18]

IV. Do Households Cure Their Delinquent Cards During Foreclosure?

We begin our empirical analysis by examining the relationship between time in foreclosure and the likelihood of curing a delinquent credit card. In this context, we restrict the sample to households that are seriously delinquent (60 days or more past due) on one or more credit card accounts as of the last mortgage interest payment date. Of the 292,577 individuals in the merged sample, 60,552 satisfy this criterion.

We then exclude from this sample all households in bankruptcy proceedings as of the last mortgage interest payment date. We do not include in our analysis delinquent cards that are in bankruptcy because the cure of those cards is likely to be a result of bankruptcy discharge rather than a consequence of the borrower prioritizing card repayment. This restriction leaves 55,854 individuals in the analysis sample.

Foreclosure Timeline and Control Variables. The foreclosure timeline for a mortgage subject to a foreclosure filing is defined as the number of months between the last mortgage interest payment date

[18] The card cure and card balance change results reported in this paper are robust to using an alternative, narrower definition that equates the foreclosure timeline with the period between foreclosure start and end.

and the foreclosure end date. Because of concerns that an individual household's foreclosure timeline may be endogenously related to the household's credit card performance, we use a two-equation, instrumental variables approach for fitting models with dichotomous dependent variables and continuous endogenous regressors.[19] The two equations — a first-stage, linear regression model for loan-level foreclosure timelines and a second-stage, probit model for whether the borrower cures — are jointly estimated via maximum likelihood.[20]

The first-stage linear regression equation relates loan-level timelines to the local area average timeline for similar-sized loans plus a set of control variables intended to control for sources of variation around the average timeline. Average foreclosure timelines are calculated by zip code location of the property, loan size category, and date of entry into foreclosure (year and quarter) using the full (nonmerged) LPS database.

The dependent variable for the second-stage probit equation is *Card Cured,* which indicates for each individual whether at least one of the credit cards observed to be delinquent as of the last mortgage interest payment date is cured within the subsequent six quarters. Card Cured takes the value of one if at least one of the delinquent cards is cured and zero if otherwise.

Two control variables, age of the mortgage in months and original loan size, both measured in logs, are specific to the first-stage equation. Other control variables are common to the first- and second-stage equations. These include the following borrower characteristics measured as of one quarter prior to the last interest payment date: borrower credit score (*Lagged Equifax Risk Score*), number of active credit card accounts (*Number of Cards*), and a dummy variable for borrowers 25 years of age or younger (*Dummy Borrower Age ≤25*).[21] We also include indicators for whether the borrower had delinquent cards one year before the initial mortgage delinquency date (*Dummy Card 60+ DPD 12 Months Prior*) and an indicator for loan modification activity (*Dummy Modification*). The latter identifies mortgages that are in active modification status as of the last interest payment date or that undergo modification during the subsequent six quarters.[22] In addition, we include indicators for jumbo (*Dummy Jumbo Mortgage*), subprime (*Dummy Subprime Mortgage*), and government-insured (*Dummy*

[19] An endogenous relationship may arise, for example, if borrowers choosing to make partial payments on the mortgage while allowing their cards to remain delinquent might receive more favorable treatment from servicers, as reflected in delaying the foreclosure process.

[20] We use STATA's IVPROBIT estimator.

[21] The results are robust to including control variables for borrower age.

[22] The Black Knight McDash loss mitigation flag is used to determine modification status.

Government-Insured Mortgage) mortgages. Subprime mortgages are identified as not government-insured and with an origination FICO score of less than or equal to 620.

Credit problems tied to local unemployment shocks may exhibit distinct delinquency and cure dynamics from those triggered by other types of adversity. Therefore, two measures of local economic conditions leading to foreclosure are included: *Unemployment 12 Month Change* and *County-Level Card Delinquency Rate*. The first is the change in the county unemployment rate between 15 months prior and three months prior to the initial mortgage delinquency date (*Unemployment 12 Month Change*). The second measure is the county-level card delinquency rate as of the initial mortgage delinquency date (the percentage of individuals who are 60 days or more past due on at least one of their credit cards, among the population with at least one active card account). A larger percentage of residents delinquent on their credit cards may indicate a weaker local economy.[23]

In addition, we construct three dummy variables identifying time periods with distinct economic or legal environments that may have impacted borrower behavior. These dummy variables distinguish the mortgage crisis period (third quarter of 2007 through fourth quarter of 2009), the postcrisis period (2010 and later), and the portion of the precrisis period following implementation of the Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA) in October 2005.[24] The first two variables, *Dummy Crisis Period* and *Dummy Post-Crisis*, control for the differing economic contexts relative to the precrisis period. The *Dummy Post-BAPCPA* variable controls for potential impacts of the limitations placed on consumer bankruptcy filings by the BAPCPA.[25] In particular, to the extent that the BAPCPA restricted the ability of some households to discharge their card debt through bankruptcy, post-BACPCA, a household may have been more inclined to prioritize card debt repayment over mortgage repayment, which may be reflected in an impact on card cure or paying down of card balances. Moreover, because the BAPCPA tightly limited the "automatic stays" of foreclosure proceedings that had typically

[23] Various other explanatory variables were tested, including additional indicators for the type of mortgage (for example, adjustable rate, interest only); total number of open, nonmortgage credit accounts; ratio of mortgage payment to credit card balance; and local area house price appreciation. The results presented here and in the next two sections were not materially affected by including these variables, which were not statistically significant.

[24] We use the foreclosure start date for assigning observations to periods.

[25] For discussion of the limitations placed on consumers by the BAPCPA, see DeFalaise (2006), Gargotta (2006), and Lesperance (2006).

accompanied refiling of bankruptcy petitions, the BAPCPA may have had some impact on foreclosure timelines.[26]

We estimate alternative specifications of the model with and without inclusion of these dummy variables. Inclusion of these dummy variables attempts to control period-specific changes in borrower behavior are not necessarily tied to expanded foreclosure timelines. However, because foreclosure timelines were systematically longer during the crisis and postcrisis periods, it may be difficult to separate the impact of the extended timelines from other period-specific factors.

Summary statistics of the data are presented in Table 1, panel A. Note that the observation count (55,650) reported there is slightly smaller than the analysis sample size of 55,854 because we have removed observations with missing or invalid values for any of the explanatory variables.[27] Close to half of the sample is associated with the financial crisis period (third quarter of 2007 to the fourth quarter of 2009), and close to one-third is associated with the postcrisis period (2010 or later). The post-BAPCPA portion of the precrisis period contains 9 percent of the sample.[28] The average foreclosure timeline for the sample is 18.2 months from the last mortgage interest payment to the foreclosure end date, of which 6.9 months is a gap between the last mortgage interest payment and the start of foreclosure and 11.3 months is the time between foreclosure start to foreclosure end. About half of foreclosures end in the transfer of ownership of the property to the lender as REO, and about one-quarter end in the cure of the delinquent mortgage (including cure through modification). The remainder of the terminations are coded (in the LPS data) as property liquidation or as a payoff of the mortgage loan.

Empirical Results. As stated, our objective is to investigate the impact of extended foreclosure timelines on borrowers' ability to cure their nonmortgage debt. Specifically, for borrowers (outside of bankruptcy) with at least one credit card that is 60 or more days past due as of the initial mortgage delinquency date, we examine the relationship between the time in foreclosure and whether the credit card cures within six quarters of the initial mortgage delinquency date.

[26] The BAPCPA's restrictions may have had an impact on the timelines of foreclosures that commenced some time before October 2005 by restricting a borrower's ability to refile for bankruptcy later on. Therefore, for the first-stage, foreclosure timeline regression, we extend the BAPCPA period (set BAPCPA = 1) to include all of 2005.

[27] Examples include invalid geography being reported in the data, missing risk score, and improperly reported mortgage origination date.

[28] The remaining (pre-BAPCPA) portion of the precrisis period contains only 4 percent of the sample. When the BAPCPA period is extended to include all of 2005 (for the first-stage regression), the remaining portion of the precrisis period contains only 2 percent of the sample.

Borrower performance with card debt in relation to length of the foreclosure process may depend not only on the realized foreclosure timeline but also on the extent to which the timeline is anticipated at the outset.[29] If the borrower is aware from the outset that the foreclosure process will be lengthy, then the borrower may be more inclined to prioritize precommit to a strategy for repaying card debt. Thus, the anticipation of an extended timeline may lead to an ex-ante commitment to pay off card debt with the savings from the mortgage payment relief, such that debt repayment exhibits a weaker relationship to within-state variation in timelines across individuals.

Borrowers are likely to base their expectations of the typical length of the foreclosure process on information from news reports or on the experiences of neighbors or acquaintances. And since anticipated timelines are likely to be longer in judicial states compared with nonjudicial states, we estimate separate two-stage regression models for each grouping to account for this possibility.

Estimation results are presented in Table 2.[30] Results in Table 2 are divided into two parts, corresponding to the first- and second-stage regression equations, and into four columns. The first two columns correspond to model specifications with and without the time period dummy variables, estimated with all states combined. The last two columns provide the results from the model (without period dummies) estimated separately for judicial and nonjudicial states.

The first-stage regression results presented in Table 2 determine the instrumented foreclosure timeline. The estimated coefficients relate the individual foreclosure timeline to the average timeline observed in the full LPS sample for similarly situated loans in foreclosure (in the same zip code with a similar loan amount and the same quarter of entry into foreclosure) and individual loan and borrower characteristics. The results suggest that larger origination amounts, older mortgage accounts, and subprime mortgages are associated with longer foreclosure timelines relative to the segment average timeline. The length of time in foreclosure tends to be shorter than the segment average for mortgages associated with some type of loss mitigation and borrowers with lower lagged credit scores.

The primary relationship of interest in Table 2 is the impact of the instrumented foreclosure timeline on the likelihood of credit card cure from the second-stage equation. The results indicate that a longer foreclosure timeline is associated with a higher probability of defaulted credit cards being cured. The coefficient of *Instrumented Individual Timeline* is positive and statistically significant at the 1 percent

[29] We are grateful to an anonymous referee for alerting us to this possibility and suggesting a distinction between judicial and nonjudicial states.

[30] Standard errors for these regressions and those presented later in the paper are clustered at the county level.

level in Model 1 and is little changed after the inclusion of the period dummy variables, as shown in Model 2 of Table 2.

Interestingly, the results in Models 3 and 4 indicate that the likelihood of cure (within the six quarters following the last mortgage interest payment) increases more sharply with the instrumented timeline in nonjudicial states compared with judicial states. The results are consistent with the previously mentioned conjecture that repayment strategies may involve a greater degree of ex-ante commitment in judicial states and may be less impacted by the variability of the timelines across individuals within these states. Alternatively, individual timelines may be more idiosyncratic and, hence, less predictable in judicial states, resulting in a weaker relationship of the (instrumented) individual timeline to the likelihood of cure.

The estimated coefficients on a timeline when estimated separately for judicial and nonjudicial states (Models 3 and 4) are larger than for the pooled sample (Model 1), suggesting that the relationship for the pooled sample is nonlinear because judicial states tend to have longer timelines.[31] The results overall are consistent with the hypothesis that the liquidity provided by longer foreclosure timelines was used to improve performance on other consumer credit.

Local economic factors are statistically significant, and as expected, the probability of cure is smaller in counties where economic conditions are weak (as reflected in rising unemployment or a relatively high aggregate county delinquency rate for credit cards). The coefficients of other control variables also are generally significant with intuitively plausible signs.[32] For instance, individuals with a longer-term history of card delinquency are less likely to cure (as indicated by the statistically significant, negative sign on *Dummy Card 60+ DPD 12 Months Prior*), consistent with such households facing longer-term financial difficulties.

The jumbo mortgage indicator is positively related to the likelihood of cure. Households with jumbo mortgages tend to have higher incomes and might have greater access to backup sources of liquidity, or they might obtain a greater liquidity benefit from the suspension of payment on the large mortgage amounts. Conversely, subprime mortgages are less likely to cure because the households generally have lower incomes and less backup liquidity, and the loan sizes are smaller.

[31] The results are consistent with the hypothesized linear relationship for the pooled sample and approximate an overall cubic relationship such that the steepest slope is in the intermediate timeline range in which judicial and nonjudicial states overlap.

[32] The dummy variables indicating the period of foreclosure filing are not included in the final model because they are correlated with the foreclosure timelines.

A higher credit score (*Lagged Equifax Risk Score*) is associated with a lower likelihood of cure, which seems counterintuitive. However, one plausible scenario is that an individual may have a relatively high risk score despite being behind on mortgage and card payments. This may be the case if the individual made an ex-ante choice to remain current on some active credit accounts and fall behind on others. Such ex-ante decisions may be reflected in relatively low cure rates on the accounts selected for delinquency.

The estimated coefficient on the loss mitigation indicator is positive and statistically significant, indicating that individuals with modified mortgages or mortgages associated with some type of loss mitigation are more likely to cure their delinquent cards. Thus, it appears that the reduced mortgage payments associated with loan modification helped some households cure not only their mortgage but also their delinquent credit card debt.

V. The Impact of Longer Foreclosure Timelines on Card Balances

Next, we turn our attention to the relationship between the time in foreclosure and the change in credit card balance. As in the cure-from-delinquency analysis, we analyze card payment performance over the six quarters following the last mortgage interest payment.

For this purpose, we restrict the sample to individuals with at least one active credit card account and a total card balance of at least $100 as of their last mortgage interest payment date, dropping a small number of outlier individuals whose card balances exceed $250,000. Of the 292,577 individuals in our merged sample, we retain 210,272 after applying these criteria.[33]

We then exclude from this sample all households in bankruptcy proceedings as of the last mortgage interest payment date or who those that file for bankruptcy within the subsequent six quarters. We do not include delinquent cards that are in bankruptcy in our analysis because any reduction of the balance on those cards could be a result of bankruptcy discharge rather than a consequence of the borrower prioritizing card repayment. This restriction leaves 187,739 individuals in the analysis sample.

For 23,938 of these individuals, the reporting of card balance terminates during the six-quarter period without any indication that the balance is paid off or that the individuals have filed for bankruptcy; that is, the balance goes from positive to missing. Because the six-quarter balance change for these individuals is unknown, we drop them from the analysis. As a robustness check, however, we

[33] There are 231,753 individuals with a least one credit card, of whom 210,342 have card balances totaling at least $100 and 76 have balances exceeding $250,000.

also estimate the model with these individuals included, using their final reported balance to calculate their balance change. After this exclusion, the sample for the balance change analysis consists of 163,801 individuals.

Again, we apply an instrumental variables approach to explore the impact of foreclosure timelines on mortgage defaulters' ability to reduce their credit card balances, involving estimation of two linear regression equations via two-stage least squares.[34] In the first-stage model, we estimate an equation for loan-level foreclosure timelines, as described previously. The dependent variable for the second-stage model, denoted *Change_Balance*, is the change in the individual's total card balance between the last interest payment data and six quarters following that date:

$$Change\_Balance = [Card\ Balance_{(last\ interest\ payment\ date)} - Card\ Balance_{(last\ interest\ payment\ date\ +\ 6Q)}])$$

The dependent variable is winsorized at the 1st and 99th percentiles (-39,863 and 29,495) to mitigate potential impacts of extreme outliers. The second-stage regression equation then relates change in card balance to the instrumented foreclosure timeline and the previously specified control variables.

Summary statistics of the data are presented in panel B of Table 1. Comparing panels B and A reveals significant differences between the two samples in mean values for the credit quality measures *Lagged Equifax Risk Score* and *Dummy Card 60+ DPD 12 Months Prior.* Panel A's sample is distributed toward lower credit quality, which is a natural consequence of restricting the sample to individuals with at least one delinquent credit card. It also has a larger percentage of subprime mortgage borrowers and a small average mortgage origination amount. The two samples have similar composition with respect to other variables.

Empirical Results. Estimation results are presented in Table 3. The results again are divided into two parts, corresponding to the first- and second-stage regression equations, and four columns. Again, the first two columns correspond to model specifications with and without the time period dummy variables, estimated with all states combined, and the last two columns present results for the model (without period dummies) estimated separately for judicial and nonjudicial states.

The primary relationship of interest in Table 3 is the impact of an instrumented, individual foreclosure timeline on balance change in the second-stage equation. The coefficient of the instrumented timeline is negative and statistically significant in all four specifications, consistent with

[34] We use STATA's IVREGRESS estimator.

longer foreclosure timelines enabling borrowers to reduce their credit card debt more quickly.[35] Similar to the relationships observed in the cure-from-delinquency analysis, we find a steeper relationship between the length of the foreclosure period and the rate of balance reduction in nonjudicial compared with judicial states (Models 3 and 4 in Table 3).

The results in Table 3 also indicate that card balance reduction is positively associated with mortgage loan modification, suggesting that the reduction in mortgage payments accompanying a modification enables a borrower to pay down card balances. Younger borrowers (younger than 25 years old) and subprime borrowers are less able to reduce their card balances given the same foreclosure timelines as other borrowers.[36]

Whereas a higher county-level card delinquency rate exhibits an inverse relationship, a recent rise in the unemployment rate exhibits a positive relationship to balance change. This is consistent with conflicting effects of local economic trends — on one hand, a weaker local economy is associated with reduced household spending, whereas on the other hand, it may adversely impact an individual household's ability to pay down card debt. Finally, we note that the results reported in Table 3 are robust to again include individuals with unknown six-quarter balance change using their last reported balance to calculate their balance change.

Considered together, the results from Tables 2 and 3 are consistent with the notion that the liquidity benefit of a lengthened foreclosure timeline facilitates an improved credit position and balance sheet. Table 4 calculates the marginal effects of a longer foreclosure timeline, based on Models 1, 3, and 4 of Tables 2 and 3, on the probability of cure and on card balance.[37] The calculated marginal effects highlight the substantial impacts of expanding the timeline from a baseline of six months by successive six-month increments.

For instance, the probability of curing a delinquent card within six quarters, based on Model 1 of Table 2, increases by about 2.64 percentage points as the foreclosure timeline lengthens from six

[35] Consistent results are obtained when the continuous dependent variable for the stage-two equation is replaced by a binary variable Y indicating balance decrease after six quarters (Y = 1) or not (Y = 0); a longer instrumented timeline is associated with a greater likelihood of balance decline.

[36] Similar results are obtained using a one-stage ordinary least squares regression with a segment-average foreclosure timeline as the instrument for an individual timeline, with or without county-fixed effects added to the regression equation.

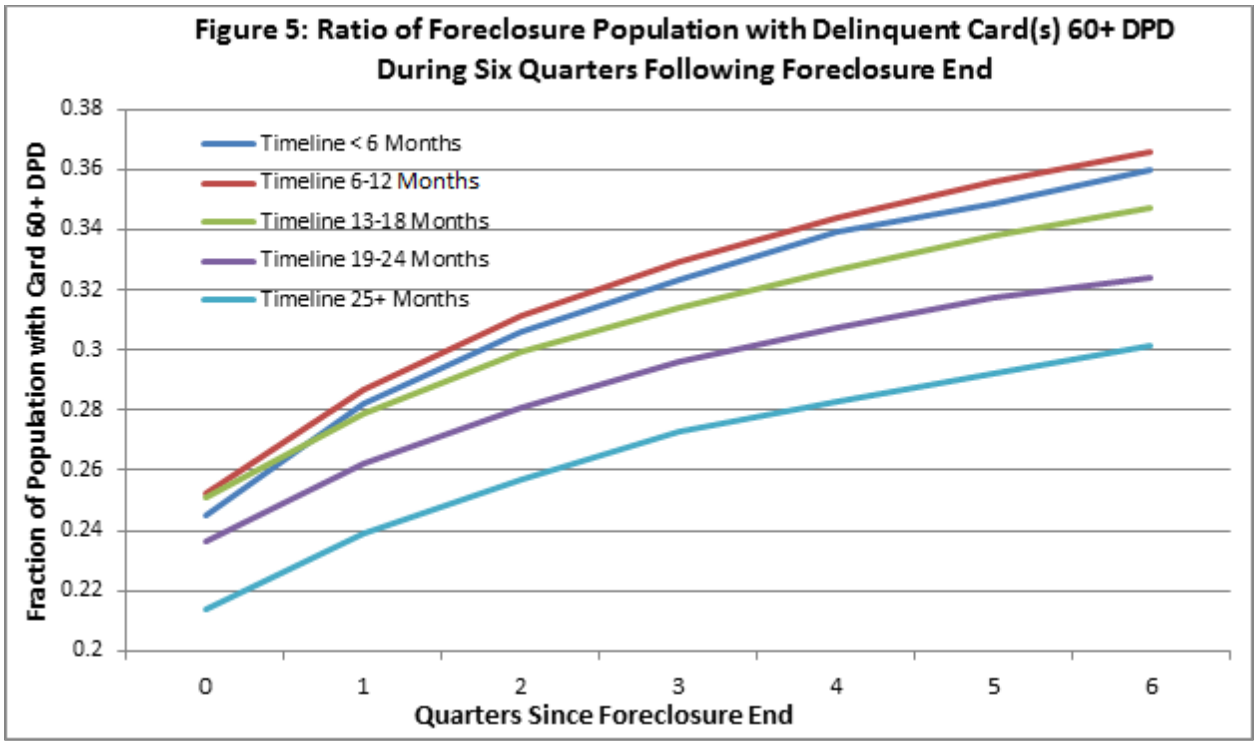
[37] We calculate marginal effects at representative values by applying our estimated models to all individuals replacing the instrumented timeline with 6, 12, 18, 24, 30, and 36 months and then averaging the estimated cure rates and balance changes across individuals. We then subtract the mean of estimated balance change or cure rate at six months from the mean for a longer timeline to show the change relative to the six-month baseline.

months to three years. The decline in average card balance, based on Model 1 of Table 3, is about $3,000 over the six quarters as the foreclosure timeline lengthens from six months to three years.

VI. What Happens After the Foreclosure Ends?

The finding of an association between the time in foreclosure and the likelihood of curing delinquent cards suggests that households in foreclosure tend to use their temporary mortgage payment relief to improve their credit card payment performance. Once the foreclosure process ends, this liquidity benefit can be expected to dissipate. We now explore the question of whether longer-lasting foreclosure periods have longer-lasting liquidity benefit, as reflected in reduced probability of card delinquency after the foreclosure ends.

Figure 5 tracks the percentage of individuals in our sample having at least one delinquent credit card (60 days or more past due) after exiting from foreclosure, quarterly for six quarters following the exit. The individuals are grouped by their foreclosure timeline range. The plot indicates that the likelihood of card delinquency subsequent to foreclosure end decreases with the length of time in foreclosure. Thus, individuals who had a longer time in foreclosure appear better positioned to remain current on their credit cards over the longer term, suggesting a persistent effect of obtaining financial relief during the foreclosure process.



Source: Authors' calculations using merged data from the Black Knight Financial Services McDash and FRBNY Consumer Credit Panel/Equifax databases (sample includes all foreclosed loans with foreclosure start dates in 2004:Q1 or later and with foreclosure end dates in 2013:Q2 or earlier)

To further investigate the ex-post credit card repayment performance of households that have been through a foreclosure process, we first restrict our sample to individuals for whom the foreclosure process ended by the second quarter of 2013 to allow six quarters of observed performance after the foreclosure ends. Of the 292,577 individuals in our merged sample, 276,295 meet this criterion.

We then restrict the sample to individuals who, as of the foreclosure end date, have at least one credit card and for whom no card is 60 days or more past due. After this restriction, 132,371 individuals remain in the sample. Finally, we exclude individuals in bankruptcy proceedings as of the foreclosure end date, leaving a sample of 123,610 individuals.

The same two-equation, instrumental variables approach used for the cure-from-delinquency analysis is used here. Specifically, we use the same first-stage linear regression model for loan-level foreclosure timelines along with a second-stage probit model for card delinquency six quarters beyond the foreclosure end date. These equations are jointly estimated via maximum likelihood.

We define the dependent variable of the stage-two regression to be a binary variable indicating whether the borrower is 60 days or more past due on at least one credit card six quarters after the foreclosure end date. It takes a value of 1 if the borrower is delinquent and 0 if otherwise.

We update three control variables used in the previous, two-stage regression equations to be measured as of the foreclosure end date: *County Rate Card 60+ DPD, Unemployment from -15 to -3 Months*, and *Number of Cards.* Otherwise, we include the various loan and borrower characteristics used previously with the same timing of measurement.[38]

We estimate two alternative specifications with this set of explanatory variables: without and with inclusion of the crisis and postcrisis period dummy variables. Also, we estimate the equation without period dummies, adding an indicator for foreclosures that end in cure or payoff. The latter (potentially endogenous) variable controls for the possibility that shorter foreclosure timelines may be associated with foreclosures that end in cure or payoff, which in turn may be associated with more favorable local economic conditions that also reduce the incidence of card delinquency.

Summary statistics of the data are presented in panel C of Table 1. Compared with panel B, panel C exhibits a larger mean age of the mortgage and shorter mean foreclosure timeline, reflecting the later date of observation (as of the date of foreclosure end) and the restriction to loans with completed foreclosures. Panel C also exhibits a larger mean value for *Lagged Equifax Risk Score*, likely reflecting the restriction of this sample to borrowers whose credit cards are all in current status as of the foreclosure end date. The two samples have a similar composition with respect to other variables.

Empirical Results. The results are presented in Table 5. The estimated coefficient of the instrumented foreclosure timeline is negative and statistically signficant in all three specfications. Thus, longer timelines, which are associated with a larger amount of financial relief, are associated with a greater ability to remain current on credit card debt after the foreclosure ends.

One caveat here is that a longer foreclosure timeline implies a longer interval between the financial stress event triggering the initial mortgage delinquency and the start of the performance observation period (as of foreclosure end), and this longer temporal gap may explain the better performance outcome following foreclosure end. Because we have restricted the sample to borrowers with no delinquent credit cards as of foreclosure end and we control for the borrower's credit score as of foreclosure end, we find this alternative explanation to be less compelling, although we cannot rule it out.

The estimated coefficients of the control variables are as expected. Borrowers with a larger number of credit cards and lower credit scores are more likely to become delinquent on at least one card after the foreclosure ends. Borrowers who previously had jumbo mortgages are more likely to

[38] We drop *Dummy Card 60+ DPD 12 Months Prior,* which is not relevant in the context of this population that consists entirely of individuals emerging from a period of financial stress.

become delinquent on a card subsequent to the end of the foreclosure, which mirrors the finding that jumbo mortgage borrowers were more likely to cure card delinquency while in foreclosure. Weaker local economic conditions as indicated by the county-level card delinquency rate as of the initial mortgage delinquency date are positively associated with the likelihood of card delinquency subsequent to foreclosure end.

Rising county-level unemployment in the year prior to the initial mortgage delinquency date is inversely associated with the likelihood of card delinquency subsequent to foreclosure end. An intuitive interpretation is that the restriction of the sample to individuals who are current on their credit card payments as of foreclosure end leads to a selection effect whereby households that had been subject to a local unemployment shock are more financially resilient.

From Models 1 and 2 of Table 5, borrowers whose mortgages were modified are less likely to become delinquent on their cards after the end of foreclosure. In Model 3, we observe an inverse relation between the foreclosure ending in cure or payoff and the likelihood of a household becoming delinquent after the end of foreclosure, consistent with both outcomes being expected as a result of improvement in a household's financial condition.

VII. Conclusions

Borrowers in default on their mortgages receive a temporary benefit from reduced housing expenses as they continue to live in their homes without making any mortgage or rental payments. With the foreclosure timeline lengthening in recent years, this benefit has been expanding. Do households use this temporary benefit to maintain consumption levels, or do they use the benefit to improve their balance sheets and improve their credit performance on nonmortgage debt? We have examined the impact of time in foreclosure on credit card repayment performance to address this question.

Our findings support the hypothesis that households in default on their mortgages take advantage of lower housing expenses to improve their balance sheets as foreclosure timelines expand. Longer foreclosure timelines are associated with an increased likelihood of cure of delinquent credit card debt and reduced card balances. Longer foreclosure timelines also have a longer-lasting benefit subsequent to the end of the foreclosure period, reflected in lower ex-post delinquency on credit card debt.

Thus, our findings indicate that households do not consume all the benefits from a temporary relief from housing expenses; instead, they use that temporary relief to cure delinquent credit card debt and reduce their credit card balances. Interestingly, we find that payment relief from loan modifications

has a similar impact to payment relief from longer foreclosure timelines: Both are associated with curing card delinquency and reducing card balances during the foreclosure process and reducing the likelihood of delinquency after the end of foreclosure.

Although the recent recession provides an ideal representation of a severe stress for credit performance on mortgage loans, it may be less ideally representative for credit card performance. Credit card default has not been as severe as mortgage defaults during the financial crisis, partly because of the savings to consumers from housing expense relief that has allowed them to improve their credit card debt performance. Conversely, improving credit card (or other nonmortgage consumer credit) performance during the postcrisis period may be slowed by the removal of the temporary liquidity benefits as foreclosures in process reach completion and the foreclosure backlog clears.

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Table 1: Summary Statistics of the Merged, Black Knight Financial Services McDash and FRBNY and FRB Philadelphia Consumer Credit Panel/Equifax Databases

Panel A: Summary Statistics of the Data Set Used for the Analysis of Curing of Delinquent Cards Following the Last Mortgage Interest Payment Date

Variable	N	Mean	Std. Dev.	Minimum	Maximum
Card Cured	55,650	0.08	0.27	0	1
Mortgage Origination Amount	55,650	207,029	149,079	12,181	5,704,000
Age of Mortgage	55,650	38.91	23.28	1	146
Foreclosure End Type: REO	55,650	0.53	0.50	0	1
Foreclosure End Type: Cured	55,650	0.26	0.44	0	1
Foreclosure End Type: Liquidation	55,650	0.11	0.32	0	1
Foreclosure End Type: Paid Off (including Short Sale)	55,650	0.05	0.22	0	1
County-Level Card Delinquency Rate	55,650	0.04	0.02	0	1
Unemployment 12-Month Change	55,650	0.53	2.03	-13.30	13.77
Foreclosure Timeline Number of Months	55,650	17.92	12.58	1	131
Lagged Equifax Risk Score	55,650	484.93	78.02	287	831
Number of Cards	55,650	3.09	2.26	0	29
Dummy Card 60+ DPD 12 Months Prior	55,650	0.46	0.50	0	1
Dummy Borrower Age ≤25	55,650	0.01	0.11	0	1
Dummy Jumbo Mortgage	55,650	0.08	0.27	0	1
Dummy Subprime Mortgage	55,650	0.25	0.44	0	1
Dummy Government-Insured Mortgage	55,650	0.02	0.16	0	1
Dummy Modification	55,650	0.38	0.48	0	1
Dummy Three Quarters Pre-BAPCPA	55,650	0.02	0.14	0	1
Dummy Post-BAPCPA	55,650	0.09	0.29	0	1
Dummy Crisis Period	55,650	0.40	0.49	0	1
Dummy Postcrisis	55,650	0.47	0.50	0	1

<u>Panel B</u>: Summary Statistics of the Data Used for Analysis of Card Balance Change Following Last Mortgage Interest Payment Date — Excludes Borrowers with Card Balances <$100 as of Last Mortgage Interest Payment

Variable	N	Mean	Std. Dev.	Minimum	Maximum
Card Balance as of Last Interest Payment	162,554	11,579.75	17,105	100	249,755
Card Balance as of Last Interest Payment +6Q	162,554	10,368.87	20,356.1	0	3,559,124
Mortgage Origination Amount	162,554	246,382.2	167,399	10,000	5,704,000
Age of Mortgage	162,554	38.80	23.83	1	145
Foreclosure End Type: REO	162,554	0.51	0.50	0	1
Foreclosure End Type: Cured	162,554	0.24	0.43	0	1
Foreclosure End Type: Liquidation	162,554	0.14	0.35	0	1
Foreclosure Type: Paid Off (including Short Sale)	162,554	0.06	0.24	0	1
County-Level Card Delinquency Rate	162,554	0.04	0.01	0	1
Unemployment 12-Month Change	162,554	0.63	2.10	-16.86	14.41
Foreclosure Timeline Number of Months	162,554	16.67	11.70	1	114
Lagged Equifax Risk Score	162,554	634.19	123.76	287	841
Number of Cards	162,554	3.30	2.23	1	29
Dummy Card 60+ DPD 12 Months Prior	162,554	0.12	0.32	0	1
Dummy Borrower Age ≤25	162,554	0.01	0.09	0	1
Dummy Jumbo Mortgage	162,554	0.11	0.32	0	1
Dummy Subprime Mortgage	162,554	0.17	0.38	0	1
Dummy Government Mortgage	162,554	0.02	0.14	0	1
Dummy Modification	162,554	0.37	0.48	0	1
Dummy Three Quarters Pre-BAPCPA	162,554	0.02	0.13	0	1
Dummy Post-BAPCPA	162,554	0.08	0.27	0	1
Dummy Crisis Period	162,554	0.42	0.49	0	1
Dummy Postcrisis	162,554	0.48	0.50	0	1

Panel C: Summary Statistics of the Data Set Used for Analysis of Probability of Becoming Delinquent on a Card After Foreclosure End

Variable	N	Mean	Std. Dev.	Minimum	Maximum
Dummy Delinquent on Card at Foreclosure End +6Q	122,553	0.12	0.32	0	1
Mortgage Origination Amount	122,553	252,643	166,403	10,000	4,875,000
Age of Mortgage as of Foreclosure End	122,553	54.47	25.26	5	157
Foreclosure End Type: REO	122,553	0.51	0.50	0	1
Foreclosure Type: Cured	122,553	0.23	0.42	0	1
Foreclosure Type: Liquidation	122,553	0.15	0.36	0	1
Foreclosure End Type: Paid Off (Including Short Sale)	122,553	0.07	0.25	0	1
County-Level Card Delinquency Rate	122,553	0.03	0.01	0	0.5
Unemployment 12-Month Change	122,553	0.04	1.79	-14.3	6.1
Foreclosure Timeline Number of Months	122,553	15.13	10.09	1	107
Lagged Equifax Risk Score	122,553	683.74	105.16	312	846
Number of Cards	122,553	2.78	2.02	1	29
Dummy Borrower Age ≤25	122,553	0.01	0.08	0	1
Dummy Jumbo Mortgage	122,553	0.11	0.32	0	1
Dummy Subprime Mortgage	122,553	0.15	0.36	0	1
Dummy Government-Insured Mortgage	122,553	0.02	0.12	0	1
Dummy Modification	122,553	0.37	0.48	0	1
Dummy 3 Quarters Pre-BAPCPA	122,553	0.02	0.14	0	1
Dummy Post-BAPCPA	122,553	0.08	0.27	0	1
Dummy Crisis	122,553	0.41	0.49	0	1
Dummy Postcrisis	122,553	0.48	0.50	0	1

Sources: Authors' calculations using merged data from the Black Knight Financial Services McDash and FRBNY Consumer Credit Panel/Equifax databases augmented with variables obtained by the Federal Reserve Bank of Philadelphia

Table 2: Probability of a Delinquent Card Curing Within Six Quarters Following Last Mortgage Payment Date

The dependent variable is the probability of curing a card delinquency — at least one card that is 60 days or more past due on at least one card as of the last mortgage interest payment date becomes current during the subsequent six quarters. The sample is limited to individuals with at least one delinquent credit card as of the last mortgage interest payment date. Models 1 and 2 are estimated on pooled geographies. Models 3 and 4 separate the sample into judicial and non-judicial states, respectively. Robust standard errors (clustered at the county level) are reported in parentheses below the coefficients. The ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

Independent Variables	Model 1: Entire Sample	Model 2: Entire Sample	Model 3: Judicial States Only	Model 4: Nonjudicial States Only
First Stage ***Dependent Variable: Time from Last Mortgage Interest Payment to Foreclosure End Date***				
County-Level Card Delinquency Rate	65.83***	61.95***	95.73***	54.51***
	(7.190)	(6.956)	(10.90)	(8.465)
Unemployment 12-Month Change	0.155***	0.0872***	0.391***	0.0510*
	(0.0299)	(0.0274)	(0.0597)	(0.0263)
Lagged Equifax Risk Score	-0.0128***	-0.0128***	-0.0127***	-0.0128***
	(0.000821)	(0.000809)	(0.00163)	(0.000909)
Number of Cards	0.0142	0.0121	-0.0275	0.0314
	(0.0253)	(0.0254)	(0.0414)	(0.0311)
Dummy Card 60+ DPD 12 Months Prior	-0.350***	-0.313***	-0.0822	-0.502***
	(0.112)	(0.111)	(0.215)	(0.125)
Dummy Borrower Age ≤25	-1.164***	-1.184***	-0.902	-1.441***
	(0.370)	(0.370)	(0.671)	(0.420)
Dummy Jumbo Mortgage	1.538***	1.594***	1.132*	1.484***
	(0.204)	(0.207)	(0.638)	(0.208)
Dummy Subprime Mortgage	1.813***	1.841***	1.945***	1.740***
	(0.124)	(0.124)	(0.224)	(0.148)
Dummy Government-Insured Mortgage	0.00152	0.00838	-0.0273	0.0114
	(0.300)	(0.300)	(0.556)	(0.339)
Dummy Modification	-1.429***	-1.484***	-2.693***	-0.670***
	(0.163)	(0.165)	(0.280)	(0.150)
Dummy Three Quarters Pre-BAPCPA		-1.775***		
		(0.559)		

Dummy Post-BAPCPA		-0.518 (0.477)		
Dummy Crisis Period		0.514 (0.459)		
Dummy Postcrisis		-0.110 (0.450)		
Segment-Level Average Timeline	0.721*** (0.0173)	0.721*** (0.0181)	0.616*** (0.0290)	0.724*** (0.0223)
Log (Mortgage Age in Months)	0.797*** (0.124)	0.807*** (0.127)	0.675*** (0.235)	1.031*** (0.120)
Log (Mortgage Origination Amount)	1.478*** (0.0990)	1.378*** (0.103)	1.772*** (0.206)	1.571*** (0.123)
Intercept	-12.36*** (1.315)	-11.12*** (1.450)	-13.50*** (2.596)	-14.25*** (1.726)
Second Stage ***Dependent Variable: Probability of Delinquent Card Being Cured Within Six Quarters Following Last Mortgage Interest Payment Date***				
Instrumented Individual Timeline	0.00598*** (0.00214)	0.00649*** (0.00248)	0.00766* (0.00432)	0.0157*** (0.00305)
County-Level Card Delinquency Rate	-1.972*** (0.585)	-2.005*** (0.603)	-1.618 (1.293)	-3.005*** (0.686)
Unemployment 12-Month Change	-0.0195*** (0.00436)	-0.0192*** (0.00480)	-0.0311*** (0.00784)	-0.0142*** (0.00515)
Lagged Equifax Risk Score	-0.000876*** (0.000133)	-0.000862*** (0.000134)	-0.00127*** (0.000179)	-0.000601*** (0.000175)
Number of Cards	0.0339*** (0.00365)	0.0338*** (0.00368)	0.0357*** (0.00612)	0.0308*** (0.00433)
Dummy Card 60+ DPD 12 Months Prior	-0.450*** (0.0187)	-0.449*** (0.0193)	-0.415*** (0.0334)	-0.461*** (0.0225)
Dummy Borrower Age ≤25	-0.00525 (0.0831)	-0.00888 (0.0829)	-0.0837 (0.133)	0.0859 (0.104)
Dummy Jumbo Mortgage	0.0954*** (0.0282)	0.0941*** (0.0292)	0.122* (0.0690)	0.0369 (0.0332)
Dummy Subprime Mortgage	-0.0763***	-0.0796***	-0.0549*	-0.0949***

	(0.0199)	(0.0203)	(0.0303)	(0.0268)
Dummy Government-Insured Mortgage	-0.0698 (0.0525)	-0.0689 (0.0523)	-0.184* (0.103)	-0.0000863 (0.0603)
Dummy Modification	0.0866*** (0.0157)	0.0888*** (0.0155)	0.137*** (0.0249)	0.0626*** (0.0188)
Dummy Post-BAPCPA		0.0110 (0.0502)		
Dummy Crisis Period		-0.0184 (0.0464)		
Dummy Postcrisis		-0.0233 (0.0494)		
Intercept	-0.974*** (0.0751)	-0.971*** (0.0855)	-0.887*** (0.108)	-1.162*** (0.104)
Number of Observations	55,650	55,650	20,312	35,313

Sources: Authors' calculations using merged data from the Black Knight Financial Services McDash and FRBNY Consumer Credit Panel/Equifax databases augmented with variables obtained by the Federal Reserve Bank of Philadelphia

Table 3: Change in Total Credit Card Balance over Six Quarters Months Following the Last Mortgage Interest Payment

The dependent variable is the change in combined credit card balance over the six quarters following the last mortgage interest payment date; see equations 1 and 2. The sample is limited to individuals with total card balances of at least $100. Models 1 and 2 are estimated on pooled geographies. Models 3 and 4 separate the sample into judicial and nonjudicial states, respectively. Robust standard errors (clustered at the county level) are reported in parentheses below the coefficients. The ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

Independent Variables	Model 1: Entire Sample	Model 2: Entire Sample	Model 3: Judicial States Only	Model 4: Nonjudicial States Only
First Stage				
Dependent Variable: Time from Last Mortgage Interest Payment to Foreclosure End Date				
County-Level Card Delinquency Rate	82.07***	75.48***	116.4***	70.41***
	(6.422)	(6.038)	(10.13)	(7.748)
Unemployment 12-Month Change	0.166***	0.0762***	0.385***	0.0914***
	(0.0268)	(0.0185)	(0.0519)	(0.0195)
Lagged Equifax Risk Score	-0.00480***	-0.00465***	-0.00450***	-0.00492***
	(0.000291)	(0.000292)	(0.000586)	(0.000325)
Number of Cards	0.0678***	0.0619***	0.0711***	0.0664***
	(0.0117)	(0.0116)	(0.0237)	(0.0128)
Dummy Card 60+ DPD 12 Months Prior	-0.675***	-0.615***	-0.483***	-0.761***
	(0.0964)	(0.0955)	(0.184)	(0.109)
Dummy Borrower Age ≤25	-0.0645	-0.129	0.0874	-0.149
	(0.279)	(0.280)	(0.609)	(0.264)
Dummy Jumbo Mortgage	0.847***	0.958***	0.391	0.838***
	(0.120)	(0.120)	(0.394)	(0.109)
Dummy Subprime Mortgage	1.709***	1.799***	1.806***	1.648***
	(0.0983)	(0.0946)	(0.174)	(0.117)
Dummy Government-Insured Mortgage	-0.0883	-0.134	0.0274	-0.168
	(0.203)	(0.201)	(0.375)	(0.230)
Dummy Modification	-1.291***	-1.366***	-2.604***	-0.643***
	(0.148)	(0.149)	(0.290)	(0.104)
Dummy Three Quarters Pre-BAPCPA		-1.614***		
		(0.367)		

Dummy Post-BAPCPA		-0.386 (0.354)		
Dummy Crisis Period		1.535*** (0.360)		
Dummy Postcrisis		0.830** (0.339)		
Segment-Level Average Timeline	0.700*** (0.0167)	0.696*** (0.0174)	0.587*** (0.0308)	0.718*** (0.0163)
Log (Mortgage Age in Months)	0.575*** (0.0869)	0.455*** (0.0756)	0.102 (0.143)	0.910*** (0.0752)
Log (Mortgage Origination Amount)	1.720*** (0.0795)	1.523*** (0.0820)	1.834*** (0.178)	1.830*** (0.0898)
Intercept	-19.54*** (0.999)	-17.38*** (1.103)	-17.31*** (2.022)	-22.12*** (1.142)
Adjusted R-Square	16.6%	16.9%	12.5%	11.7%
Second Stage ***Dependent Variable: Card Balance Change over Six Quarters Following Last Interest Payment Date***				
Instrumented Individual Timeline	-100.9*** (16.78)	-32.90*** (12.22)	-92.74*** (17.22)	-268.9*** (17.77)
County-Level Card Delinquency Rate	20694.1*** (2752.3)	7068.6*** (2148.9)	24461.6*** (5045.9)	31807.4*** (4235.2)
Unemployment 12-Month Change	-74.75*** (12.06)	-192.2*** (15.69)	-73.44*** (24.11)	-67.98*** (12.60)
Lagged Equifax Risk Score	16.88*** (0.335)	17.38*** (0.362)	16.52*** (0.454)	16.98*** (0.454)
Number of Cards	-562.4*** (22.42)	-596.6*** (21.94)	-588.6*** (34.99)	-544.0*** (28.39)
Dummy Card 60+ DPD 12 Months Prior	-699.0*** (74.73)	-544.7*** (69.34)	-458.6*** (93.84)	-906.7*** (96.67)
Dummy Borrower Age ≤25	1601.7*** (109.3)	1286.2*** (107.2)	1530.5*** (158.9)	1254.4*** (161.1)
Dummy Jumbo Mortgage	-357.5*** (138.1)	-627.0*** (124.7)	-1000.2*** (272.6)	414.8*** (142.5)

Dummy Subprime Mortgage	1832.2*** (56.11)	1559.2*** (51.85)	1701.3*** (82.36)	1908.7*** (72.64)
Dummy Government-Insured Mortgage	217.0* (117.8)	383.5*** (114.6)	-80.77 (204.7)	301.2* (154.6)
Dummy Modification	-242.7*** (49.09)	-96.08** (46.69)	-326.1*** (83.93)	-230.9*** (72.24)
Dummy Post-BAPCPA		1280.0*** (167.9)		
Dummy Crisis Period		606.3*** (148.9)		
Dummy Postcrisis		-912.8*** (139.9)		
Intercept	-9359.9*** (287.1)	-10038.5*** (289.2)	-8807.8*** (359.5)	-7739.3*** (318.4)
Number of Observations Adjusted R-Square	162,554 6.6%	162,554 8.7%	52,025 6.4%	110,450 0.6%

Sources: Authors' calculations using merged data from the Black Knight Financial Services McDash and FRBNY Consumer Credit Panel/Equifax databases augmented with variables obtained by the Federal Reserve Bank of Philadelphia

Table 4: Foreclosure Timeline Marginal Impacts

The numbers below are marginal effects calculated from the coefficients of instrumented individual timeline estimated in Stage 2 of the regression, as presented in Table 2, column 1 (for *Card Cured*) and in Table 3, column 1 (for *Card Balance Decreased*). These numbers summarize the relationship between the foreclosure timeline and likelihood of curing a delinquent card and the relationship between the foreclosure timeline and the amount of card balance change.

	Foreclosure Timeline (in Months)					
	6	12	18	24	30	36
All States: Probability of a Delinquent Card Being Cured Within Six Quarters After Last Mortgage Interest Payment Date	0	0.0048	0.0098	0.0151	0.0206	0.0264
All States: $ Difference in Card Balance Change Between Last Mortgage Interest Payment and Six Quarters Later	0	-605.3	-1210.5	-1815.8	-2421.0	-3026.3
Judicial States Only: Probability of a Delinquent Card Being Cured Within Six Quarters After Last Mortgage Interest Payment Date in Judicial States	0	0.0058	0.0120	0.0186	0.0256	0.0331
Judicial States Only: $ Difference in Card Balance Change Between Last Mortgage Interest Payment and Six Quarters Later In Judicial States	0	-556.4	-1112.9	-1669.4	-2225.8	-2782.3
Nonjudicial States Only: Probability of a Delinquent Card Being Cured Within Six Quarters After Last Mortgage Interest Payment Date in Nonjudicial States	0	0.0121	0.0257	0.0412	0.0586	0.0783
Nonjudicial States Only: $ Difference in Card Balance Change Between Last Mortgage Interest Payment and Six Quarters Later in Nonjudicial States	0	-1613.1	-3226.2	-4839.3	-6452.4	-8065.5

Sources: Authors' calculations using merged data from the Black Knight Financial Services McDash and FRBNY Consumer Credit Panel/Equifax databases augmented with variables obtained by the Federal Reserve Bank of Philadelphia

Table 5: The Probability of Becoming Delinquent on a Card After Foreclosure Ends

The dependent variable is a binary indicator distinguishing individuals (initially current on all their cards) who became 60 days or more past due on at least one credit card six quarters following the foreclosure end date. The sample is limited to individuals with at least one credit card and all of their credit cards current as of the foreclosure end date. Robust standard errors (clustered at the county level) are reported in parentheses below the coefficients. The ***, **, and * represent statistical significance at the 1%, 5%, and 10% levels, respectively.

Independent Variables	Probability of at Least 1 Delinquent Card as of Foreclosure End +6Q		
	Model 1	Model 2	Model 3
First Stage ***Dependent Variable: Time from Last Mortgage Interest Payment to Foreclosure End Date***			
County-Level Card Delinquency Rate	-21.61*** (4.869)	-69.57*** (7.267)	-31.46*** (4.967)
Unemployment 12-Month Change	0.433*** (0.0474)	1.090*** (0.0839)	0.487*** (0.0525)
Lagged Equifax Risk Score	-0.00643*** (0.000316)	-0.00771*** (0.000365)	-0.00702*** (0.000345)
Number of Cards as of Foreclosure End Date	-0.171*** (0.0134)	-0.177*** (0.0146)	-0.142*** (0.0125)
Dummy Borrower Age ≤25	2.662*** (0.331)	2.321*** (0.306)	2.280*** (0.303)
Dummy Jumbo Mortgage	0.0730 (0.133)	-0.816*** (0.153)	0.132 (0.127)
Dummy Subprime Mortgage	1.865*** (0.101)	1.712*** (0.0893)	2.237*** (0.101)
Dummy Government-Insured Mortgage	-0.0762 (0.206)	0.658*** (0.198)	-0.433** (0.205)
Dummy Modification	-1.461*** (0.120)	-1.417*** (0.108)	-0.861*** (0.0963)
Dummy 3 Quarters Pre-BAPCPA		-1.905*** (0.420)	

Dummy Post-BAPCPA		-0.239 (0.448)	
Dummy Crisis Period		0.431 (0.465)	
Dummy Postcrisis		-6.650*** (0.462)	
Dummy Foreclosure Ended in Cure			-4.141*** (0.242)
Segment-Level Average Timeline	0.366*** (0.0248)	0.391*** (0.0240)	0.410*** (0.0251)
Log (Mortgage Age in Months)	5.116*** (0.151)	6.765*** (0.222)	5.155*** (0.157)
Log (Mortgage Origination Amount)	2.478*** (0.129)	2.961*** (0.140)	2.392*** (0.136)
Intercept	-35.93*** (1.732)	-43.13*** (2.086)	-34.24*** (1.724)
Second Stage ***Dependent Variable: Indicator for 60 or More Days Past Due on at Least One Card as of Six Quarters After Foreclosure End***			
Instrumented Individual Timeline	-0.0268*** (0.00152)	-0.0229*** (0.00138)	-0.0247*** (0.00151)
% People with Card 60+ DPD in County as of Foreclosure End Date	2.920*** (0.575)	1.355** (0.621)	2.565*** (0.573)
Unemployment 12-Month Change	-0.0451*** (0.00460)	-0.0220*** (0.00478)	-0.0432*** (0.00465)
Lagged Equifax Risk Score	-0.00400*** (0.0000576)	-0.00405*** (0.0000589)	-0.00407*** (0.0000596)
Number of Cards as of Foreclosure End Date	0.0742*** (0.00258)	0.0757*** (0.00266)	0.0765*** (0.00251)
Dummy Borrower Age ≤25	0.0498 (0.0487)	0.0208 (0.0487)	0.0306 (0.0491)

Dummy Jumbo Mortgage	0.170*** (0.0177)	0.143*** (0.0172)	0.163*** (0.0175)
Dummy Subprime Mortgage	-0.00559 (0.0138)	-0.0150 (0.0143)	0.00845 (0.0138)
Dummy Government-Insured Mortgage	-0.114*** (0.0350)	-0.0942*** (0.0356)	-0.129*** (0.0353)
Dummy Modification	-0.0219** (0.00935)	-0.0182** (0.00912)	0.0104 (0.00964)
Dummy Post-BAPCPA		0.228*** (0.0391)	
Dummy Crisis Period		0.262*** (0.0394)	
Dummy Postcrisis		0.0235 (0.0362)	
Dummy Foreclosure Ended in Cure or Payoff			-0.205*** (0.0136)
Intercept	1.543*** (0.0563)	1.413*** (0.0698)	1.599*** (0.0571)
Observations (N)	122,552	122,552	122,552

Sources: Authors' calculations using merged data from the Black Knight Financial Services McDash and FRBNY Consumer Credit Panel/Equifax databases augmented with variables obtained by the Federal Reserve Bank of Philadelphia