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Determinants of Missed Payments and Foreclosure Initiation Among Homeowners who File for Bankruptcy

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Homeowners have long sought debt relief in the federal bankruptcy courts, but they take different paths to reach that point. For some, home mortgage problems are a precipitating "last straw," with borrowers filing bankruptcy petitions to literally stop foreclosure sales in their tracks. Other homeowners go bankrupt without ever having missed a single mortgage payment. In-between, there are homeowners who have stumbled and missed mortgage payments, but managed to cure notwithstanding their serious financial problems. Still others have failed to cure but have not yet ended up in foreclosure by the time they file for bankruptcy.

Despite the obvious potential for mortgage debt to play a part in the financial duress homeowners may find themselves in, their coping strategies for dealing with unmanageable debt loads and their decisions about what chapter of the bankruptcy code to file under, the role of mortgage debt in financial distress and bankruptcy has been surprisingly little studied. In addition, although there is a rapidly growing body of literature on the determinants of mortgage delinquencies, researchers still do not fully understand how borrowers and lenders behave when delinquencies do occur and how this behavior affects the possibility of reinstatement and cure (Quercia and Cowan 2008, p. 464; Cutts and Green 2005). Nor do most of the studies that have been done have access to the demographic characteristics and attitudes of borrowers. Many loans that become delinquent do not result in foreclosure, and researchers and policymakers often assert that lenders are best served by preserving homeownership if homeownership is potentially sustainable because the costs associated with foreclosing are typically quite high (Quercia and Cowan 2008). Theory would therefore suggest that lenders will seek workouts if the expected net present value of facilitating them is greater than pursuing foreclosures after accounting for the probability workouts will succeed. The recent foreclosure crisis, however, has highlighted structural barriers and agency problems that can prevent servicers from making adequate efforts to contact borrowers and offer workouts, including incentive problems, uncertainty about the probability workouts will succeed, and potential constraints on servicers created by securitization and the legal contracts that govern it.

This paper examines the determinants of missed payments and foreclosure initiations among mortgage borrowers who have filed for bankruptcy using a unique dataset based on court records, a survey, and phone interviews of a randomly selected group of filers. It contributes not only to the understanding of circumstances leading up to bankruptcy, but to the understanding of how financial distress intersects with home mortgage problems more generally and their

propensity to be cured. The data we analyze are from the 2007 Consumer Bankruptcy Project, a national study of families who filed for bankruptcy in the first four months of 2007.

Remarkably, even though the financial stresses on sampled homeowners were great enough for them to decide to incur the costs of filing for bankruptcy, roughly half of them had not missed any mortgage payments within the two years prior to bankruptcy. These filers, at least, did not appear to be using bankruptcy for its specific mortgagor protection features, although leveraged homeownership may have contributed to their financial troubles in indirect ways. The other roughly half missed at least one payment, and the average number of payments missed was four in the two years leading up to their filing. This raises the obvious question of why some homeowners faced with severe financial problems opt to continue to make mortgage payments while others do not. To explore this question, a model is presented here that evaluates the determinants of a borrower missing at least one mortgage payment and a model that evaluates the determinants of missing four or more payments ("severe" delinquencies)[1] among those who missed a payment. Missed payments are modeled as a function of demographic, income-related, mortgage-related, bankruptcy-related, and access-to-credit related variables, which we include both as proxies for credit score as well as indicators of reliance on and use of various types of consumer credit. In addition to finding some expected associations -- such as between missing any mortgage payments and losing income, filing a chapter 13 bankruptcy, and using a mortgage broker -- we also find that those who relied heavily on credit card debt were more likely to have remained current on their mortgages. In terms of missing multiple mortgage payments, the strongest determinant is being self-employed. In addition, having a college education and having credit-card-related reasons for bankruptcy, the only significant credit access variable, are also associated with fewer missed mortgage payments.

To explore the question of how borrowers that miss mortgage payments are treated by their servicers, a model is presented that explores the determinants of the probability that a borrower who misses mortgage payments will have a legal foreclosure action initiated against them. For these models, we add in information on the type of foreclosure law in the states in which borrowers resided. About half of borrowers who missed at least one payment reported that lenders actually initiated legal foreclosure proceedings. Not surprisingly, the number of missed

[1] The industry regards 90+day delinquencies as "serious." For reasons of sample size, 120+ day delinquency is examined here, and labeled "severe."

payments was the most significant factor in foreclosure initiation, but it was not the only strong determinant. But uncertain timing of missed payments relative to the initiation of foreclosure proceedings in the dataset (the interviews did not include a question about how many payments were missed before a foreclosure proceedings was filed versus after it was filed) leads to potential endogeneity between the number of missed payments and likelihood of the lender to initiate foreclosure (i.e. the potential motivation for borrowers to go on missing additional payments once a foreclosure has been initiated). Two different methods are used to control for this endogeneity. While the models produce slightly different sets of significant covariates, they lead to similar findings: that a borrower's credit history, age, and state foreclosure processes are significantly associated with lender decisions to initiate foreclosure, as is a borrower's history of having mortgage payment burdens and having a gap in income. There were also findings that were not shared by both models, such as the significance of having children in reducing the odds of foreclosure initiation and self-associating as a minority in increasing probability, each of which were only significant in one model but not another.

Citing a mortgage payment burden as a reason for filing bankruptcy is a statistically significant determinant of a foreclosure action in both models. This suggests that the people do not report mortgage problems as being a reason for filing unless they are severe enough to justify foreclosure actions, internally validating this measure. In addition, the significant association between lender initiation of foreclosure and state foreclosure law, specifically the timeline of the foreclosure process, suggest that state laws directly impact the way lenders treat delinquent borrowers.

These findings of a significant association with credit health and access and the likelihood borrowers will end up in foreclosure are consistent with the view that credit health measures are key drivers in decisions about how to treat delinquent accounts. Another interpretation of these credit-related results is that access to mainstream debt options such as credit cards enables homeowners to become current again on their mortgage payments even though these credit products compound financial problems in other ways, due in part to their high cost. To the extent that this is the proper interpretation, in a credit constricted environment we might expect to see a greater proportion of the homeowners in bankruptcy with severe mortgage problems even though bankruptcy law currently offers relatively few tools to relieve these problems for filers seeking to retain their homes.

Previous Studies of Mortgage Delinquencies, Foreclosures, and Bankruptcy

The literature relevant to the topics discussed in this paper roughly divides into the literature on: (1) the factors that influence the decision to file for bankruptcy and how homeowners that file differ from those that do not; (2) the factors that influence the decision to miss mortgage payments; and (3) that factors that influence the actions that mortgage servicers take in response to borrower defaults. Several prior studies examine the differences between homeowners that do and do not file for bankruptcy (Lown, 2008; Moorman and Garansky, 2008; Thorne, Warren, and Sullivan, 2008). As summarized by Moorman and Garansky (2008), these studies have found positive correlations between the odds of filing and being a female, minority, or single parent, and having children, a higher level of education, low income, a failed business, and health problems. Likelihood of filing for bankruptcy has been found to decrease with full-time employment and homeownership. Although the likelihood of bankruptcy also is thought to decrease with age, Thorne, et al. (2008) found Americans aged 55 and older had the sharpest increases in bankruptcy filings from 1991 to 2007.

Several recent studies have explored the experience of homeowners in bankruptcy (Carroll and Li, 2008; Porter, 2008; Jacoby, 2007; Bahchieva et al. 2005; Long, 2005; White and Zhu, 2008, and Levitin and Goodman, 2008). Many of these studies underscore the continued hardship homeowners face after filing for bankruptcy. In their study of Delaware bankruptcy filings, Carroll and Li (2008) find that nearly a third of homeowners who file for bankruptcy still end up losing their homes to foreclosure, while Long (2005) finds that filing bankruptcy actually increases homeowners' likelihood of losing their home by 28 percent largely due to lost access to credit, particularly for mortgage loans, after filing. Carroll and Li do find, however, that bankruptcy filing delays loss of a home due to foreclosure by approximately one year. They also find that the likelihood of losing the home is determined by bankruptcy trigger events such as unemployment, household financial situation, the quality of one's legal representation, and a year or more of mortgage delinquency. They also estimate that losses faced by servicers are approximately 30 percent of outstanding balances in foreclosure. Porter (2008) finds that mortgage servicers frequently do not comply with bankruptcy law in Chapter 13 cases in ways that decrease families' ability to save their homes. White and Zhu (2008) find that even after changes to bankruptcy laws in 2005, nearly all Chapter 13 filers do so wishing to save their homes. Additionally, they find that the current home-saving regime in Chapter 13 has little

impact on saving one's home, but that stripping down mortgage debt to the home's current market value, as some lawmakers have proposed, would help many debtors avoid loss of their homes. Levitin and Goodman (2008) study market sensitivity to mortgage modification risk using foreclosure sale and consumer bankruptcy data, and suggest that modification of mortgages to strip mortgage debt to current home value would have little or no impact on mortgage markets, in part because only a small percentage (less than 1 percent) of mortgages end up in bankruptcy.

Within our subset of bankrupt homeowners, this study examines the borrower decision to default on mortgages. In the general literature on mortgage defaults not limited to bankruptcy, negative net home equity has long been considered a major factor in the decision to default (Jacoby, 2007; Jacoby, 2008; Avery et al., 1996; Bahchieva et al., 2005; LaCour-Little, 2004; Springer and Waller, 1993; Stegman, 2007). But equity levels do not fully explain the decision and only a small fraction of those in negative net equity situations default. Even in an extreme case like Boston the early 1990s, less than 10 percent of those with negative net equity defaulted (Gerardi et al. 2007). Cohen-Cole et al. (2009) suggest that availability of consumer credit has a great deal of influence along with house price change and its influence on home equity, showing that cash-strapped homeowners with falling home values chose mortgage default over credit card default to protect their access to liquidity to cover everyday living expenses. This supports similar findings from Gerardi et al (2007) that the combination of house price appreciation, expectations of future house price appreciation, household income, and wealth drives the likelihood of mortgage default and foreclosure. Additional studies have show that trigger events (such as job loss, health problems, death, and divorce or other family breakup) that may impact household incomes permanently or for an extended period of time also play a strong role (Cutts 2006; Clauretie, 1989; Elmer and Seelig, 1998). Other studies, however, find a less clear relationship between trigger events and default (Capozza and Thompson, 2006; Quercia and Stegman, 1992). However, Ambrose and Capone (1998) suggest that some of the lack of clarity is because there may be two types of defaulters: trigger-event defaulters who default for reasons beyond their control, and 'ruthless defaulters' who optimize their own behavior, and that servicers in dealing with default would be well suited to treat these types of borrower differently (Jacoby, 2007).

On the cost side of the equation, several studies have looked at the impact of state foreclosure laws (Clauretie, 1989; Clauretie and Herzog 1990; Pence, 2003; Cutts and Merrill,

2008). These studies generally compare judicial foreclosures and power of sale foreclosures. Judicial foreclosures take longer and involve higher costs than power-of-sale foreclosures, which do not involve the pursuit of a lawsuit; Cutts and Merrill (2008) also look more closely at foreclosure timelines, independent of court involvement, and compare the actual minimum number of days needed to complete a foreclosure according to each state's laws.

Analyses of cure rates relate to our study because past cure rates and past associations to cure rates inform lenders' and servicers' decisions on the circumstances under which they should initiate foreclosure and how quickly. Cutts and Merrill (2008) study cure rates and other outcomes of delinquent mortgages in Freddie Mac's portfolio. They consider the potential influence of several factors including trigger events (loss of income is more detrimental to cure rates than extreme debt obligations), length of foreclosure timelines (some may be too long while others too short), servicer-borrower communication (more than half of those who lost their homes to foreclosure never had a discussion with their servicers), loan modifications (the fail rate of modified loans was much lower than that of unmodified loans), length of repayment plans (repayment plans of 3 months or less were most successful), post-delinquency counseling (counseling increased workout success rates by 6.3 percentage points) and extent of delinquency upon beginning a repayment plan (loans beginning repayment plans 90 days delinquent had significantly higher failure rates than those beginning 30 days delinquent). Additional studies of loan cure rates include Pennington-Cross (2006), which supports the findings from Cutts & Merrill that loans delinquent for longer periods of time were more likely to fail than those delinquent for shorter periods when they entered a repayment plan. Alternatively, Ding et al. (2007) found that longer periods of delinquency led to a lower likelihood of a loan being terminated through foreclosure. Concluding that loan modifications were successful, albeit costly, tools for curing mortgages, Cutts and Merrill argued that lawmakers should consider reducing the barriers that make these modifications so costly and complicated. On the other hand, Adelino, Gerardi and Willen (2009) argue that true costs of a modification cannot easily be determined beforehand since some delinquent loans may self-cure without modification and some modified loans may default anyway—effectively just postponing the foreclosure and extending the losses to the investor, especially in a time of falling house values—and lenders and servicers may have significantly different views or estimates of the true costs of foreclosures.

Several studies have focused on the potential impact of race and ethnicity on cure rates and foreclosures. In most cases, being a minority is found to have a detrimental effect on cure rates, but the inability to adequately control for other factors has limited the conclusiveness of the findings. Quercia and Cowan (2008) found that black homeowners who were delinquent on their mortgages were 40 percent less likely to avoid foreclosure than white homeowners, but the authors note that they lacked controls for interest rates and home equity, which other studies (Ambrose and Capone, 1998; Lauria, Baxter and Bordelon, 2004) had shown to be correlated with minority status.[2] Additionally, other papers (Black, 1977; Clair, 1988; Horne, 1997; Yezer, Phillips and Trost, 1994; Black et al., 1997; Lawrence, 1997; Bostic and Canner, 1997; Black et al., 2001) have suggested that minority status may proxy for differences in neighborhood characteristics such as house price trends that impact lender behavior and are correlated to minority status. Our inability to control for some financial, employment, and neighborhood characteristics in our models that studies such as Munnell et al. (1992) have shown to reduce, though not always eliminate, disparities in outcomes between distressed black and white homeowners leaves the interpretation of minority coefficients ambiguous. Additionally, the relatively small sample size limits the ability to test certain characteristics of race and ethnicity. After eliminating records with missing data, our final sample has only 66 respondents who self-identified as minorities in the initial questionnaire—52 of whom identified themselves as black. We concluded that it was necessary to look at all 66 respondents as a group to retain as many observations as possible, recognizing that this approach is far from ideal.

Dataset

The 2007 Consumer Bankruptcy Project is a national random sample of people who filed for chapter 7 or chapter 13 bankruptcy petitions in February through April of 2007. Lawless et al. (2008) lay out the methods of data collection in depth. The CBP draws on three sources of information: a written questionnaire that all respondents completed, bankruptcy court records submitted by the filers under penalty of perjury, and telephone interviews for a subset of respondents. The population for our study is comprised of the individuals who completed the

[2] Unfortunately, the quality and sufficiency of the interest rates and home equity data in our data prevent us from including these variables in our model.

housing telephone interview between September 2007 and February 2008. Table 1 provides descriptive statistics for this subsample that are used as variables in our analysis.[3]

The dataset does not include certain financial information that would be available to servicers when deciding how to handle a delinquent account. Examples include detailed loan payment and delinquency histories, current loan balances, loan-to-value ratios, and borrower credit scores. Furthermore, there are some limitations in the financial information that we do find in the dataset. First, there is a great deal of missing data on home values, loan values, and income levels that, again, a loan servicer would have when dealing with delinquent accounts. Second, we don't have precise information about the timing of the mortgage delinquency and possible foreclosure relative to the bankruptcy. For example, although we know how many mortgage payments respondents missed in the two years leading up to a bankruptcy, we can't determine how many payments were missed before that period or when payments were missed relative to when a foreclosure was filed, or if foreclosure was threatened or completed more than two years before the bankruptcy filing.

Our analysis has some additional important limitations to note. First, our focus here is on borrowers who ultimately file for bankruptcy and our sample is exclusively of bankruptcy filers. Although they are a cross section of American households, they are not directly representative of the general population or of financially distressed homeowners more broadly. For instance, compared to the general population they were disproportionately more likely to have missed mortgage payments in the past. Therefore, we do not generalize from these respondents and their mortgage servicers to the broader universe of financially distressed borrowers and their servicers. Second, we lack precise information on loan payments and other variables found in the literature which uses servicing data (Canner and Luckett, 1990; Livingstone and Lunt, 1992; Moorman and Garansky, 2008; Carroll and Li, 2008). This includes critical factors that may affect the likelihood of cure, such as a direct measure of contemporaneous credit scores, as well as other critical missing elements such as the loan amount at the time of the bankruptcy filing, the loan-to-value ratio at the time of serious delinquency or foreclosure filing, and the debt-to-income ratios at the time of loan origination. Although data were collected on some of these variables, the number of missing values of them

[3] Appendix tables A-1 and A-2 provide additional descriptive statistics about the housing telephone interview subsample relative to homeowners in the written questionnaire sample, as well as to U.S. homeowners in general according to the American Housing Survey.

in our sub-sample was too great and the bias too systematic between the cases in our sub-sample with and without these missing variables to include them in our models.[4] Third, although many commentators focus on the importance of contact between borrowers and lenders to the propensity to cure defaults (Brinkman, 2008; HOPI, 2006), we had a very high level of borrower-lender contact in our sample—nearly all did have contact. Lastly, we lack information about the timing of missed payments relative to foreclosure initiation, whether missed payments were consecutive or intermittent, or, for some of the respondents, when they occurred relative to completed foreclosure, short sale, or transfer of a deed-in-lieu of foreclosure.

What the survey does have is a wealth of demographic and socioeconomic data typically not available in studies that rely on servicer databases, such as age, education, race/ethnicity, family history, and family type. The dataset also includes several variables with information on respondents' other debts, forms of borrowing, specific triggers of financial problems, stated reasons for delinquency, whether or not the borrower had been in contact with the servicer after being delinquent, and feelings on the treatment they have received from their servicer. With these variables, we create additional proxy variables to approximate measures potentially used by servicers in evaluating delinquent loans, such as borrower credit history and credit score. An example of such a proxy is our variable 'bad access to credit.' This is a simple binary variable we create to identify those who were either recently unable to refinance their homes or who had taken out a car-title or payday loan. Both of these circumstances could be signs of impaired or limited access to mainstream credit options potentially resulting from or contributing to a low credit score. Therefore, we consider this variable not just as a proxy for bad access to credit, but as a proxy for having a low credit score.

[4] We did try running models using these variables to see if we could extract any usable information about them despite the large number of missing values and systematic bias in missing values. Results are volatile, but suggest that having a high original mortgage payment to income ratio has a positive impact on the number of missed payments, and low loan levels at bankruptcy have a negative impact. See Appendix A for further discussion.

Table 1: Characteristics of Homeowners in the Bankruptcy Survey

Dummy Variables	Number in Universe	Number in Category	Share in Category
Race/Ethnicity - Minority [not non-Hispanic white]	639	157	0.25
Family Type – Married	658	345	0.52
Family Type – Children in household	654	285	0.44
Age of Bankruptcy Filer - Age 35 and under	622	117	0.19
Age of Bankruptcy Filer - Age 36 to 55	622	363	0.58
Age of Bankruptcy Filer - Over age 55	622	142	0.23
Education - High school graduate or less	639	205	0.32
Education - Some college	639	309	0.48
Education - College graduate or higher	639	125	0.20
Employment – Household head was self employed	614	124	0.20
Income - Head or spouse experienced a gap	652	360	0.55
Income - Household experienced a drop	655	304	0.46
Home was a mobile home	658	131	0.20
First time homebuyer	656	357	0.54
Mortgage Loan - Used a mortgage broker for original loan	550	182	0.33
Mortgage Loan - Original loan was an adjustable rate mortgage	556	140	0.25
Filed Chapter 13 bankruptcy	658	272	0.41
State foreclosure process timeline[5] in quickest 33% of states	658	207	0.31
State foreclosure process timeline in slowest 33% of states	658	238	0.36
Filed bankruptcy because of burden of mortgage payments	658	148	0.22
Filed bankruptcy because of constant debt collectors calls	658	288	0.44
Filed bankruptcy because of medical reasons	658	309	0.47
Coped with bills by borrowing from family/charity	658	436	0.66
Coped with bills by relying heavily on credit cards	658	429	0.65
Had bad access to mainstream credit[6]	658	287	0.44
Missed a mortgage payment in the 2 years prior to bankruptcy	575	312	0.54
Missed 4 or more mortgage payments in 2 years prior to bankruptcy[7]	283	149	0.53
Lender initiated the foreclosure process	570	182	0.32

[5] Fast and slow foreclosure states derived from data in Amy Crews Cutts and William A. Merrill. March 2008. "Interventions in Mortgage Default: Policies and Practices to Prevent Home Loss and Lower Costs". Freddie Mac Working Paper #08-01.

[6] *Bad Access to Mainstream Credit* is a proxy variable taken as the combination of variables identifying those who either coped with their bills through payday or car title loans or filed bankruptcy because they couldn't refinance their current mortgage. Greater detail on this variable is given in the text.

[7] The universe drops from 312 to 283 due to dropping 29 records that report having missed a payment but do not report the number of payments they missed.

Continuous Variable			
Mortgage Payments Missed in 2 yrs Prior to Bankruptcy[8] – Number(#)	582	n/a	1.98

Modeling Approach and Results

Homeowners with mortgages in the years leading up to their bankruptcy filings must decide each month whether to make mortgage payments. Roughly half of the owners in our sample missed at least one mortgage payment within the two years leading up to the filing. Among those who missed at least one payment, the average number missed is four. Approximately half of the borrowers who reported missing at least one payment reported having had foreclosure initiated by their lenders.

These patterns raise two important questions. First, why might about half of the mortgage borrowers, all of whom are under extreme financial distress, remain current on their mortgages until they file and the other half not? Second, what might govern lenders' decisions about whether or not to initiate foreclosure when borrowers have missed mortgage payments? More specifically, given the richness of our information on the households, we can look at how household characteristics, coping behavior when faced with financial crisis, reasons for filing bankruptcy, and access to credit influence these decisions.

To explore the first question, we fit a logistic model with a set of variables intended to capture various potentially relevant aspects of each filer's situation available to us from one of three sources: their bankruptcy court files, answers to the written questionnaire, and answers to the phone survey. The logistic model is particularly suitable given our interest in the determinants of the likelihood of missing a payment, a binary outcome, as well as our use of a number of dichotomous covariates from the survey. We run the logistic model on all homeowners with a mortgage in our sample. The binary decision modeled is whether or not to miss any mortgage payments. To form an even greater distinction for those who have been more seriously or repetitively delinquent, we then model the probability of being seriously delinquent (missing four or more payments) among those who missed at least one mortgage payment. The results are consistent across the two specifications. While the number of reported missed

[8] The number of missed payments is top-coded at 7 to reduce the over-influence of a small number of outliers with an extreme number of missed payments.

payments are not necessarily consecutive, the latter model better reflects what causes filers to miss multiple payments contingent on having missed at least one.

We use two approaches to explore the second question. In the first, we deploy a two stage approach. A two-stage approach is required because the decision by borrowers to miss mortgage payments and the decision of lenders to initiate foreclosure influence each other. The more payments a borrower misses, the more likely a lender will threaten foreclosure. Having missed several payments, a borrower might miss additional payments because they may cease to see the value of making additional mortgage payments if foreclosure is likely. In the absence of a suitable instrument for the number of missed mortgage payments, we create an instrument through a first-stage ordinary least squares regression. But because so many variables that drive missed payments also drive lenders' decisions with respect to initiating foreclosures, the first-stage must use a parsimonious specification that attempts to meet the tests of a sound instrument while allowing variables that likely influence both decisions to be preserved for use in the second stage model. The resulting instrument is rather weak and still includes variables that may have independent influence on initiation of foreclosure. Therefore, we include an alternative specification of our foreclosure model that controls for missed payments by using a subsample of delinquent borrowers who missed a similar number of payments. Because half of the delinquent borrowers missed between 3-5 payments, we use this subsample.

Missed Payments

The decision of one borrower with a mortgage to remain current on her mortgage up until she files for bankruptcy but another to miss a payment, and still others to miss multiple payments – when all of them are so financially distressed that they file for bankruptcy -- is of great interest. To explore this question, we construct logit and OLS models that draw on a common set of covariates intended to capture observable information that might bear on the mortgage payment behavior of homeowners who file for bankruptcy. Descriptive statistics on these variables is presented in Table 1[9].

[9] This study also considered several variables on medical history, following the literature on bankruptcy trigger events. Two variables came closest to significance: (1) reporting medical bills as a reason for having filed bankruptcy and (2) having more than $5,000 in medical costs not covered by insurance. Neither was significant in the missed payments model and results were ambiguous for the foreclosure initiation model. Inclusion of these variables also had little effect on the coefficients and significance of the other covariates.

Specifically, our delinquency models take the form of the log odds ratio of missing at least one payment **P** (or three or more payments) as a linear combination of a vector of variables **X** that influence whether or not payments are missed. We include demographic variables, income-related variables, mortgage-related variables, bankruptcy-related variables, access to credit, and type of foreclosure law in the states in which they resided. While most variables entered into the model are binary variables by definition, other variables such as age and education were transformed into categorical binary variables in order to identify more complex relationships that may be categorical, as opposed to simply incremental. This approach is inspired by Warren (2003), who found that propensity to file bankruptcy didn't simply decrease with years of education; rather, it began low for those who didn't graduate high school, was highest for high school graduates and then decreased with additional years of higher education.

The results of the logit model of the odds of ever having missed a mortgage payment in the two years leading up the filing are presented in Table 2. This analysis also highlights the significant relationship between having access to credit and staying current with one's mortgage payments, as all but one of our credit variables are significant and with signs consistent with expectations that access to credit enables homeowners to miss fewer mortgage payments. Notably, *those who rely heavily on credit card debt are half as likely to have missed a mortgage payment, while those falling under our proxy for having bad access to credit - those who were recently unable to refinance their homes or who had taken out a car-title or payday loan - were more than twice as likely to have missed a mortgage payment then those who had not.* More expected was the finding that a significant drop in household income makes one nearly twice as likely to miss a mortgage payment. Those who identified mortgage payments as a reason for their bankruptcies were three times as likely to have missed a payment as those not claiming this as a reason. Likewise, those who filed chapter 13 were significantly more likely to have missed a mortgage payment in the two years before filing. This finding is consistent with the view of chapter 13 as a mortgagor protection law that permits filers to cure defaults over their lenders' objections. As previously discussed, chapter 7 does not include this feature.

The results of the logit model of the odds of four or more payments missed by delinquent borrowers only (conditional on missing at least one payment) are presented in Table 2 as well. Among just those having been delinquent, the relationship to missing four or more payments is less clear. Results show the strict model is nowhere near as robust as the previous model on

missing any payments, but still it fits reasonably well as judged by the Hosmer and Lemeshow Goodness of Fit chi-square statistic, nor does it suffer from high variance inflation among any collinear covariates. Most significant among the covariates is being self employed. Delinquent borrowers who were self employed were more than twice as likely to miss four or more payments as others. Two other covariates were slightly less significant and both led to lower probabilities of delinquent borrowers missing four or more payments. Relying heavily on credit cards to pay bills as well as being college educated, relative to having only some college education, both made a delinquent borrower nearly half as likely to miss four or more payments. To be clear, the survey counts total number of missed payments in the two years prior to bankruptcy and therefore does not allow us to differentiate between frequency of delinquency spells and duration of a single string of delinquency.

Table 2: Modeled Probabilities of Missing Mortgage Payments

Variable	**Missed a Payment** [10]		**Missed Four or More Payments**	
Universe	All Borrowers		Delinquent Borrowers	
	Log Odds	VIF	Log Odds	VIF
Intercept	-1.36*		0.66	
Race/Ethnicity - Minority [not non-Hispanic white]	0.08	1.24	0.01	1.29
Family Type – Married	-0.10	1.15	-0.19	1.20
Family Type – Children in household	0.43	1.40	0.14	1.44
Age of Bankruptcy Filer - Age 35 and under	-0.30	1.31	-0.64	1.37
Age of Bankruptcy Filer - Over age 55	0.09	1.38	-0.31	1.31
Education - High school graduate or less	-0.02	1.23	-0.46	1.22
Education - College graduate or higher	0.30	1.20	-0.64~	1.22
Employment – Household head was self employed	0.04	1.19	0.93**	1.20
Income - Head or spouse experienced a gap	0.05	1.21	0.24	1.28
Income - Household experienced a drop	0.65*	1.13	0.20	1.17
First time homebuyer	-0.05	1.31	0.21	1.31
Mortgage Loan - Used a mortgage broker for original loan	0.50**	1.07	-0.32	1.10
Mortgage Loan - Original loan was an adjustable rate mortgage	0.10	1.16	-0.55	1.25
Filed Chapter 13 bankruptcy	0.66*	1.24	-0.48	1.20
Filed bankruptcy because of burden of mortgage payments	1.11*	1.25	0.03	1.25
Filed bankruptcy because of constant debt collectors calls	0.64*	1.11	-0.19	1.14
Filed bankruptcy because of medical reasons	-0.09	1.16	0.05	1.27
Coped with bills by borrowing from family/charity	0.64**	1.17	0.31	1.08
Coped with bills by relying heavily on credit cards	-0.82*	1.30	-0.56~	1.24
Had bad access to mainstream credit	0.77*	1.26	0.22	1.23
N	425		217	
R^2	0.23		0.11	
Adjusted R^2	0.31		0.15	
Likelihood Ratio	111.3		25.8	
Hosmer & Lemeshow Goodness of Fit (Pr > ChiSq)	0.87		0.91	

* : significant at the 99% level
** : significant at the 95% level
~ : significant at the 90% level

[10] Logit model coefficients displayed are log odds ratios.

Initiated with Foreclosure

As discussed, we deploy a two-stage least squares approach to handle the endogeneity between missed mortgage payments (decisions made by borrowers) and foreclosure initiations (decisions made by the lender). The models are fit only for borrowers that missed at least one payment. While a small number of filers that did not miss any mortgage payments reported having a foreclosure initiated, these are unusual cases.

The two-stage least squares procedure cannot be extended to non-linear models, so we shift to OLS modeling. The first stage is a streamlined OLS model similar to the logistical delinquency models presented above but on the number of payments missed. To determine our streamlined model, we perform stepwise selection on the covariates, requiring all variables to have F-statistics significant to the 90 percent level to be entered or to remain within the model, meaning that each variable must account for a significant reduction in model error. At the same time, we also look to maximize a balance between the overall F-statistic of the model and the adjusted r-squared value of overall fit. In this process, variables found to be insignificant in the previous delinquency models such as race, family type and age drop out of the model and the instrument for the number of payments missed is streamlined to the following reduced-form equation:

$$\text{Stage 1: } P = b\mathbf{X} + u \qquad (1)$$

In this equation, P is the number of mortgage payments missed and $\boldsymbol{X}$ is reduced to a vector of four instrumental variables: our variable for being self employed, having experienced a gap in income either by the household head or spouse, having had originally had an adjustable rate mortgage, and having coped with bills prior to bankruptcy by relying heavily on credit cards. The strength of the four instruments in predicting the number of mortgage payments missed is shown in Table 3.

Table 3: Stage 1 Model of Missed Mortgage Payments among Delinquent Homeowners

Instrument Variable	Regression Coefficient
Intercept	4.04*
Employment – Household head was self employed	0.87*
Income - Head or spouse experienced a gap	0.56**
Mortgage Loan - Original loan was an adjustable rate mortgage	-0.55 ~
Coped with bills by relying heavily on credit cards	-0.51~
Number of Observations	217
R-Square	0.08
Adj R-Sq	0.06
F-Value	4.5
Pr > F	0.002

* : significant at the 99% level
** : significant at the 95% level
~ : significant at the 90% level
Note: Significance levels of covariates and F-statistic of model reflect HC4 controls for heteroskedasticity. See Hayes and Cai (2007).

The instrument is rather weak, and furthermore relies on determinant variables that may arguably have their own individual associations with initiation of foreclosure. For these reasons, interpretation of the significance of missed payments within the second stage model must be taken with some caution. Although we continue with the two stage least squares approach, we will compare this model to an alternative model that controls for the number of payments missed by restricting the sample to those borrowers who missed three to five mortgage payments.

The predicted value for the number of missed mortgage payments of delinquent homeowners from the stage one model is entered into a second stage equation as a non-endogenous covariate that will proxy for the number of missed payments. We run a second-stage model to assess the relevant factors associated with the propensity of delinquent homeowners being initiated with foreclosure under the following equation:

$$\text{Stage 2: } FC_{\text{initiated}} = \alpha_0 + \alpha_1 P^* + \alpha_2 \mathbf{Z} + \varepsilon \qquad (2)$$

where P* is the predicted number of missed payments resulting from the first stage equation, while **Z** is a vector of socio-economic covariates. Because the model is linear, including both the

predicted value of missed payments and the instruments used to gain that predicted value would result in high variance inflation that would bias the significance of these variables in the second-stage equation. Therefore, **Z** does not include the covariates used in stage one. It does, however include two additional geographic variables not associated with missed payments but related to the legal duration of the foreclosure process in the homeowner's respective state as calculated by Cutts and Merrill (2008). Fast foreclosure states are the third of states with the shortest foreclosure timeline, while slow foreclosure states are the third of states with the longest timeline.

The results of the two-stage model for initiated with foreclosure are shown in column one of table 4.[11] As expected, the predicted value of missed payments is significant, and the sign of the coefficient shows that after controlling for all other variables in the model, each additional predicted missed payment increases the probability of being threatened with foreclosure by 22 percentage points. Additionally, we find that one of the greatest and most significant associations with being initiated with foreclosure is our proxy for bad access to credit. Recall that this variable combines having used a payday or car title lender to make ends meet before bankruptcy or having been unable to refinance one's mortgage as a reason for filing. Falling into this category, which could also proxy for having a poor credit score, was significant at the 99 percent level, and led to a 19 percentage point increase in probability of a delinquent borrower being initiated with foreclosure.

The model also finds that being a minority is highly significant in increasing the probability of being threatened with foreclosure, other factors considered. The model finds being a minority is significant to the 99th percentile and has the largest positive coefficient. Positive significance of minority status in initiations of foreclosure, even with controls for proxies for credit quality and access to credit, is consistent with findings from Quercia and Cowan (2008). As previously mentioned, our ability to draw inferences from these findings is limited by our inability to adequately control for other potentially correlated factors such as interest rates, home equity levels, geography, and house price.

[11] Because the dependent variable in the first stage linear model is discrete, and that in the second stage is binary investigation of significance requires controls for heteroskedasticity. To check for the impact of heteroskedasticity within our model, we use the HC4 method described in Hayes and Cai (2007)[11]. Our tests found that heteroskedasticity has no significant impacts on any variables found to be significant in the first or second stages of the initiated with foreclosure model However, the F values and covariate significance levels reported in the models reflect the HC4 heteroscketasticity consistency controls.

Being young (35 or younger), originating a mortgage through a mortgage broker, and having filed bankruptcy due at least in part to mortgage payment burdens each also were significantly associated with being initiated with foreclosure at the 95 percent significance level. None of these associations are altogether unexpected. Younger borrowers may be more exposed to foreclosure for a number of reasons not controlled in this model. They have had fewer years to build credit, build equity in their homes, or build savings for emergency expenses, while at the same time they may have lower wages or less tenure giving them more tenuous employment situations. The positive significance of using a mortgage broker supports theories that these loans were more likely to be loosely underwritten with little regard to the long-term performance of the loan.

Several variables were also significantly associated with fewer initiations of foreclosure. Having children, while associated with missing a mortgage payment, was one of the most significant variable negatively associated with being foreclosed upon. It is unlikely that lenders would directly consider the presence of children in the decision to initiate the foreclosure process less often, but the presence of children may proxy for other borrower behavior not included in the model. Those with children may be more able or willing to take steps to cure their delinquent loan prior to a bankruptcy. One example is the increased likelihood of families with children to revolve credit card debt (Canner and Luckett, 1990; Bertaut and Haliassos, 2001; Kim and DeVaney, 2001) which may extend from a greater need to pay mortgage bills and keep the family home.[12] Being older (over age 55) was also associated with a lower likelihood of being initiated with foreclosure. As described in the case of younger householders, older householders may have more equity built up, longer credit histories, and more stable income sources, and more savings that may enable them to self-cure their delinquency even in the time of a bankruptcy.

State laws setting the timeline for foreclosure also have an impact on who is initiated with foreclosure. Living in a slow foreclosure state (a state in the third with the longest legal foreclosure process timeline), which at the 95 percent significance level is associated with18 percentage points lower propensities of being threatened with foreclosure, after factoring in the effect of all other covariates. The higher costs of a lengthy foreclosure process may explain why foreclosure would be less likely in slow foreclosure states, but it is not attributable to a lower level of contact between respondents and their loan servicers. In fact, delinquent borrowers in

[12] Canner and Luckett (1990) find poor debt payment histories (more missed consumer debt payments) for those with children.

slow foreclosure states actually reported contact with servicers and lenders slightly more often than those in the middle third of states, although the overwhelming majority in all states– over eighty percent of delinquent borrowers in fast, middle, and slow foreclosure states alike – reported contact with lenders post-delinquency.

A simple descriptive analysis also shows that within these state groups, talking to servicers had no effect on the incidence of foreclosure initiations. In fast foreclosure states, foreclosures were initiated in half of delinquencies regardless of whether delinquent borrowers reported contact with their services. In slow foreclosure states, foreclosures were initiated approximately 40 percent of the time, contact or not. In the middle third of states, borrower-lender contact did lower the average foreclosure initiation rate from 73 percent to 61 percent, but this difference was well within the large margin of error due to the small sample size.

All else considered, this finding may support the Cutts and Merrill (2008) assertion of a "sweet spot" of a state's legal foreclosure timelines for purposes of maximizing the possibility of cure. Cutts and Merrill suggest that states with aggressive legal foreclosure timelines have low cure rates because they don't allow borrowers enough time for a workout, while lengthy timelines increase both lender and borrower costs and also reduce the likelihood of a borrower keeping their home in the end. If foreclosures and workouts are expensive for servicers, and if the structure of incentive payments from lenders to servicers rewards only successful workout efforts and not failed attempts, it is possible that loan servicers dealing with delinquent mortgages in states with lengthy legal foreclosure timelines may withhold from initiating foreclosure longer to allow more time for loans that are able to self-cure to do so before they are put into a potentially costly foreclosure process.

The last notable finding from the model is that having a mobile home made foreclosure initiation 20 percentage points less likely, all else considered. This suggests that the baseline cost of foreclosure may discourage foreclosure actions in cases where asset values are low, especially where the security interest is in both the mobile home and the land. We were not able to differentiate those instances from those in which the security interest was in only the mobile home and thus more flexible state personal property foreclosure law (modeled on Article 9 of the Uniform Commercial Code) would govern the disposition of collateral.

Table 4: Results of 2 Stage Least Squares Models – Delinquent Borrowers Only[13]

	2SLS Foreclosure Initiated	OLS Foreclosure Initiated
Universe	All Delinquent: *1+ Missed Payments*	Moderately Delinquent: *3-5 Missed Payments*
	Coefficient	Coefficient
Intercept	-0.40	0.27
Number of Mortgage Payments Missed (Predicted)	0.22 *	
Race/Ethnicity - Minority [not non-Hispanic white]	0.20 *	0.18
Family Type – Married	-0.07	-0.17
Family Type – Children in household	-0.17 **	-0.17
Age of Bankruptcy Filer - Age 35 and under	0.23 **	0.30 ~
Age of Bankruptcy Filer - Over age 55	-0.18 ~	-0.45 *
Education - High school graduate or less	-0.06	-0.03
Education - College graduate or higher	-0.03	0.18
Employment – Household head was self employed		0.16
Income - Head or spouse experienced a gap		0.42 *
Income - Household experienced a drop	-0.02	0.00
Home was a mobile home	-0.15 ~	-0.10
First time homebuyer	0.01	0.10
Mortgage Loan - Used a mortgage broker for original loan	0.17 **	0.01
Mortgage Loan - Original loan was an adjustable rate mortgage		-0.14
Filed Chapter 13 bankruptcy	0.04	-0.11
State foreclosure process timeline in quickest 33% of states	-0.04	0.26 ~
State foreclosure process timeline in slowest 33% of states	-0.18 **	0.04
Filed bankruptcy because of burden of mortgage payments	0.17 **	0.32 *
Filed bankruptcy because of constant debt collectors calls	-0.08	0.06
Filed bankruptcy because of medical reasons	0.02	0.21 ~
Coped with bills by borrowing from family/charity	-0.04	0.03
Coped with bills by relying heavily on credit cards		-0.20 ~
Had bad access to mainstream credit	0.19 *	-0.07

[13] Significance of coefficients were obtained from heteroskedasticity -consistent regressions using methods HC4 as described in Hayes, Andrew F. & Li Cai. 2007. "Using heteroskedasticity-consistent standard error estimators in OLS regression: An introduction and software implementation." *Behavior Research Methods*, 39 (4), 709-722. F statistics and coefficient significances displayed use heteroskedasticity-consistent controls.

Number of Observations	217	86
R-Square	0.31	0.52
F-Value	8.90	10.37
Pr > F	<.001	<.001

* : significant at the 99% level
** : significant at the 95% level
~ : significant at the 90% level

An Alternative Look at Determinants of Foreclosure Initiated

It is likely that the proxy for missed payments used in the above model is too weak to be conclusive, and that the covariates used in building the proxy are themselves associated with being initiated with foreclosure.. Therefore, in order to form an alternative look at foreclosure determinants while controlling for the number of missed mortgage payments, we narrow our modeling sample to those having missed between 3 and 5 mortgage payments and model initiation of foreclosure by a lender or servicer by adapting equation (2) as the following:

$$\text{Stage 2: } FC_{initiated} = \beta_0 + \beta_2 \mathbf{Z} + \varepsilon \qquad (3)$$

Here **Z** now includes the stage 2 model covariates from above plus the stage 1 socio-economic variables formerly used to proxy for number of missed payments. The results of the single-stage model on having had foreclosure initiated, in column 2 of table 4, show several covariates with significant associations. Unsurprisingly, the model points to a significant relationship between initiation of foreclosure and having had filed bankruptcy at least in part due to mortgage payment burdens. Having had a gap in income, which was not a significant covariate in the missed payments models, was one of the greatest determinants of being foreclosed upon.

The most significant covariate in the model was being over 55 years old, which significantly reduced the likelihood of being foreclosed upon among those who missed 3-5 mortgage payments. Being 35 years old or younger was also significant and positively associated with foreclosure initiation. As noted above in the discussion of the two stage model, age could proxy for several factors not in the model that would likely reduce the possibility of a foreclosure, including having a longer credit history with the lender, which may also indicate a

better credit score and perhaps more leeway after missed payments than someone with less history. Relative to those younger, older homeowners could also have had more time to build equity in their homes and therefore greater access to funds, which could also mean lower debt levels or ratios on their mortgages. Older homeowners may also have higher or more stable incomes due to having more experience and tenure, therefore making them appear to lenders as being more likely to self-cure.

Relying heavily on credit cards to pay bills in the two years leading up to bankruptcy was also significantly associated with fewer initiations of foreclosure among those missing 3-5 mortgage payments. The significance of this variable could mean that use of credit cards alleviates mortgage payment pressure and allows owners to get current and stave off foreclosure initiation. The relationship between heavy users of credit cards and a lower likelihood of mortgage delinquency, as determined in the earlier missed payments models, also suggests that these borrowers may have missed fewer payments in the past. Their better credit histories may make them appear to lenders to be more able to self-cure than others borrowers who, at the time of our survey, appear as having a similar number of missed payments.

Being in a state that is among the quickest foreclosure processes had a positive and significant relationship with foreclosure initiation. This suggests that the shorter state foreclosure timelines, which others such as Cutts and Merrill (2007) have suggested is correlated with lower lender foreclosure costs, leads to higher likelihood of a lender initiating foreclosure. Consistent with the earlier discussion, differences in foreclosure initiation rates by state foreclosure timelines were not due to any associated differences in rates of borrower-lender contact. Delinquent borrowers in each group of states were overwhelmingly in contact with servicers.

Lastly, having filed bankruptcy for medical reasons was also positively associated with a higher likelihood of being initiated with foreclosure. It is unlikely that personal medical conditions are considered by lenders in their foreclosure decisions, but the disruptive effect of medical emergencies on the personal finances of these homeowners may make them appear simply as homeowners in default with little likelihood of self-cure. For instance, disruptive medical events may be associated with more substantial drops or longer gaps in income than experienced by those without such hardships, making self-cure much more difficult.

Conclusions

This paper provides insights into why some homeowners that declare bankruptcy miss mortgage payments in the two years leading up to a filing while others do not. It also sheds light on how homeowners who do miss payments are treated by their lenders. A key finding is that those with poor access to credit are more likely to miss a mortgage payment while those that leaned heavily on credit card debt were more likely to have remained current on their mortgage. Unlike credit card debt, informal borrowing and high-cost lending channels increased the propensity to miss a mortgage payment, suggesting that these debt or financing approaches are not helping to alleviate mortgage debt problems. Unsurprisingly, a drop in household income was a strong determinant of missing a mortgage payment, but so was having used a mortgage broker in obtaining a mortgage and filing a chapter 13 bankruptcy as opposed to a chapter 7.

Findings related to mortgage broker involvement are consistent with many studies that have detailed the poor performance of broker-originated mortgage loans (Ding et al., 2008; Woodward, 2008; Alexander et al., 2002; Lacour-Little and Chun, 1999). Those studies offer reasons such as their disproportionate role in originating loosely underwritten high-cost subprime loans and the lack of appropriate incentives for brokers to consider a loan's future performance during loan origination. The higher likelihood of missing mortgage payments among those who filed Chapter 13 bankruptcy points to the endogenous nature of such filings. Homeowners may file Chapter 13 bankruptcy not only as a result of mortgage delinquency in an attempt to save their home, but also, in a time of financial stress, choose to let a mortgage payment go unpaid with the knowledge that a Chapter 13 filing and its resulting repayment plan is imminent. Even without geographical or income variables, there was no significant relationship found between missing a mortgage payment and any of our demographic variables such as race, age, and education, although our sample did exist entirely of bankrupt homeowners.

For those who had missed at least one mortgage payment, the model is less robust as to the determinants of severe delinquency, for very few determinants appear significant and only one of these also appears in the first model of any delinquency. The strongest determinant of severe delinquency among those delinquent is being self-employed, which, all else equal, gives one a 72 percent modeled probability of missing four or more payments. Heavy reliance on use of credit cards to pay bills prior to filing for bankruptcy, the only significant credit access variable in the model, is also associated with a lower likelihood of missing four or more mortgage payments. The

third and final variable with any significance in the model is having graduated college, which is associated with a lower than average likelihood of being severely delinquent.

In our models on foreclosure initiation, we achieved mixed results depending on the way in which we controlled for the number of missed mortgage payments. Both models have their weaknesses. The two stage model uses a predicted value for missed mortgage payments from a rather weak proxy, while the 3 to 5 missed payment subsample model uses a rather small sample. However, the models agree on the significance of several factors. First, both models find that a borrower's age is a significant factor. Relative to adults aged 36 to 55, both show younger adults to have higher probabilities of being initiated with foreclosure and older adults over age 55 have lower probabilities. The models also find that state foreclosure timelines are significant in foreclosure initiation decisions, albeit in slightly different ways. The two-stage model finds long foreclosure timelines to be significant in reducing the probability of foreclosure initiation, while the subsample model finds that fast foreclosure timelines are significant in raising probabilities of initiation.

Both models also find credit access factors to be significant determinants of foreclosure initiation, but through different covariates. Whereas the two-stage model finds bad access to mainstream credit, our proxy for a low credit score, to be a significant factor in raising the probability of foreclosure initiation, the subsample model finds heavy reliance on credit cards to be a significant factor in lowering the probability of initiation. Results from the two-stage model could be interpreted as support of multiple studies that show low credit score as a major determinant of foreclosure. The second model tends to reinforce results from our missed payment models – that although credit card debt can compound financial problems in other ways, delinquent homeowners may use it to become current on their mortgage payments and avoid foreclosure initiation. To the extent this is true, in a credit constricted environment we might expect to see a greater proportion of homeowners in bankruptcy with severe mortgage problems that, at least at present, bankruptcy law offers debtors fewer tools to address. [14]

Lastly, both models find that reporting difficulty meeting mortgage payments as a contributing factor to bankruptcy leads to significantly higher odds of being taken to foreclosure.

[14] Heavy reliance on credit cards is not included directly in the two stage model for direct comparison because the two stage model uses it to form a proxy for missed mortgage payments. Its significance in the subsample model supports the assertion that heavy credit card use is individually associated with both missed mortgage payments and initiation of foreclosure.

A small number of findings were not consistent between the models. For instance, the two stage model finds that having children in the household is associated with a significantly lower probability of foreclosure initiation. This may reflect parents' perceived importance of avoiding foreclosure that leads to other actions not measured here, but it is not significant in the subsample model. Additionally, the subsample model finds an income gap to be a significant determinant of foreclosure initiation. The income gap variable is not included in the stage two model directly for comparison because it is used there as a proxy for missed payments, which is significant. The significance of the income gap variable in both the subsample model and the stage one model suggests that, like heavy reliance on credit cards, it is associated with both missed payments and initiation of foreclosure but is not necessarily an inconsistency between the two foreclosure initiation models.

Another covariate significant to foreclosure initiation in the two stage model but not in the subsample is minority status. Even after controlling for access to credit and indicators of credit health, being a minority was just as significant and with a positive coefficient to lender decisions nearly as large as that of predicted missed payments, and increased probabilities of being initiated with foreclosure by 20 percent. The significance of a borrower's racial identity within these lender decisions, even after controlling for the number of missed payments, is peculiar, but we are unable to conclude whether race appears as a proxy for credit score and therefore is reducing the significance of other credit proxies in the model, or alternatively as a proxy for neighborhood location factoring into lender decisions, as concluded by previous studies.

Though we are using several different proxy measures and methods to control for potential endogeneities and cross correlations within our dataset, our findings are consistent with views that loan servicers factor in credit scores or some other types of credit health measures when they make decisions about threatening or initiating foreclosure.

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Appendix Table A-1: Demographic Comparison of Primary Petitioner Homeowners in Consumer Bankruptcy Project with American Housing Survey Homeowner Householders

	Number			Percent		
	CBP		AHS	CBP		AHS
	In Housing Phone Survey	Not In Housing Phone Survey		In Housing Phone Survey	Not In Housing Phone Survey	
Marital Status						
Married	345	447	47,445,983	53.0	52.3	63.9
Widowed	45	61	8,409,812	6.9	7.1	11.3
Divorced	150	212	10,079,802	23.0	24.8	13.6
Separated	37	47	1,065,781	5.7	5.5	1.4
Never married	74	87	7,291,316	11.4	10.2	9.8
Total	651	854	74,292,694	100.0	100.0	100.0
Sex						
Male	235	352	44,743,538	35.8	41.0	60.2
Female	421	507	29,549,156	64.2	59.0	39.8
Total	656	859	74,292,694	100.0	100.0	100.0
Age						
Under 25	10	12	1,068,622	1.6	1.5	1.4
25-34	97	160	8,552,411	15.6	19.6	11.5
35-44	170	244	15,338,546	27.3	29.9	20.6
45-54	187	202	17,630,570	30.1	24.8	23.7
55-64	110	129	13,962,319	17.7	15.8	18.8
65 and Over	48	68	17,740,226	7.7	8.3	23.9
Total	622	815	74,292,694	100.0	100.0	100.0
Race / Ethnicity						
White	482	586	59,159,066	75.4	70.0	79.6
Black	121	182	5,952,596	18.9	21.7	8.0
Other	36	69	9,181,032	5.6	8.2	12.4
Education						
Less than High School	83	49	9,930,647	9.6	7.5	13.4
High School Graduate	267	162	20,113,760	30.8	24.7	27.1
Some College	356	309	20,789,962	41.1	47.2	28.0
College Degree or Higher	161	135	23,458,325	18.6	20.6	31.6
Total	867	655	74,292,694	100.0	100.0	100.0

Notes: CBP data reported here includes all respondents who owned homes at some time during the five years before filing bankruptcy. AHS includes all homeowners. For sake of comparison to marital status categories in AHS, “other” marital status records are excluded from this comparison.
Sources: 2007 Consumer Bankruptcy Project; US Census Bureau, American Housing Survey, 2005.

Appendix Table A-2: Comparison of Mail Survey Responses of Primary Petitioner Homeowners in Consumer Bankruptcy Project Included vs. Excluded in Phone Survey

	Number		Percent	
	In Housing Phone Survey	Not In Housing Phone Survey	In Housing Phone Survey	Not In Housing Phone Survey
Provided additional story detail on reasons for bankruptcy				
Yes	474	552	75.0	63.7
No	158	315	25.0	36.3
Used a credit card to pay for uncovered medical bills				
Yes	170	175	32.0	24.6
No	362	537	68.0	75.4
Head of household unemployed & looking for work				
Yes	37	87	5.6	10.0
No	621	780	94.4	90.0
Age of spouse of householder				
Under 25	12	9	3.3	1.9
25-34	52	106	14.4	22.4
35-44	107	165	29.6	34.9
45-54	101	103	27.9	21.8
55-64	68	69	18.8	14.6
65 and over	22	21	6.1	4.4
Householder is financially responsible for someone				
Yes	354	525	54.1	61.0
No	300	335	45.9	39.0
Householder lives in a slow foreclosure state				
Yes	238	273	36.2	31.5
No	420	594	63.8	68.5
Householder is unemployed and unable to work for medical reasons				
Yes	88	81	13.4	9.3
No	570	786	86.6	90.7

Note: Includes all survey respondents who owned homes at some time during the five years before filing bankruptcy.
Source: 2007 Consumer Bankruptcy Project.

Appendix B: A Primer on Bankruptcy Law and Foreclosure Law

Individuals are potentially eligible for four types of relief under the U.S. Bankruptcy Code: chapters 7 ("liquidation"), 11 ("reorganization"), 12 ("family farmer or fisherman with regular income"), and 13 ("individual with regular income"). Chapters 7 and 13 are, by far, the two most prominent choices for filers dealing with consumer debt problems. Thus, consumer bankruptcy in the U.S. is generally conceptualized as a two-chapter system. Both homeowners and non-homeowners use bankruptcy as a response to severe financial distress. Involuntary bankruptcy petitions filed by creditors are permissible (in chapter 7) but rare in consumer bankruptcy cases. The majority of filings each year are under chapter 7, but, as we shall see, homeowners with mortgage problems have reason to be disproportionately attracted to chapter 13.

The filing of a bankruptcy case triggers the creation of an estate containing property interests of the debtor. The filing almost always triggers an automatic stay that protects the debtor and bankruptcy estate assets from most collection actions, including by creditors with security interests. Those creditors must seek court permission (seek to "lift" the automatic stay) to continue with foreclosure or other formal or informal collection activities.

Chapter 7 is the liquidation chapter. In theory, a chapter 7 debtor forfeits her non-exempt assets as largely determined by state law exemption statutes. In return, chapter 7 provides to the honest debtor a discharge of personal liability on debt. Technically, chapter 7 has only one eligibility requirement for individuals: they must have received a credit counseling briefing in the six months prior to filing. However, this eligibility requirement is supplemented by a variety of grounds to dismiss or convert a case, including dishonesty or failure to disclose important financial information, bad faith, and ability to pay debts or lack of insolvency (a "means test"). Most chapter 7 cases are "no-asset," meaning there will be no monetary distribution to creditors. Assuming they are honest, chapter 7 debtors usually do receive a discharge, even in no-asset cases. The bankruptcy estate in chapter 7 cases excludes future income and the discharge is not contingent on the commitment of future income. But filers often commit future income to pay pre-bankruptcy debts notwithstanding. The most significant commitment comes from payment on secured debts, as the bankruptcy discharge does not affect *in rem* rights against collateral. Thus, chapter 7 debtors who are delinquent on their home mortgages or car loans need to make an arrangement with their lenders or they likely will lose the property after the case is over.

Debtors can sign binding agreements ("reaffirmations") to retain personal liability on these debts. Other times, debtors must use future income to pay obligations that the Bankruptcy Code has rendered non-dischargeable. The list of non-dischargeable debts grows with each set of bankruptcy amendments, and now includes most student loans, obligations to ex-spouses even if not in the nature of support, and some credit card debts, particularly if incurred relatively close to the time of bankruptcy.

Chapter 7 does not offer tools to retain a home over a mortgagee's objection for a borrower who has defaulted, but still has some mortgagor protection features. A homeowner might file chapter 7 to discharge unsecured debt and perhaps to avoid judgment liens and thus have more available income to make mortgage payments. Chapter 7 also may be used to part with a home employing a different sale process than state law requires, or to discharge personal liability on a deficiency judgment from a foreclosure prior to bankruptcy. Thus, bankruptcy acts as a federal anti-deficiency statute for filers even their state of residence does not directly limit deficiency judgments.

Chapter 13 is the repayment plan chapter. It permits the debtor to retain non-exempt assets that would have been forfeited in a chapter 7, but expands the bankruptcy estate to include a debtor's future income over a three-to-five year period. The discharge of debt is suspended pending the completion of a repayment plan, although debtors often do not finish those plans. During the pendency of the plan, the automatic stay remains in effect unless the court grants a secured creditor's motion to lift the stay under limited circumstances. Chapter 13 requires that unsecured creditors are promised at least as much as they would receive in a chapter 7 liquidation (known informally as the "best interests of creditors" test). Beyond this, the debtor generally must commit 100 percent of "disposable income" to unsecured creditor repayment. Since 2005, the method of calculation of disposable income has depended on the debtor's income level; courts have more discretion to determine disposable income for lower income debtors, whereas the disposable income of higher income debtors is determined by a formula set by Congress in the 2005 amendments. Some courts use the "good faith" plan confirmation requirement to require more significant promises of unsecured debt payment. Originally, debtors who completed chapter 13 plans were thought to be entitled to a broader "super discharge" of debts than they would have received in a chapter 7, but Congress has scaled back the generosity of the chapter 13 discharge and now the two discharges look very similar.

Chapter 13 law provides particular kinds of help for problems with secured debts such as mortgages. In particular, it permits homeowners to cure a mortgage default through a repayment plan and reinstate the mortgage over the objection of the lender. The lender may object, but that objection will be overridden if the plan satisfies the requisite statutory requirements as interpreted in that judicial district by the presiding bankruptcy judge. Such features of bankruptcy relief are not waivable in advance by contract. Chapter 13 also permits plans that modify car loans by reducing the amount of the secured claim to the value of the collateral over the objection of the lender (known as "stripdown" or "cramdown" or "lien stripping"), although the 2005 amendments imposed additional constraints on this entitlement.

Chapter 13 has several formal eligibility requirements along with requirements of good faith and other expectations. In addition to the credit counseling briefing requirement with which individual filers in any chapter must comply, chapter 13 filers must be "individuals with regular income" and their non-contingent liquidated debts must fall below a statutory cap. Currently, the cap for secured debt is just over $1,000,000, and nearly $350,000 for unsecured debt, and is adjusted every three years. Individuals need not have primarily consumer debts to be eligible for chapter 13; chapter 13 filers can be sole proprietors operating small businesses.

Although our study involves bankruptcy filers, it relates closely to foreclosure law because many of the respondents in the sample had foreclosure initiated against them before they sought bankruptcy relief. Foreclosure law regulates the debt collection efforts of lenders that seek to satisfy debts owed to them from borrowers in default through the sale of homes pledged as collateral for their loans. Generally, if a lender wishes to sell a home over a defaulting borrower's objections and to apply the sale proceeds to the debt, the lender must initiate a state law process to terminate the debtor's equity of redemption, which is the borrower's right to retain ownership of the property by paying the full debt plus damages in a lump sum. The details of this process vary greatly from state to state. One key distinction is whether the foreclosure must be a judicial proceeding that requires the filing of a lawsuit, as it the case in about forty percent of the states. The remaining states permit judicial foreclosure but also allow power of sale foreclosures if so designated in the original loan agreement. The typical power of sale foreclosure process takes considerably less time to complete than judicial sales. Power of sale foreclosure also tends to have less stringent notice requirements although they still run the risk of later court challenges. Other notable variations in foreclosure law relate to the allowance of

deficiency judgments, post-sale redemption rights, whether borrowers can reinstate the mortgage without paying the accelerated debt, and rights to remain in residence for some period of time post-sale. These distinctions affect the timeline of the process as well as the substantive rights of the lender and borrower.

When a homeowner defaults, the mortgage servicer may take several actions. The servicer may wait and see if the borrower becomes current on her own; provide late notices or threats of foreclosure; attempt to contact the borrower to obtain more information about the delinquency; attempt to work with the borrower on a temporary plan to get them current, modify the mortgage interest rate, substantive terms or even the loan balance; or may initiate foreclosure, normally in combination with at least one of the previous actions. Servicers also may seek a resolution that involves the borrower consensually giving up the home, such as in a short sale. Because servicers bear the costs of interacting with the borrower, in choosing the course of action they usually compare the potential costs to the likelihood that a delinquent loan may be cured (Adelino et al., 2009). Although servicers often use proprietary data systems and models to determine their course of action, several studies have attempted to determine which factors are significant.