

STRATEGIC DEFAULT BEHAVIOR AND ATTITUDES AMONG LOW-INCOME HOMEOWNERS

Working Paper: November 2012

By
Sarah F. Riley

UNC Center for Community Capital
The University of North Carolina at Chapel Hill

Prepared with financial support from the Ford Foundation

Center for Community Capital
Research and analysis on the transformative power of capital



UNC
COLLEGE OF
ARTS & SCIENCES

Strategic Default Behavior and Attitudes among Low-Income Homeowners

Sarah F. Riley¹
Senior Research Economist
UNC Center for Community Capital
University of North Carolina at Chapel Hill
1700 Martin Luther King Blvd., Suite 129, CB#3452
Chapel Hill, NC, 27599-3452
Tel.: +919-843-5399
Fax: +919-843-2080
Email: sfr@email.unc.edu

November 30, 2012

Forthcoming in *Real Estate Finance*

¹ I wish to thank an anonymous reviewer and my colleagues at the UNC Center for Community Capital, especially Chao Yue Tian and Kim Manturuk, for their helpful comments on previous versions of this paper. I thank the Ford Foundation for financial support. All opinions and any errors remain my own.

Strategic Default Behavior and Attitudes among Low-Income Homeowners

Abstract

Using data from the Community Advantage Program, I examine the incidence and drivers of strategic default behavior and attitudes among low-income homeowners. I find that most low-income mortgage defaults are not strategic and that low-income homeowners are less likely than others to engage in strategic default, despite the fact that they express similar beliefs about the morality and prevalence of strategic default and a greater willingness to walk away from an underwater mortgage. The most salient predictors of strategic default behavior and attitudes for the low-income population are household income, the mortgage interest rate, geographic location, the year of loan origination, and the loan servicer. Of these, geography has the greatest impact. Beliefs about the morality of strategic default are also strongly related to an expressed willingness to default strategically. I infer that survey measures may be an imprecise way to measure the true strategic default propensity of the low-income population.

Keywords: Strategic default, Low-income homeownership, Community Reinvestment Act

JEL Classification: R31, R51, G21, G28

Strategic Default Behavior and Attitudes among Low-Income Homeowners

1 Introduction

A *strategic default* is commonly defined as the occasion in which a borrower has the financial resources to make his mortgage payments but chooses to default on his mortgage solely because he owes more than his house is worth. Following the U.S. housing market decline that began in the spring of 2006, evaluating the prevalence and determinants of strategic default has increasingly become a concern for both financial institutions and government policy makers. However, there is considerable variation both in the methods used to measure strategic default and in the incidence estimates obtained. Moreover, the implications of existing research for understanding strategic default behavior among low-income borrowers, who tend to have the highest overall default rates and are also the target of various government lending programs, remain unclear.

On the one hand, industry-based analyses of credit bureau data conducted between 2009 and 2011 suggest that between 12% and 19% of all mortgage defaults have been strategic in recent years (Experian and Oliver Wyman, 2009, 2010, 2011; Morgan Stanley, 2010; Fair Isaac, 2011). However, there is variation by credit score, loan balance, and household income. For borrowers with credit scores below 700, less than 10% of defaults appear to be strategic, while as many as 40% of defaults by borrowers with the highest credit scores fall into this category. Similarly, households with loan balances less than \$200,000 have approximately a 12% likelihood of defaulting strategically, compared with more than 16% for loan balances above \$200,000. Finally, strategic default among households making less than \$40,000 per year has been estimated at around 9%, while this estimate rises to 19% and higher for households making

at least \$80,000. These results seem to imply that lower-income households, who on average also have lower credit scores and obtain mortgage approval for less expensive houses, should be relatively less likely to default for strategic reasons.

On the other hand, analyses of survey data collected during the same period suggest that between 17% and 36% of Americans believe that it is sometimes okay to walk away from an underwater mortgage, and that up to 35% of defaults may be strategic (Taylor et al, 2010; Guiso et al, 2009, 2011). These analyses lack credit score data but do include information about household income and have found that higher-income borrowers are less likely to express a willingness to default strategically and are more likely to think that strategic default is morally wrong. These alternative results, therefore, would suggest that low-income borrowers should be relatively more likely to default strategically.

In this paper, I seek to reconcile and better understand these existing and seemingly contradictory findings by examining both mortgage performance data and survey data for the low-income borrowers who received loans via a targeted secondary mortgage market demonstration program known as the Community Advantage Program (CAP). This program was established in 1998 via a partnership among Fannie Mae, the Ford Foundation, and Self-Help, a non-profit lender with headquarters in Durham, North Carolina, and it provides low-income borrowers with an opportunity to receive mortgage credit on more favorable terms than they most likely would have been able to obtain in the regular mortgage market. The borrowers would conventionally be classified as subprime based on credit score and income, but the loans themselves are 30-year, fixed-rate mortgages with near-prime interest rates.

Under CAP, Self-Help purchases qualified loans from originating lenders and then sells them to Fannie Mae while retaining recourse for a pre-specified period of time. The Ford

Foundation provided the original underwriting capital for this purchasing arrangement. To qualify for purchase under CAP, a loan must have been made to a borrower who, at the time of loan origination, either (1) had household income of no more than 80% of the metropolitan statistical area median income (MSAMI), or (2) was a racial/ethnic minority or was located in a census tract with greater than 50% minority representation and had household income no greater than 115% of MSAMI. These lending criteria are intentionally broadly consistent with those of the lending test of the Community Reinvestment Act, under which lending institutions are evaluated on the extent to which they serve both the lending needs and depository needs of the communities in which they operate. CAP was designed with the intention of informing public policy with respect to community reinvestment lending.

As of the first quarter of 2012, more than 46,000 loans had been purchased by Self-Help as part of CAP. Of these, about 73% were originated in 1999 or later, and just over 13% were originated during or after 2005. Approximately 40% of CAP loan recipients are racial/ethnic minorities, and CAP borrowers had a median annual household income of \$31,000 at loan origination. The median loan balance at origination was \$79,000, and the median down payment was about \$2,500, resulting in a median original loan-to-value ratio of 97%. Origination and payment history data are available for these loans, and Fannie Mae has provided quarterly zip-code-level house price estimates for underlying properties. Thus, the data permit me to analyze the payment patterns and negative equity positions of CAP borrowers both before and during the housing market downturn that began in the second quarter of 2006, and to roughly compare the results of this analysis with those of the industry analyses conducted by Experian, FICO, and Morgan Stanley for the broader U.S. mortgage market.

In addition, a subset of 3,743 CAP borrowers whose loans were originated between 1999 and 2003 has been surveyed annually since 2003. A comparison of CAP survey participants with respondents to the May 2003 Current Population Survey indicates that CAP borrowers are largely representative of the U.S. low-income population with respect to both income and race distributions (Riley et al, 2009)². The survey interviews are overseen by the UNC Center for Community Capital with funding from the Ford Foundation and were designed to obtain a variety of information about the experiences and characteristics of households participating in CAP, the goal being to evaluate the effectiveness of the program and inform future housing policy for low-income borrowers.

Several survey items related to strategic default were added to the 2011 CAP survey instrument. These items were drawn from the work of Guiso et al (2009, 2011), who evaluate data from the Chicago Booth/Kellogg School Financial Trust Index Survey. In particular, CAP survey participants were asked whether they consider strategic default to be morally wrong and how likely they would be to walk away from their mortgages if they had certain levels of negative equity, such as \$20,000 or \$50,000. Therefore, I can compare the resulting survey estimates of CAP borrower attitudes toward strategic default with those obtained by Guiso et al (2009, 2011) for the purpose of evaluating the extent to which the attitudes of low-income homeowners differ from those of U.S. homeowners more generally.

Thus, in this paper I make at least three contributions to the literature. First, I consider two different types of metrics of strategic default based on administrative mortgage performance

² CAP homeowners do differ from low-income homeowners nationally in other respects. CAP homeowners are much more geographically concentrated; they also tend to be somewhat more educated and more attached to the labor force. Moreover, efforts were made to exclude retirees from the CAP survey, so these CAP borrowers tend to be somewhat on the younger side. These differences could cause CAP borrower attitudes and behavior to differ from those of low-income homeowners nationally. These limitations should be kept in mind when considering the generalizability of the results.

data and survey data, and I examine the extent to which these are consistent with each other for a single population. Prior analyses have generally been limited to one source of data or the other. Second, I assess the prevalence of strategic default among low-income borrowers and examine the drivers of their strategic default behavior and attitudes, which have not yet been independently studied in depth. Third, I examine the relationship between loan origination characteristics, such as the note rate or the borrower's debt-to-income ratio, and attitudes toward strategic default. Previous work has considered the relationships between demographic characteristics and strategic default attitudes, and between loan origination characteristics and observed mortgage default, but to the best of my knowledge, it has not explicitly considered how the attitudes of potential strategic defaulters may vary with loan attributes. The combination of mortgage origination data and survey data makes this latter analysis possible for CAP borrowers.

In brief, the results suggest that low-income borrowers are, on average, less likely than other borrowers to engage in strategic default. Most mortgage defaults among low-income households result from liquidity constraints rather than negative equity. Low-income borrowers are just as likely as other borrowers to view strategic default as morally wrong, and they have a similar perception of the rate of strategic default among their peers. However, low-income borrowers are more likely to express a willingness to default strategically for a specific dollar-valued equity shortfall, both in absolute terms and relative to the value of the house or relative to household wealth. The most salient predictors of strategic default attitudes and behavior for the low-income population are household income, the mortgage interest rate, geographic location, the year of loan origination, and the loan servicer. Of these, geography has the greatest impact. Social factors also matter, but their effect is substantively small, with the exception of beliefs about the morality of strategic default, which is strongly inversely related to an expressed

willingness to default strategically. Finally, because of the discrepancy between the strategic default incidence estimates derived from the administrative data as opposed to the survey data, I infer that survey measures may be an imprecise way to measure the true strategic default propensity of the low-income population.

In the remainder of the paper, I discuss related literature, describe the data set and key measures, provide a descriptive analysis of behavior and attitudes of CAP borrowers with respect to strategic default, and present a variety of probit regressions evaluating the geographic and loan-origination factors most predictive of these outcomes. I conclude with policy suggestions and directions for future research.

2 Related Literature

Measuring strategic default is not straightforward, because the intentions of delinquent borrowers are not directly observable. By definition, negative equity is a necessary condition for a default to be strategic; thus, an upper bound on the fraction of defaults that are strategic can be obtained simply by identifying which borrowers who are in default also have negative equity. However, such a metric is unsatisfactory for identifying likely strategic defaulters, because it fails to distinguish between delinquent underwater borrowers who are facing liquidity constraints and those who are not.

While a large existing economics and finance literature has demonstrated that the level of equity relative to the outstanding mortgage balance (i.e., the loan-to-value ratio) is a key driver of mortgage default, many studies have discussed the fact that borrowers typically do not engage in strategic default until they experience negative equity in excess of at least 10-20% of the value of their properties (e.g., Vandell, 1995; Foote et al, 2008). Some researchers have suggested that

the necessary shortfall is actually more than 60% for many borrowers (Bhutta et al, 2010). The fact that borrowers do not default ruthlessly when the loan-to-value ratio reaches 100% has been attributed to various factors, such as the option-value of defaulting in the future (Kau and Keenan, 1993; Kau et al, 1994) or the transaction costs, both financial and emotional, associated with moving house (Cunningham and Hendershott, 1984; Foster and Order, 1985). For these reasons, efforts have been made to identify as strategic defaulters only those borrowers who are not obviously facing binding liquidity constraints and who also have substantial negative equity at the time of default.

In the literature concerning strategic default during the recent economic recession and ongoing recovery, one approach to measuring the prevalence of strategic default involves the use of large credit bureau and/or lender data sets with broad coverage of the U.S. mortgage market and categorizes borrowers based on mortgage payment history and the extent to which they are current on other credit obligations, such as credit cards or automobile loans.³ This approach forms the basis of the statistics published in industry white papers, such as those produced by Experian. Based on these data, delinquent borrowers are assigned to one of the following categories:

- Distressed default - These borrowers have defaulted on both their mortgage and other credit lines, indicating systematic financial distress. These borrowers have insufficient income or assets to service any of their credit obligations fully.

³ Along similar lines, Bhutta et al (2010) use CoreLogic loan performance and house price index data for 2006-2009 to estimate the negative equity threshold at which the median borrower in the sand states of California, Arizona, Florida, and Nevada chose to default strategically. In addition, Bajari et al (2010) use CoreLogic loan performance data and Case-Shiller house price index data for 2000-2007 to estimate the effect of negative equity on the likelihood of subprime mortgage default.

- Cash flow management - These borrowers have defaulted on their mortgages but are current on other credit lines. These borrowers have sufficient income or assets to cover either the mortgage or other credit obligations, but not both, and are thus viewed as making a conscious decision to default on the mortgage rather than sacrifice access to other credit lines.
- Strategic default - Like cash flow managers, these borrowers have defaulted on their mortgage but remain current on other credit lines. However, these borrowers have sufficient income or assets to service all credit obligations and have thus chosen to stop paying the mortgage solely as a result of having substantial negative equity.

Under this approach, one difficulty is distinguishing cash-flow managers from strategic defaulters, because cash flow and assets are generally not observed by the lender at the time of default, and both groups are superficially distinguished as having defaulted on the mortgage but remaining current on all other credit lines. To deal with this issue, attempts have been made to differentiate these two groups based on their payment history, the thought being that true strategic defaulters will not make any payments or attempt to cure their delinquencies after having missed a payment. Strategic defaulters are, therefore, those delinquent borrowers with negative equity who are current on other credit lines and are observed to have a 30-60-90 straight roll in consecutive months in their payment history, with the 90-day-plus delinquency still persisting for months after the initial default. Under this definition, borrowers who made any payments after their initial missed payment are excluded from the set of strategic defaulters.

Another approach to measuring the prevalence of strategic default in recent years involves survey data.⁴ In particular, Guiso et al (2009, 2011) use data from the Chicago Booth/Kellogg School Financial Trust Index Survey (FTIS) to investigate how attitudes toward strategic default vary by individual demographic and emotional characteristics. Their sample is designed to be generally representative of U.S. households, and their survey questions are of the following form:

- *Do you think it is morally wrong to walk away from a house when one can afford to pay the monthly mortgage?*
- *If the value of your mortgage exceeded the value of your house by [\$50K / \$100K / \$150K], would you walk away from your house (that is, default on your mortgage) even if you could afford to pay your monthly mortgage?*
- *How many people do you know who have defaulted on their house?*
- *How many people do you know who have walked away from his/her house (that is, defaulted on their mortgage) even if he/she could afford to pay the monthly mortgage?*

The first and second of these survey questions assess respondent attitudes concerning the morality of default and sensitivity to declining house prices. Moreover, when combined with house value estimates, they permit an evaluation of what threshold level of negative equity would be required to induce strategic default. The third and fourth questions can be used to create a ratio of strategic defaults to total defaults and thereby measure the perceived incidence of strategic default among peers. Respondents who perceive strategic default to be more common

⁴ In a related vein of research also based on self-reports, Seiler et al (2011a), Seiler et al (2011b), Seiler et al (2011c), and Seiler (2012) use experimental data and/or simulations to investigate the extent to which behavioral factors drive strategic default.

may be more inclined to default strategically themselves, so this measure also permits an evaluation of how social norms influence attitudes.

In this paper, I approach the measurement of strategic default using both administrative mortgage performance data and attitudinal survey data. Measuring strategic default in a manner that is largely consistent with these prior analyses makes it possible to compare the behavior and attitudes of low-income households (as measured using CAP data) with those of U.S. homeowners more generally (as previously captured by credit bureau data and the FTIS). I describe the CAP data set, specific measures, and empirical methods below.

3 Data and Descriptive Analysis

3.1 Measures

For analytic purposes, I begin with all 20,209 CAP loans originated in 1999 or later⁵ for which complete house price and loan origination data are available. I then classify these loans based on the pattern of mortgage payments during the last two years prior to either termination (for inactive loans) or the end of 2012Q1 (for active loans), and based on whether the borrower had negative equity during that time. A loan is classified as seriously delinquent if the loan reached 90-day delinquency at any point during this two-year period. A total of 3,669 loans meet this criterion. Moreover, following the approach of the recent industry analyses that make use of credit bureau data, I further classify those borrowers who had negative equity and whose payment histories indicate a straight roll (with no subsequent attempt to cure) as likely strategic

⁵ The loans in the CAP survey were all originated in 1999 or later, so I exclude earlier loans from the full sample.

defaulters.⁶ Using this information, I create three alternative strategic default measures that reflect varying levels of negative equity:

- *StratDef*: Straight roll and negative equity.
- *StratDef10*: Straight roll and negative equity of at least 10%.
- *StratDef20*: Straight roll and negative equity of at least 20%.

I then create several additional strategic default measures for CAP survey respondents based on the survey data collected in 2011. In particular, 1,097 of the 20,209 borrowers in the full sample provided survey responses in 2011 and continue to be homeowners.⁷ Respondents were asked whether they consider strategic default to be morally wrong and whether they would be willing to default strategically at each of four possible shortfall values: \$20K, \$50K, \$100K, and \$200K. Respondents were also asked how many people they knew who had defaulted on their mortgages, as well as how many of those had, to their knowledge, defaulted strategically. From these latter responses, I create a ratio and calculate the average perceived strategic default rate. The CAP survey questions are worded similarly to those analyzed by Guiso et al (2009, 2011), and I construct the derived measures to be comparable. Finally, I also use self-reported house prices and equity to create a measure of the reported default threshold (\$20K, \$50K, etc.) as a fraction of perceived house value. This measure provides a rough guide as to what percentage shortfall would potentially induce strategic default among survey respondents.

⁶ Because credit bureau information about delinquency on other credit lines is not available, these strategic default indicators can be interpreted as providing an upper bound on the fraction of these borrowers who are defaulting strategically.

⁷ Only current homeowners received the negative equity questions about whether they would be willing to walk away from their homes, because renters do not have an owned home on which to base their responses.

3.2 *Loan Origination Characteristics Overview*

I present descriptive statistics for CAP loan origination characteristics in Table 1. The first column of the table contains information about the full sample of 20,209 loans, while the second and third columns contain information about two subsamples. The first subsample represents 18% of the full sample and consists of the 3,669 borrowers who are classified as seriously delinquent based on the criteria described above. The second subsample comprises the 1,097 borrowers who completed the 2011 CAP survey. The overlap between these two subsamples is approximately 10%.

Loans in the full sample were originated between 1999 and 2007, with about 20% originated in 2001. An additional 15% were originated in 2002, with about 10% originated in each year from 2003 to 2005. An additional 10% were originated after 2005. About 20% of loans in the full sample were made to borrowers located in North Carolina. The next two most highly represented states are Ohio (12%) and Oklahoma (10%). Moreover, 14% of CAP properties are located in the sand states of California, Arizona, Florida, and Nevada, with 31% in low-to-moderate-income (LMI) census tracts and 27% in minority census tracts. (A low-to-moderate-income tract is defined as a census tract where the median income is less than 80% of the U.S. Department of Housing and Urban Development Estimated Median Incomes. A minority census tract is defined as a census tract in which the minority representation, as a fraction of the population, is greater than 50%.) About half of the underlying properties are single-family residences, and 12% are located in rural areas. On average, these properties were valued at about \$96,000 at loan origination.

The average annual household income of borrowers in the full sample was \$33,326 at loan origination, and their average origination credit score and debt-to-income ratio were 682

and 36%⁸, respectively. These loans were originated with an average loan-to-value ratio of 95% and average interest rate of 7.1%.

The subsample of 3,669 seriously delinquent loans also comprises loans that were originated between 1999 and 2007, but a larger fraction (18% vs.10%) was originated after 2005. Among seriously delinquent loans, representation is higher in Ohio (18% vs. 12%), in rural areas (14% vs. 12%), and in LMI census tracts (35% vs. 31%) as compared with the full sample. Representation is lower in Oklahoma and the sand states. In addition, borrowers in the seriously delinquent sample exhibited slightly lower incomes (\$32,000 vs. \$33,000) and lower credit scores (644 vs. 682) on average than borrowers in the full sample, and they purchased less expensive properties (\$88,000 vs. 96,000) at slightly higher interest rates (7.3% vs. 7.1%). However, the loans in the seriously delinquent sample are similar to those in the full sample with respect to average loan-to-value ratio and debt-to-income ratio at loan origination, and with respect to a similar fraction having purchased single-family detached housing.

The subsample of 1,097 loans made to the 2011 CAP survey respondents is similar to the full sample with respect to average origination credit score, loan-to-value ratio, and debt-to-income ratio. However, these loans were all originated before 2004, with half originated in 2002 and an additional 25% originated in 2001. Moreover, the survey sample more heavily represents North Carolina (31% vs. 21%) and Oklahoma (20% vs. 10%) and is considerably less likely to be located in the sand states (5% vs. 14%). The properties of survey respondents are also more likely to be located in rural areas (17% vs. 12%), slightly less likely to be in LMI census tracts

⁸ To avoid confusion, note that I use the term *debt-to-income ratio* in the manner in which it is used in the mortgage industry. It is *not* a ratio of total outstanding debt to annual income, but is instead a ratio of monthly debt payments to monthly income. This measure is also known as the *back-end ratio* and is routinely used for underwriting purposes.

(27% vs. 31%) or minority census tracts (22% vs. 27%), and more likely to be single-family detached residences (62% vs. 53%). Survey respondents also purchased less expensive houses (\$81,000 vs. \$96,000) at higher interest rates (7.4% vs. 7.1%) and had a slightly lower household income (\$31,000 vs. \$33,000) at loan origination.

One important limitation of the analysis, therefore, is that the survey measures of strategic default attitudes are not available for all CAP borrowers for whom loan origination data and payment history are available. In particular, most of the loans in the survey sample did not experience serious delinquency, so this makes it impossible to dig very deeply into attitudinal differences between those seriously delinquent borrowers in the full sample who defaulted strategically and those who did not. However, the largest differences between the survey sample and the full sample involve loan origination date and property location. Moreover, all of the CAP borrowers self-selected into the same lending program. Therefore, the survey estimates concerning strategic default attitudes, which I discuss below, should reflect general CAP borrower attitudes to the extent that all CAP borrowers would have expressed similar attitudes under comparable experiences in the housing market.

3.3 Strategic Default Descriptive Analysis

I present descriptive statistics for current loan activity status and the strategic default measures by sample in Table 2. As indicated in the second column of the table, approximately 40% of the seriously delinquent loans terminated in a foreclosure sale. An additional 17% were returned to the originating lender, while 8% managed to prepay their CAP mortgages, and 35% remained active as of 2012Q1. In comparison, only about 7% of the full sample and 3% of the survey sample experienced a foreclosure sale.

Among seriously delinquent borrowers, 35% had negative equity, 24% had at least 10% negative equity, and 17% had at least 20% negative equity. Moreover, 29% of seriously delinquent borrowers went through a straight roll. However, only 13% of seriously delinquent borrowers had both a straight roll and negative equity; this fraction falls further, to 9% and 7%, respectively, if seriously delinquent borrowers with negative equity of at least 10% or at least 20% are considered. Put differently, one in eight, or about 13% of borrowers with negative equity of at least 20% of the house value went through a straight roll. Thus, most seriously delinquent borrowers defaulted for liquidity reasons rather than because of having substantial negative equity, and strategic default incidence for this cohort appears to be in the neighborhood of 7-13%. This range is consistent with the estimates of 9-12% previously obtained by Experian and Oliver Wyman (2009, 2010, 2011), Morgan Stanley (2010), and Fair Isaac (2011) for borrowers with similar income levels, credit scores, and loan balances.⁹

Among survey respondents, about 82% said that they believed strategic default to be morally wrong. Moreover, 36% reported knowing someone who had defaulted on a mortgage, while 14% reported knowing someone who had defaulted strategically. The average perceived strategic default rate in the sample, obtained as the average of the ratio of known defaulters to known strategic defaulters, is 32%. These estimates are similar to those obtained by Guiso et al (2009, 2011), who found that 81% of borrowers in the nationally representative Financial Trust Index Survey (FTIS) believed strategic default to be morally wrong and calculated a perceived strategic default rate of 35%. Thus, low-income borrowers appear to have similar beliefs about the morality of strategic default and a similar perception of the prevalence of strategic default among their peers as do U.S. homeowners overall.

⁹ Both negative equity rates and serious delinquency rates increased after 2004, so limiting the sample to loans originated during or after 2004 does not substantively change the estimated rates of strategic default.

With regard to the dollar threshold at which they would hypothetically be willing to strategically default, 13% of CAP survey respondents said that they would default at a shortfall of \$20K. This percentage rises to 31% (an additional 18%) at a shortfall of \$50K, and 54% (an additional 23%) at a shortfall of \$100K. In contrast, the estimates of Guiso et al (2009, 2011) suggest that 9% and a cumulative 23% of FTIS homeowners would be willing to default strategically when the threshold reaches \$50K and \$100K, respectively. Thus, CAP survey borrowers express a greater willingness to default strategically for a given dollar-valued amount of negative equity.

Given that the median perceived house value in the CAP survey sample at the time of the 2011 survey was approximately \$100,000, these survey responses also indicate that a large fraction of low-income borrowers would not be willing to default strategically even if they experienced negative equity in excess of 100% of the house value. In fact, taking the ratio of the indicated default threshold and the perceived property value suggests that the median CAP survey borrower would default at 110% negative equity, and that approximately 30% would default at 60% negative equity.¹⁰

As a further comparison with the results of Guiso et al (2011), I consider the default propensity over several ranges of negative equity as a fraction of the house value and by ranges of household wealth; these results are presented in Table 3. Guiso et al (2011) report that about 12% of FTIS respondents would be willing default at negative equity of \$50K when this value represents a shortfall of 30-40% or 40-50% of the house value. The likelihood of default at \$100K negative equity is about seven percentage points higher for a given percentage of negative equity, indicating a default rate of about 19% in those ranges. In comparison, about 30% of

¹⁰ Note that Bhutta et al (2010) obtained a median default threshold of 62% for a broader sample of homeowners in states that experienced highly volatile house prices.

CAP survey respondents express a willingness to default strategically at \$50K when this represents between 30% and 50% of the house value, and just slightly more than 40% express a willingness to default strategically at negative equity of \$100K over the same range. Therefore, CAP borrowers express a greater willingness to default at a given equity shortfall, both in absolute terms and relative to the value of the house.

Relative to household wealth, Guiso et al (2011) also report that, at household wealth of less than \$100K, slightly less than 20% of FTIS respondents would default at negative equity of \$50K. This fraction rises to slightly more than 40% at negative equity of \$100K. Similarly, at household wealth between \$100K and \$200K, the percentages willing to default are about 10% and 25% at \$50K and \$100K negative equity, respectively. The corresponding default propensities for CAP borrowers are 33% and 56% at household wealth less than \$100K, and 31% and 53% at household wealth between \$100 and \$200K. Thus, CAP borrowers also express a greater willingness to default strategically at a given equity shortfall relative to household wealth.

4 Drivers of Strategic Default

4.1 Models

In an effort to ascertain which low-income households are most likely to default strategically, I estimate a series of probit regressions predicting the strategic default outcomes discussed above. For the sample of seriously delinquent borrowers, the models predict the likelihood of having at least 20% negative equity and performing a straight roll (*StratDef20*). For the survey sample, the models predict whether the borrower believes strategic default to be morally wrong and whether he would default strategically at each of four different negative equity thresholds as a percentage

of the perceived house value: 20%, 60%, 80%, and 100%. Individual demographic and emotional factors have previously been found to influence default rates and attitudes toward strategic default (Guiso et al, 2009, 2011). Therefore, I focus this part of the analysis on the underwriting criteria, loan characteristics, and geographic factors that both lenders and government agencies may readily use to differentiate mortgages, and on the relationship of these factors to strategic default behavior and attitudes, which have the potential to be influenced.

With regard to loan characteristics, I specifically consider origination year, household income, credit score, and debt-to-income ratio, as well as the mortgage interest rate and loan servicer. I also consider property type (single-family detached vs. other) and geographic location. Specifically, I consider indicators for whether the property is located in one of the sand states, in an LMI census tract, or in a minority census tract. Tract income and minority characteristics are used as qualification criteria for community reinvestment lending and other government housing programs, so the relationship of these measures to the strategic default outcomes has potential relevance for government policies. I also control for household-level demographic variables where these are available. For the full sample, only information on race and gender are available; for the survey sample, I include a wider variety of controls for race, gender, marital status, age, education level, and the presence of children in the household. However, omitting these demographic variables from the specifications does not substantively alter the results.¹¹

I omit the original loan-to-value ratio (OLTV) from all of the models because nearly all of the loans in the sample are very high-OLTV loans. Because of the restriction of range in this variable within this sample, OLTV is not a significant determinant of any of the outcomes

¹¹ The bivariate correlations of the variables included in the models all fall below 0.6 and are generally below 0.05 in absolute value.

considered. In addition, the amount of equity that each respondent has as a fraction of house value is almost completely determined by the year of loan origination and the geographic location of the property, and this should be kept in mind while interpreting the results. Thus, the models include both geographic controls and fixed effects for the loan origination year but not the amount of equity held in the house, and the former variables can be considered a proxy for the latter. Finally, household income is highly correlated with the original loan balance and property value, and either of the latter appears to have a similar relationship to the outcomes as household income, so I omit these other variables from the models that I present.

In predicting observed strategic default, I consider all 3,669 seriously delinquent borrowers. However, for the survey sample, I present models for only the subset of 359 respondents with CAP loans that are still active. Because it is possible that survey respondents with inactive loans (which are primarily prepaid loans) may differ in systematic ways from those who still have active CAP loans, I also estimate a Heckman probit selection model¹² to test for the presence of a selection effect that could bias the estimates. However, I am not able to reject the null hypothesis of no sample selection being present, and the average marginal effects estimated under these two models are very similar. Therefore, I only present estimates from the standard probit model here.

4.2 *Strategic Default among Seriously Delinquent Borrowers*

In Table 4, I present average marginal effects from three probit specifications predicting *StratDef20*, which is the indicator for whether a seriously delinquent borrower had at least 20% negative equity and went through a straight roll when defaulting on the mortgage. The first specification includes loan and borrower characteristics at loan origination, as well as controls

¹² See Heckman (1979) for a discussion of sample selection bias.

for whether the property is a single-family residence and whether it is located in one of the sand states. This last measure is substantively the most important predictor, as being located in one of the sand states contributes nearly 15 percentage points to the likelihood of strategic default. The next most salient predictor is borrower origination income, followed by borrower origination credit score and the note rate. A one-percent increase in annual income is associated with more than a five-percentage-point increase in the likelihood of strategic default. A credit score above 720 and a one-point increase in the interest rate are each associated with about a two-percentage-point greater likelihood of strategic default. The origination year fixed effects are also significant, indicating that loans originated more recently have been at greater risk of strategic default.

The second specification in Table 4 incorporates the additional impact of being located in an LMI census tract or a minority census tract. The minority tract indicator is not significant, but being located in an LMI tract is associated with an increased likelihood of strategic default by about two percentage points. In the third specification, fixed effects for loan servicer are added. The existing estimates remain largely unchanged, but servicing effects are significant and do provide additional information about the likelihood of strategic default. The magnitude of servicer effects ranges between one-half and four percentage points in absolute value.

I also consider the possibility that the influence of geography may vary with the economic environment, but interactions between the sand states indicator and the tract characteristics indicators are not significant; I therefore do not include these interaction terms in these specifications. As discussed below, however, such interactions are important for explaining morality and strategic default attitudes.

4.3 *Morality Beliefs among Survey Borrowers*

In Table 5, I present average marginal effects from four specifications predicting whether those survey respondents with active loans believe that strategic default is morally wrong. The first specification comprises the same set of loan origination and borrower characteristics considered in specification 1 of Table 4. All of these predictors are highly significant.

Again, location appears to be a primary factor associated with the outcome. Being located in one of the sand states is associated with a lower likelihood of believing that strategic default is morally wrong by about 10 percentage points. Having a credit score above 720 has a similar association, increasing the likelihood by about 11 percentage points. A one-percent increase in annual income increases the likelihood by five percentage points. Smaller associations obtain for a one-point increase in the interest rate (about four percentage points), having a single-family property (about four percentage points), and having an origination debt-to-income ratio above 38% (about three percentage points).

The second specification in the table incorporates the indicators for LMI and minority tracts and considers the interactions of these variables with the sand states indicator. In predicting beliefs about morality, these interactions are highly significant. The magnitude of the estimated effects of the other variables in this specification remains largely unchanged. The results indicate that respondents in sand states who are located non-LMI and non-minority census tracts are about three percentage points less likely than similar respondents in other states to believe that strategic default is morally wrong. Residents of LMI tracts in sand states are about 11 percentage points more likely to believe that strategic default is morally wrong, while those not in sand states are about five points less likely. Residents of minority census tracts located in sand states are nearly 42 percentage points less likely to believe that strategic default is morally

wrong, while those in minority tracts not in sand states are nearly six percentage points more likely to believe that strategic default is morally wrong. Thus, the relationship between neighborhood attributes and morality beliefs is mediated by the broader state environment.

The third specification in Table 5 includes responses to the survey questions asking whether the respondent knows someone who defaulted on a mortgage or defaulted strategically on a mortgage. Both variables have a significant but substantively small (less than one percentage point) association with the outcome. Respondents who know any defaulters or any strategic defaulters are slightly less likely to consider strategic default morally wrong. The final specification in this table includes servicer fixed effects, which are again significant although small, at slightly less than one percentage point. The other point estimates again remain largely unchanged, indicating that servicing contributes to borrower beliefs over and above the other factors considered.

4.4 Hypothetical Strategic Default among Survey Borrowers

In Table 6, I present average marginal effects for four models predicting different negative equity thresholds at which the respondents indicated that they would hypothetically be willing to engage in strategic default. For these models, I adopt the last specification presented in Table 5, which captures all of the factors that are related to beliefs about the morality of strategic default, and then I also control for those beliefs themselves. Thus, these models capture the contribution of loan features and geography while holding morality beliefs constant.

The first model predicts whether the borrower would default strategically if he had negative equity of at most 20% negative equity as a fraction of the perceived house value. The

remaining three models similarly predict strategic default thresholds of $\leq 60\%$, $\leq 80\%$, and $\leq 100\%$.

In these models, annual income, the debt-to-income ratio, and the interest rate on the mortgage all have a positive and significant effect on the likelihood of strategic default, regardless of which of the four strategic default measures is considered. The association of a marginal increase in income ranges between five and 13 percentage points. Similarly, having a high debt-to-income ratio is associated with increased risk of five to eight percentage points, and a marginal increase in the interest rate contributes between one and four percentage points. In addition, borrowers who believe that strategic default is morally wrong are between four and 15 percentage points less likely to express a willingness to default at these thresholds. Moreover, servicing effects remain highly significant throughout and range between four and 11 percentage points.

However, the relationships of the other variables to the likelihood of strategic default are not monotonic. For example, having a high credit score is associated with a one or two percentage point greater likelihood of strategic default at a threshold of 20% or 60%, but it is associated with a two or three percentage point lower probability of strategic default at a threshold of 80% or 100%. To understand this result, note that these models are capturing not only the relationship of covariates to the likelihood of strategic default at a higher or lower threshold, but also the likelihood of strategic default at all. Thus, those borrowers with higher credit scores are more likely to default strategically at smaller amounts of negative equity. However, when strategic default at very high levels of negative equity is considered, the relationship is reversed, indicating that those with higher credit scores are also less likely to en-

gage in strategic default at all. Thus, it appears that higher-credit-score borrowers are less likely to default strategically but that, if they do, they are likely to do it sooner. A similar pattern obtains for borrowers who know any strategic defaulters and borrowers who are living in single-family properties.

Finally, location again appears to be the key driver of strategic default, although the effects vary considerably by threshold. Residents of LMI tracts not located in sand states are less likely to express a willingness to default strategically at any threshold, but those in sand states are enormously more likely. Being located in an LMI tract in one of the sand states almost perfectly predicts strategic default at small amounts of negative equity. The association is smaller when higher thresholds are considered, but the association remains strong. Overall, this association ranges between 30 and 90 percentage points.

Residents of minority tracts in sand states are slightly more likely to express a willingness to strategically default, and this association is between one and 10 percentage points. However, this effect is concentrated at either very low or very high levels of negative equity; at intermediate thresholds, these borrowers are less likely to default strategically.

Residents of non-LMI, non-minority tracts in sand states are considerably less likely than those in similar tracts in other states to express a willingness to default strategically. Thus, residents of sand states are on average more likely to express a willingness to default strategically, but this association stems almost entirely from the responses of residents of LMI tracts in these states.

4.5 *Discussion*

Overall, the factors that are consistently predictive of strategic default behavior and attitudes for this population are income, the interest rate, geographic location, the timing of loan origination, and the loan servicer. Intuitively, we can sketch a rough picture of the low-income borrower who is most likely to default strategically as one who has a relatively higher income and a more recently originated loan and who faces a higher interest rate and lives in a state or neighborhood that has been especially hard hit by the financial crisis. He will also have had an unpleasant experience with his servicer.

Although the other regressors considered in the models are predictive of borrower attitudes, it is not clear that these are related to strategic default in practice. In particular, considering the results of the earlier descriptive analysis, the discrepancy between observed behavior among seriously delinquent borrowers and the expressed willingness to default of survey respondents suggests that some borrowers may overestimate or overstate their true likelihood of walking away from an underwater mortgage. Along these lines, the tract-level indicators interacted with the sand states indicator are predictive of attitudes/beliefs but not of observed strategic default. In other words, respondents living in LMI census tracts in sand states are more likely to express a willingness to default strategically, but it is not clear that they are actually more likely to follow through than are residents of non-LMI tracts in those states, especially since the former are, ironically, also the group most likely to express the belief that strategic default is morally wrong.

More generally, the fact that CAP survey respondents state a greater willingness to default strategically than FTIS respondents, combined with the fact that CAP borrowers actually exhibit a lower strategic default rate when compared to borrowers nationally, suggests that

attitudinal survey data may be an imprecise way to capture the true strategic default propensity of the low-income population. At a minimum, CAP borrowers greatly overestimate the rate of strategic default among their peers, if we assume that those peers have similar tendencies as these borrowers themselves. This overestimation may be happening because, as noted by Seiler et al (2011c), “strategic defaulters are more likely to share that they defaulted by choice than they are to admit default due to economic hardship.” In other words, survey respondents may perceive strategic default to be much more prevalent than it actually is.

Nevertheless, the additional predictors of attitudes and beliefs do provide some insight into the thought process, and perhaps the decisions-making process, of these borrowers. For example, the fact that knowing someone who has defaulted strategically somewhat increases the expressed willingness to default strategically and reduces the likelihood of believing that strategic default is morally wrong supports the idea that social networks matter in driving strategic default; this inference is consistent with previous work by Guiso et al (2009, 2011) and Seiler et al (2011a,b). That borrowers with higher credit scores are also more likely to default strategically at smaller values of negative equity also suggests that such borrowers are also more financially savvy; this finding corroborates prior work by Experian and Oliver Wyman (2009, 2010, 2011), Morgan Stanley (2010), and Fair Isaac (2011).

In addition, the relationship of the debt-to-income ratio to borrower attitudes among survey respondents is noteworthy, as it suggests that the strategic default decision may hinge in part on the total amount of debt that the borrower is carrying. This decision could be related both to cash flow considerations and to lifetime wealth maximization. Even if the borrower is not technically liquidity constrained in the sense of defaulting because he has less cash on hand than the amount of his mortgage payment, he may be making a judgment call with respect to how

much debt he feels comfortable carrying, given his income and ability to repay that debt, especially if part of that debt is no longer collateralized and is essentially being paid into a black hole. Alternatively, there could also be some type of endogeneity in the data, whereby borrowers who feel more comfortable defaulting are also likely to carry more debt.

5 Conclusions

In this paper, I have considered the incidence and drivers of strategic default behavior and attitudes among low-income homeowners who received community reinvestment loans as part of the Community Advantage Program. The results are consistent with economic theory suggesting that equity-driven defaults should be relatively more common among high-income borrowers than among low-income borrowers (LaCour-Little and Yang, 2010; Campbell and Cocco, 2011). Intuitively, low-income borrowers are more likely to face binding liquidity constraints, so payment-driven defaults should represent a higher fraction of total defaults for this population. Moreover, it appears that low-income borrowers are less likely to default strategically despite the fact that they express similar beliefs about the morality of strategic default and a greater willingness to walk away from an underwater mortgage. In consequence, it may be that a greater prevalence of liquidity constraints among low-income households is masking a greater tendency to default strategically in the absence of such constraints, or it may be that there is a large disconnect between the stated attitudes and actual behavior of this population. Therefore, a potential avenue for future research is to examine in greater detail exactly how attitudes and beliefs translate into behaviors in this context.

From a policy perspective, some industry analysts and academic researchers have suggested various means of preventing further strategic defaults; these typically focus on ways to

influence social norms (Seiler et al, 2011a,b), reduce the amount of negative equity (Zingales, 2010; Edmans, 2010), and improve servicing (Fair Isaac, 2011; Experian and Oliver Wyman, 2009; Seiler, 2012). The results of this paper do provide support for the ideas that reducing the amount of negative equity is important for reducing the likelihood of strategic default among low-income homeowners, and that social factors and servicing also play an important role. However, the results of this paper also suggest that most defaults among low-income households are not strategic. Rather, liquidity constraints are the primary default driver for this population, with other factors providing secondary motivation. Thus, low-income default behavior appears consistent with existing dual-trigger theories suggesting that negative equity is neither a necessary nor sufficient condition for mortgage default and that insolvency can play a key role (Vandell, 1995; Elmer and Seelig, 1999). Therefore, any interventions that are designed to reduce the overall default rate for low-income households should take into consideration not only the level of negative equity and social norms toward mortgage default but also the liquidity constraints and borrowing costs faced by the household. An integrated approach that addresses all of these factors is likely to be most effective.

In particular, the practical relevance of this paper for community reinvestment practitioners is similar to that of other recently published analyses of strategic default for practitioners in the broader mortgage market: lenders and servicers who interact with low-income borrowers in the field can use the presented information to distinguish likely strategic defaulters from other defaulters and thus treat each group most appropriately. The current analysis suggests that the former type of defaulter will have negative equity, a relatively higher income, a higher mortgage interest rate, a more recently originated loan, and a property located

in one of the sand states. These borrowers are likely to be most responsive to attentive customer service and modifications that address the negative equity situation. In contrast, the latter type of borrower will likely be most responsive to a reduced monthly payment, which could be achieved in a variety of ways. Moreover, both types of borrowers may be responsive to a reduction of the interest rate. To the extent that moral hazard is a concern, such concessions could be made contingent upon successful future repayment, as has been suggested by Edmans (2010). Finally, keeping in mind that most low-income borrowers will not be defaulting for strategic reasons, practitioners would be advised to rely more heavily on payment history and underwriting information than on self-reported attitudes when making loan modification decisions.

References

- Bajari P, Chu S, Park M (2010) An Empirical Model of Subprime Mortgage Default from 2000 to 2007. Working Paper
- Bhutta N, Dokko J, Shan H (2010) The Depth of Negative Equity and Mortgage Default Decisions. Working Paper 2010-35, Finance and Economics Discussion Series, Division of Research & Statistics and Monetary Affairs, Federal Reserve Board, Washington, D.C.
- Campbell JY, Cocco JF (2011) A Model of Mortgage Default. NBER Working Paper 17516
- Cunningham D, Hendershott P (1984) Pricing FHA Mortgage Default Insurance. Housing Finance Review, October
- Edmans A (2010) The Responsible Homeowner Reward: An Incentive-Based Solution to Strategic Mortgage Default. Working Paper
- Elmer PJ, Seelig SA (1999) Insolvency, Trigger Events, and Consumer Risk Posture in the Theory of Single-Family Mortgage Default. Journal of Housing Research 10(1):1-25
- Experian and Oliver Wyman (2009) Understanding Strategic Default in Mortgages, Part I. Experian and Oliver Wyman Market Intelligence Report
- Experian and Oliver Wyman (2010) Understanding Strategic Default in Mortgages: Q2 2010 Update. Experian and Oliver Wyman Market Intelligence Report
- Experian and Oliver Wyman (2011) Strategic Default in Mortgages: Q2 2011 Update. Experian and Oliver Wyman Market Intelligence Report
- Fair Isaac (2011) Predicting Strategic Default. Fair Isaac Corporation White Paper
- Foot C, Gerardi K, Willen P (2008) Negative Equity and Foreclosure: Theory and Evidence. Journal of Urban Economics 64:234-245

- Foster C, Order RV (1985) FHA Terminations: A Prelude to Rational Mortgage Pricing. AREUEA Journal 13(3):273-291
- Guiso L, Sapienza P, Zingales L (2009) Moral and Social Constraints to Strategic Default on Mortgages. National Bureau of Economic Research Working Paper No. 15145
- Guiso L, Sapienza P, Zingales L (2011) The Determinants of Attitudes toward Strategic Default on Mortgages. Journal of Finance (forthcoming).
- Heckman JJ (1979) Sample Selection Bias as a Specification Error. Econometrica 47(1):153-161
- Kau JB, Keenan DC (1993) An Overview of Option-Theoretic Pricing of Mortgages. Journal of Housing Research 6(2):217-244
- Kau JB, Keenan DC, Kim T (1994) Default Probabilities for Mortgages. Journal of Urban Economics 35:278-296
- LaCour-Little M, Yang J (2010) Pay Me Now or Pay Me Later: Alternative Mortgage Products and the Mortgage Crisis. Real Estate Economics 38(4):687-732
- Morgan Stanley (2010) Understanding Strategic Defaults. Morgan Stanley ABS Market Insights Report
- Riley SF, Ru H, Quercia R (2009) The Community Advantage Program Database: Overview and Comparison with the Current Population Survey. Cityscape 11(3)
- Seiler M (2012) The Effect of Perceived Lender Characteristics and Market Conditions on Strategic Mortgage Defaults. Working Paper
- Seiler M, Collins A, Fefferman N (2011a) Preventing the Spread of a Financial Contagion through a Social Network: An Epidemiological Approach. Working Paper
- Seiler M, Lane M, Harrison D (2011b) Mimetic Herding Behavior and the Decision to Strategically Default. Journal of Real Estate Finance and Economics (forthcoming)

- Seiler M, Seiler V, Lane M, Harrison D (2011c) Fear, Shame, and Guilt: Economic and Behavioral Motivations for Strategic Default. *Real Estate Economics* (forthcoming)
- Taylor P, Morin R, Wang W, Dockterman D (2010) Walking Away: A Third of the Public Says It's Sometimes OK to Stop Paying a Mortgage. Pew Research Center Social and Demographic Trends Report
- Vandell KD (1995) How Ruthless is Mortgage Default? A Review and Synthesis of the Evidence. *Journal of Housing Research* 6(2):245-264
- Zingales L (2010) The Menace of Strategic Default. *City Journal* 20(2)

Table 1: Summary of Loan Origination Characteristics

Variable	Full Sample N= 20,209		Seriously Delinquent N= 3,669		2011 Survey N= 1,097	
	Mean	STD	Mean	STD	Mean	STD
Annual Income	\$33,326	\$10,912	\$31,514	\$10,917	\$30,844	\$9,590
Credit Score	682	62	644	59	681	58
Debt-to-income Ratio	36%	9%	37%	8%	36%	8%
Loan-to-value Ratio	96%	7%	97%	5%	97%	7%
Note Rate	7.1%	0.9%	7.3%	0.9%	7.4%	0.9%
Property Value	\$95,539	\$43,283	\$88,886	\$40,330	\$81,377	\$30,195
Variable	Percent (%)		Percent (%)		Percent (%)	
Single Family	53		53		62	
North Carolina	21		19		31	
Ohio	12		18		11	
Oklahoma	10		8		20	
Sand States	14		6		5	
Rural	12		14		17	
LMI Tract	31		35		27	
Minority Tract	27		28		22	
Year Originated:						
1999	9		7		3	
2000	14		17		18	
2001	19		13		25	
2002	15		10		49	
2003	11		9		5	
2004	11		12		.	
2005	11		14		.	
2006	8		15		.	
2007	2		3		.	

Table 2: Summary of Current Loan Activity Status and Strategic Default Measures

	Full Sample N= 20,209	Seriously Delinquent N= 3,669	2011 Survey N= 1,097
Current Activity Status	Percent (%)	Percent (%)	Percent (%)
Active	37	35	33
Prepaid	53	8	63
Foreclosure Sale Held	7	40	3
Returned to Originator	4	17	2
Strategic Default Measures	Percent (%)	Percent (%)	Percent (%)
Seriously Delinquent	18	100	10
Negative Equity	18	35	4
Negative Equity >= 10%	11	24	3
Negative Equity >= 20%	8	17	1
Straight Roll	5	29	4
Straight Roll and Negative Equity	2	13	1
Straight Roll and Negative Equity >= 10%	2	9	<1
Straight Roll and Negative Equity >= 20%	1	7	<1
Strategic Default at <= 20K Negative Equity	.	.	13
Strategic Default at <= 50K Negative Equity	.	.	31
Strategic Default at <= 100K Negative Equity	.	.	54
Strategic Default at <= 200K Negative Equity	.	.	65
Strategic Default at <= 20% Negative Equity	.	.	6
Strategic Default at <= 60% Negative Equity	.	.	27
Strategic Default at <= 80% Negative Equity	.	.	35
Strategic Default at <= 100% Negative Equity	.	.	43
Strategic Default Morally Wrong	.	.	82
Knows Any Defaulters	.	.	36
Knows Any Strategic Defaulters	.	.	14
Perceived Strategic Default Rate (Mean)	.	.	32

Table 3: Default Propensities by Household Wealth and Negative Equity

2011 Survey N =1,097	% Strategically Defaulting at:		
	<= \$20K	<= \$50K	<= \$100K
Household Wealth			
< \$100K	15	33	56
\$100-200K	16	31	53
>= \$200K	4	18	46
Fraction of House Value			
10-20%	12	17	29
20-30%	15	17	21
30-40%	17	28	42
40-50%	23	31	41

Table 4: Average Marginal Effects Predicting *StratDef 20*

Specification:	1	2	3
Constant	.	.	.
ln(Annual Income)	5.44 (1.18)***	5.85 (1.20)***	5.71 (1.16)***
Credit Score > 720	2.31 (0.12)*	2.49 (1.31)*	2.40 (1.27)*
DTI Ratio > 38%	0.60 (0.76)	0.67 (0.76)	0.76 (0.74)
Note Rate	1.89 (0.68)***	1.86 (0.68)***	2.40 (0.78)***
Single Family	- 0.04 (0.89)	0.01 (0.89)	-0.60 (0.86)
Sand States	14.93 (2.68)***	13.67 (2.61)***	13.32 (0.30)***
LMI Tract	.	2.34 (0.99)**	2.48 (0.98)**
Minority Tract	.	0.47 (0.99)	0.71 (0.99)
Demographic Controls	Yes**	Yes**	Yes*
Loan Year Fixed Effects	Yes***	Yes***	Yes***
Servicer Fixed Effects	No	No	Yes***
<i>N</i>	3,669	3,669	3,669
<i>Pseudo - R</i> ²	0.21	0.21	0.22

Notes:

*** indicates $p \leq 0.01$, ** indicates $p \leq 0.05$, and * indicates $p \leq 0.10$.

For ease of interpretation, all estimates are multiplied by 100. Standard errors are provided in parentheses. The dependent variable is an indicator for whether the borrower experienced both a straight roll and at least 20% negative equity.

Table 5: Average Marginal Effects Predicting Morally Wrong

Specification:	1	2	3	4
Constant
ln(Annual Income)	4.99 (0.36)***	4.93 (0.36)***	4.94 (0.36)***	4.97 (0.36)***
Credit Score > 720	11.76 (0.19)***	11.11 (0.19)***	11.03 (0.19)***	11.00 (0.19)***
DTI Ratio > 38%	2.85 (0.22)***	2.88 (0.22)***	2.93 (0.22)***	2.91 (0.22)***
Note Rate	3.75 (0.18)***	4.31 (0.17)***	4.29 (0.17)***	4.12 (0.18)***
Single Family	3.50 (0.27)***	3.60 (0.26)***	3.47 (0.26)***	3.46 (0.26)***
Sand States	-10.32 (0.76)***	-2.56 (1.04)**	-2.03 (1.03)**	-1.30 (1.03)
LMI Tract	.	-4.86 (0.31)***	-4.86 (0.31)***	-4.79 (0.31)***
Minority Tract	.	5.89 (2.66)***	5.93 (0.27)***	6.01 (0.27)***
Sand States * LMI Tract	.	15.96 (0.17)***	16.03 (0.16)***	16.15 (0.16)***
Sand States * Minority Tract	.	-47.81 (2.24)***	-48.02 (2.24)***	-49.35 (2.24)***
Knows Defaulters	.	.	-0.50 (0.27)*	-0.50 (0.28)*
Knows Strategic Defaulters	.	.	-0.95 (0.41)**	-0.95 (0.41)**
Demographic Controls	Yes***	Yes***	Yes***	Yes***
Loan Year Fixed Effects	Yes***	Yes***	Yes***	Yes***
Servicer Fixed Effects	No	No	No	Yes***
<i>N</i>	359	359	359	359
<i>Pseudo - R</i> ²	0.06	0.07	0.07	0.07

Notes:

*** indicates $p \leq 0.01$, ** indicates $p \leq 0.05$, and * indicates $p \leq 0.10$.

For ease of interpretation, all estimates are multiplied by 100. Standard errors are provided in parentheses. The dependent variable is an indicator for whether the respondent believes that strategic default is morally wrong.

Table 6: Average Marginal Effects Predicting Default Threshold

Threshold:	<=20%	<=60%	<=80%	<=100%
Constant
ln(Annual Income)	5.29 (0.24)***	13.24 (0.46)***	4.65 (0.52)***	7.48 (0.54)***
Credit Score > 720	1.11 (0.20)***	2.30 (0.38)***	-2.67 (0.41)***	-1.65 (0.43)***
DTI Ratio > 38%	7.35 (0.21)***	5.12 (0.30)***	7.62 (0.34)***	5.01 (0.35)***
Note Rate	4.07 (0.15)***	3.53 (0.23)***	1.23 (0.25)***	2.55 (0.26)***
Single Family	4.09 (0.24)***	5.88 (0.39)***	-0.59 (0.41)	-1.06 (0.43)**
Sand States	-5.61 (0.10)***	-25.24 (0.16)***	-16.81 (1.14)***	-23.71 (1.24)***
LMI Tract	-2.76 (0.13)***	-2.14 (0.32)***	-6.53 (0.37)***	-9.82 (0.39)***
Minority Tract	6.58 (0.31)***	3.45 (0.42)***	-2.00 (0.46)***	5.10 (0.49)***
Sand States * LMI Tract	93.90 (0.09)***	74.24 (0.17)***	23.78 (0.24)***	41.29 (1.60)***
Sand States * Minority Tract	-5.25 (0.07)***	-12.90 (0.06)***	11.93 (0.25)***	4.80 (2.60)*
Knows Defaulters	-1.19 (0.14)***	-4.63 (0.31)***	-0.12 (0.38)	0.66 (0.40)
Knows Strategic Defaulters	2.10 (0.30)***	3.38 (0.54)***	3.50 (0.57)***	-2.48 (0.58)***
Morally Wrong	-4.18 (0.07)***	-14.79 (0.19)***	-13.10 (0.31)***	-9.68 (0.39)***
Demographic Controls	Yes***	Yes***	Yes***	Yes***
Loan Year Fixed Effects	Yes***	Yes***	Yes***	Yes***
Servicer Fixed Effects	Yes**	Yes***	Yes***	Yes***
<i>N</i>	359	359	359	359
<i>Pseudo - R²</i>	0.29	0.09	0.04	0.04

Notes:

*** indicates $p \leq 0.01$, ** indicates $p \leq 0.05$, and * indicates $p \leq 0.10$.

For ease of interpretation, all estimates are multiplied by 100. Standard errors are provided in parentheses. The dependent variables are indicators for whether the respondent would default strategically at negative equity less than or equal to 20%, 60%, 80%, or 100% of the perceived house value.