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**Strategic Consumer Default: Mortgage Versus Consumer
Debt**

By

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Abstract

A new data set allows us to investigate interconnections between the default decisions for mortgages and consumer loans from 2006-2011. Consumers are found to be acting strategically in deciding on which debt to default. Increases in the current loan-to-value ratio of a mortgage increases both types of default, while being underwater accelerates mortgage default only. Access to liquidity assumes a critical role in these decisions. Consumers act to preserve liquidity as credit card utilization rates increase, and eventually the default on consumer loans decreases while the default on mortgages continues to increase.

Strategic Consumer Default: Mortgage Versus Consumer Debt

I. Introduction

Following the collapse of the subprime mortgage market and the banking crisis, the general downturn in the U.S. economy brought about financial difficulties for many households. At the onset of the recession late in 2007, about 40 percent of U.S. households reported holding both mortgages and other types of consumer debt.¹ In balancing these debt obligations, many households in financial stress faced a decision about which debt to default on. This paper uses a new national household data set covering the period from 2006 through 2011 to examine the interconnected factors in different default decisions. The survey, known as the *Consumer Finance Monthly (CFM)*,² provides comprehensive information on household behavior with regard to all types of debt, and this allows us to investigate the subtle aspects of the strategic default decision for this critical period.

When homeowners maximize their utility in making choices regarding loan repayment/default, they consider the consequences of the different defaults, such as loss of their home or car, damaged credit scores, higher future borrowing costs, loss of access to liquidity, and other situations which may arise depending on which debts they choose for default. Here we consider a general framework of the default decision in which both mortgage and consumer debt are present. We find that the default decision for one of these debt instruments is indeed connected with the decision about default on the other instrument. Passing the underwater threshold on a mortgage causes an upward jump in mortgage default, as one might

¹ Other consumer loans include credit card debt, bank loans, student loans, auto loans, installment loans, and payday loans. (*The Consumer Finance Monthly Survey*).

²*The Consumer Finance Monthly* is a monthly telephone survey of a random sample of U.S. households taken by the Center for Human Resource Research at Ohio State University.

expect. Less obvious is the fact that a higher *current* loan-to-value ratio (LTV)³ on a mortgage increases default not only on the mortgage but also on consumer loans since the household's general financial situation is impacted by the deteriorating home values reflected in the current LTV. The default decision in the case of credit cards is made more complicated still by the prospect of loss of access to liquidity for maintaining day-to-day living conditions. While credit card default involves no loss of collateral, such consumer loan default has strong behavioral implications since many life functions depend on the use of a credit card: credit cards serve a transactions purpose for renting cars, making internet purchases, etc. They also satisfy the precautionary motive to smooth consumption in the case of unexpected adverse events. While both mortgage and consumer loan default increase as consumers use up more of their available credit card credit, at some point a continuing decline in this available credit causes consumers to act to preserve their liquidity. Then the propensity to default on consumer loans begins to decrease while the default on mortgage debt continues to increase.

This paper proceeds as follows. In section II, we discuss background information on default and the previous literature in the area. Section III discusses the data used in our analysis and presents the empirical model which captures the strategic default decision when both mortgage and consumer debt are present. In section IV, we present our empirical findings. Summary and conclusions are presented in section V.

³ The current LTV is computed from survey questions asking for the current mortgage balance, including both a first and possibly a second mortgage, and the respondent's reported current house value.

II. Background and Previous Literature

Default is a process. When a borrower does not meet a scheduled payment for a number of periods, the lender considers the borrower to have made a decision to stop the payment completely, which is defined as default. The number of nonpayment periods which will lead a borrower to consider that a loan is in default varies from lender to lender, with the typical number being 60 to 90 days. At this point, the lender will take steps to begin the process of loan termination. In the case of a mortgage, this would ultimately lead to foreclosure. In the case of consumer loans such as credit card debt, the next step usually involves turning the debt over to a collection agency. After 120 –180 days of non-payment⁴, a lender is allowed to “charge off” the debt and eliminate that loan from its books. At various points in this process, credit bureaus will begin to adjust the consumer’s credit score accordingly. In this study, we will take delinquency of more than 60 days to be our indicator of default on both mortgage and consumer debt. This is the indicator available in the *CFM* survey, as in other major household finance surveys such as the *Survey of Consumer Finance (SCF)*, and is a benchmark that has been used by previous researchers (Stavins 2000 and Cohen-Cole and Morse 2010). For many, the end stage of the default process could lead to bankruptcy (Fay et al. 2002).

Traditionally, there have been two competing hypotheses in the literature on mortgage default only: the “net equity” approach and the “ability to pay” approach, (Jackson and Kasserian, 1980; Campbell and Dietrich, 1983). These approaches consider the borrower to make the default decision based either on their net home equity or the insufficiency of income flows. Following up on the net equity approach, Foster and Van Order (1980) treat mortgage default as

⁴ Typically, at a maximum of 180 days for credit card debt and 120 for mortgage debt (see FDIC Law, Regulations, Related Acts).

exercising a put option, defining “ruthless default” as occurring when a property value drops to underwater levels. Vandell (1990, 1992) examines this empirically and finds that only about 8 percent of borrowers with market loan-to-value (LTV) ratios in excess of 110 percent default.

Foote, Gerardi and Willen (2008) have looked at foreclosures among a sample of Massachusetts homeowners who had negative equity during 1990s and find that negative equity is a necessary but not sufficient condition for homeowners to consider default. More recent studies by Guiso et al. (2011) and Bhutta et al. (2011) focus on strategic mortgage default and find that homeowners do not default until equity falls below 50 percent of their home’s value. The latter study also finds that about 80 percent of defaults are the result of income shocks combined with negative equity.

Olsen and Dunn (2010) also use the *CFM* data set used here to investigate mortgage default among underwater homes in the period following the subprime mortgage collapse, and they find that most of these homeowners remained current on their home loans. Li and White (2009) find that mortgage default is associated with increased probability of bankruptcy filing. Jiang and Dunn (2012) use the *CFM* data to study credit card behavior and find borrowing and payoff behavior changing significantly among younger age cohorts, increasing the probability of default on consumer loans across time. Other works which have also examined credit card delinquency and default include Gross and Souleles (2002), Agarwal, Liu, and Mielnicki (2002), Agarwal and Liu (2003), Dunn and Kim (2004), Crook and Banasik (2005), Lopes (2007). These authors relate default to declines in default cost and legal restrictions, credit card utilization rates, required minimum payment to income ratios, and unemployment rates, etc.

A recent paper by Cohen-Cole and Morse (2010) examines the strategic delinquency decision for mortgage and credit card debt for the 2006-07 period. Using Transunion data on a sample of individuals who have been delinquent on

either mortgage or credit cards but not both, they find many individuals choose to pay credit card bills to preserve liquidity even at the cost of mortgage delinquencies and foreclosures. Credit bureau data sets have the advantage of providing very large samples, but they lack some critical information such as the current LTV, household assets, or current income.

III. Data

The data used in this study come from a national monthly random digit dialing telephone survey known as the *Consumer Finance Monthly (CFM)*⁵. The *CFM* survey has certain advantages over other household finance surveys. First, the *CFM* contains several unique financial variables that are not available with other non-proprietary data sets, such as more detailed information on credit card usage, payoff, missed payments, etc. The *CFM* also collects data on an ongoing monthly basis and makes it available within one quarter, as opposed to the *Survey of Consumer Finance* whose tri-annual survey provides very extensive household finance data but only every three years. In addition, the *CFM* contains geographic information on respondents so that we are able to control for state level changes in housing prices and unemployment rates. Compared to proprietary data sources such as banks and credit bureaus, the *CFM* data allows us to look at the consumer's delinquency behavior in the context of their overall debt situation and financial well-being, including assets and income from various sources. Here we restrict our sample to homeowners who are carrying both mortgage and consumer debt and use data from January 2006 to December 2011, giving a sample size of

⁵ The *CFM* is conducted by the Center for Human Resource Research at Ohio State University. For a comparison of the *CFM* data with data from the *Survey of Consumer Finances*, see Olsen and Dunn (2010).

7,672. The mean current mortgage debt for this group is \$124,875, and the mean consumer debt is \$12,141.⁶

The *CFM* survey asks respondents if they have been late for a mortgage payment for more than 60 days in the past 12 months. Using this information, the dependent variable for default – more-than-60-day mortgage delinquency – is constructed. Usually 60 to 90 days after the payment is initially missed, the lender will send a notice of default and will begin the process which could ultimately lead to foreclosure.

With regard to consumer loan default, the *CFM* asks respondents if they have been late or have missed a payment for more than 60 days in the past 6 months. Here consumer loans include, in addition to credit card debt, bank loans, auto/installment loans, payday loans, and other consumer loan sources.⁷ Among the consumer loan default cases, credit card debt default is the major component, accounting for approximately 61 percent. This paper will use the terms “delinquency” and “default” interchangeably, and both refer to delinquency of more than 60 days.

Table 1 below presents descriptive statistics on default for the sample for the two types of debt. Eighty-four percent of the respondents sampled during the survey period from 2006 through 2011 had no instance of default. More than 13 percent of the sample defaulted on consumer loans but not on their mortgage; about one percent defaulted on their mortgage but not consumer loans; and 2.1 percent defaulted on both types of loan. The respective default rates across time using this same data are shown in Figure 1 below.

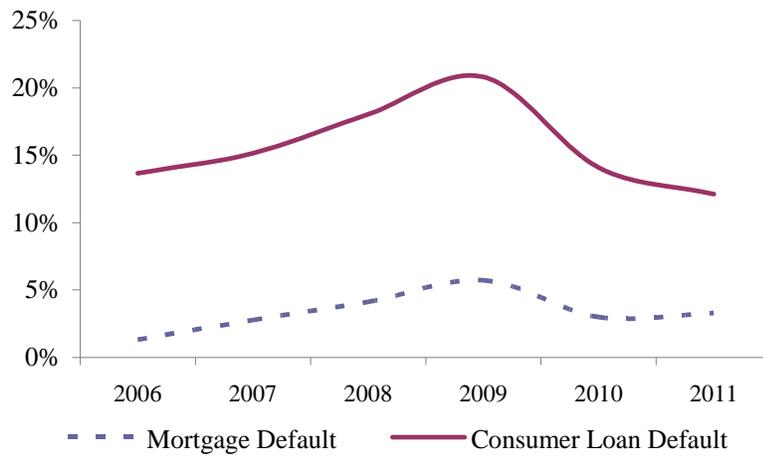
⁶ In our sample, the average monthly mortgage payment takes about 20 percent of the pre-tax household income. Of the consumer loan debt, credit cards account for 25 percent, and installment loans (primarily auto loans) account for 57 percent.

⁷ Home equity loans and lines of credit are omitted from our analysis. Since they have both features of mortgages and consumer loans, they present a complication that will not be addressed in this paper.

Table 1. Frequency and Percentage of Default (More than 60-Days Late)
from *CFM* Data

Mortgage	Consumer Loan		
	No Consumer Loan Default	Consumer Loan Default	Total
No Mortgage Default	6435 (83.9%)	1004 (13.5%)	7439 (97.0%)
Mortgage Default	72 (0.9%)	161 (2.1%)	233 (3.0%)
Total	5763 (84.8%)	1054 (15.2%)	7672 (100%)

**Mortgage Default and Consumer Loan Default
Rate from CFM Data**



IV. Considerations in Examining Strategic Default

We will consider the problem of strategic default in the following framework. We will assume that households only have two types of debt – mortgage and credit card debt. We further assume that a homeowner who defaults on mortgages could not sell their house at a price that would recoup their equity plus transactions cost. Consumers are assumed to maximize their expected total utility in the consumption of housing services and other non-housing commodities. The trigger for a default may be a cash flow problem causing the household to be unable to meet the periodic obligation of required payments. This is usually due to income shocks or the encountering of credit constraints. For mortgage default, there is the additional factor of negative shocks to house prices, which may give negative equity against which to borrow.

The costs of default on mortgage debt may include actual loss of housing services as well as financial and psychological stress or stigma from the foreclosure process and concern about future credit impairment. The benefits include reduction in current and future debt repayment obligation, thus freeing up resources for other consumption and/or debt-repayment uses, and a reduced risk of larger future financial losses, especially if the house is underwater.

The costs of default on non-housing consumer loans includes the possible repossessing of items such as cars or furniture and therefore loss of these consumption commodities; reduced access to credit in the future and/or higher borrowing costs; and the stress or stigma effect associated with these phenomena. Benefits from consumer loan default also include primarily the reduction in current and future debt repayment obligation, thus freeing up resources for other consumption and/or debt-repayment uses. The default decision is clearly complex and involves weighing the benefits and costs for each case.

The Econometric Model

For estimation purposes, our goal is to unify the respective default decisions into a framework encompassing both types of debt. To this end, we use a bivariate probit model which examines factors that affect both default decisions at the same time using two latent variables – one for mortgage default and one for consumer loan default. This allows the two default decisions to be related through the correlation of the error terms from the two underlying equations.⁸ Denoting the latent dependent variables for mortgage default and consumer loan default as y_m^* and y_c^* are respectively, there are two underlying dependent variables and a common set of independent variables as follows:

$$\begin{aligned}y_{m,t}^* &= x_{m,t}'\beta_m + \epsilon_{m,t}, \\y_{c,t}^* &= x_{c,t}'\beta_c + \epsilon_{c,t}, \\cov(\epsilon_{m,t}, \epsilon_{c,t}) &= \rho \neq 0\end{aligned}$$

where $y_{m,t} = 1$, if $y_{m,t}^* \in D_m$, and 0 otherwise; $y_{c,t} = 1$, if $y_{c,t}^* \in D_c$, and 0 otherwise.

There are thus four cases in total for the dependent variables:

- (i) pay both mortgage and consumer loans, i.e., $y_m = 0, y_c = 0$;
- (ii) pay mortgage but default on consumer loans, i.e., $y_m = 0, y_c = 1$;
- (iii) pay consumer loans but default on mortgage, i.e., $y_m = 1, y_c = 0$;
- (iv) default on both mortgage and consumer loans, i.e., $y_m = 1, y_c = 1$.

Descriptive statistics for each of the four possible states listed above are given in Appendix A.

⁸ An LR test confirms that the bivariate probit model fits the data better than simply using univariate logit or probit models separately for mortgage or consumer loan delinquency.

The explanatory variables for these default decisions were selected based on theoretical considerations and empirical findings in the previous literature together with a careful examination of the novel data contained in the *CFM*. The independent variables are listed in Table 2 below. Clearly the influences on the different types of default for households facing these decisions are complex and varied. Given the limitations of our data, here will focus primarily on the impact of (a) home equity positions; (b) liquidity considerations, particularly as these are related to credit cards; (c) the influences from unemployment rates and house price changes; and (d) key socioeconomic variables such as liquid assets.

Our data on default do not allow us to distinguish default on different types of consumer loan debt, and this restricts the influences on default that we can examine. Thus for example, the size of the monthly payments on the different types of debt could be a factor, but we cannot tie the monthly payment to a specific loan default. However, for the period January 2006 through March 2008, we do have separate data on credit card default. We have examined the default decision between mortgages and credit cards specifically for this time period, and those results are presented in Appendix C. Our empirical conclusions are qualitatively the same in this case, and this lends confidence our results expanded to all types of consumer loan default.

Table 2. Definition of Variables

Dependent Variables	Definition	Mean
Current LTV Ratio*	Ratio of mortgage balance to current house value	0.54
Underwater	1 if mortgage balance > house value; 0 otherwise	0.06
Log Liquid Assets	Includes checking and savings accounts, CDs, stocks and bonds	10.7
Log Income	Log total annual household income	10.13
Log Mortgage Balance	Log mortgage balance	11.47
Log Consumer Debt	Log total consumer debt	5.89
State Unemploy. Rate	Monthly state-level unemployment rate	6.2
HPI Change	Quarterly change in state level house price index	1.42
Have Credit Card	1 if owns credit card; 0 otherwise	0.92
Credit Card Revolver	1 if revolver (carries balance); 0 otherwise	0.46
Percent Cards Maxed Out	Percentage of credit cards at borrowing limit	6.7%
Credit Card Utilization Rate	Percentage of credit line used for all cards	7.31
Gender	1 if female; 0 if male	0.54
Marital Status	1 if married; 0 otherwise	0.75
Black	1 if Black; 0 otherwise	0.83
Hispanic	1 if Hispanic; 0 otherwise	
Other Ethnic Groups	1 if other; 0 otherwise	
No. of Children	Household members under age of 18	0.87
Education	Years of schooling	0.48
Age	Age of the respondent	50

* The LTV includes home equity loans.

V. Results

Among our results, there are two sets of factors that are most directly related to the strategic default decision. One is the set of variables capturing the home equity position of a household. These include the current LTV and whether the home is currently “underwater”, implying a LTV greater than one. To capture the underwater effect, we have included both an underwater dummy and an interaction term – Underwater x (LTV-1).

The second set of key variables will capture the liquidity position of the household. Here a major factor is the availability of credit from credit cards. Approximately 80 percent of the U.S. population has a credit card providing access to liquidity. Credit card use has become a pervasive method of bill payment for many types of expenditures, including necessities like groceries, utilities, medical bills, etc. The liquidity provided by the credit line on a credit card also functions to fulfill the precautionary saving motives for many households (Brito and Hartley, 1995; Cohen-Cole and Morse, 2010). A consideration of these factors should enter a consumer’s overall default decision. We thus include explanatory variables to indicate the following credit card-related conditions: (a) whether the sample member owns a credit card; (b) whether a cardholder is currently a revolver (i.e., carrying a balance); (c) the total utilization rate for all cards; and (d) the percentage of credit cards for which the cardholder has reached the borrowing limit or “maxed-out” and its quadratic term.

Other relevant variables in our fits include the change in the house price index (HPI) at the state level and the state unemployment rate. These variables will capture the macroeconomic environment of the period under consideration. We also control for relevant demographic and socioeconomic factors. The results are presented in Table 3 below.

Table 3. Bivariate Probit Regression Results for Default

Dependent Variables:	Mortgage		Consumer Loans	
	Estimate	Std. Error	Estimate	Std. Error
LTV	0.55**	0.22	0.25**	0.10
Underwater	0.31**	0.14	-0.08	0.12
(LTV-1)*Underwater	-0.54**	0.14	0.09	0.25
Log Liquid Asset	-0.06**	0.01	-0.03**	0.01
Log Income	-0.003	0.01	-0.01	0.01
Log Mortgage Balance	-0.08	0.07	-0.03	0.03
Log Consumer Loan	0.02**	0.01	0.04**	0.02
Credit Card Owner	-0.84**	0.16	-0.78**	0.10
Credit Card Revolver [§]	0.22*	0.13	0.27**	0.06
Percent Cards Maxed [§]	1.4**	0.58	2.8**	0.39
(Percent Cards Maxed) ^{2§}	-0.58	0.61	-2.5**	0.41
CC Utilization [§]	0.73**	0.23	0.76**	0.12
State Unemploy. Rate	0.04**	0.02	0.01	0.01
HPIC	-0.05**	0.02	-0.04**	0.01
Years of Education	-0.02	0.02	0.01	0.01
Age	0.03**	0.01	0.02**	0.01
Age*Age	-0.00**	0.00	-0.00**	0.00
Gender	0.06	0.08	0.12**	0.04
Marital Status	-0.12	0.09	-0.17**	0.05
Black	0.34**	0.13	0.15	0.10
Hispanic	0.36**	0.15	0.16	0.10
No. of Children	0.08**	0.03	0.03*	0.02
Rho	0.53**	0.04		
no. of observation	6799		6799	

Note: **indicates the estimate is significant at 5% confidence level. * indicates the estimate is significant at 10% confidence level. §These variables refer only to credit card holders

(i) The Current Loan To Value Ratio and Being Underwater

Our results show that the likelihood of default on *both* mortgage and consumer loans increases significantly as the current LTV increases. To our knowledge, consumer loan default has not been previously tied to current LTV in the literature. However, it is logical that as current LTV increases, a homeowner's equity position and overall financial condition is deteriorating, and this can lead to increases in consumer loan default. The significant coefficients on the underwater terms for mortgage default indicate that there is an upward jump when a house passes the underwater threshold. However, the coefficients show that mortgage default does not change much thereafter as the house falls increasingly underwater. Crossing the underwater threshold does not cause a significant change in the probability of default on consumer loans, which continue to increase steadily with increasing current LTV. These results are the outcome of strategic decision-making by a consumer who must consider the costs and benefits of default on both types of debt.

(ii) Variables Related to Credit Cards: Carrying a Balance and Utilization Rate

There are four credit card-related variables in the fit in Table 3. Ownership of a credit card, which provides access to liquidity, is found to decrease the likelihood of default on *both* mortgages and consumer loans. As a cardholder begins to carry balances (becomes a revolver), in addition to reducing their available liquidity, they incur interest charges which add to their financial burden. All of this increases the probability of default on both the consumer loans

and the mortgage. The utilization rate on credit cards, which reflects how a consumer has drawn down their access to liquidity, captures the extent of this problem. We find that as the utilization rate increases and thus the access to liquidity decreases, the probability of default on both the mortgage and the consumer loans increases.

Credit cards can thus provide a buffer to consumers who are struggling to repay loans. With the access to liquidity provided by a credit card, it is possible for a cash-strapped consumer to rearrange their payment method decisions (e.g., using the credit card to pay for non-discretionary purchases⁹) so that they can reserve their cash for loan repayment as required. It may even be possible for consumers to make payments on mortgages and some types of installment loans with their credit cards.¹⁰ In addition, by using a credit card to charge purchases, the consumer implicitly receives a float (or buys time) until the payment due date is reached.

Finally, pursuing the issue of access to liquidity and financial condition further, we find that as the percentage of credit cards which are actually maxed-out (i.e., which have lost their liquidity function) increases, the likelihood of default on both the mortgage and consumer loans is further increased. The quadratic term on maxed-out cards shows that this situation ultimately works differently for consumer loans than mortgages. The quadratic term is not significant for mortgage default but is significant and negative for consumer loan default. These maxed-out variables show consumer loan default peaking out and declining as increasingly less liquidity from credit cards is available to the consumer. The default peak for percentage of maxed-out cards occurs at around

⁹ In our sample, 35 percent reported using a credit card to make non-discretionary payments, such as for groceries, medical expenses, prescription drugs, rent or mortgage payments, etc.

¹⁰ Consumers with multiple credit cards can also switch payments between cards to manage loan repayment. See Dunn and Kim (1999).

54 percent. In these situations, consumers will act aggressively to protect the liquidity which is necessary for carrying on their day-to-day living. ((There are even people in the sample who choose to default on a mortgage that is *not* underwater rather than their consumer loans when???) These findings reinforce the point made above that access to liquidity is critical for the default decision. They are consistent with Cohen-Cole and Morse (2010), who also find that consumers left with less available credit protect their liquidity position by defaulting on their mortgage instead of their consumer loans.¹¹ These results are the outcome of strategic decision-making by a consumer who must weigh the prospect of loss of access to liquidity incurred by consumer loan default – especially on credit cards -- against the consequences of default on their mortgage.

Officials at the Federal Reserve have recently have recently highlighted the problem of access to credit in their policy discussions.¹² In this period of historically low interest rates, many financially distressed consumers are denied these more favorable credit terms because of tightened

(iii) The Influence of the Macro Environment and Socioeconomic Factors

The general macroeconomic environment is captured in our use of the state unemployment rate and quarterly change in the state-level House Price Index (HPI). Increases in the state unemployment rate are found to increase the default on mortgages but not consumer loans. If a person thinks that their likelihood of unemployment has gone up, they can plan to adjust their housing

¹¹ Studies of the payday loan industry have found that approximately half of payday loan users own a credit card, but they periodically choose to pay excessive interest rates rather than use up the remaining credit on their credit card. In interviews they cite possible situations such as the need for car rental, etc. (Rivera and Dunn, 2006)

¹² “Fed Wrestles with How Best to Bridge U.S. Credit Divide,” *Wall Street Journal*, June 19, 2012, page A1.

accommodations and become renters. However, the need for liquidity is not as easily adjusted if a person is using credit cards to buy groceries and other necessities. Also, a person may be more reluctant to default on installment debt such as car loans since transportation is necessary for many jobs and job searches.

A decrease in the state-level HPI is found to increase the default on both mortgages and consumer loans. It is not unexpected that mortgage default would increase as house values fall. The negative relationship between house prices and consumer loan default is again probably related to liquidity issues. Declining home values decrease the value of a consumer's portfolio and thus limit their access to liquidity through various types of loan instruments including home equity loans.

Having more liquid assets decreases default on both types of debt, as one would expect. However, we find that income (controlling for liquid assets) does not affect either type of default. Being married decreases the likelihood of default on consumer loans. Default on both types of loans increase with the number of children in a household, probably due to greater demands on income as family size increases. White respondents are less likely to default on a mortgage than non-whites, but there is no racial/ethnic difference in default on consumer loans.

VI. Summary and Conclusions

The recent recession in the U.S., with the severe downturn in the housing market and sharply rising unemployment, put many households into a situation where they faced default on one or more of their loan instruments. The popular press has focused on one aspect of the strategic default decision where homeowners walk away from underwater mortgages. However, the decision is more complex and involves weighing the costs and benefits of default on the different debt instruments. This paper has used a new national-level household data set – the *Consumer Finance Monthly* – covering the period from 2006

through 2011, to investigate the strategic default decisions on mortgages or consumer loans for households with both types of debt. Using a bivariate probit analysis, we find that the decisions to default on different types of loans are indeed interconnected.

There are four main findings in this paper. (1) A higher current loan-to-value ratio not only contributes to a greater chance of default on mortgage debt but also a greater probability of default on consumer loans. (2) In addition, when a house mortgage passes into underwater territory, the propensity to default on mortgage debt jumps upward but remains flat thereafter as the home falls further under water. Having a home under water, however, does not affect default on consumer loans. (3) As the utilization rate on credit cards increases (i.e., as liquidity provided by credit cards decreases), both mortgage and consumer loan default increase, as credit card credit buffers negative shocks and can also facilitate loan repayment. Furthermore, as the percentage of credit cards which are actually maxed out increases, eventually consumers begin to act aggressively to preserve liquidity to meet their day-to-day needs. When the percentage of maxed-out credit cards reaches 54%, the propensity to default on credit cards begins to decline while the propensity to default on mortgage debt continues to increase. (4) Both defaults are impacted by changes in the macro environment.

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Appendix A

Summary Statistics by Default Cases in *CFM* Data

Variable	Repay Both	Default on Both	Default on Mortgage Only	Default on Consumer Loans Only
LTV	53.5%	81.8%	72.4%	60.9%
Log Home Value	12.3	11.8	12.0	12.1
Log Liquid Assets	9.3	4.8	5.4	8.2
Log Income	8.7	8.8	7.8	8.9
Log Mortgage Balance	11.4	11.3	11.3	11.4
Log Consumer Debt	5.7	8.8	7.5	7.7
Age	50.0	46.0	51.2	47.7
State Unemploy. Rate	6.4	7.1	7.8	6.4
HPIC	0.14	-0.78	-0.51	0.0
Number of Children	0.87	1.5	1.02	1.13
Years of Education	15.4			
Frequencies for Dummy Variables				
Underwater	6.2%	25.2%	23.6%	7.6%
Black	4.2%	15.6%	10.9%	6.8%
Hispanic	4.2%	9.6%	7.3%	5.4%
Female	53.6%	68.1%	51.4%	62.7%
Married	76.0%	65.9%	54.5%	70.6%
Credit Card Owner	93.9%	51.2%	65.5%	90.8%
No. of observations	6435	161	72	1004

Appendix B

Statistics for Credit Care Related Variables in *CFM* Data

Variable	Average	Repay Both	Default on Both	Default on Mortgage Only	Default on Consumer Debt Only
No. of Credit Cards	3.5	3.5	1.7	2.0	3.8
CCmaxed-out Credit Card Revolver	3.0%	4.5%	14%	11%	11%
	34%	31%	44%	35%	52%
Total CC Lines Current Available	\$29,633	\$30,682	\$7,225	\$8,300	\$24,113
Credit No. of observations	\$21,805	\$19,505	\$3616	\$5,649	\$13,966
	7175	6074	135	55	911