

Credit Cards and The Option to Default

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The value of the option to default on unsecured credit contracts is estimated and found to be significantly impacted by state and federal laws governing creditors' collection practices and bankruptcy. The data suggest that the expected value of the option to default influences debtors' choices in default and is correlated with their use of their credit cards before default. Cardholders who use their lines of credit very intensely before default are significantly more likely to make choices in default which allow them to realize a greater benefit from default. Furthermore, these results offer a possible explanation for consumers' seeming insensitivity to interest rates charged on revolving lines of credit.

I. INTRODUCTION

In the household credit arena, two recent phenomena reflecting changes in debtor behavior attracted policy-level attention. The first is the dramatic growth in unsecured credit outstanding associated with the use of third-party credit cards. Revolving credit outstanding increased from about 18% of total consumer installment credit in 1980 to 35% in 1993. During that period, consumer credit outstanding increased from about \$250 billion to \$770 billion. While third-party credit cards had been available from the middle to late 1960s, in 1970 only 16% of U.S. households had a bank card. By 1989, 54% of households had at least one bank card. This dramatic increase in the ownership and use of unsecured revolving credit lines has been attributed to multiple factors, including the elimination of most state usury ceilings, the convenience of small amounts of immediately accessible consumer credit, and a surge in the number of households in the prime debt-use phase of the life cycle (Canner & Lucket, 1992). The public policy concern was focused on the pricing of revolving credit, specifically, concerns about whether the market for third party credit cards was sufficiently competitive (Ausebel, 1991; Government Accounting Office, 1994). The Fair Credit and Charge Card Disclosure Act, effective in 1988, was designed to strengthen mandatory disclosure for credit cards, reducing consumers' search and switching costs. An analysis of

the average profitability of credit card banks between 1988 and 1993 showed that spreads and profits on credit card operations have remained high relative to other bank products. Shaffer (1994) concluded that the Act had not increased the degree of price competition in the market for credit cards.

The second phenomenon is the surge in the annual number of non-business estates filing for protection from creditors in bankruptcy court—from about 200,000 in 1980 to approximately 1,000,000 in 1993. Historical trends in personal bankruptcy show that periods of rapid increase coincide with periods of economic contraction. The sharp increase in the incidence of personal bankruptcy during the economic expansion period that started in November 1982 and extended into 1990 was, thus, inconsistent with historical patterns (Lockett, 1988; Canner & Lockett, 1991). Explanations offered for the latter development include a change in the federal bankruptcy code that reduced the private cost of bankruptcy. One of the aims of the Bankruptcy Reform Act of 1978 was to establish a federal standard for the value of personal assets exempted from liquidation under Chapter 7 of the U.S. Bankruptcy Code. The Act also expanded eligibility for Chapter 13 of the Code to practically all non-business debtors.¹ A more recent reform, the Bankruptcy Reform Act of 1994, further amended the Bankruptcy Code to make Chapter 13 a more attractive and accessible choice in bankruptcy. Canner and Lockett (1991) suggested that the 1978 reform made bankruptcy a more attractive option for troubled debtors relative to outright default or informal renegotiation with creditors. They argued that the “rise in bankruptcy may be reflecting to a significant degree a shift in the way households choose to respond to debt problems rather than an increase in debt problems per se.” The public policy concern was whether bankruptcy relief had become “too easy,” creating a high social cost which, in turn, would increase the cost of and reduce the availability of unsecured household credit (Credit Research Center, 1982).

This paper investigates a dimension of the possible relationship between the two phenomena. Specifically, the question addressed is whether there is evidence that consumers who use credit cards aggressively and then default prefer filing bankruptcy to other methods of responding to debt problems. Others have alluded to this relationship. Analyzing petition data, Demowitz claimed “an increase in credit card debt relative to income is one of the strongest contributors to the probability of filing for bankruptcy” (1992, p. 16). Offering insight into consumer behavior, Pozdena used option theory to conclude that cardholders have an incentive to take risks in their credit-use behavior when using credit cards. Pozdena argued that “the high default potential of credit card loans means that their value depends more on the implicit default option than on the prevailing time value of money” (1991, p. 17). Furthermore, less creditworthy households may self-select and use credit cards more intensely because of the valuable default option, made more so by bankruptcy reform. This potential for moral hazard, if it exists, creates an interesting risk management/pricing problem for credit card portfolio managers.

The next section of this paper discusses the conditions that determine the value of the default option. The third section summarizes related empirical literature. Section IV presents summary statistics of the data analyzed in the paper, and Section V presents empirical evidence of the relationships between debtors’ behavior before and after default and the value of their option to default. The last section considers the implications of these results.

II. THE OPTION TO DEFAULT

A debtor with an unsecured line of credit has the ability, at any time, to default on the contract. The debtor has an option to “buy” the outstanding credit obligation from the creditor at a cost equal to the amount of cash the debtor voluntarily repays or that the creditor is able to collect through various legally defined collection remedies. These remedies include actions against the assets or future income of the cardholder. In addition to any cash voluntarily forfeited or recovered through the creditor’s collection actions, the debtor bears other costs of default such as damage to his or her credit rating and reduced access to unsecured credit in the future. As credit records are considered not only in the extension of future credit but also in applications to rent a home, buy insurance, or seek employment, these costs should be nontrivial in the debtor’s decision process. The difference between the amount of credit outstanding on the defaulted line of credit and the present value of all expected cash and reputation costs of default is the value of the default option held by the debtor for each unsecured credit line.

A. Creditor’s Rights and the Debtor’s Choice

A priori, the expected value of the debtor’s option to default on an unsecured credit obligation is a function of the collection efforts the creditor is expected to pursue. These efforts are, in turn, a function of the manner in which the debtor chooses to default. It is the debtor’s choice to default outright or to file for bankruptcy. Furthermore, it is the debtor’s choice to file under Chapter 7 or Chapter 13 of the U.S. Bankruptcy Code. Once the debtor has made these choices, then state and federal laws defining creditors’ legal access to the debtor’s assets or future income, and the actions in which the creditor chooses to engage, ultimately determine the value of the default option.

B. Default and Wage Garnishment

Debtors in trouble typically default outright on their unsecured credit obligations after an extended period of delinquency, an action which is recognized by the formal charging off of the account by the creditor. Following charge off, the creditor may engage in various activities to collect the account balance, including the legal attachment of the debtor’s future earnings through garnishment. In garnishment, the creditor applies for and receives court approval to attach a portion of the debtor’s paycheck to retire the debt. The availability of garnishment and the amount of wages that may be garnished are conditions established by federal and state law and vary somewhat across states. The Consumer Credit Protection Act is a federal law that provides guidelines restricting the extent to which a debtor’s wages may be garnished to satisfy consumer credit claims. Some states have rules that limit the garnishment of wages further, even to the point that it is prohibited for the repayment of consumer credit claims.² Garnishment is a powerful remedy and, when used, may substantially reduce the expected value of the debtor’s default option.

C. Bankruptcy—Chapter 7 versus Chapter 13

Instead of defaulting and risking wage garnishment, individuals may petition the bankruptcy court for protection from creditors’ collection actions and for access to processes for having unsecured debts reorganized or legally discharged. In the event that the debtor

files bankruptcy, all collection efforts including garnishment are automatically stayed by court rule. Most types of unsecured debt are eligible for discharge in bankruptcy, with the exception of federal tax obligations, debts incurred for the payment of federal tax obligations, child support payments, and debts incurred by fraud or in anticipation of bankruptcy. In particular, credit card charges for luxury goods and services or cash advances in excess of \$1,000 and incurred within 60 days of the bankruptcy filing are not dischargeable.

The Bankruptcy Code provides that unsecured debts not satisfied after the payout of the proceeds from liquidation of nonexempt assets in Chapter 7 may be discharged. Unsecured debts not covered by a three- to five-year repayment plan based on the debtor's anticipated disposable income will be discharged in Chapter 13.

The extent to which the debtor's assets are accessible to satisfy unsecured creditors' claims in bankruptcy is determined by the federal bankruptcy law, unless a state passes overriding legislation to uniquely define allowed exemptions. More than half of the states (35) have passed overriding legislation, with some having defined asset exemption allowances that are less generous than that provided by the U.S. Bankruptcy Code.³ Holding other things constant, the expected value of the default option would be highest in those states where a high value of personal and household assets is exempt from liquidation. In a Chapter 13 case, the Bankruptcy Code provides that the amount repaid to unsecured creditors under the proposed repayment plan must be at least as great as would be possible if the debtor's nonexempt assets were liquidated in Chapter 7. This equivalency rule theoretically makes the debtor with nonexempt assets indifferent between Chapter 7 and Chapter 13, holding other conditions constant.

Traditionally, more than 70% of non-business petitions are filed under Chapter 7. As a reflection of the low liquidation value of most household assets and liberal asset exemption allowances, most petitions filed under Chapter 7 are "no asset" cases. Consequently, the unsecured creditors for the typical petitioner will recover nothing and the debtor gains the value of total discharge of accumulated unsecured debts.

III. LITERATURE REVIEW

The behavioral implications for debtors and creditors of the value of the default option as it is defined by rules for garnishment and bankruptcy have been investigated in studies of the cross-state variability in bankruptcy rates. Variations in legal conditions that influence the expected value of the option to default are expected to be systematically related to variations in the probability that debtors would exercise the default option. This would hold unless, in anticipation of debtors' opportunistic actions, creditors make offsetting adjustments in credit standards. Apilado, Dauten, and Smith (1978) published the first study that related cross-state variation in bankruptcy rates (non-business petitions per 100,000 population) and legal conditions for garnishment and bankruptcy. Using data from 1963 through 1974, they found that the relationship between the level of asset exemptions and bankruptcy rates was nonlinear. The rate was low in states with low asset exemptions as well as in states with high asset exemptions. States restricting or prohibiting garnishment had a significantly lower bankruptcy rate than did states that used the federal guidelines for garnishment.

Peterson and Aoki (1984) and Shephard (1984) found that the level of allowed exemption was not a critical factor for explaining cross-state variation in the rate of personal

bankruptcy immediately after the enactment of the Bankruptcy Reform Act of 1978. But in states where garnishment was prohibited, the bankruptcy rates were significantly lower both before and after the change in the federal Bankruptcy Code than was the case in states that allowed garnishment.

Shiers and Williamson (1987) found that the bankruptcy rate was significantly higher in states with low asset exemptions. They attributed this to the possibility that creditors took more credit risk in those states where the value of the default option was low. They found no relationship between garnishment restrictions and the bankruptcy rate. However, their result could be attributable to a misspecification error in that the authors claimed that all states permitted garnishment to some extent and, therefore, did not include a variable for states that actually prohibited garnishment for purposes of recovering consumer credit claims.

Sullivan and Worden (1991) found that between 1981 and 1988, the bankruptcy rate was significantly lower in states that restricted garnishment more than the Consumer Credit Protection Act. Furthermore, they demonstrated that while the rate of bankruptcy was relatively low in some states with low asset exemptions, it was high in some low-exemption states. In those states, an above-average percentage of petitioners opted for Chapter 13. This decision allowed them to protect their assets from liquidation. Theoretically, however, this choice should not have produced a higher valued option because of the equivalency rule.

In sum, the literature supports the hypothesis that the value of the option to default is influenced by regulations governing garnishment and bankruptcy and, correspondingly, influences debtor and creditor behavior. However, none of these studies included an assessment of consumer default that did not involve a bankruptcy filing. In this analysis, we study the impact of those conditions that influence the default option value on debtor's response to debt problems. Furthermore, the relationship between card use before charge-off and the value, *ex post*, of the debtor's option to default on unsecured claims is investigated. Specifically, we investigate the existence of moral hazard that was suggested by Pozdena's work.

IV. DESCRIPTIVE STATISTICS

A. The Data

To evaluate the relationships between regulations and cardholder behavior before and after default, complete account histories of charged-off accounts from a national portfolio of credit card accounts were needed. A very large regional bank provided such a data base. The data analyzed are made up of account histories of a national sample of active bank credit card accounts in the portfolio of a single Midwestern bank and a subsample of the portfolio which includes the entire population of accounts that had been open prior to 1990 and charged off in 1991. The data set included the complete account histories for both groups of accounts for 1990 and 1991. Because information about any activity in the account is retained even after charge-off, the data set enabled the reconstruction of all action in the charged-off accounts one year before and up to one year after charge-off.

The samples included no gold or premium cards and no accounts specifically targeted at students. The portfolio sample included 3,094 active standard credit card accounts selected randomly from the portfolio. While these cardholders were residents of all states, with the exception of Vermont, the majority (82%) resided in the Midwest, followed by 13% from the South. The charge-off sample included 5,112 standard accounts, with 65% of cardholders residents of the Midwest, followed by 24% from the South. Many of the accounts in the portfolio sample and the charge-off data set were added to the bank's portfolio through acquisition of entire portfolios of other financial institutions. Thus, the two samples are representative of the populations of cardholders served by the banks involved in the transactions. While these distributions of accounts may not be representative of the U.S. population of cardholders, valid inferences may be drawn with regard to the potential relationships between variation in legal conditions and measures of cardholder behaviors.

B. Charge-Off Experience in the Portfolio

The bank was observing its normal charge-off and collection procedures in 1990 and 1991, thus allowing observations based on those data to be representative of default behavior across time. The lender typically classified an account as "charged off" after a standard period of time had elapsed with no payments having been received, when fraudulent card use was reported, or when a notice was received that a petition for bankruptcy had been filed by the cardholder or that the card holder had died. In the random sample of active standard accounts, 1.9% of accounts were charged off in 1991; excluding death and fraud as reasons for charge-off reduced that figure to 1.4% of active accounts. (All charge-off statistics in this analysis exclude those accounts charged off due to fraud or the death of the principal cardholder.) The initial charge-off action for 67.6% of the charged-off accounts was attributed to severe delinquency. About 9% of those accounts filed for bankruptcy protection after the creditor started collection efforts. Ultimately, 61.4% of accounts charged off in 1991 were attributed to severe delinquency; 32.4% were attributed to a Chapter 7 filing under the Bankruptcy Code, and 6.2% were bankruptcies filed under Chapter 13.

C. Variability in Legal Conditions

Within the portfolio, the creditor was exposed to considerable state-by-state variability in garnishment rules and asset exemption allowances. In states that restricted garnishment more severely than the federal rule and where asset exemptions were set at or above the federal level, a pro debtor legal framework for default was said to have existed for purposes of the present analysis. In those states, creditors' access to cash recovery is limited, making the expected value of the debtor's default option comparatively high. About 40.6% of the charge-off accounts in the portfolio involved cardholders residing in pro debtor states (see Table 1). About 36.3% of charge-offs in the portfolio originated in states with strict exemption allowances and the federal allowance for garnishment. These were characterized as pro creditor states, where the option to default would have comparatively less value, holding other things constant. About 23% of charge-off cases occurred in states that followed the federal guideline for garnishment but had high exemption allowances, characterized as mixed-message states in this study. This distribution was similar to that of the portfolio sample, as shown in Table 1.

TABLE 1
Accounts Opened Prior to 1990

<i>Legal Conditions</i>	<i>Total Sample n = 3519</i>	<i>Charge Off Sample n = 5112</i>
Pro Debtor	42.7%	40.6%
Mixed Message	23.8	23.1
Pro Creditor	33.2	36.3

D. Legal Restrictions and Charge-Off Rate

The results of research cited earlier suggest that lenders may adjust their credit standards to manage imbalances in risk and expected return that may be created by legal conditions that influence the value of the debtors' default option. The data in Table 2 show that in this portfolio, the charge-off rate, or the number of charged-off accounts as a percentage of total active accounts, does not vary significantly across legal conditions. Neither variation in garnishment rules nor in asset exemption allowances is statistically associated with variation in charge-off rates. In other words, legal conditions that were expected to have an influence on the borrowers' incentive to default have been apparently offset by adjustments in credit underwriting standards, eliminating significant cross state variation in charge-off experience. However, the charge-off rates for the whole portfolio do not reveal the whole story concerning the value of the default option and its effect on the behavior of debtors. That story is revealed by examining defaulted debtors' choices before and during charge-off. We hypothesize that debtors make choices in default that will maximize the expected value of their option to default. Furthermore, we hypothesize that debtors' pre-default card use behavior is correlated with the expected value of their default option; that is, cardholders who use their cards aggressively for credit make choices in default that produce a higher gross benefit, measured as the percentage of the credit line ultimately discharged.

TABLE 2
All Accounts Charged Off in 1991
Default Choice by Year-End 1991

<i>Legal Conditions</i>	<i>Total Sample</i>		<i>Charge-off Sample</i>	
	<i>Charge Off Rate (%)</i>	<i>Delinquency</i>	<i>Bankruptcy</i>	
			<i>Ch. 7</i>	<i>Ch. 13</i>
Pro Debtor	1.69%	65.3%	30.0%	4.7%
Mixed Message	0.68	59.5	34.9	5.6
Pro Creditor	1.52	58.3	33.5	8.2
	$\chi^2 = 3.7$			$\chi^2 = 35.8^*$
Overall	1.4%	61.4%	32.4%	6.2%

V. THE RESULTS: DEBTOR CHOICES AND THE VALUE OF THE DEFAULT OPTION

A. Legal Regimes and Debtors' Choices

Overall, the debtors charged off in 1991 were almost twice as likely to default outright as file bankruptcy (61.4% versus 38.6%) (see Table 2). Debtors in states providing greater protection of income and assets (pro debtor regime) were significantly more likely to default outright than was the case for debtors in states characterized as pro creditor. In pro creditor states, debtors in default were more likely to seek the protection of the bankruptcy process than was the case in pro debtor states (41.7% vs. 34.7%). A relatively high proportion of petitioners for bankruptcy filed under Chapter 13 in pro creditor states (garnishment allowed; low asset exemption). A possible explanation is that under conditions where income may be garnished, debtors are more likely to file bankruptcy to protect future income, irrespective of exemption allowances. This result is inconsistent with the assumption that bankruptcy would be a lower-valued choice in states with strict restrictions on asset exemption allowances. However, it does suggest that the bankruptcy code provides more protection for future income relative to the federal guidelines for garnishment—a factor that would be expected to be associated with an increase in the use of bankruptcy. A similar result is discussed by Sullivan and Worden (1991), who found that in some states with low asset exemptions, the incidence of Chapter 13 was abnormally high, causing the overall rate of bankruptcy to be high in those states.

In general, these data revealing the distribution of debtors' choices suggest that debtors do make choices in default that are consistent with maximization of the expected value of their default option, given the legal conditions affecting their choices. This conclusion is further supported by the results (shown below) of an estimation of the value of the default option.

B. Debtors' Choice and the Gross Value of the Default Option

An estimate of the value of the default option was calculated for those accounts that were charged off during the first six months of 1991 (Table 3). This time frame was used to allow for the inclusion of repayments made in response to collection activities following charge off. This group of debtors had between six and 11 months to make payment on the charged-off account, either voluntarily or as a result of payments outlined in a Chapter 13 repayment schedule. The creditor's loss, after subsequent payments, was calculated as a percent of the credit line charged off for each account. What the creditor lost was estimated as being equal to what the debtor gained, which was the value of the option to default.

The option to default had its highest value for Chapter 7 bankruptcies, with an average value of 93.6% of the credit line, followed by an average value of 88.04% under Chapter 13. For the delinquency charge off, the default option value was an average of 80.2% of the credit line. Debtors realized the highest average gain from default in pro debtor states, even though debtors in those states were more likely to choose outright default than bankruptcy. However, the option value for each of the three default choices was highest in the pro debtor states, confirming the appropriateness of our label for those states. In the pro creditor states, debtors were more likely to use the courts for protection in default. However, on average, debtors in the pro creditor states did not benefit as much proportionately as those in the other

TABLE 3
Mean Percent Credit Line Charged Off Between January–June 1991
(Net of Repayments by Year-End 1991)

<i>Legal Conditions</i>	<i>Delinquency</i>	<i>Bankruptcy</i>		<i>Total</i>
		<i>Chapter 7</i>	<i>Chapter 13</i>	
Pro Debtor	83.21%	97.29%	88.44%	87.7%
Mixed Message	82.72%	91.73%	77.95%	85.6%
Pro Creditor	75.21%	91.16%	87.34%	81.5%
	<i>F</i> = 7.73*	<i>F</i> = 5.77*	<i>F</i> = 1.23	
Overall Mean	80.20%	93.60%	88.04%	
Sample Size	1,697	846	152	2,695

Note: *Significant at the 95% level of confidence.

states. The relationship between cardholders' behavior before default and the value of their choices in default is considered in Section VI.

C. Credit Card Use and Charge-Off Experience

As Pozdena suggested, cardholders who use their cards more intensively, or credit more aggressively, may be doing so because of the value of their option to default. In our initial investigation of this behavioral effect of the default option, the total portfolio sample was segmented in terms of various descriptors of card use behavior in 1990, the year before accounts were charged off. Specifically, accounts were segmented in terms of size of credit line, the number of months that a balance had been revolved, the portion of the total credit line that had been used on average during the year (based on the average daily balance during the year), and whether or not the account had used the cash advance feature. Because interest is charged from the date of transaction for a cash advance, this is also an indication of the intensity with which the card was used for credit.

Univariate analysis indicates that these descriptors of card use are significantly associated with the probability of charge-off (see Table 4). The probability of charge-off was

TABLE 4
Card Use Characteristics and the Charge-Off Rate, Total Portfolio Sample
N = 3096

<i>Credit Line</i>	<i>Charge-Off Rate</i>	<i>Revolving Balance in 1990</i>	<i>Charge-Off Rate</i>
≤ \$1,000	8.9%	≤ 9 months	0.1%
\$1,000–\$3,000	2.0	> 9 months	3.9
> \$3,000	0.5		
	$\chi^2 = 53.4^*$		$\chi^2 = 71.8^*$
<i>Percent Credit Line Used in 1990</i>	<i>Charge-Off Rate</i>	<i>Used Cash Advance in 1990</i>	<i>Charge-Off Rate</i>
≤ 75%	0.2%	No	0.9%
> 75%	14.6	Yes	4.5
	$\chi^2 = 339.4$		$\chi^2 = 33.0^*$

TABLE 5
Logit Analysis of the Default Choice

Dependent Variable: probability of choosing bankruptcy over outright default.

<i>Independent Variable</i>	<i>Estimated Coefficient</i>	<i>P-value</i>	<i>Variable Mean Value</i>
Legal Condition			
Prodebtor	-0.286*	.0002	.406
Procreditor	0.062	.4234	.363
Credit Limit	0.0002*	.0001	\$2,187
Account Age	0.006*	.0001	61 months
Aggressive	0.530*	.0001	.253
Constant	-1.295*	.0001	

Notes: $N = 5,103$ (with 38.5% filing bankruptcy).

Model chi-squared = 200.8; significant at the 95% level of confidence.

dramatically higher for accounts with credit limits less than \$1,000 versus accounts with larger credit limits. The probability of charge-off was significantly higher for accounts that revolved their balances for more than nine months of the year relative to those that were used less intensely as a source of credit. The probability of charge-off was also significantly higher among those accounts in the sample for which, on average, more than 75% of the available line was used during the year relative to the rest of the sample of accounts. Finally, accounts using the cash advance feature of the credit card had a significantly higher probability of charge-off.

In sum, cardholders who use their credit cards aggressively for credit are distinctively different from other cardholders in terms of the probability that they will go into charge-off. In the final section, we use multivariate analysis to assess the extent to which these measures of card use are related to the value of the choices the cardholders make in default.

D. Card Use and the Default Option

A logit regression is used to estimate the likelihood of the debtor's various choices in default. In logit analysis, the dependent variable in the regression model reflects a binary choice on the part of the debtor. In the first analysis, the debtor's choice is to default outright or to file bankruptcy (Table 5). If the choice to file bankruptcy is made, then the debtor must decide between filing under Chapter 7 or Chapter 13 of the Bankruptcy Code. The latter is the binary choice examined in the second analysis (Table 6).

Given information on those factors which are hypothesized to affect debtors' choices, the logit regressions estimate the likelihood that a debtor will file bankruptcy rather than simply default and, further, what type of bankruptcy. It is assumed that the debtor's decisions are characterized by a logistic distribution, and the maximum likelihood estimates of the regression coefficients yield an estimated probability derived from the cumulative logistic distribution function. The logistic procedure calculates the p -value as a measure of the significance of each estimated regression coefficient. The overall model fit is measured by the -2 log-likelihood statistic. This statistic has a chi-squared distribution under the null hypothesis that all explanatory variables in the model are insignificant. The explanatory variables used in the estimations are defined as the legal condition present in the debtor's

TABLE 6

Logit Analysis of the Bankruptcy Choice For Debtors Who Chose Bankruptcy

Dependent Variable = probability of choosing Chapter 13 over Chapter 7.

<i>Independent Variable</i>	<i>Estimated Coefficient</i>	<i>P-value</i>	<i>Variable Mean Value</i>
Legal Condition			
Prodebtor	-0.024*	.8883	.365
Procreditor	0.444	.0065	.392
Credit Limit	-0.00003	.3052	\$2,370
Account Age	0.0005	.8436	64 months
Aggressive	-0.281*	.0432	.323
Constant	-1.704*	.0001	

Notes: $N = 1,967$ (with 16.0% filing under Chapter 13).

Model chi-squared = 17.6; significant at the 95% level of confidence.

state, account characteristics, and card-use behavior. To measure the legal condition, two dummy variables are included. *Prodebtor* takes the value of 1 for states that have higher restrictions on wage garnishment than the federal rule and where asset exemptions were set at or above the federal level, and 0 otherwise. The variable *Procreditor* takes the value of 1 for states with strict or low asset exemption allowances and the federal allowance for wage garnishment, and 0 otherwise. The mixed message states in this study will remain in the constant.

Another dummy variable was created to measure aggressive card-use behavior in the year prior to charge-off. The variable *Aggressive* takes the value 1 for those accounts that were revolved more than nine months in that year, kept an average balance of more than 75% of the credit line, and used the cash advance feature at least once. Otherwise, *Aggressive* takes the value 0.

The continuous variable, *Credit Limit*, is the dollar value of the account's credit line. It is expected that this account characteristic is positively correlated with the creditworthiness of the cardholder. Analysis of these accounts indicates that the size of the credit line is significantly positively correlated with the age of the principal cardholder.⁴ The continuous variable *Account Age* measures the length of time the account has been opened, another measure of creditworthiness.

E. Outright Default versus Bankruptcy

The estimated logit model performs well in determining the probability that a debtor will choose bankruptcy over outright default. In particular, account characteristics are significantly related to the debtor's default choice, holding legal conditions constant (Table 5). Cardholders with larger credit lines and those with more mature accounts were significantly more likely to file bankruptcy relative to other cardholders. Furthermore, cardholders who revolved a large percentage of their line for most of the year and also used cash advances were significantly more likely to file bankruptcy than default outright. This result reinforces the idea that aggressive card users chose the default option which yields the highest value.

As was the case in the univariate analysis, debtors in default in pro debtor states were significantly less likely to choose bankruptcy than were debtors in the mixed message states.

However, in contrast to the results of the univariate analysis, debtors in the pro creditor states were not significantly more likely to choose bankruptcy, holding account characteristics and aggressive card use behavior constant.

For further insight on the impact of legal conditions on debtors' choices, holding card usage characteristics constant, we duplicated the analysis in Table 5, disaggregating the legal conditions into separate garnishment and asset exemption variables. The results (not shown) indicate that debtors' choices between outright default and bankruptcy were not systematically impacted by the level of asset exemptions. However, debtors were significantly more likely to default outright rather than file bankruptcy in states where garnishment was prohibited or severely restricted. These results are consistent with those of several other analyses of the significance of the rules governing garnishment in consumers' default behaviors.

F. Chapter 7 versus Chapter 13

The estimated logit model also performed well in determining the probability that a debtor would choose Chapter 13 over Chapter 7, once the bankruptcy option had been selected (Table 6). The results suggest that aggressive cardholders—those who revolved large balances for a large portion of the year—were significantly less likely to choose Chapter 13 than the rest of the sample, holding all else constant. In other words, the more aggressive cardholders made choices in default that maximized the value of their option to default. In a separate analysis, the estimated measure of the default option value was significantly higher for the aggressive cardholders relative to the rest of the sample of defaulted accounts. Debtors in states that followed the federal guidelines for garnishment and had low exemption allowances (pro creditor) were more likely to choose Chapter 13 than debtors in the mixed message states, holding the use variables constant. When the legal conditions were separated, holding the use variables constant, the garnishment variables were insignificant in the choice between Chapter 7 and Chapter 13. But, the asset exemption variable was a significant influence in that choice. Debtors in states with low exemption allowances were significantly more likely to file under Chapter 13.

VI. SUMMARY AND IMPLICATIONS

Questions of the causal relationship between credit card use and the incidence of bankruptcy have arisen as the two phenomenon have grown concurrently during the last 15 years. This study used account data from a national credit card portfolio to demonstrate that among cardholders, estimates of the value of the option to default are significantly higher for bankruptcy than outright default. Furthermore, holding legal conditions constant, cardholders who use their credit cards aggressively for credit are significantly different from other cardholders in terms of the choices they make in default. Aggressive credit-card users realize a higher value on average when they exercise their option to default than do other cardholders because they are significantly more likely to file bankruptcy and to file under Chapter 7. Holding card-use characteristics constant, there is a significant relationship between garnishment restrictions and debtors' choices to default outright or file bankruptcy. However, variation in the level of asset exemption allowances is not a significant influence in that decision. Once the decision to file bankruptcy is made, holding card use characteristics

constant, the level of asset exemption allowances has a significant influence on the debtor's choice between Chapter 7 and Chapter 13.

An intriguing result of this analysis is that cardholders who use cards aggressively tend to make choices in default that maximize the value of their option to default. Pozdena argued that some households may "self-select," intensely using the credit feature of their cards and paying large interest charges with the understanding that the value of their option to default reduces the expected cost of their credit use. This moral hazard aspect of credit cards may provide another clue to the puzzle related to the high average level of interest rates for credit cards and consumers' lack of sensitivity to those rates. The results of this analysis suggest that the consumers who are most likely to be paying the high interest rates on credit cards may discount the importance of that rate and focus instead on maximizing the value of their option to default.

NOTES

1. Luckett (1988) provides a detailed discussion of the Bankruptcy Code.
2. The federal standard for weekly wages exempt from garnishment (established in 1970) is the greater of 75% of the disposable earnings of the debtor or 30 times the minimum hourly wage in effect. In the late 1980s, those states with more restrictive limits on the garnishment of wages included: AK, AL, CT, DE, HI, IA, ID, IL, KS, LA, MA, MD, ME, MN, MO, NE, NH, NJ, NM, NY, OR, RI, VT, WV, and WI. Wage garnishment was prohibited for the repayment of consumer credit or if the earnings were necessary for family support in FL, NC, ND, PA, SC, SD, and TX.
3. By the late 1980s, those states that chose to "opt out" of the federal exemption allowance and establish a lower level of exempt assets included AL, AR, DE, GA, KY, MD, NE, NH, OH, OK, SC, TN, and VA.
4. The data set included the age of the principal cardholder for only about 50% of the accounts, so this cardholder characteristic could not be included in the final analysis.

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