

Determinants of Consumer Credit Card Repayment Patterns

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This study investigates three credit card repayment patterns, namely revolvers, partial revolvers, and non-revolvers, which are defined as original responses for holders of bank or retail store cards, based on the 1983 Survey of Consumer Finances. Multivariate logistic regression analysis is used in this study to determine the probability of repayment patterns by households' socio-demographic, financial, and attitudinal characteristics. The results show that financial and attitudinal factors are the most important determinants.

American households' credit-card debts have been growing for many years. The amount of outstanding balances on credit cards per family have increased from \$649 to \$1,472 (measured in constant 1986 dollars) from 1970 to 1986 (Canner, 1988). Actually, households' credit-card debts were steadily increasing after 1986. The median credit-card debt of families holding rose from \$600 to \$900 (in 1989 dollars), and the proportion of families carrying such debts increased from 37 percent to 39.9 percent between 1983 and 1989 (Kennickell & Shack-Marquez, 1992).

Not only the amount of credit-card debt has increased, the proportion of household holding credit cards has also expanded during the same time period. Credit cards have been widely held by American families. The proportion of families holding at least one type of credit card has grown from 51 percent to 71 percent between 1970 and 1986. Retail store cards were the most frequently held type of card in 1986, with 62 percent of all families holding such a card. The most dramatic increase has occurred in the holding of bank cards, which were the second widely held in 1986, from 16 percent to 55 percent over the time period (Canner, 1988).

Retail store cards and bank cards show a common characteristic: the opportunity to revolve the credit card debt. Many researchers attribute the successful increase of the revolving credit card to its flexible repayment terms (Heck, 1983; Canner, 1988), interest-free grace periods (Canner & Cynrak, 1986), and convenience (Lockett & August, 1985; Canner & Cynrak, 1986). Therefore, two types of credit card usage patterns by consumers can be identified: for financial needs through installments and for convenience in transactions (Canner & Cynrak, 1986). These two credit card

usage patterns create three types of repayment patterns for the credit card outstanding: always revolving, partial revolving, and never revolving in the 1983 Survey of Consumer Finances. Consumers, who always revolve credit card debt and hardly ever pay the amount of credit card bills in full, can be named as revolvers; whereas consumers, who never revolve credit card debt and always pay full bills, can be called non-revolvers. Some consumers at the middle stage, who sometimes pay full amount or always pay some bills in full, are partial revolvers.

The purpose of this study is to investigate the determinants which contribute to the probability that a consumer with bank or store cards will be primarily a revolver, partial revolver, or non-revolver. The characteristics of revolvers and partial revolvers are important to credit issuers. The profits of card issuers depend in large part on generating interests from the outstanding debt of revolvers. The more monthly payments consumers do not pay in full, the more profits card issuers earn. On the other hand, some consumers revolve credit card debts because of their financial difficulties, which means higher risk for creditors. Hence, the probability of a consumer being a revolver and partial revolver, related to their characteristics, provides a useful information concerning potential risks and profits for card grantors.

Understanding the determinants of being a revolver, partial revolver, or non-revolver is also important for social-economists. Only revolving credit debt represents the true consumer credit-card burdens. The credit for convenience purposes may inaccurately inflate the growth of consumer debt (Lockett & August, 1985). Therefore, subtracting non-revolvers' debts from the total consumer debt is useful to investigate the actual households' credit burdens and their repayment abilities. Revolvers who have problems paying full credit debts usually tend to go bankrupt, resulting in social loss. The results of this study can provide further insight on financial and economic characteristics of consumers who potentially have payment problems.

The Determinants of a Revolver or Non-Revolver

The first objective of this article is to determine factors related to being a revolver, partial revolver, or non-revolver. To perform the

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objective of this study, a model of credit card repayment patterns is used similar to Canner and Cynrak's (1986) model. They study household credit card usage patterns by selected family characteristics and develop a logistic model to estimate the probability of a household's usage pattern, using the data of the 1983 Survey of Consumer Finances. In their model, the dependent variable is convenience, which is a dummy variable dividing households into two groups: convenient users who always pay the full amount of credit card bills, and financial users who hardly ever or sometime pay bills in full. However, the 1983 survey data provide three payment categories of bank or store credit card holders: those who hardly ever, those who sometimes or for some cards, and those who almost always pay the total amount due each month. There is no theoretical reason that consumers with sometime full payments will tend to be revolvers or non-revolvers, so they can be a single group, neither revolver nor non-revolver. Thus, it is a premise in this study that the dependent variable has three ordinal categories consistent with the original data.

Canner and Cynrak (1986) assume that the probability of being a convenience user is a function of financial, socio-demographic, and attitudinal variables. In their model, financial factors are 1982 family income, ratio of monthly debt payments plus monthly rent payments for non-homeowners to monthly income, and ratio of liquid assets to 1982 income. Demographic variables are education level, age, and race of household head, and race multiplied by 1982 income. Attitudinal factor is an index constructed by summing the number of positive responses about possible reasons for borrowing. All their independent variables are included in this study, except the variable of race multiplied by 1982 income. They employ this variable to represent the interaction between race and income. However, it is not significant in their results, and the Pearson correlation coefficient for race and income is only 0.05 in the present study. Thus, this interaction variable is excluded from the model. Another change is that their attitudinal factor is substituted by adopting the direct answer to consumers' general attitude toward credit cards in this model.

Variables indicated above have the same hypotheses as those in Canner and Cynrak's model. Income is proposed to have a positive relationship with the ability to pay the credit card debt (Canner & Cynrak, 1986; Slocum & Mathews, 1970; Mandell, 1972). The ratio of liquid assets to income is hypothesized to be positively related to the probability of being a non-revolver, whereas the ratio of monthly payment to income is negatively related to that probability (Canner & Cynrak, 1986). Age is hypothesized to be positively associated with the probability of achieving full payments, according to the life-cycle theory (Ando & Modigliani, 1963; Thurow, 1969). During the 20 to 35 age period, a household is faced with problems of raising and building a family. So, the family

consumption is higher, related to the family income when a household head is young. After 35 years of age, a household's income may begin to exceed expenditures for current consumption. Therefore, a household's repayment ability increases as the family head ages (Canner & Cynrak, 1986; Mandell, 1972). Whites are found to be positively related to being non-revolvers in Canner and Cynrak's (1986) study. Household heads with high educational level are assumed to have a greater probability of being non-revolvers compared to low educational household heads (Canner & Cynrak, 1986; Mandell, 1972).

Moreover, the model tested in this study controls for five more demographic factors and one more financial factor than the model used by Canner and Cynrak: family size (i.e., the total number of persons in household), presence of a child under eighteen years of age, marital status, occupation, sex of household head, and the consumer loan payment problem. Family size and presence of children are related to the stage of family life cycle (Heck, 1983), also associated with family consumption expenditures (Thurow, 1969). It is probably the case that large families with children are faced with heavier financial needs and higher potential payment problems (Heck, 1983).

Sullivan and Fisher (1988) identify the characteristics of consumers who missed or fell behind scheduled debt repayments. They report that a greater proportion of women have debt payment difficulties than men. However, they also argue that the sex of household head incorporated family life-cycle. Hence, the gender of household head is added in the present model to test the relationship between gender and credit card repayment difficulties, controlling for other variables.

Canner and Lockett (1990) apply multivariate techniques to approach the determinants of household loan payment performance. Their results show that the marital status of household head is significantly related to a household's loan payment performance. Households with married and single heads have a higher probability without any missed or late payment than separated or divorced head, when controlling for other variables. Thus, the marital status is included in this credit repayment pattern study, and presented as a dummy variable: 1 is separated or divorced, and 0 is others. Canner & Lockett (1990) also examine the relationship between the occupation of household head by twelve categories and loan payment problems. Here, occupation is a dummy variable (1 represents professional workers or managers, 0 is others).

Credit grantors usually view consumers with records of late loan payments as risky credittees, because those consumers may have financial problems and also hardly pay the revolving card debt in full. So, the consumer loan payment problem is added into the model as one of the financial variables to examine whether it actually is related to the revolver/non-revolver status. Chart 1 presents the definitions of all variables used in

Chart 1
Variable Definitions

INDEPENDENT VARIABLES

SOCIO-DEMOGRAPHIC

AGE - age of household head	
FAMILY SIZE - total number of persons in household	
CHILDREN - presence of a child under 18 years of age	1: if household has children under 18; 0: if not.
MARITAL STATUS - marital status of household head	1: divorced or separated; 0: others.
OCCUPATION - job category of household head	1: professional worker or manager; 0: others.
SEX - the gender of household head.	1: male; 0: female.
EDUCATION - the educational level of household head	1: 0-8 grades; 2: 9-12 grades; 3: high school diploma; 4: some college; 5: college degree.
RACE - race of household head	1: white; 0: non-white.

FINANCIAL

LOAN-PROB - the consumer loan payment problem	1: sometimes delayed or missed payments 0: all paid as scheduled or no loan
INCOME - 1982 family income (dollars)	
LIQUID/INCOME - ratio of liquid assets to 1982 family income	
PAYMENT/INCOME - ratio of monthly debt payments plus monthly rent payments for non-homeowners to monthly income	

ATTITUDINAL

ATTITUDE - general credit attitude	1: good idea or good in some ways 0: bad idea
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DEPENDENT VARIABLES

PAYMENT PATTERN (Model 1) - payment patterns for retail store and bank credit cards	2 : always pay full amount credit card bills 1 : sometimes pay full amount or always pay some bills in full 0 : hardly ever pay full amount of bills
PAYFULL (Model 2-1) - payment patterns for store and bank cards	1: always pay full amount credit card bills 0: others
PAYSOME (Model 2-2) - payment patterns for store and bank cards	1: sometimes pay full amount or always pay some bills in full 0: others
PAYHARD (Model 2-3) - payment patterns for store and bank cards	1: hardly ever pay full amount of bills 0: others

this study. Since the dependent variable, the repayment pattern, contains three levels, the ordinal Logistic regression analysis is suggested as an appropriate technique for analysis (Aldrich & Nelson, 1988).

The second objective of this study is to determine distinctive household characteristics for each type of credit repayment patterns: non-revolvers who always pay full amount of credit card bills, partial revolvers who sometimes pay full amount or always pay some bills in full, and

revolvers who hardly ever pay full amount of bills. Therefore, three separate models are developed for three repayment patterns. Independent variables in this part are the same as those in the first model. The definitions of the three dependent variables are also listed in Chart 1. The binary logistic regression is used to examine these three models.

Empirical Tests

Data are from the 1983 Survey of Consumer Finances conducted by the Survey Research Center of

Table 1
Ordinal Logistic Regression Results
Model 1: Three Types of Credit Card Repayment Patterns

Independent Variable	Mean Value	Parameter Estimate	Standard Error	Wald Chi-Square	
Constant 1		-0.71	0.33	4.74	*
Constant 2		0.62	0.33	3.60	*
SOCIO-DEMOGRAPHIC VARIABLES					
Age	46.32	0.01	0.00	10.39	**
Race	0.89	0.32	0.13	5.83	*
Education	3.55	0.04	0.04	1.06	
Family Size	2.79	-0.10	0.05	4.87	*
Children	0.42	0.01	0.13	0.01	
Marital Status	0.12	-0.08	0.15	0.27	
Occupation	0.39	0.08	0.10	0.55	
Gender	0.79	0.08	0.13	0.34	
FINANCIAL VARIABLES					
Loan-Problem	0.11	-1.00	0.14	52.07	**
Income	33.01	0.00	0.00	5.33	*
Liquid/Income	0.50	0.88	0.10	77.72	**
Payment/Income	0.18	-1.01	0.21	22.51	**
ATTITUDINAL VARIABLE					
Attitude	0.81	-0.46	0.11	16.78	**
Criteria for Assessing Model Fit					
-2 Log Likelihood				$\chi^2 = 469.08$	**
Concordance				71.6%	
Score Test for the Proportional Odds				$\chi^2 = 19.94$	

*significant at .05 level.
**significant at .01 level.

the University of Michigan. The survey sample consists of 3,824 randomly selected U.S. households. A total of 2,224 households holding at least one bank or retail store card, without negative income and uncertain attitudes toward credit cards, are analyzed in this study. Within these households, 1,059 are non-revolvers, 584 are partial revolvers, and 581 are revolvers.

Pre-test

The interactions within independent variables have been tested before applying logistic analysis. None of the Pearson correlation coefficients between each pair of variables is greater than 0.75. Therefore, no variable representing interaction is included in models.

Three Types of Credit Card Repayment Patterns

Table 1 presents the results of the ordinal logistic regression. Three credit card repayment patterns are analyzed as ordinal responses. The premise assumption of three parallel types of credit card repayment patterns is accepted as measured by the chi-square value of 19.94. It

supports that sometimes paying credit card bills in full can be viewed as a middle pattern between long-term revolver and non-revolver. Also, the model fit is significant at 0.01 level.

The age of household head and family size are significantly related to credit card repayment pattern. As the age of household head increases, the probability of paying full credit card bills increases. On the contrary, family size is negatively associated with the probability of paying credit card bills in full. These two results are consistent with the life-cycle theory. The race of household head is also a significant variable. Whites are more likely to pay credit card bills in full than blacks, Hispanics, and others.

The proportions of revolvers, partial revolvers, and non-revolvers by sex and marital status of household heads, without the consideration of other variables are illustrated in Table 2. Women are more likely to be long-term revolvers than men. Also, separated or divorced

Table 2
Credit Card Repayment Patterns by Gender and
Marital Status of Household Head

Characteristics	Non-revolver	Partial Revolver	Revolver	Chi-Square
Male	46.79	27.40	25.81	5.72*
Female	50.75	21.94	27.31	
Separated & Divorced	40.58	27.54	31.88	7.48*
Married, Single, & Widowed	48.61	26.08	25.31	
All Households	47.62	26.26	26.12	

* significant at .05 level.

household heads are more likely relative to other marital status to revolving credit card debts. However, sex and marital status are not significant in multivariate analysis (shown in Table 1). The present study supports that gender and marital status of household head incorporate other household characteristics (Sullivan and Fisher, 1988) which dominate the credit card repayment patterns. Moreover, there is no evidence that other demographic variables, such as the presence of children under eighteen, occupation, and educational level of household head, are related to credit card repayment pattern when controlling for other variables.

All financial variables are significantly associated with credit card repayment patterns. Consistent with the hypotheses, the repayment pattern of a household with higher income or higher ratio of liquid assets to income is more likely to be a non-revolver. It is obviously that households with higher income or more liquid assets have greater ability to pay the full amount of monthly credit card bills. The ratio of monthly debt payments plus monthly rent payments for non-homeowners to monthly income is negatively related to being a non-revolver. In addition, households with consumer loan payment problems tend to hardly ever pay the full amount of credit card bills. It is probably the case that loan payment problems are associated with the family financial difficulty, so those households have to revolve their credit card debts. This result reveals why credit grantors use late payment records to reject credit card applicants. Creditors tend to accept the possible association between bad payment records and financial problems, then reject those credit applicants due to minimizing business risk.

Not unexpected, a negative attitude toward credit cards is highly related to being a non-revolver. For households with problems of paying bills in full, revolving credit cards help them solve the payment difficulty. On the other hand,

consumers who have a positive attitude toward credit cards may use credit cards more frequently and rely upon credit cards more easily.

Special Characteristics for Each Pattern of Repayment

The next step is to examine each type of credit card repayment pattern to find out its special characteristics. Three multivariate logistic models are developed for three patterns: non-revolvers who always pay full amount of credit card bills, partial revolvers who sometimes pay full amount or always pay some bills in full, and revolvers who hardly ever pay full amount of bills. The results are illustrated in Table 3 to Table 5. These three models all fit at the 0.01 level.

The significant variables for being a non-revolver (shown in Table 3), contrasting to other two repayment patterns, are the same as those in the previous ordinal logistic model. The finding is not surprised because roughly half of the bank and retail credit card holders were non-revolvers contributing the characteristics in these two models.

However, a closer analysis for partial revolvers (presented in Table 4) indicates their distinctive characteristics. Compared with long-term revolvers and non-revolvers, households with consumer loan payment problems and lower ratio of liquid assets to income are more likely to be partial revolvers. Also, a positive attitude toward credit cards is positively and significantly related to being a partial revolver. This is acceptable because a partial revolver may have only temporal payment difficulty, but not actually rely upon credit cards long term.

The further multivariate logistic analysis for revolvers (shown in Table 5) identifies that

Table 3
Multivariate Logistic Regression Results Model 2-1: Characteristics for Non-Revolvers

Independent Variable	Parameter Estimate	Standard Error	Wald Chi-Square	
Constant	-0.44	0.37	1.44	
SOCIO-DEMOGRAPHIC VARIABLES				
Age	0.01	0.00	7.72	**
Race	0.42	0.16	7.05	**
Education	0.01	0.05	0.02	
Family Size	-0.12	0.05	4.77	*
Children	-0.06	0.15	0.15	
Marital Status	-0.11	0.17	0.46	
Occupation	0.08	0.11	0.48	
Gender	0.01	0.15	0.01	
FINANCIAL VARIABLES				
Loan-Problem	-1.01	0.18	30.87	**
Income	0.00	0.00	5.20	*
Liquid/Income	0.85	0.10	68.23	**
Payment/Income	-1.09	0.26	18.14	**
ATTITUDINAL VARIABLE				
Attitude	-0.53	0.12	18.84	**
Criteria for Assessing Model Fit				
-2 Log Likelihood			$\chi^2 = 422.93$	**
Concordance			74.0%	

*significant at .05 level **significant at .01 level.

Table 4
Multivariate Logistic Regression Results Model 2-2: Characteristics for Partial Revolvers

Independent Variable	Parameter Estimate	Standard Error	Wald Chi-Square	
Constant	-1.39	0.38	13.50	**
SOCIO-DEMOGRAPHIC VARIABLES				
Age	-0.01	0.00	1.65	
Race	-0.12	0.15	0.57	
Education	0.08	0.05	2.17	
Family Size	0.05	0.05	0.77	
Children	0.15	0.15	0.94	
Marital Status	0.16	0.18	0.80	
Occupation	0.04	0.12	0.10	
Gender	0.19	0.16	1.45	
FINANCIAL VARIABLES				
Loan-Problem	-0.31	0.16	3.66	*
Income	-0.00	0.00	1.23	
Liquid/Income	-0.45	0.10	19.07	**
Payment/Income	0.03	0.11	0.06	
ATTITUDINAL VARIABLE				
Attitude	0.37	0.14	7.29	**
Criteria for Assessing Model Fit				
-2 Log Likelihood			$\chi^2 = 85.36$	**
Concordance			60.5%	

*significant at .05 level **significant at .01 level.

Table 5
Multivariate Logistic Regression Results Model 2-3: Characteristics for Revolvers

Independent Variable	Parameter Estimate	Standard Error	Wald Chi-Square	
Constant	-0.18	0.39	0.20	
SOCIO-DEMOGRAPHIC VARIABLES				
Age	-0.01	0.00	4.95	*
Race	-0.26	0.15	2.85	
Education	-0.08	0.05	2.04	
Family Size	0.08	0.06	2.04	
Children	-0.07	0.16	0.17	
Marital Status	0.00	0.18	0.00	
Occupation	-0.11	0.13	0.77	
Gender	-0.18	0.16	1.23	
FINANCIAL VARIABLES				
Loan-Problem	1.05	0.15	49.69	**
Income	-0.00	0.00	4.06	*
Liquid/Income	-1.03	0.16	39.77	**
Payment/Income	0.68	0.24	8.45	**
ATTITUDINAL VARIABLE				
Attitude	0.31	0.14	4.74	*
Criteria for Assessing Model Fit				
-2 Log Likelihood			$\chi^2 = 286.13$	**
Concordance			73.2%	

*significant at .05 level.

**significant at .01 level.

age of household heads is negatively and significantly associated with the probability of being revolvers. Moreover, the four financial variables are all significant. Households with lower income, lower ratio of liquid assets to income, higher ratio of monthly payments to income, or other consumer loan payment problems, are more likely to always revolve their credit card debts. Also, credit revolvers tend to posit more positive attitude toward credit cards.

CONCLUSION AND SUGGESTION

The assumption of three types of credit card repayment patterns is accepted. It means that the partial revolvers should be seen as a middle stage between long-term revolver and non-revolver.

It was proved in this study that financial and attitudinal variables are more able to indicate consumers' repayment patterns than socio-demographic variables. "Attitude" is significant in all models. Almost all of the financial variables are strongly associated with credit card repayment patterns. The relationship between loan payment problems and credit card repayment patterns, which has not tested in previous studies, significant in this study. These findings imply that most households revolve their credit card debts because of the financial needs, but not only due to their positive attitudes toward credit card. Conversely, their positive credit attitudes

may be attributed to that the flexible payment of credit cards solve parts of their financial problems.

The age of household head is significant in all models, except for the test of the partial revolver. This result supports the life-cycle theory. Another variable regarding the life-cycle theory, family size, is only significant in the ordinal model and associated with being a non-revolver.

A closer analysis for each type of repayment patterns provides some further insights. These two groups donate potential profits and risk for creditors. Households having other consumer loan payment problems, lower income, and lower ratio of liquid assets to income tend not pay credit card bills in full.

Distinguishing partial revolvers is useful for creditors because this group of consumers are lower risky than always revolvers, and pay more interests to creditors than non-revolvers. However, the consumer's credit card repayment pattern only provides the information of potential profits and risks to creditors. Creditors should consider the trade-off between profits and risks. Furthermore, the profitability of each repayment pattern to creditors are also related to the amount and frequency of using credit card by consumers, which are worth further studying.

The implication for consumer educators is that consumers should learn how to properly use the credit card as a tool to solve their financial problems. Although credit cards have flexible repayment terms, the high interest rates can cause consumers to go bankrupt easily. Consumers should be aware of the interest rate and truly understand it before using credit cards. The relationship between the interest rates of credit cards and repayment patterns is another issue for the future research.

The limitation of this study is that the 1983 survey data is too old to represent households' credit card repayment patterns in 1992. However, the change of repayment pattern over time period can be examined by using the 1989 and 1983 Surveys of Consumer Finances to develop a pooled cross-section time series research.

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