

Credit Card Rates and Consumer Switch: New Evidence

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Abstract

This paper investigates the underlying determinants of consumer's choices regarding switching credit-card balances. To estimate the likelihood that consumers switch credit cards, two logit models are estimated. Using data from the Consumer Finance Monthly (CFM) of The Ohio State University, the author finds that at the conventional 5 percent level of significance, the following variables have significance: old interest rate, new interest rate, duration of the introductory rate, balances, number of credit cards, homeownership, and age. As expected, interest rates, balances, the duration of new introductory offer rates, and homeownership have the greatest influence on why or why not people switch credit cards. The findings are consistent with the view that consumers make rational decisions in the credit card market, challenging Ausubel's (1991) argument of credit card consumer irrationality and Calem and Mester's (1995) empirical finding that credit card rates are sticky because consumers are irresponsive to rate cuts.

Keywords: consumer search, credit cards, economic theory, home ownership, interest rate, logit model, survey data, switching costs

1. Introduction

In 1887, in his novel "Looking Backward," Edward Bellamy, an American author and socialist, speculated about buying commodities with a card. The introduction of the credit card in the mid-twentieth century revolutionized and transformed how people live. Credit, in general, is as old as human society. However, the concept of a general purpose credit card came to existence in 1949 when Frank McNamara dined in a New York restaurant and discovered he could not pay for his meal. Later, he founded and named Diners Club, which would issue cards to consumers and sign merchants to accept those cards (Evan & Schmalensee, 1999). In 1958, the first widely accepted plastic charge card was introduced by American Express having the marketing tagline as "Do not Leave Home without It". BankAmericard introduced the first revolving general-purpose credit card in 1959, which became Visa in 1977. In 1966, the Interbank Card Association introduced "Master Charge" which became MasterCard in 1979.

The credit card industry in the United States experienced high and sticky interest rates in 1980s. During this period, the average credit card rate was almost 19.8 percent, while the rate for the perfectly competitive market with zero profit was estimated to be around 13.2 percent (Ausubel, 1991). In his major investigation of the US credit card industry, Ausubel (1991) attributed the industry deviation from being a perfectly competitive industry to three reasons: consumer irrationality, search costs, and switching costs. Much has changed in the credit card industry. In particular, the Truth-in-Lending Act of 1988 has produced a major shake-up in the industry. The Fair Credit and Charge Card Disclosure Act of 1988 intends to improve informational efficiency in order to increase competition in the credit card industry. Under the Truth-in-Lending Act, credit card issuers are required to disclose all information regarding interest rate, annual fees, and grace period in their solicitations, thereby forcing card issuers to report upfront their most important contract terms (Kerr & Dunn, 2002). Beginning in the mid 1990s, the U.S. credit card market started to become more competitive. Interest rates became more competitive and variable as price competition increased. There was a wide dispersion of interest rates, ranging from zero percent introductory rates up to rates well above 20 percent. Debt-carrying credit card users started to search more for better rates which enhanced competition in the industry (Kerr & Dunn, 2002). On the other hand, advances in technology in terms of credit security technology and data quality reduced the economic significance of information-based barriers to prescreening and solicitation of card applicants. In addition, information innovation such as widespread access to the internet reduced the search and switching costs of

customers (Calem, Gordy, & Mester, 2005).

The credit card industry is highly concentrated. The top 10 credit card issuers controlled approximately 88 percent of the market share with \$972.73 billion in general purpose card debt outstanding in 2008. That includes Visa, MasterCard, American Express, and Discover and is up from approximately 85% in 2007 (Nilson Report, 2009). Moreover, the industry has no barriers to entry and exit, consistent with contestable market theory. The Contestable Market Theory is a theoretical analysis focusing on perfectly free entry and exit. The theory suggests that the special case of perfectly free, absolute, reversible entry is the basis for defining efficient allocation. The theory rests on the following three assumptions:

- 1). Entry is free and without limit. With no costs, the new entrant can replace the incumbent.
- 2). Entry is absolute. With a slight price difference, the entrant can displace the existing firm.
- 3). Entry is perfectly reversible. Firms can exit the market at no cost. Sunk cost is zero.

2. Overview of Literature

Despite the fact that the first credit cards were issued approximately 50 years ago, research into their usage has been relatively new. The bulk of early research on credit card usage centered on explaining the stickiness of interest rates in the credit card industry and effects of search on interest rates prevalent in the 1980s. Early research has attributed the rate stickiness in the credit card industry to the failure of interest rate competition due to the following three sources: switching and search costs, adverse selection, and consumer irrationality. The first attempt to explore this industry was pioneered by Ausubel (1991). Ausubel noticed that although there were about 4,000 banks in the US credit card market, the industry was far from being competitive because of high and sticky interest rates during 1980s. Pozdena (1991) provides an alternate market-based explanation for insensitivity of credit card interest rates to changes in the market rates. Pozdena argues that the majority of credit card holders are convenience users who routinely pay off their balances in full each month without revolving balances from one billing period to another. Credit card convenience users do not search for lower rates, but they will be primarily sensitive to annual fees and grace periods, an implication that is consistent with Ausubel's theory. This will dissuade cards issuers from lowering their card rates. Canner and Lockett (1992) employ information theory to explain that consumer insensitivity to bank card interest rates may be rational if credit cards are used for transaction convenience, rather than for carrying balances. Mester (1994) provides different explanations for high and sticky interest rates on credit cards by focusing on the non-collateralized features of credit card debt. Mester recognizes that imperfect information about cardholders risk is the reason behind the high rates in this industry. Calem and Mester (1995) support Ausubel's theory that the credit card industry deviates from a perfectly competitive model because consumers do not conform to the behavioral assumptions of perfect competition, due to the existence of search and switching costs, and due to the likelihood of facing an adverse selection problem by firms who reduce their interest rates unilaterally. They provide an additional explanation of why the credit card industry deviates from being perfectly competitive. They attribute this deviation to their finding that desired consumers with high balances may face higher switching costs than less desired consumers who are revolving low balances, inducing an adverse selection problem in the credit card market. Brito and Hartley (1995) provide theoretical explanations for interest rate stickiness based on the liquidity services offered by credit cards" asymmetric information and consumer transaction costs. They provide different explanations for the observed high level of card interest rates. Their theoretical model predicts that it is rational to borrow on high credit card interest rates and pay interest on outstanding credit card balances rather than the transaction costs associated with alternative financing. Their model predicts that even small costs of arranging for other costs of loans can induce consumers to borrow on higher interest rates. Cargill and Wendel (1996), using data from the 1989 Survey of Consumer Finance, empirically show that income negatively affects the likelihood of borrowing on credit cards but is positively related to the amount borrowed. Stavins (1996) argues that one would expect banks to drop their interest rates to attract customers in a competitive market. In the class of perfect competition with complete information, price equals marginal cost and changes in the marginal costs must be translated into changes in the price of the product. However, credit-card-issuing banks do not appear to behave in this way in the credit card industry. The industry interest rates have been consistently higher than other types of consumer debt instruments. Park (1997) attributes credit card rate stickiness and high profits in the industry to their option-value nature. He argues that high credit card rates reflect the value of the cardholders' option to borrow when they become riskier. "The option value is partly offset by the presence of cardholders who choose credit card loans while they are less risky because of high transaction costs of alternative loans." Ausubel (1999) finds evidence of adverse selection in the credit card market. Crook (2002) shows that credit card holders with higher balances do not search less than those with lower balances. Using data

from the 1998 Survey of Consumer Finance, Crook finds that households with poor payment histories do not appear to search more or less than those with better payment histories. Kerr and Dunn's (2002) study findings demonstrates the important role of the Truth-In-Lending Act of 1988 in lowering the cost of gathering information by cardholders, leading to the decline in credit card interest rates in recent years. Min and Kim (2003) investigate the socioeconomic determinants of consumer credit card borrowing. Using a two-step estimation procedure to model consumer credit card borrowing, they find that credit-constrained households who are likely to be denied other forms of credit have a higher demand for credit card borrowing. Berlin and Mester (2004) find that many models of consumer search, such as Ausubel (1991) and Calem and Mester (1995), fail to explain recent credit card decline as well as pricing behavior in credit card markets. Moreover, the authors find that a drop in consumer switching costs is not a good explanation for the drop in credit card rates in the 1990s. Dey and Mummy (2005) use data from the 1998 U.S. Survey of Consumer Finances (SCF) to examine the association between borrower quality and the offered menu of credit card borrowing limits and interest rates. Their empirical findings show that there is a negative relationship between the credit card limit and the interest rate. On the other hand, they find that an increase in the credit card interest rate will increase the default rate of the borrower. Yang et al. (2007) provide an alternative explanation of the long debated puzzle on the stickiness of credit card interest rates. They argue that consumer's unrealistic optimism about their future borrowing estimates will make them less sensitive to the APR and more sensitive to the annual fee. Telyukova and Wright (2008) provide a cost-based explanation of why consumers maintain credit card debt and pay interest despite the associated high interest rates. They argue that consumers may carry high-interest credit card debt and pay high interest while maintaining balances in their low-interest bearing bank accounts to avoid the expected costs of not holding precautionary balances or transactions balances. Another strain of the literature looks at the impact of consumer switching costs on the card rates. Stango (2002) and Barone et al. (2006) find that the degree of consumer switching costs in the credit card market have an important influence on the card rates.

3. Data Analysis

3.1 Data Source and Variables

The unique data set used in this research comes from the Center for Human Resource Research (CHRR) at The Ohio State University and is known as the Consumer Finance Monthly (CFM). The Consumer Finance Monthly (CFM) is an ongoing national survey that asks unique questions on credit card usage that are not available in any major national surveys. The CFM was instituted in 2005 and has been conducted each month with a random sample of adult household members. A minimum of 300 surveys are completed each month. The random-digit-dialing method of sample selection is used to select a nationwide sample. The CFM also includes detailed questions on credit knowledge, credit stress, bill payment, and demographic information, expectations about the future, household debts, savings, and assets. Moreover, besides detailed questions of household credit card use, the CFM includes a complete series of questions on household assets and liabilities that allows researchers to analyze consumers behavior in relation to credit cards in the context of their overall financial situations. The variables used in the analysis can be grouped into three broad categories: credit card related variables, balance switching variables, and socioeconomic variables. Annual percentage rate (APR), amount owed on all credit cards, and borrowing limit are important contractual variables in the credit card section. Balance switching section variables include whether or not any balances have been switched in the past 6 months, introductory teaser rates, balance switching fee, number of household credit cards, APR on the card switched away from, and APR on the card switched to. Socioeconomic variables can be divided into two subgroups: demographic variables and financial variables. Demographic variables include age and marital status. Financial variables include homeownership. The following are the credit card questions from the CFM that are used in this paper:

- 1). Do you have any credit cards? How many credit cards do you have?
- 2). In the past 6 months, have you switched any balances between cards or to a new card?
- 3). What was the old interest rate on the card you switched away from?
- 4). What was the interest rate on the card you switched to?
- 5). If you had an unpaid balance on the card you charge the most on, what interest rate would you have to pay?
- 6). Please think about the credit card on which you owe the most. What is the interest rate for unpaid balances on this card?
- 7). Are there any attractive reward features on this card?
- 8). In the past 6 months, what was the lowest credit card interest rate offer you got in the mail?

9). For all your credit cards taken together, after any payments you have made or will make on your most recent bills, how much you still owe on them?

10). Is your house/ apartment in which you live is either owned or being bought?

11). Do you currently have Home Equity Line of Credit (HELOCs)?

12). What year you were born?

13). What is your current marital status?

The original sample includes 12,962 households. On average, 75% of the households in the U.S. population have at least one credit card, and among all cardholders about 40 percent have unpaid balances on their credit cards. The average balance for those carrying a balance amounted to about \$8,000. In this study, those who have at least one credit card are considered, which will give us a sample of 1,101 households including only revolvers (those who do not pay in full each month) of whom 186 cardholders switched cards and 915 did not.

3.2 Descriptive Statistics

Figure 3 present detailed statistics on switchers and non-switchers in the sample. Detailed variables definitions and summary statistics (actual and percentage values) are provided in Tables 1 and 2. The means and standard deviations in the table are computed using sample weights so that the descriptive statistics are representative of the U.S population. Only households who have at least one credit card are considered in the calculation of the descriptive statistics.

Table 1. Definitions of variables

Variables	Type	Definitions of Variables
Y_i	Binary	1-if switched, 0-otherwise
APR_0	Continuous	Interest rate on card switched from
APR_1	Continuous	Interest rate on card switched to
Intro Rate Period	Continuous	# of months APR1 is an introductory
Balance	Continuous	Balances of all credit cards
NCC	Continuous	Number of household credit cards
Age	Continuous	Age of respondent
Marital Status	Binary	1-if married, 0: otherwise
Home Ownership	Binary	1-if owner, 0: otherwise
Switching Benefits (\$)	Continuous	\$ saved by switching

Table 2. General sample characteristics (N = 1,101)

Variables	Sample Mean	Sample Standard Deviation
Y_i	0.17	.26
APR_0	12.75	6.23
APR_1	3.67	5.57
Intro Rate Period	9.03	9.62
Balance	7606.13	10775.92
NCC	3.40	2.28
Age	48.55	15.60
Marital Status	.68	0.49
HomeOwnership	.83	0.41
Switching Benefits (\$)	604.37	1383.09

Table 3. Sample characteristics of switchers (Ns = 186) and no switchers (Nn = 915)

Variables	Sample Mean		Sample Standard Deviation	
	Switchers	Non-Switchers	Switchers	Non-switchers
Y_i	0.00	1.00	0.00	0.00
APR_0	12.14	15.75	7.32	6.77
APR_1	3.88	2.65	5.31	4.27
Intro Rate Period	9.50	6.76	9.43	10.20
Balance	6,535.84	12,871.24	9,420.75	14,779.49
NCC	3.23	4.23	2.24	2.60
Age	48.76	47.51	12.31	11.88
Marital Status	0.67	0.68	0.46	0.47
Homeownership	0.82	0.90	0.39	0.30
Switching Benefits (\$)	434.75	1438.81	1125.20	1925.76

4. Logistic Regression Analysis

4.1 Logit Model Specification

To examine the consumer decision of whether or not to switch a credit card (balances), logistic regression analysis is the most appropriate type of examination. The general formulation of the logit model is given by Greene (2003, p. 669). The consumer's switching decision is modeled as

$$Y_i^* = X_i' \beta + \varepsilon_i \quad (1)$$

with

$$Y_i = 1 \quad \text{if } Y_i^* > 0$$

$$Y_i = 0 \quad \text{if } Y_i^* \leq 0$$

The subscript i refers to cardholders. $Y_i \in \{0,1\}$ denotes the absence or presence of switching ($Y_i = 1$ if the consumer switches and $Y_i = 0$ if he/she does not switch). In this formulation, $X_i' \beta$ is called the index function (Greene 2003 pp. 669), where Y_i^* is a latent (unobserved) variable for credit card switching and the dichotomous variable Y_i is the observed variable. The vector of covariates X_i' controls for a variety of socioeconomic variables (financial and demographic) that may correlate with a household's decision whether or not to switch a credit card. These include age, APR, fee, balances, homeownership, and HELOC. The explanatory variables can themselves be binary or dummy or quantitative or a mixture thereof. This is because logistic regression makes no assumptions about the distribution of the independent variables. Table 1 presents the definitions of all variables used in this analysis. β is a vector of regression coefficients of the predictor variables and ε_i is the error term, assumed to have a log-

Weibull (double exponential) distribution with a reverse extreme value distribution that is asymmetric and has a long tail to the right, with c.d.f: (Greene 2003, p. 720):

$$F(\varepsilon_i) = \exp^{-e^{-\varepsilon_i}} \quad (2)$$

In this notation e represents the base of natural logarithms which is approximated at 2.718. When using dummy variables, the dependent variable is not continuous but binary or dichotomous (a category variable that has two values such as "yes" and "no"). In this case, the dependent variable takes the two values (1, 0). Positive or (yes) response would be assigned a value of one, while a negative response would be assigned a value of zero. Since a positive outcome occurs only when the latent variable exceeds the threshold, the logit specification of a positive outcome is of the following form.

$$\text{Prob}[Y_i = 1] = \frac{\exp(X_i' \beta)}{1 + \exp(X_i' \beta)} = \frac{1}{1 + \exp(-(X_i' \beta))} \quad (3)$$

Where $Y_i = 1$ if the offer to switch is accepted, and $Y_i = 0$ if the offer to switch is not accepted. Equation (3) represents what is known in statistics as the (cumulative) logistic probability distribution function. Where Y_i is the binary dependent variable indicating whether or not cardholder i switches a credit card. \exp is the exponential function, sometimes written as e . When cardholder i switches balances, Y_i takes the value 1; otherwise Y_i is equal to 0.

4.2 The Econometric Model

On the basis of the theoretical considerations, the following two regression equations are run; logit models will be estimated using logistic regression models for estimating the probability of a cardholder's credit card (balances) switch

Model 1:

$$Y^* = \beta_0 + \beta_1(APR_0)_i + \beta_2(APR_1)_i + \beta_3(INTRO)_i + \beta_4(Bal)_i + \beta_5(NCC)_i + \beta_6(AGE)_i + \beta_7(MS)_i + \beta_8(HO)_i + e_i \quad (4)$$

Model 2:

$$Y^* = \beta_0 + \beta_1(BENEFITS)_i + \beta_2(NCC)_i + \beta_3(AGE)_i + \beta_4(MS)_i + \beta_5(HO)_i + e_i \quad (5)$$

where $Y_i = 1$ if a consumer switches and $Y_i = 0$ if the consumer does not switch. $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$, and β_8 are unknown parameters to be estimated. Finally, ε_i is the error term.

5. Empirical Results

5.1 Model 1 Determinants of Credit Card Switching

Table 4 presents the results of the model 1 (equation 4) logit estimation for credit card switching.

Table 4. Model 1 logit estimates for credit card switching (N = 1,101)

Variables	Coefficient	Standard Error	Marginal Effect
Intercept	-3.0440	0.4865	N/A
APR ₀ ***	8.4147	0.0127	1.0339
APR ₁ ***	-7.9180	0.0204	-0.9729
Intro Rate Period***	0.0193	0.00844	0.1275
Balance***	0.00036	7.24E-6	0.0004473
NCC	0.0769	0.0355	0.9453
Age**	-0.0158	0.00736	-0.1937
Marital Status	-0.2803	0.1894	-3.4447
HomeOwnership***	0.7973	0.2792	-9.7964

Note. Marginal effects are in terms of percentage points.

***Significant at 1% level or better.

**Significant at 5% level or better.

*Significant at 10% level or better.

Besides the parameters coefficients and standard errors, marginal effects around the mean are also reported to reflect the estimated changes in the probability of switching. The marginal effects are calculated for a representative household with sample mean characteristics. These regression results support the general conclusion that consumers balances switching is systematically related to the explanatory variables. Moreover, they show variables that seem to explain what influences consumer behavior toward switching. Among these variables are: old interest rate, new interest rate, duration of the introductory rate, balances, number of credit cards (NCC), homeownership, and age. At the conventional 5 percent standard level for statistical significance, the following coefficients have significance: old interest rate, new interest rate, duration of the introductory rate, balances, number of credit cards, homeownership, and age.

One of the key variables of the study, interest rate, is a significant determinant of credit-card switching. When shopping for credit cards in the market, revolvers usually prefer offers with lower interest rates, although convenience users are not as sensitive to the interest rate as revolvers (Canner & Luckette, 1992).

Not surprisingly, the old interest rate is positively and significantly related to the likelihood of switching and the marginal effect is about 1.03 percent points with every one unit increase in the old interest rate.

In recent years, card issuers have made widespread of “teaser” rates, soliciting cardholders to switch banks. These teaser rates are simply much lower than the prevailing rate for the first year or so, encouraging cardholders to switch balances to the lower interest rates. After the introductory rate offer period ends, card issuers will increase the rate to prime plus a dozen. The new interest rate is negatively and significantly associated with the likelihood of switching because the interest rate is the price of borrowing and it is more expensive to borrow on credit cards with higher interest rates. Holding other variables constant at sample mean levels, one unit increase in the new interest rate (APR₁) will decrease the likelihood of switching by 0.97

percentage points for a representative household.

The duration of new introductory offer rates is positively related to the likelihood of switching and the marginal effect is 0.23 percentage points with each additional one month (period) increase in the duration of a new introductory rate offer the representative household is offered.

Multiple credit cards increase the available funds for borrowing and therefore the likelihood of switching. Holding multiple credit cards by a consumer may be an indication of this consumer's willingness to take on a high debt which may be manifested in higher balances held. The logit model shows that number of credit cards is significantly and positively related to the likelihood of switching and the marginal effect is 0.94 percentage points with one additional credit card the representative household has. Switchers tend to hold more credit cards because they can save money by transferring balances from credit cards with higher interest rates to those with lower interest rates. This makes sense because the more credit cards a consumer has the more freedom he/she has to switch balances between existing cards, consistent with Cargill and Wendel's (1996) finding that people obtain more cards to allow for larger balances. Compared with transactors, revolvers tend to have more credit cards as well as more balances. Therefore, revolvers have more incentives to search for lower rates. This is consistent with Cook's (2002) finding that credit card holders with high balances do not seem to search less than those with lower balances. Moreover, economic theory indicates that credit card balances should fall as the APR increases. However, Min and Kim (2003) found that for households, interest rates had no significant effect on the amount of borrowing, only on the borrowing decision. The empirical regression results obtained in this study fit the theory fairly well. The higher the balances of a representative household, the higher the probability of switching. Hence, credit card balances have the expected positive and significant effect on the likelihood of switching. For a household with sample mean characteristics, each additional \$100 increase in balances will increase the probability of switching by 0.04473 percentage points.

Among demographic variables, age is significantly and negatively associated with the decision of switching and with each additional year of age the probability of switching cards goes down by 0.19 percentage points. The negative coefficient on age is consistent with Calem and Mester's (1995) and Min and Kim's (2003) findings that credit card balances are negatively related to age. They argue that older households are less likely to use credit cards for borrowing than younger households and the more elderly an applicant is, the greater the physical difficulty of searching for lower interest rates is. Also, some elderly consumers may prefer the traditional payment methods to credit cards, consistent with the premise that age reflects on the amount of desired credit, borrowing needs tend to be relatively lower in the earlier and late stages of the lifecycle. Hence, older households search and switch less than younger households. Homeownership is significantly and positively associated with the decision of switching a credit card, the estimated difference in the probability of credit card switching is 9.79 percentage points for a homeowner representative household. Homeownership may influence credit card borrowing through home equity lines of credit (HELOC). HELOCs provide another finance instrument for consumers who are homeowners tend to borrow less on their credit cards than renters. They have the option of borrowing from HELOCs instead from credit card, and they also can choose to pay down their credit card debt using HELOCs. Since renters do not have such an option, this might be the reason why they switch balances and borrow more on their credit cards than homeowners. Marital status (MS) was not found to be significantly associated with the decision of switching balances. The probability of switching a credit card is less for married consumers. According to the marginal effect the probability of switching cards for a married household is 3.44 percentage points less than for non-married household. Table 5 presents the analysis of testing the hypotheses whether or not the coefficients on the old interest rates and the new interest rates are equal in magnitude but opposite in sign. I failed to reject the hypothesis that $\beta_1 = -\beta_2$, that is β_1 and β_2 (the coefficients on APR1 and APR2) are opposite in sign. However, I rejected the hypothesis that $\beta_1 = \beta_2$, that is β_1 and β_2 (the coefficients on APR₁ and APR₂) are equal in magnitude and have the same sign.

Table 5. Testing whether or not the coefficients on APR₁ and APR₂ are equal

Label	Wald Chi -Square	DF	Pr > Chi -Square
Test 1	0.0570	1	0.8113
Test 2	36.8752	1	< .0001

5.2 Model 2 Determinants of Credit Card Switching

Table 6 presents the results of the model 2 (equation 5) logit estimation for credit-card switching.

Table 6. Model 2 logit estimates for credit card switching (N = 1,101)

Variables	Coefficient	Standard Error	Marginal Effect
Intercept	-2.2077	0.4314	N/A
Benefits of Switching***	0.000483	0.000070	0.006089
NCC***	0.0903	0.0339	1.1378
Age***	-0.0145	0.00723	-0.1821
Marital Status	-0.2525	0.1856	-3.1818
HomeOwnership***	0.7115	0.2771	8.9667

Note. Marginal effects are in terms of percentage points.

***Significant at 1% level or better.

**Significant at 5% level or better.

*Significant at 10% level or better.

Besides the parameters coefficients and standard errors, marginal effects around the mean are also reported to reflect the estimated changes in the probability of switching. At the conventional 5 percent level for statistical significance, the following coefficients have significance: benefit from switching, number of credit cards (NCC) held, age, and homeownership. As expected, the switching benefit variable has the greatest influence on why consumers switch credit cards.

Switching benefit is positively and significantly related to the likelihood of switching. Holding other variables constant at sample mean levels, each additional unit increase in switching benefits will increase the likelihood of switching by 0.0060 percentage points for a representative household. At sample mean levels, a typical cardholder's expected benefits from switching is \$604.37 over the entire introductory rate period.

The number of credit cards in logit model 2 shows that the number of credit cards is significantly and positively related to the likelihood of switching in logit model 2 and the marginal effect is 1.13 percentage points with one additional credit card the representative household has. Age is significantly and negatively related to the decision of switching and with each additional year of age the probability of switching cards goes down by 0.18 percentage points. Homeownership is significantly and positively associated with the decision of switching a credit card, the estimated difference in the probability of credit card switching is 8.96 percentage points for a homeowner representative household. Marital status (MS) was not found to be significantly associated with the decision of switching balances. The probability of switching a credit card is less for married consumers. According to the marginal effect the probability of switching cards for a married household is 3.18 percentage points less than for non-married household.

5.3 Measuring the Goodness of Fit of the Logit Regression Model

The logit regression output yields many new statistics because the estimation methodology is different from multiple regression. The first statistic is measure of the overall fit. The log-likelihood test, analogous to the global F-test where the null hypothesis says that some of the β_s are equal to zero. The absolute values: (880.480) and (907.678) in models 1 and 2 respectively have no interpretation; the statistics shows that model 1 with the eight explanatory variables is significantly better than the model with the (base or null) that lacks these variables. Similarly, the statistics shows that model 2 with the four explanatory variables is significantly better than the tmodel with the (base or null) that lacks these variables. Another way to test the goodness of fit of a logit regression model is to use Hosmer and Lemeshow test. The Hosmer and Lemeshow test is a measure of overall model fit, comparing the observed and predicted values. Hosmer and Lemeshow, also called the chi-square test, has an insignificant Chi-square value for the presented model, yielding a p-value of 0.0865 and 13.824 Chi-Square value for model 1 (equation 4) thus suggesting a model with a (fairly) good predictive value and indicating a good model fit. Therefore, fail to reject the null hypothesis that there is no difference between observed and model predicted values.

5.4 J-Tests for Model Selection Results

Tables 7 and 8 report the empirical results of the J-Tests for models 1 and 2.

Table 7. Model 1(J-test) logit estimates for credit card switching (N = 1,101)

Variables	Coefficient	Standard Error	Pr > Chi -Square
Intercept	-3.1001	0.4933	<.0001
APR ₀ ***	8.8474	1.3329	<.0001
APR ₁ ***	-8.1569	2.0596	<.0001
Intro Rate Period***	0.0193	0.00852	<.0001
Balance***	0.000041	8.296E-6	<.0001
NCC	0.0828	0.0358	0.0207
Age**	-0.0167	0.00742	0.0247
Marital Status	-0.2978	0.1900	0.1171
HomeOwnership**	0.8144	0.2799	0.0036
$\hat{Y}_{i2_Expected}$	-0.5341	0.4918	0.2774

Note. Marginal effects are in terms of percentage points.

***Significant at 1% level or better.

**Significant at 5% level or better.

*Significant at 10% level or better.

Table 8. Model 2 (J-test) logit estimates for credit card switching (N = 1,101)

Variables	Coefficient	Standard Error	Pr > Chi -Square
Intercept	-2.0388	0.4292	<.0001
Benefit of Switching***	0.00563	0.000929	<.0001
NCC***	0.0982	0.0350	0.0051
Age**	-0.0155	0.00727	0.0337
Marital Status	-0.2948	0.1872	0.1153
HomeOwnership**	0.7338	0.2719	0.0070
$\hat{Y}_{i1_Expected}$	-0.7180	0.5041	0.1544

Note. Marginal effects are in terms of percentage points.

***Significant at 1% level or better.

**Significant at 5% level or better.

*Significant at 10% level or better.

Among many approaches which have been formulated for model selection is the J-test of Davidson and MacKinnon (1981). J-test is most commonly used to test non-nested hypotheses. This test is used in this paper and is proceeded as follows: (1) models 1 and 2 were estimated, deriving the fitted values (expected values for models 1 and 2) of \hat{Y}_{i1} and \hat{Y}_{i2} ; (2) the variable \hat{Y}_{i1} was added as an independent variable to model 2 and the new model was re-estimated to test the hypothesis that the coefficient on \hat{Y}_{i1} is equal to zero using a t-test. I failed to reject the hypothesis in question; and (3) the variable \hat{Y}_{i2} was added to model 1 and the new model was re-estimated to test the hypothesis that the coefficient on \hat{Y}_{i2} is equal to zero. The hypothesis was not rejected. Both models 1 and 2 are accepted models. I failed to reject the hypotheses that the coefficients on the fitted values of \hat{Y}_{i2} and \hat{Y}_{i1} are equal to zero. Adding the fitted values for \hat{Y}_{i1} to model 2 had no explanatory power over and above the variables in model 2. Similarly, adding the fitted value of \hat{Y}_{i2} to model 1 had no additional explanation over and above the variables in model 1. Therefore, neither model is rejected and both models are accepted.

6. Conclusion

I have theoretically identified the crucial factors that determine whether or not a consumer is likely to switch cards. Specifically, this research represents an effort of modeling credit card switching of consumers using an econometric model that is anchored on the economic theory of consumer behavior that incorporates demographic, economic and socioeconomic considerations into the decision making process. It has empirically investigated consumer credit card usage and switching. The variables which I have examined have captured some key behaviors which have not been studied previously and hopefully shed new light on overall consumer behavior in the credit card market. Using data from the Consumer Finance Monthly (CFM) of The Ohio State University, I find that at the conventional 5 percent level of significance, the following variables have significance: old interest rate, new interest rate, duration of the introductory rate, balances, number of credit cards, homeownership, and age. As expected, interest rates, balance, the duration of new introductory rate, and

homeownership have the greatest influence on why or why not people switch credit cards in model 1. Switching benefit, number of credit cards, and homeownership have the greatest influence on why or why not people switch credit cards in model 2.

Another key result is that the interest rates on existing balances significantly and positively influence credit-card switching of the U.S. households. This finding is consistent with the view that consumers make rational decisions in the credit card market, since balance-carrying consumers are sensitive to the terms of credit card contracts, such as the interest rate on existing balances, the new rate, and the duration of the new rate. It also implies that switching and search costs are important economic factors in this market, challenging Ausubel's (1991) argument of credit card consumer irrationality and Calem and Mester's (1995) empirical finding that credit card rates are sticky because consumers are unresponsive to rate cuts. I have also found that the longer the duration of the introductory rate, the higher the probability of switching. The empirical data used in this study tends to support that consumers usually receive new offers to switch cards with significantly lower rate than what they already have, however they reject to switch. One of the main reasons for this consumer irresponsiveness or reluctance to switch credit-card balances is that these offers are introductory, lasting for only a short period of time. Due to costs associated with the consumer decision of switching credit card suppliers, consumers may become reluctant to switch, suggesting that switching costs outweigh switching benefits.

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