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Author(s): Paul S. Calem and Loretta J. Mester

Source: *The American Economic Review*, Vol. 85, No. 5 (Dec., 1995), pp. 1327-1336

Published by: American Economic Association

Stable URL: <https://www.jstor.org/stable/2950992>

Accessed: 24-02-2019 12:24 UTC

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Consumer Behavior and the Stickiness of Credit-Card Interest Rates

By PAUL S. CALEM AND LORETTA J. MESTER*

Between May 1989 and November 1991, the prime rate dropped from 11.5 percent to 7.5 percent, and the interest rate on large-denomination CD's fell from around 9 percent to 5 percent. During this period, bank credit-card rates barely moved, the largest issuers holding their rates fixed at 18–20 percent.

This recent stickiness of credit-card rates repeated a familiar story. During several episodes in the 1980's, when other interest rates rose or fell, credit-card rates changed little. At the same time, credit cards consistently earned higher returns than most other bank products. A carefully done study by Lawrence M. Ausubel (1991) concluded that during the 1980's, bank credit-card operations earned 3–5 times the rate of return earned in the banking industry at large.

The historically slow response of credit-card rates to changes in money-market rates is consistent with imperfect competition. The shifting spread between card rates and banks' costs of funds suggests that card issuers have exercised market power. For an issuer with market power, the preferred spread depends upon the perceived elasticity of demand for card credit and would shift with perceived

changes in demand.¹ The demand for card credit, in turn, may be influenced by the level of real interest rates in financial markets, a point argued by Mester (1994).

This observed performance is intriguing in light of the fragmented structure of the industry. There are numerous providers of credit cards and no major barriers to entry; one would expect such a market structure to lead to competitive performance, whereby prices would align with costs and issuers would earn a normal rate of profit.² Ausubel argues that the industry deviates from the perfectly competitive model because consumers (cardholders) do not conform to the behavioral assumptions of perfect competition. Discrepancies from the outcome of the perfectly competitive model could result from: (i) consumers facing search costs; (ii) consumers facing switch costs; and/or (iii) firms facing an adverse-selection problem if they were to unilaterally reduce their interest rates.

We present empirical evidence in support of this argument, drawing on data from the Federal Reserve's 1989 *Survey of Consumer Finances*. Unlike previous studies, we provide specific evidence about consumer behavior, which is at the core of the theories on the stickiness of credit-card rates. Our analysis suggests that each of the three factors cited by Ausubel has contributed to the observed performance of the credit-card market.

* Calem: Financial Structure, Mail Stop 149, Division of Research and Statistics, Board of Governors of the Federal Reserve System, Washington, DC 20551; Mester: Research Department, Federal Reserve Bank of Philadelphia, Ten Independence Mall, Philadelphia, PA 19106-1574, and Finance Department, Wharton School, University of Pennsylvania. We thank Avi Peled for excellent research assistance, and Lawrence Ausubel, Robert Avery, Glenn Canner, Gary Koppenhaver, Robert Litan, Martha Starr-McCluer, Richard Rosen and other session participants at the 1994 ASSA meetings, Michael Ward and other seminar participants at the FTC Bureau of Economics, and two anonymous referees for helpful comments. The views expressed here are those of the authors and do not necessarily represent the views of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.

¹ For instance, prior to 1980, usury ceilings generally were binding on card issuers. Subsequently, as inflation began to moderate in the early 1980's, issuers may have discovered that the demand for card credit was fairly insensitive to the widening rate spread. Thus, they would have found it profitable to let the bank-card rate rise relative to other rates.

² See Ausubel (1991), Calem (1992), Calem and Mester (1995), and Christopher C. DeMuth (1986) for further discussion of the structure and performance of the bank-card industry.

If the usual demand variable and access to credit are held constant, we find that credit-card indebtedness is inversely related to an individual's propensity to comparison-shop "for the best terms" on loans or deposits. This result suggests that consumers with substantial search costs tend to have high balances, which we interpret as evidence that card issuers face an adverse-selection problem induced by search costs.

We also find that households with larger outstanding card balances are more likely to have applications for credit denied and are more likely to have experienced payment problems. Issuers may interpret large card balances as a signal of credit risk if they are unable to distinguish high-risk applicants from low-risk applicants among those applicants with high card balances. For example, an issuer is unable to distinguish card borrowers who are intending to use a new card to increase their total debt outstanding and those who are planning just to switch their current balances to the new card. Thus, customers with higher card balances are more likely to face rejection when they apply for other credit, and so they face higher switch costs. An issuer that lowers its rate may not be able to attract profitable customers (i.e., those with high balances but low credit risk), if these customers know their probability of rejection is high and, therefore, do not apply. Thus, switch costs can induce an adverse-selection problem for card issuers.

The paper is organized as follows. Section I reviews the theoretical explanations for the observed performance in the credit-card market and introduces our two new arguments pertaining to adverse selection. Section II includes a description of the data and presents our empirical analysis of consumer search behavior. Section III provides our empirical evidence on adverse selection due to consumer switch costs. Section IV presents conclusions.

I. Search Costs, Switch Costs, and Adverse Selection

The profit and interest-rate performance of the bank-card industry during the 1980's, as documented by Ausubel (1991), suggests that card issuers have enjoyed a measure of market

power.³ Ausubel argues that issuers have exercised market power because consumers (cardholders) have tended to be unresponsive to offers of lower interest rates and because there exists an adverse-selection problem that discourages issuers from competing on interest rates. He discusses three factors that explain why consumers may not react to lower rates: search costs, switch costs, and systematic underestimation by consumers of the likelihood that they will borrow in the future. He then shows that search behavior may naturally induce an adverse-selection problem.

A. Adverse Selection Due to Search Behavior

Ausubel posits that borrowers representing low default risks tend to be less willing to engage in search than other credit-card customers because lower-risk borrowers belong disproportionately to a category of cardholders "who do not intend to borrow but find themselves doing so anyway" (Ausubel, 1991 p. 70). These cardholders hold positive debt but are unwilling to search for the best card rate because they believe their indebtedness will be short-lived. As a result, a bank that unilaterally lowers its rate would tend to attract relatively high-risk borrowers, while low-risk borrowers would tend to be unresponsive. Thus, the bank would face an adverse-selection problem, which would augment other disincentives against rate-cutting arising directly from consumer search and switch costs.

This is not the only possible way in which consumer search behavior could induce an adverse-selection problem. It could be that consumers who maintain higher credit-card balances also face high search costs (i.e., have a high disutility of search). Consumer psychology may be such that those who are unwilling to devote time to search activities also tend to strongly prefer current to future consumption (they are impatient). Thus, a firm that unilaterally lowers its interest rate will tend to draw customers who maintain lower

³ In Callem and Mester (1995), we discuss whether there has been a fundamental change in competitive conditions in the credit-card market since 1991.

balances and hence yield lower profits. This situation would further discourage issuers from competing on interest rates.⁴

B. Adverse Selection Due to Switch Costs

Consumer switch costs can also induce an adverse-selection problem in at least two ways.⁵ First, more creditworthy borrowers may have higher switch costs because they may have been granted favorable credit limits from their current issuers on the basis of private information. Therefore, a firm that unilaterally lowers its interest rate would tend to draw customers who are less creditworthy. Issuers generally grant higher credit limits to cardholders who have established favorable account histories over time. These increases and the underlying account histories may remain private information, so the cardholders granted these benefits would become subject to switch costs: they would not be able to obtain comparable credit limits upon switching to a new issuer.⁶ Moreover, such cardholders may be unable to transfer the entire balances in their accounts to the new issuer. Obviously, borrowers with unfavorable account histories would not be subject to such a switch cost; but these are not borrowers an issuer would prefer to attract through a rate cut.

Second, consumers who have large outstanding card balances may have greater difficulty switching to a new card than consumers who have low balances, other factors held constant. Such a correlation between card debt and

switch costs may arise because applicants intending to switch may not be distinguishable from those applying for a new card in order to accumulate more debt.⁷ Thus, card issuers would be particularly cautious of applicants with large amounts of card debt outstanding. Those applicants would face a relatively high likelihood of being rejected for credit (or obtaining less than their desired credit limits) when applying for a new card and so would be subject to comparatively high switch costs.⁸ They also would impose comparatively high costs on issuers in the form of resources expended processing applications that ultimately are rejected. By this reasoning, a unilateral interest-rate cut on the part of a card issuer would tend to bring in customers with lower balances. This adverse-selection problem would further discourage issuers from competing on interest rates.

Thus, search costs and switch costs may make the credit-card market imperfectly competitive, in that some issuers may face less than perfectly elastic demand for their cards. These factors may lead to adverse-selection problems, which would exacerbate the effect of search and switch costs on competition. The empirical evidence presented in the following sections is consistent with this general view.⁹

II. Empirical Analysis of Consumer Search Behavior

We used data from the 1989 *Survey of Consumer Finances* (SCF), which was sponsored by the Federal Reserve and conducted by the Survey Research Center at the University of Michigan. The SCF provides data on the

⁴ See Calem and Mester (1995) for a simple model illustrating this possibility.

⁵ For generic models of markets with switch costs, see, for instance, Paul Klemperer (1987) and Joseph Farrell and Carl Shapiro (1988). For a formal model of how private information may give rise to switch costs in credit markets, see Steven Sharpe (1990).

⁶ This was brought to our attention by Thomas Lynch of Chase Manhattan Bank. For instance, an individual who exceeds an assigned credit limit more than once or who runs up a large balance and appears unable to reduce the debt over time provides indications of credit risk not available from credit agency reports. Moreover, issuers' direct knowledge of their cardholders' payment histories may be more reliable and more up-to-date than information obtained through credit bureaus.

⁷ David S. Bizer and Peter M. DeMarzo (1992) examine this type of moral-hazard problem in credit markets, which occurs when borrowers can apply sequentially for loans.

⁸ The greater likelihood of being rejected for credit would entail substantial direct switch costs among applicants with large card debt because they would have to curtail their spending to reduce their debt or would have to reapply a number of times to qualify for a new card offering more favorable credit terms.

⁹ Search and switch costs and the associated adverse selection problems may more readily explain the pricing behavior of incumbent firms than that of new entrants (see Calem and Mester, 1995).

TABLE 1—MEANS OF VARIABLES

Variable	Definition	Mean
INC	household income	0.5852
INCSQ	household income squared	0.5894
AGE	respondent's age	50.47
SEX	1 if male respondent, 0 if female	0.8338
MARI	1 if married respondent, 0 otherwise	0.7279
ED	respondent's highest level of schooling	13.89
RACE	1 if nonwhite respondent, 0 otherwise	0.1288
HSIZE	household size	2.801
CUREMP	years head of household has been at current job, 0 if unemployed or employed less than one year	9.265
CURADD	years household has been at current address	13.09
HOMEOWN	1 if household owns its home, 0 otherwise	0.7983
HOMECURR	1 if household owns its home but has lived there for less than two years, 0 otherwise	0.06562
MEXPINC	major monthly expenditures (rent, mortgage, auto loan, and lease payments)/household income	0.3291
LIQS	household holding of liquid assets, including balances in checking, money-market, and other passbook and savings accounts, CD's, and mutual funds	0.4295
STOBO	household holding of stocks and bonds, including publicly traded stocks, U.S. savings bonds, mortgage-backed securities, U.S. government bonds, municipal bonds, and other bonds	0.2903
DEBTINC	household debt net of bank-card borrowing/household income	0.7276
TDEBTINC	(household total debt)/(household income)	0.7517
SHOP	1 if household often shops for best terms for borrowing and saving, 0 otherwise	0.3931
BELINST	1 if household feels it is a bad idea to use installment credit, 0 otherwise	0.3329
BELVACA	1 if household feels it is a bad idea to borrow for a vacation, 0 otherwise	0.8664
BELJEW	1 if household feels it is a bad idea to borrow to buy jewelry, 0 otherwise	0.9247
AVAILBAL	credit line available on household's credit cards = household's total bank-card credit line net of outstanding card debt	0.07069
DELINQUENT	1 if household has recently experienced difficulties in paying its debt, 0 otherwise	0.1216
CCB	household's bank-card debt	0.008555
TURNDOWN	1 if household is credit constrained, 0 otherwise	0.1174

Notes: All dollar amounts are measured in units of \$100,000.

balance sheets, fiscal practices, and financial status of U.S. families (see Arthur Kennickell and Janice Shack-Marquez [1992] for a description).

Our analysis relies on a subsample of 1,661 households that have at least one bank-type credit card.¹⁰ Table 1 defines and gives the sample means of the variables we used.¹¹

¹⁰ Our sample omits 89 households having more than \$1 million in stocks, bonds, and liquid assets and an additional 95 households with annual incomes greater than \$250,000 as not being representative of typical credit-card users. In addition, a few households were excluded because of misreported data. We obtained estimates using TSP (registered trademark) version 4.2B for OS/2.

The SCF imputes five alternative values for some of the key variables when data are missing. The data can be treated as five different data sets (see Donald B. Rubin,

A. Empirical Model

To investigate whether adverse selection arises because borrowers face search costs or are reluctant to search because they believe their borrowing will be short-lived, we test whether a cardholder's borrowing is correlated with the individual's propensity to engage in search.

1987). In the present paper we report results based on the first data set, which contains the first observation for each household, but our results are robust to using any of the other four.

¹¹ All dollar values are measured in \$100,000 units. Results are qualitatively similar if log(dollars) is used instead.

Specifically, we estimate a tobit model in which a household's bank-card debt (CCB) is expressed as a linear function of economic, demographic, and attitudinal variables:¹²

$$(1) \quad \text{CCB} = f(\text{SHOP}, \text{BELINST}, \text{BELVACA}, \text{BELJEWE}, \mathbf{X}).$$

SHOP, which measures a household's propensity to engage in search, equals 1 if the household "shops around for the best terms when making major decisions about borrowing and saving" and 0 otherwise.¹³ Cardholders with a high disutility of search would not be inclined to comparison-shop for the best terms on deposits and loans. An inverse relationship between borrowing and search supports the view that search costs induce adverse selection: a firm that unilaterally lowers its interest rate will tend to draw customers who maintain low balances and hence yield lower profits.

The three variables BELINST, BELVACA, and BELJEWE represent, respectively, the household's attitude toward installment credit generally, toward borrowing to finance a vacation, and toward borrowing to finance the purchase of jewelry. Each variable equals 1 if the respondent believes it is a bad idea to borrow and 0 otherwise.¹⁴ These variables are in-

cluded to control for a household's demand for card credit, as in the study by John V. Duca and Stuart S. Rosenthal (1993).

Also included on the right-hand side of (1) is a vector (\mathbf{X}) of financial and demographic variables that previous studies have found to be correlated with a household's demand for borrowed funds or with the total credit limit available to the household, as determined by lenders' perceptions of default risk (see William J. Boyes et al., 1989; Glenn B. Canner and Charles A. Lockett, 1990; Tullio Jappelli, 1990; Stuart A. Gabriel and Rosenthal, 1991; Duca and Rosenthal, 1993).¹⁵

The variables included in \mathbf{X} are those shown in column (1) of Table 2 (those other than SHOP, BELINST, BELVACA, and BELJEWE). INC is household income; it should be positively related to CCB, at least initially, since a household tends to have greater access to card credit as household income rises. This relationship may be weaker among upper-income households. Therefore, we also include the term INCSQ, which is $(\text{INC})^2$.

DEBTINC is a household's debt-to-income ratio, net of bank-card borrowing. Households with higher levels of DEBTINC may have had greater need for credit or better access to credit *ex ante*; hence, we expect a positive association between DEBTINC and CCB.¹⁶ MEXPINC is the ratio of major monthly expenditures (rent, mortgage, and auto loan payments) to income, which may affect a household's demand for card debt or its access to credit. HOMEOWN equals 1 if the household owns its own home and 0 otherwise; LIQS is the household's holding of liquid assets, and STOBO is its holding of stocks and bonds. One would expect these wealth variables to be inversely related to demand for card debt and inversely related to default risk.

¹² The SCF asked respondents to report the "balance still owed" on their bank-type credit-card accounts "after the last payment was made on these accounts." CCB equals the dollar amount reported in response to this question.

¹³ The SCF asked: "When making major decisions about borrowing and saving, some people shop around for the very best terms while others don't. Where would your family be on the scale?" The possible responses ranged between 0 (almost no shopping) and 10 (a great deal of shopping). We set SHOP = 1 if the response was greater than 7, and SHOP = 0 otherwise. (Defining SHOP = 1 if the respondent chose a number greater than 5 yielded similar results.)

¹⁴ The SCF asked: "In general, do you think it is a good idea or a bad idea for people to buy things on the installment plan?" and "People have different reasons for borrowing money which they pay back over time. Please tell me whether you feel it is all right for someone like yourself to borrow money . . . [first] to cover the expenses of a vacation trip? . . . [second] to finance the purchase of a fur coat or jewelry?" There is no qualitative change in the results reported here if these attitude variables are excluded from the regressions.

¹⁵ One noteworthy omission from equation (1) is household credit history. We omit it because it is not exogenous, as it depends on household borrowing decisions.

¹⁶ A high ratio of debt to income signals greater access to credit *ex ante* because, in order to accumulate debt, the household had to apply and be approved for credit. As noted in footnote 21, however, a high ratio of debt to income may result in reduced access to credit *ex post*.

TABLE 2—ESTIMATES OF EQUATIONS (1), (2), AND (3)

Independent variables	Dependent variable		
	CCB (1)	TURNDOWN (2)	DELINQUENT (3)
Constant	0.03733* (4.290)	−0.8768* (2.169)	0.1770 (0.4955)
SHOP	−0.01084* (5.455)	0.08690 (0.9687)	−0.09577 (1.089)
BELINST	−0.004443* (2.059)	0.1446 (1.523)	
BELVACA	−0.009565* (3.460)	−0.1082 (0.8444)	
BELJEWE	−0.01040* (2.989)	0.02598 (0.1585)	
CCB		4.469* (2.480)	8.272* (4.912)
AVAILBAL		−0.4647 (0.9669)	
DELINQUENT		0.5131* (4.527)	
INC	0.01211 (1.545)	0.3204 (0.9110)	−0.1652 (0.4811)
INCSQ	−0.003346 (0.9458)	−0.09876 (0.6516)	0.01689 (0.1106)
DEBTINC	0.004884* (4.964)		
TDEBTINC		0.1319* (3.833)	0.02899 (0.8884)
MEXPINC	−0.004914* (2.814)	−0.02807 (0.9237)	0.04584* (2.096)
HOMEOWN	−0.005116† (1.725)	−0.2632* (2.038)	−0.1466 (1.165)
LIQS	−0.01657* (7.680)	−0.07031 (1.168)	0.01645 (0.2910)
STOBO	−0.009134* (3.579)	0.01280 (0.1877)	−0.03452 (0.4444)
HSIZE	0.002284* (2.816)	0.03175 (0.8875)	0.02389 (0.6802)
CUREMP	0.00009921 (0.9539)	−0.009221† (1.745)	−0.005151 (1.036)
CURADD	−0.0001386 (1.031)	−0.009966 (1.521)	0.005370 (0.8840)
HOMECURR	−0.002205 (0.5459)	−0.2713 (1.452)	−0.4135* (2.046)
AGE	−0.0003230* (3.492)	−0.01053* (2.449)	−0.02301* (5.284)
SEX	−0.006083 (1.608)	0.08946 (0.5395)	0.1531 (0.9268)
MARI	0.001771 (0.4988)	−0.1490 (0.9874)	−0.05307 (0.3558)
RACE	0.009591* (3.610)	0.4135* (3.558)	0.2079† (1.797)
ED	−0.0004914 (1.232)	0.008566 (0.4558)	−0.02493 (1.402)
R^2 :	NA	0.1200	0.08458
Percentage correct predictions:	NA	0.8844	0.8778

Notes: Absolute values of t statistics are given in parentheses. NA = not applicable.

† Significantly different from 0 at the 10 percent level.

* Significantly different from 0 at the 5 percent level.

HSIZE is household size. Other factors held constant, larger households may have greater demand for card credit, or they may be viewed as greater credit risks; hence, the sign on this variable is ambiguous a priori. CUREMP is the number of years that the head of the household has been at his or her current job.¹⁷ Individuals who change jobs frequently may be subjected to tighter credit limits. CURADD is the number of years that the household has resided at its current address, which may be related to demand or risk. For example, households that only recently moved into a new home may require additional credit to purchase furniture or appliances. HOME-CURR is $CURADD \times HOMEOWN$.

AGE, SEX, MARI, RACE, and ED control for the age, sex, marital status, race, and years of schooling of the head of household, respectively. These variables are defined in Table 1.

B. Results

The maximum-likelihood estimates of equation (1) are presented in Table 2 in column (1). Most of the explanatory variables are statistically significant. In particular, the search variable SHOP bears a negative and significant relationship to CCB. Thus, consumers who search for the best rates on deposit and loan products tend to incur less credit-card debt. This is consistent with consumer search costs inducing adverse selection in the credit-card market, since if a bank offers a lower credit-card rate it is more likely to attract the less profitable customers. It is also consistent with Ausubel's argument that consumers holding large balances are often reluctant to search because they believe their borrowing will be short-lived.¹⁸ Note that search costs do not preclude switch costs: borrowers might not search if they face high switch costs.¹⁹

¹⁷ CUREMP equals 0 if the head of household is not currently employed full time or has been at the current job less than a year.

¹⁸ See Calem and Mester (1995) for additional empirical results regarding this second possibility and for other robustness tests.

¹⁹ Signs of the coefficients on the other variables that control for household demand or default risk seem sensible. For example, the derivative of CCB with respect to

III. Empirical Analysis of Switch Costs

The credit-card market may also deviate from the perfectly competitive model because consumers in the market may face switch costs, and these switch costs may induce adverse-selection problems. We investigated this possibility by testing whether households with large amounts of credit-card debt are more likely to be turned down in whole or in part when applying for new credit, holding constant other factors such as the household's total debt-to-income ratio. A strong, positive relationship between credit-card indebtedness and being denied access to new credit would be consistent with switch costs inducing adverse selection, and it would suggest that applicants with large amounts of card debt have difficulty transferring the debt because of information asymmetries between their current issuer and the prospective lender, or because credit-card debt is viewed as a signal of credit risk. To determine whether it is reasonable for banks to view credit-card debt in this way, we also examined whether households with larger outstanding card balances are more likely to have experienced debt-repayment problems.

Specifically, we estimated the probit model:

$$(2) \text{ TURNDOWN} = h(\text{CCB}, \text{AVAILBAL},$$

$$\text{SHOP}, \text{BELINST}, \text{BELVACA},$$

$$\text{BELJEWE}, \text{DELINQUENT}, \text{X1}).$$

TURNDOWN, which indicates whether a household is credit-constrained, equals 1 if at least once during the five-year period preceding the 1989 SCF the household submitted an application for credit and had the application

INC (computed using the coefficients on INC and INCSQ) indicates that income is significantly positively correlated with credit-card balances at the mean level and at lower levels of income. This finding may reflect greater access to or greater demand for credit-card debt as income increases from these levels. (Evaluated at the maximum level of income in the sample, the correlation is insignificantly different from zero.)

denied, in whole or in part; it equals 0 otherwise.²⁰

The vector $\mathbf{X1}$ in equation (2) is identical to \mathbf{X} in equation (1), except that DEBTINC is replaced by TDEBTINC , which incorporates credit-card debt into the debt-to-income ratio. In fact, all of the explanatory variables in (1) are also included in (2), since the likelihood of unsuccessfully applying for credit should depend upon the household's demand for borrowed funds as well as lenders' perceptions of default risk.²¹

Equation (2) relates a household's experience applying for and gaining access to credit during the previous five years to *current* household characteristics. If these characteristics are stable over time, then one can interpret equation (2) as predicting the probability of being credit-constrained as a function of the right-hand-side variables. Otherwise, one must be cautious in interpreting the estimated coefficients.²²

CCB is included as an explanatory variable in (2). A positive and significant relationship

between CCB and TURNDOWN , other factors held constant, would be consistent with switch costs inducing adverse selection in the credit-card market. One possible criticism of this test is that we might observe a positive relationship because, other factors held constant, households that have been unable to obtain other types of credit may depend more heavily on card debt as a substitute. However, for reasons discussed below, we do not consider this to be an important source of bias.

If we are to interpret a positive relationship between CCB and TURNDOWN as evidence that switch costs induce adverse selection, we must control for the possibility that households with large amounts of card debt are more likely to apply for credit. This would be the case if, on average, such households are closer to their bank-card debt ceilings. To control for this possibility, we include the household's total bank-card credit line, net of outstanding card debt (AVAILBAL), in equation (2).

DELINQUENT , which equals 1 if the household recently experienced debt-repayment difficulties (and 0 otherwise) also is included in equation (2) to control for the influence of applicant credit history on the disposition of loan applications.²³

Our second test involves estimating the probit model:

$$(3) \text{ DELINQUENT} = F(\text{CCB}, \text{SHOP}, \mathbf{X1}).$$

To the extent that households with larger credit-card balances (holding constant the ratio of total debt to income) are more likely to experience debt-repayment difficulties, it would be rational for lenders to be cautious about granting additional credit to such households.

A. Results

Table 2 presents estimates of equations (2) and (3). In each equation, the coefficient on CCB is statistically significant and positive. Households with larger card debt outstanding are more likely to find themselves credit-

²⁰ The SCF asked: "In the past five years, has a particular lender or creditor turned down any request you (or your husband/wife) made for credit, or not given you as much credit as you applied for?"

²¹ The household's ratio of total debt to income now carries a different interpretation than it had in equation (1). *Ex post*, a household with a high ratio of debt to income represents a greater risk and stands an increased chance of being rejected for credit. Hence, we expect a positive sign on this variable in equation (2).

²² In particular, there may be a causality problem with HOMEOWN , since a household might have been rejected for mortgage credit at some point within the past five years, which would lead to $\text{HOMEOWN} = 0$ and, simultaneously, $\text{TURNDOWN} = 1$. Thus, equation (2) may exaggerate the extent to which homeownership reduces credit constraints. Any such bias is probably small, however, because (i) many of the households for which $\text{TURNDOWN} = 1$ may have been rejected for a type of loan other than a mortgage, and (ii) by far the most common reason for rejection of mortgage applications is poor credit history (see Canner and Dolores S. Smith, 1992 p. 804); households that have had mortgage applications rejected for this reason are likely to find themselves credit-constrained for some time thereafter.

The estimated coefficient on TDEBTINC may also be biased, because a household's current ratio of total debt to income depends on whether it was credit-constrained in the past. In this case, the coefficient would *understate* the degree to which TDEBTINC reduces a household's current access to credit.

²³ $\text{DELINQUENT} = 1$ if within one year prior to the survey, the household fell behind in a payment, and 0 otherwise.

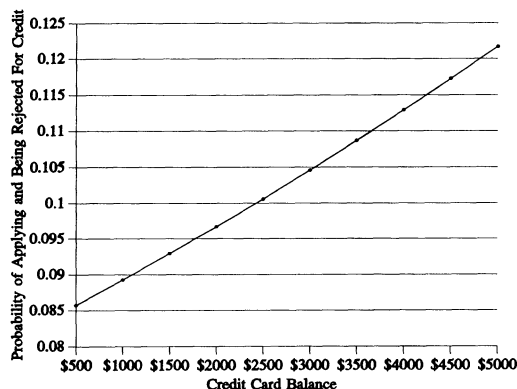


FIGURE 1. PROBABILITY OF APPLYING AND BEING REJECTED FOR CREDIT VERSUS CREDIT-CARD BALANCE

constrained and more likely to experience debt-repayment difficulties, other factors held constant. In addition, households with higher ratios of total debt to income, including credit-card debt, are more likely to find themselves credit-constrained. Thus, switch costs may induce adverse selection.

B. Is Our Test for Switch Costs Biased?

As noted above, one possible criticism of using equation (2) to test for switch costs is that TURNDOWN may predetermine CCB. Accordingly, we might observe a positive relationship between CCB and TURNDOWN only because, other factors held constant, households that have been rejected for other types of credit may depend more heavily on card debt as a substitute. We do not find this argument convincing. In most instances when a household has been rejected for a loan, card debt would not serve as an adequate substitute.

If anything, TURNDOWN might predetermine CCB in a way that would bias the estimated coefficient on CCB downward, and so we would be *underestimating* borrower switch costs. Specifically, households might reduce their credit-card balances after having applications denied because of excessive card debt. Moreover, a *successful* application for credit might be accompanied or followed by an increase in credit-card borrowing.

Another possible criticism of equation (2) is that an individual may have run into finan-

cial difficulties in previous years, which may have forced the individual to borrow more heavily against existing credit lines and may have led to debt-repayment problems and to subsequent denial of applications for new credit. While controlling for credit history beyond the prior year might reduce the magnitude of the positive relationship between CCB and TURNDOWN, we believe it would still be statistically and economically significant. Indeed, a correlation between credit-card balances and past financial difficulties would reinforce our argument that credit-card balances may serve as a signal of an applicant's credit risk.

C. Magnitude of the Adverse-Selection Problem

Figure 1 graphs the estimated probability of applying and being rejected for credit, $P_{A\&R}$ (i.e., the estimated probability that TURNDOWN = 1) as a function of household credit-card balances (CCB), based on equation (2) evaluated at the means of all other explanatory variables.²⁴ This probability increases by about one percentage point for each \$1,000 increase in credit-card debt. For example, if credit-card debt increases from \$2,000 to \$3,000, then $P_{A\&R}$ increases from 0.097 to 0.105 (holding TDEBTINC constant).²⁵ (By comparison, the difference between $P_{A\&R}$ for a nonhomeowner and $P_{A\&R}$ for a homeowner, holding other variables constant at their means, is 0.0468.)

IV. Conclusions

Through most of the 1980's and into early 1991, the credit-card industry was characterized by sticky interest rates and abnormally high profits for many issuers. A plausible

²⁴ One would like to know the probability of rejection conditional on having applied for credit, $P_{R|A}$, but the survey does not include questions on the households' credit applications.

²⁵ This increase in $P_{A\&R}$ implies about an 8.25-percent increase in the number of applicants (out of a fixed-size pool) who would face rejection, which seems to be a substantial incremental switch cost (see Calem and Mester, 1995).

explanation is that cardholders have not conformed to the behavioral assumptions of perfect competition because (i) cardholders face search costs; (ii) cardholders face switch costs; or (iii) firms would face an adverse-selection problem if they were to reduce their interest rates unilaterally.

Our empirical evidence suggests that each of these three factors has contributed to the observed performance of the credit-card market and supports the view that competition in that market is imperfect. Our results help explain both the nonresponsiveness of credit-card rates to changes in banks' costs of funds and the relatively high profits earned by many bank-card operations. Moreover, these findings confirm bankers' claims that credit-card rates are sticky because consumers are not responsive to rate cuts.

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