

**CONSUMER BEHAVIOR AND THE STICKINESS OF
CREDIT CARD INTEREST RATES**

by

**Paul S. Calem
Loretta J. Mester**

3-94

**RODNEY L. WHITE CENTER FOR FINANCIAL RESEARCH
The Wharton School
University of Pennsylvania
Philadelphia, PA 19104-6367**

**The contents of this paper are the sole responsibility of the author(s).
Copyright © 1994 by Paul S. Calem and Loretta J. Mester.**

**CONSUMER BEHAVIOR AND THE STICKINESS OF
CREDIT CARD INTEREST RATES**

by

**Paul S. Calem
Federal Reserve Bank of Philadelphia**

and

**Loretta J. Mester
Federal Reserve Bank of Philadelphia
and
Finance Department, The Wharton School
University of Pennsylvania**

**Revised: January 1994
First draft: September 1992**

This is a revision of "Search, Switching Costs and the Stickiness of Credit Card Interest Rates." We thank Avi Peled for excellent research assistance, and Lawrence Ausubel, Glenn Canner, Gary Koppenhaver, Robert Litan, Richard Rosen and other session participants at the 1994 ASSA meetings, 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.

CONSUMER BEHAVIOR AND THE STICKINESS OF CREDIT CARD INTEREST RATES

Abstract

Analyzing data from the 1989 Survey of Consumer Finances, we find credit card borrowing is inversely correlated with a household's willingness to comparison shop for loans and deposits. Households with larger balances have higher disutility of search, *ceteris paribus*. In addition, these households are more likely to be rejected or to be granted a lower-than-desired credit limit when applying for new credit, and so may find it difficult to switch from one card issuer to another. This partly explains the stickiness of card interest rates and why issuers enjoy above-average returns despite the industry's competitive structure.

CONSUMER BEHAVIOR AND THE STICKINESS OF CREDIT CARD INTEREST RATES

1. INTRODUCTION

Between May 1989 and November 1991, the prime rate charged by commercial banks dropped from 11.5 percent to 7.5 percent, and the interest rate on large-denomination certificates of deposit fell from around 9 percent to about 5 percent. During this entire period, bank credit card rates barely moved, with the largest issuers holding their rates fixed at 18 to 20 percent.

This recent stickiness of credit card rates repeated a familiar story. During several episodes in the 1980s, 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 Ausubel (1991) concludes that during the 1980s, bank credit card operations earned three to five times the rate of return earned in the banking industry at large.

This observed performance is intriguing when one considers the fragmented structure of the industry. There are numerous providers of credit cards and no major barriers to entry into the industry; 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.¹ Ausubel argues that the industry deviates from the perfectly competitive model because consumers (cardholders) do not conform to the behavioral assumptions of perfect competition. He argues that discrepancies from the outcome of the perfectly competitive model could result from any or all of the following causes: (1) consumers face search costs; (2) consumers face switch costs; and (3) firms would face an adverse selection problem if they were to unilaterally reduce their interest rates.

The present paper presents 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 credit card rate stickiness. Overall, our analysis suggests that each of the three factors cited by Ausubel has contributed to the

¹At year-end 1990, the four banks with the largest volumes of outstanding credit card balances held about 51 percent of total outstanding credit card balances, while the top 10 banks held about 62 percent. See Ausubel (1991), Calem (1992), and DeMuth (1986) for further discussion of the structure and performance of the bank card industry.

observed performance of the credit card market.² In addition, the paper advances two further arguments supporting Ausubel's contention that credit card issuers may face an adverse selection problem.

Ausubel posits that many cardholders, particularly those representing minimal default risk, end up borrowing more than they expect to *a priori*. He shows that such consumer irrationality can naturally induce an adverse selection problem. We show that search costs or switch costs also can induce an adverse selection problem. We argue first that consumers who face high search costs tend to maintain higher credit card balances than consumers who face low search costs. Second, consumers with high credit card balances may face relatively high switch costs. Either way, a firm that competes on interest rates will disproportionately draw customers who maintain lower balances and hence yield lower profits.

Our principal empirical findings can be summarized as follows. Holding constant demand for and access to credit, 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. We interpret this as evidence that card issuers face an adverse selection problem induced by search costs. Although this result may also be consistent with Ausubel's reasoning that consumers holding large balances are often irrational or naive in their search behavior, we find no direct evidence (no inconsistencies in consumer responses) to indicate that consumers may be underestimating their propensity to borrow.

In addition, we 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. These findings suggest that holding large card balances signals credit risk and makes it harder for a consumer to obtain alternative credit. We interpret these findings as evidence that card issuers face an adverse selection problem induced by switch costs.

The paper is organized as follows. Section 2 reviews the interest rate and profit performance of the bank card market and the market's apparent divergence from the textbook model of perfect competition. In Section 3, we review the theoretical explanations for this observed performance, and introduce our two new arguments pertaining to adverse selection. In section 4, we describe our data and present our empirical analysis of consumer search behavior. Section 5 provides our empirical evidence

²During 1992 and 1993, credit card rates declined substantially. By September 1992, the five largest issuers and many smaller issuers had lowered their card rates by three to four percentage points. Whether this unprecedented rate-cutting reflects a fundamental change in competitive conditions in the market is discussed briefly in section 2 below. (There are reasons to believe it does not.)

on adverse selection due to consumer switch costs. Section 6 presents conclusions and some policy implications of our findings.

2. IMPERFECT COMPETITION IN THE BANK CARD MARKET

The pricing and profit performance of the bank card industry strongly suggests that rate competition has been limited. Consider first the industry's profitability. Over the period 1983-88, the pre-tax return on equity in bank credit card operations was three to five times the pre-tax return in the banking industry at large, according to Ausubel (1991). Of course, this measures the *ex post* profitability of bank card operations. It is possible that card issuers were merely charging high rates to compensate for default risk—a sharp increase in defaults and delinquencies can result in substantial losses for card issuers because card debt usually is not secured by specified collateral. Thus, *ex post* profitability might have been high because over the time period studied bank card operations experienced a very favorable realization; *ex ante* profitability need not have been high. But this explanation is not altogether convincing, since resales of credit card accounts during 1984-90 paid about \$1.20 per dollar of interest-earning balances, which suggests that the *ex ante* profitability of card operations was also quite high. Ausubel calculates that buyers paying such premiums expected to earn at least three times the average return on equity in banking, after adjustment for risk. Ausubel's finding that card issuers have earned relatively high profits is consistent with imperfect competition among issuers. That is, issuers apparently have exercised market power, despite the moderately concentrated structure of the bank card industry.

Now consider the industry's interest rate performance. Bank card interest rates have varied little over the past decade, despite substantial fluctuations in the money and capital market rates that determine a bank's marginal cost of funds.³ Ausubel (1991) regressed credit card interest rates on their lagged values, a cost of funds measure, and a constant, using quarterly data from 1982-89, and found that the rate of adjustment of the card rate to changes in the marginal cost of funds was only on the order of 5 percent per quarter. A competitive spot-market model would predict a coefficient near 100 percent, holding non-interest costs constant. Also, as noted in the introduction, credit card rates remained roughly

³Canner and Luckett (1992) estimate that card issuers' funding costs have accounted for roughly 25 to 50 percent of total operating costs, depending on the size of the program. They argue that this percentage may be smaller than for other types of lending, which may in part explain why credit card rates are less responsive than other loan rates to banks' costs of funds.

unchanged over the entire period from May 1989 through November 1991, while interest rates in financial markets tumbled four percentage points.

More recently, beginning in November 1991, through 1992, bank card rates declined substantially, with major issuers reducing their rates by 3 to 4 percentage points.⁴ However, interest rates in financial markets dropped by about a percentage point during this period, so that even with the cuts, card rates have continued to lag behind other interest rates.

The historically slow response of credit card rates to changes in money market rates is consistent with imperfect competition. That is, 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 demand for card credit and would shift with perceived changes in demand.^{5,6}

It is possible that with the recent drop in card rates in 1992, on a risk-adjusted basis, card rates finally have caught up with other rates. Indeed, it may be that the industry has become more competitive because of structural changes, and that card rates will track the cost of funds from now on. For instance, consumers may have become more rate sensitive because of increased publicity regarding high credit card

⁴The first of the top five issuers to offer a lower rate was First Chicago Corp, the nation's third largest issuer. In early November 1991, First Chicago "quietly reduced the interest rate charged to its most creditworthy customers by 3 percentage points, to 14.4 percent" (*American Banker*, November 12, 1991, p. 1). In April 1992, the nation's largest issuer, Citibank, reduced its rate by 3.9 percentage points (to 15.9 percent) for customers who have "had an account for at least 12 months, consistently paid their bills on time, and stayed within their credit limits" (*American Banker*, April 20, 1992, p. 1). In June, BankAmerica Corporation, the nation's second largest issuer, "quietly unveiled a variable rate card priced almost 3 percentage points below its fixed rate card" (*American Banker*, July 20, 1992, p. 5). In September, Chase Manhattan Bank offered a 3-percentage-point reduction for creditworthy customers. Finally, in January 1993, Sears, Roebuck, and Co., "the last major issuer clinging to a 19.8 percent rate," offered a 14.9 percent rate to customers who "charged at least \$1000 in the past year and consistently paid off minimum balance amounts" (*American Banker*, January 7, 1993, p. 11).

⁵For instance, the increasing spread between bank card rates and other rates during 1982-83 could be attributed to card issuers learning about the demand for card credit. Prior to 1980, usury ceilings generally were binding on card issuers. Subsequently, as inflation began to moderate in the early 1980s, 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.

⁶The demand for card credit, in turn, may be influenced by the level of real interest rates in financial markets, as argued by Mester (forthcoming).

rates and because the ongoing recession may have triggered concern about interest payments.⁷ It is too soon to draw such a conclusion, however, and there are good reasons to believe that the industry remains imperfectly competitive. First, the risk-adjusted reduction in card rates has been smaller than suggested by the announced cuts because borrowers who pose relatively high default risk generally are not eligible for the lower rates. That is, new cardholders and cardholders who have not always made timely payments or have not always remained within their credit limits typically have been excluded from the rate cuts.⁸ Second, in addition to having a competitive purpose, the rate cuts represent an effort by issuers to spur consumer borrowing because consumer demand for card debt has slackened.⁹ Third, the current spread between card rates and money market rates is not unusually narrow relative to those observed during the 1980s. Whether there has been a fundamental change in the industry is a question beyond the scope of the present paper; indeed, the answer will depend on the long-term, future performance of the industry.

3. SEARCH, SWITCH COSTS, AND ADVERSE SELECTION

The profit and interest rate performance of the bank card industry suggests that card issuers have enjoyed a measure of market power. Ausubel (1991) 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. Ausubel posits and discusses at length three factors that explain why consumers may not react to lower rates: search costs; switch costs; and "irrationality" on the part of some consumers who systematically underestimate the likelihood that they will borrow in the future. He then shows that such consumer irrationalities may naturally induce an adverse selection problem.

⁷In November 1991, President Bush publicly called for lower interest rates on credit cards. That same month, Congress briefly considered imposing a nationwide ceiling on credit card rates.

⁸For example, as reported in the *New York Times*, roughly one third of Citicorp's 27 million cardholders do not qualify for the reduced rate [see Hansell (1993)]. Of those that do qualify, many may be "convenience users" who regularly pay off their balances and rarely incur card debt. See also footnote 4.

⁹As argued below, card borrowers with larger outstanding balances find it more difficult to switch between issuers, other factors held constant. Thus, by reducing their card debt, consumers have also reduced their switch costs, making the industry more competitive. To the extent that these debt reductions are only temporary, the reduced switch costs cannot be viewed as a fundamental structural change.

Ausubel's adverse selection argument. Ausubel posits that borrowers representing low default risks tend to be less willing to engage in search than other credit card customers for the following reason. Lower-risk borrowers belong disproportionately to a category of cardholders "who do not intend to borrow but find themselves doing so anyway." These cardholders hold positive debt but are unwilling to search for the best card rate because they believe (irrationally) that 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. In other words, the bank would face an adverse selection problem. This would augment other disincentives against rate-cutting arising directly from consumer search and switch costs.

Another adverse selection argument. We further argue that consumer search costs may augment the adverse selection problem. Specifically, consumers who face high search costs (have a high disutility of search) may maintain higher credit card balances than consumers who face low search costs. Thus, a firm that unilaterally lowers its interest rate will tend to draw customers who maintain low balances and hence yield lower profits. This would further discourage issuers from competing on interest rates.

Larger credit card balances will tend to be associated with a high disutility of search if consumption and leisure are complements for many cardholders, because the more a cardholder borrows and accordingly consumes, the more the cardholder would value leisure time. As a result, the cardholder would be less willing to devote time to search activities.

This argument might seem counterintuitive: customers with large amounts of card debt might be thought to have a relatively *high* propensity to search for low credit card rates, since these customers pay more interest than those with little or no card debt. But a simple model illustrates this is not the case. Suppose that a cardholder's decision whether or not to borrow is determined by maximization of an intertemporal (two-period) utility function subject to an intertemporal budget constraint. That is, the cardholder solves the problem:

$$\max_{c_1, c_2, s} u(c_1, c_2, s) \equiv (1-s)^\theta U(c_1) + \delta U(c_2); \quad 0 \leq \theta \leq 1 \quad \text{and} \quad 0 < \delta < 1 \quad (1)$$

$$\text{s.t.} \quad c_2 = (y_1 - c_1)(1 + r(s)) + y_2 \quad \text{and} \quad s \leq 1 \quad (2)$$

where c_i is consumption in period i , $i=1,2$, s is the fraction of a consumer's time devoted to searching for the best loan rate if the consumer is a borrower and best deposit rate if the consumer is a saver (so

$1-s$ is the fraction of a consumer's time for leisure), y_i is non-interest income in period i , $i=1,2$, and $r(s)$ is the interest rate, which depends on the time devoted to searching.^{10,11} Note that $(y_i - c_i)(dr/ds) > 0$ regardless of whether the consumer is a borrower or a saver.

The parameter δ gives an indication of the consumer's propensity to borrow: a lower δ means the consumer is more likely to want to borrow than to save in period 1. The parameter θ gives an indication of the consumer's propensity to search for a better interest rate: a lower θ means the consumer is more likely to want to search.

Suppose there is an interior solution (c_1^*, s^*) , to the cardholder's problem. It is easy to show that if consumption and leisure are complements along the budget constraint, i.e., $\frac{\partial^2 u}{\partial c_1 \partial s} \Big|_{c_2=(y_1-c_1)(1+r(s))+y_2} > 0$, then $\partial c_1^*/\partial \delta < 0$; $\partial s^*/\partial \delta > 0$; $\partial c_1/\partial \theta > 0$; and $\partial s^*/\partial \theta < 0$. Thus, the model shows that borrowing and search may be inversely correlated across households. A greater propensity to borrow (smaller δ) can be associated with greater borrowing (higher c_1) and less search, because the marginal value of leisure (the disutility of search) increases as consumption increases. Also, a higher disutility of search (larger θ) can be associated with less search and greater borrowing. The inverse correlation between borrowing and search will be reinforced if δ and θ are negatively correlated across the population of cardholders, as they might be, since saving and search both require patience on the part of the consumer.

Adverse selection due to switch costs. Consumer switch costs can also induce an adverse selection problem, in at least two ways.¹² 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,

¹⁰More generally, r may depend on the amount borrowed or saved.

¹¹Generalizing the model by allowing the consumer to allocate time three ways (to work, leisure, and search) would not qualitatively change the results.

¹²For generic models of markets with switch costs, see, for instance, Klemperer (1987) and Farrell and Shapiro (1988).

in which case the cardholders who are granted these benefits would become subject to switch costs.¹³ Specifically, these cardholders would be unable to obtain comparable credit limits upon switching to a new issuer. Moreover, such a cardholder may be unable to transfer the entire balance in his or her old account 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 want to attract through a rate cut.¹⁴

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. Thus, 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. Such a correlation between card debt and switch costs may arise because applicants for a new card who already have ample card debt cannot necessarily be trusted to give up one of their old cards should their applications be approved. In other words, they cannot necessarily be trusted to keep their total indebtedness within reasonable limits, because their interests may diverge from those of their creditors. On gaining access to additional credit, they might increase their total indebtedness to the point of exposing creditors to unacceptable default risk.¹⁵

In general, applicants who rarely borrow on their existing credit cards or applicants who intend to close other accounts and transfer the outstanding balances would not pose such a threat. However, applicants intending to make such a switch may not be distinguishable from those applying for a new card in order to accumulate more debt. Therefore, a card issuer may view *any* applicant with current card debt as someone applying for additional credit, rather than as someone intending to switch accounts. By this reasoning, card issuers, like other lenders, would consider an applicant's existing debt obligations and would be cautious with respect to any applicant having large amounts of card debt outstanding.

¹³This point was brought to our attention by Thomas Lynch, executive vice president in charge of credit card operations at 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.

¹⁴For a formal model of how private information may give rise to switch costs in credit markets, see Sharpe (1990).

¹⁵This type of moral hazard problem in credit markets, which occurs when borrowers can apply sequentially for loans, is examined by Bizer and DeMarzo (1992). They argue that it can have an important impact on loan terms and market performance.

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. Consequently, those applicants would be subject to comparatively high switch costs.¹⁶ Note that those applicants also would impose comparatively high costs on issuers, in the form of resources expended processing applications that ultimately are rejected.

Further, lenders may place more weight on card debt than on other current debt when considering an applicant's ability to repay a loan. One reason is that card debt represents borrowing from a line of credit, so that the applicant's observed, current debt may be only a percentage of the potential level. Also, relative to other major forms of household borrowing, such as home mortgage debt, card debt may be more likely to accumulate if a household has had difficulty adhering to a budget. Hence, applicants who appear heavily dependent on card credit may be viewed as greater default risks, *ceteris paribus*. Thus, even holding total debt-to-income constant, applicants with larger amounts of card credit outstanding may find it more difficult to qualify for new credit.

Summary. The bottom line is that there are three factors (search costs, switch costs, and consumer irrationality) that may make the credit card market imperfectly competitive, in that some issuers may face less than perfectly elastic demand for their card. All three of these factors may lead to adverse selection problems, which would exacerbate their effect. The empirical evidence presented in the following sections is consistent with this general view.

Before proceeding, we should note that 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 into the industry. For an incumbent, any market share gains from unilaterally lowering its interest rate would be offset by reduced payments from current cardholders; an entrant would not bear this cost. Nevertheless, new entrants into the credit card industry traditionally have not offered below-market interest rates. In recent years, entrants mostly have relied on low annual fees or nonprice inducements to attract customers; for instance, Sears introduced the Discover Card by waiving the annual fee and offering rebates on purchases.

¹⁶The greater likelihood of being rejected for credit would entail substantial, direct switch costs among applicants with large amounts of card debt because many such applicants would have to curtail their spending to reduce their debt, or they would have to reapply a number of times to qualify for a new card offering more favorable credit terms.

The pricing behavior of credit card *entrants* can be explained in several ways. First, the adverse selection problem described by Ausubel (whereby a low-rate card would tend to attract comparatively high-risk borrowers) would apply to entrants as well as incumbents, and may deter an entrant from offering a comparatively low interest rate. Second, competition via low annual fees and non-price enhancements is consistent with the notion that borrowers are subject to switch costs.¹⁷ Third, much if not most entry into the industry during the 1980s may have been a response to growing demand for card credit, rather than an attempt by entrants to seize market share and profits from incumbents.¹⁸ Indeed, search and switch costs and the associated adverse selection problems may have discouraged such battles for market share.¹⁹

4. EMPIRICAL ANALYSIS OF CONSUMER SEARCH BEHAVIOR

The empirical analysis in this and the following sections relies on data from the 1989 Survey of Consumer Finances (SCF). The 1989 SCF was sponsored by the Federal Reserve and was conducted by the Survey Research Center at the University of Michigan. The SCF is widely regarded as a reliable source of data on the balance sheets, fiscal practices, and financial status of U.S. families. It includes detailed data on assets and liabilities, relationships with financial institutions, and a variety of demographic, economic, and attitudinal variables.²⁰

¹⁷Models of competition in markets with consumer switch costs suggest that a firm would raise its prices once it succeeds in attracting a substantial share of "captive" customers. Entrants into the credit card market may have opted to offer a low annual fee and non-price inducements in place of a temporary, low interest rate.

¹⁸Demand for revolving credit grew rapidly through the 1980s; see Calem (1992).

¹⁹The entry of AT&T into the credit card industry in 1991 was exceptional, in that AT&T offered a comparatively low interest rate (in addition to waiving the annual fee) and was remarkably successful at capturing market share from incumbents. This success can be attributed to AT&T's huge marketing effort, its ability to market its Universal Card directly to its telephone customers, and its ability to offer "calling card" services as an enhancement. AT&T's success may have been a factor contributing to the recent round of rate-cutting in the industry.

²⁰The 1989 survey was preceded by a similar one in 1983 and a more limited survey in 1986. For a more detailed description of the 1989 SCF, see Kennickell and Shack-Marquez (1992).

Our empirical analysis relies on a subsample from the 1989 SCF of 1,663 households that have at least one bank-type credit card.²¹ The variables we used are listed in Table 1, along with their sample means.²²

Empirical model. We have posited that one reason the credit card market may deviate from the perfectly competitive model is that borrowers may face search costs or may be irrational in their search behavior, and these factors may induce an adverse selection problem. To evaluate the empirical significance of this theory, we test whether a cardholder's borrowing is correlated with the individual's propensity to engage in search.

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:^{23,24}

$$\text{CCB} = f(\text{SHOP}, \text{BELINST}, \text{BELVACA}, \text{BELJEWE}, \text{X}). \quad (3)$$

The variable SHOP measures a household's propensity to engage in search. The variable takes a value of 1 if the household "shops around for the best terms when making major decisions about borrowing and saving" and equals 0 otherwise.²⁵ 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

²¹We omitted from our sample 89 households having more than \$1 million in stocks, bonds, and liquid assets, and 137 households with annual incomes greater than \$250,000, as not being representative of typical credit card users. (Note: 42 households had over \$1 million in stock, bonds, and liquid assets and annual incomes over \$250,000.) In addition, a few households were excluded because of misreported data.

²²The SCF imputes five alternative values for some of the key variables when the data are missing. Thus, there are five observations for each household: if a variable is not missing, its value is the same for all five observations; if a variable is missing, each observation corresponds to a different imputation. Thus, the data can be treated as five different data sets. (See Rubin (1987).) Below, we report results based on the first data set comprising the first observation for each household, but our results are robust to using any of the other four.

²³The 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.

²⁴All dollar values are measured in \$100,000 units.

²⁵The SCF posed the question: "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 equal to 1 if the respondent chose a number greater than 7 and SHOP equal to 0 otherwise. (Defining SHOP = 1 if the respondent chose a number greater than 5 yielded similar results.)

and search would support the view that search costs induce adverse selection. That is, 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, respectively, takes a value of 1 if the respondent believes it is a bad idea to borrow and a value of 0 otherwise.²⁶ These variables are included to control for a household's demand for card credit, as in Duca and Rosenthal (1991).

Also included on the right-hand side of (3) is a vector of financial and demographic variables, denoted X. These variables have been found in previous studies to correlate with a household's demand for borrowed funds and/or with the total credit limit available to the household, as determined by lenders' perceptions of default risk.²⁷

The variables included in X are those shown in Table 2 under the Equation (3) column (excluding SHOP, BELINST, BELVACA, and BELJEWE). Specifically, INC denotes household income. The relationship between INC and CCB should be positive, at least initially, since higher income households tend to have greater access to card credit. This relationship may be weaker among upper income households. Therefore, we also include the interaction term INCD, interacting INC with a dummy variable equal to one for households earning less than \$100,000 and equal to 0 otherwise.

DEBTINC denotes 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.²⁸ MEXPINC denotes the ratio

²⁶The SCF posed the question: "In general, do you think it is a good idea or a bad idea for people to buy things on the installment plan?" In addition, the SCF posed the question: "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?"

²⁷See Boyes *et al.* (1989), Canner and Lueckert (1990), Duca and Rosenthal (1993), Gabriel and Rosenthal (1991), and Jappelli (1990). One noteworthy omission from (3) is household credit history. We do not control for credit history in (3) because it is not exogenous; rather, it depends on household borrowing decisions.

²⁸A 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 below (in footnote 34), however, a high ratio of debt-to-income may result in reduced access to credit *ex post*.

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 is a dummy variable that takes a value of 1 if the household owns its own home and 0 otherwise; LIQS and STOBO denote the household's holding of liquid assets and, respectively, stocks and bonds. One would expect these wealth variables to be inversely related to demand for card debt and inversely related to default risk.

HSIZE denotes 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 denotes the number of years that the head of the household has been at his/her current job.²⁹ Individuals that change jobs frequently may be subjected to tighter credit limits. CURADD denotes the number of years that the household has resided at its current address, which may be related to demand or risk. For instance, households that only recently moved into a new home may require additional credit to purchase furniture or appliances. HOMECURR represents the interaction of CURADD with HOMEOWN.

The variables AGE, SEX, MARI, RACE, and ED control for the age, sex, marital status, race, and years of schooling of the head of household, respectively. AGE = respondent's age; SEX = 1 if respondent is male and 0 if female; MARI = 1 if respondent is married and 0 otherwise; RACE = 1 if respondent is non-white and 0 otherwise; ED = highest year of school completed. Table 1 gives the means of the variables. Note that for the dummy variables, the mean is the percent of the sample with that variable equal to 1.

Results. Maximum likelihood estimation of equation (3) yields the results presented in Table 2 in the column labeled "Equation (3)." 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 finding supports the view that consumer search costs induce adverse selection in the credit card market.

Other variables have signs that seem sensible, given that these variables control for household demand or default risk. For instance, income is positively correlated with credit card balances, which may reflect greater access to and/or greater demand for credit card debt as income increases.

²⁹CUREMP takes a value of 0 if the head of household is not currently employed full time or has been at his/her current job less than 1 year.

Empirical significance of consumer irrationality. The negative relationship between CCB and SHOP also is consistent with the argument that consumers holding large balances are often irrational or naive in their search behavior. According to this interpretation, consumers with large amounts of card debt tend to underestimate the value of search (in regard to financial products generally) because they tend to be irrational or financially naive.

We prefer to interpret the observed negative relationship between SHOP and CCB as indicating that card issuers may face an adverse selection problem arising from consumer search costs. To begin with, the SCF data provide no direct evidence (in the form of inconsistencies in consumer responses) to indicate that consumers underestimate their own propensity to borrow. Households' reported credit card balances are consistent with their responses to the SCF question: "Do you hardly ever, sometimes, or almost always pay off your credit card bill in full each month?" The simple correlation coefficient between credit card balance and a dummy variable representing the reported frequency of full repayment is -0.39 , which is highly statistically different from zero. Table 3 presents the average credit card balance for households classified according to their answer to this question about repayment frequency. On average, households who claim to "hardly ever" pay their debt in full maintain the largest balances, while those who claim to "almost always" pay in full maintain the smallest balances.³⁰ Moreover, the attitudinal variables BELINST, BELVACA, and BELJEWE in equation (3) are significantly negatively related to CCB (individually and jointly). Thus, consumers' reported levels of borrowing are consistent with their reported attitudes toward borrowing.

Further, we may surmise that consumers who engage in self-denial with respect to their borrowing activity would be likely to assert that they "sometimes" pay off their balances in full.³¹ Our estimation results are robust, however, to deleting from the sample all consumers who claim to

³⁰We further verified the internal consistency of the data by estimating an expanded version of equation (3), including a dummy variable identifying consumers who "almost always" pay in full and another dummy variable identifying consumers who "sometimes" or "almost always" pay in full. The estimated coefficients on these dummy variables were negative and highly statistically significant. Moreover, the estimated coefficients on SHOP and the belief variables retained their original signs and statistical significance.

³¹Those asserting that they "hardly ever" pay in full probably do not discount their propensity to borrow; those asserting that they "almost always" pay in full would have to be severely underestimating their propensity to borrow if they do, in fact, regularly incur card debt.

"sometimes" pay their balances in full. In particular, the negative sign and statistical significance of the estimated coefficient on SHOP are unchanged.³²

Despite these considerations, we cannot rule out the alternative interpretation that consumers holding large credit card balances tend to be irrational in their search behavior. In particular, a consumer may be providing consistent responses to the survey and yet may be discounting his/her propensity to borrow. For example, those consumers who deny (to themselves and to others) that they borrow as much as they do, and who therefore understate their outstanding credit balances when responding to the survey, may be those who feel "it is a bad idea" to incur installment debt. This logic would suggest that the attitudinal variables may serve as proxies for the extent to which consumers understate their credit card balances.

5. EMPIRICAL ANALYSIS OF SWITCH COSTS

We also have posited that the credit card market may deviate from the perfectly competitive model because consumers in the market may face switch costs and these switch costs may induce adverse selection problems. Two potential sources of such switch costs are information asymmetries between current and prospective issuers and the fact that outstanding credit card debt may be viewed as a signal of credit risk when a household applies for new credit.

We evaluate the empirical significance of this theory 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 denied access to new credit would be consistent with our theoretical reasoning that switch costs induce adverse selection. Such a relationship 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 examine whether households with larger outstanding card balances are more likely to have experienced debt repayment problems.

³²It also is worth mentioning that our estimation results are robust to including three additional dummy variables to control for a household's financial sophistication: whether or not the household owns a mutual fund; whether or not the household owns corporate stock; and whether or not the household has a brokerage account. As expected, the coefficients on these additional variables are negative, with the one concerning mutual funds being statistically significant.

Specifically, we estimate a probit model in which the dependent variable indicates whether a household is credit-constrained (TURNDOWN). A household is defined to be credit constrained (TURNDOWN = 1) if at least once during the five-year period preceding the 1989 SCF, it submitted an application for credit and had the application denied, in whole or in part.³³ Our probit model is:

$$\text{TURNDOWN} = h(\text{CCB}, \text{AVAILBAL}, \text{SHOP}, \text{BELINST}, \text{BELVACA}, \text{BELJEWE}, \text{DELINQUENT}, \text{X1}). \quad (4)$$

The vector X1 in (4) is identical to X in (3), 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 (3) are also included in (4), 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.³⁴

Equation (4) relates a household's experience over the previous five years, with respect to applying for and gaining access to credit, to *current* household characteristics. If these household characteristics are stable over time, then one can interpret equation (4) 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.³⁵

³³The SCF posed the question: "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?"

³⁴The household's ratio of total debt-to-income now carries a different interpretation than it had in equation (3). *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 (4).

³⁵In 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 (4) may exaggerate the extent to which homeownership reduces credit constraints. Any such bias is probably small, however, for two reasons. First, many of the households for which $\text{TURNDOWN} = 1$ may have been rejected for a type of loan other than a mortgage. Second, by far the most common reason for rejection of mortgage applications is poor credit history [see Canner and 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 subject to bias 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.

A household's total credit card debt, CCB, is included as an explanatory variable in (4). A finding that households with large credit card balances have reduced access to credit would support our contention that switch costs may induce adverse selection in the credit card market. That is, a positive and significant relationship between CCB and TURNDOWN, other factors held constant, would be consistent with our theoretical reasoning. One possible criticism of this test is that we might observe a positive relationship between CCB and TURNDOWN 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 (4).

A dummy variable, DELINQUENT, equal to 1 if the household recently experienced debt repayment difficulties, and equal to 0 otherwise, also is included as an explanatory variable in (4).³⁶ This variable controls for the influence of applicant credit history on the disposition of loan applications.

Our second test involves estimating the probit model:

$$\text{DELINQUENT} = F(\text{CCB}, \text{SHOP}, \mathbf{X1}). \quad (5)$$

A positive relationship between CCB and DELINQUENT in (5) would be consistent with our theoretical arguments regarding switch costs and related adverse selection problems. To the extent that households with larger credit card balances (holding constant 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.

Results. The estimation results for the probit equations (4) and (5) are given in Table 2. In each equation, the coefficient on bank card debt (CCB) is statistically significant and positive. Households with larger card debt outstanding are more likely to find themselves credit 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

³⁶Specifically, DELINQUENT = 1 if within one year prior to the survey, the household fell behind in a payment, and 0 otherwise.

constrained. These findings support our contention that switch costs may induce adverse selection in the credit card market.

In general, the signs and statistical significance of other variables in equations (4) and (5) are consistent with our *a priori* expectations and with the findings of previous studies. For instance, minority households, younger households, and households that rent rather than own their own homes are more likely to be credit constrained and more likely to have repayment problems.

Is our test for switch costs biased? As noted above, one possible criticism of using equation (4) to test for switch costs is that TURNDOWN may pre-determine 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. For example, card debt cannot be used as a substitute for a mortgage or, in general, an auto loan. Further, even if some households do increase their card borrowing after being rejected for other types of credit, this would bias the estimated coefficient on CCB only to the extent that the reasons for rejection are not controlled for by other explanatory variables in (4).

If anything, TURNDOWN might pre-determine CCB in a way that would bias *downward* the estimated coefficient on CCB. To the extent this is true, 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. This would be the case, for example, when a credit card has been used for the down payment on an auto loan, or when a household has applied for and received a new credit card.

Another possible criticism applicable to equation (4) is that an individual may have run into financial 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.³⁷ This could generate a positive correlation between turndowns and credit card balances. While we acknowledge the possibility that the observed positive relationship between CCB and TURNDOWN might decline in magnitude if the data allowed us to control for credit history beyond

³⁷Note that DELINQUENT controls only for difficulties occurring over the past year, while TURNDOWN covers the past five years.

the prior year, we doubt that this relationship would lose its statistical or economic significance. 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.

Magnitude of the adverse selection problem. To provide an idea of the magnitude of the switch costs involved in taking on more credit card debt, 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 (4) evaluated at the means of all other explanatory variables.^{38,39} As can be seen in the figure, this probability increases by about one percentage point for each \$1000 increase in credit card debt. For example, if credit card debt increases from \$2000 to \$3000, then $P_{A\&R}$, the probability of applying and being rejected for credit, increases from 0.095 to 0.103. (By comparison, the difference between a homeowner and non-homeowner with respect to $P_{A\&R}$, holding other variables constant at their means, is about 3½ percentage points.) This increase in the probability of rejection when credit card debt increases from \$2000 to \$3000 implies about a 10 percent increase in the number of applicants (out of a fixed-size pool) that would face rejection, which implies substantial incremental switch costs.⁴⁰

An additional, empirical relationship not captured in Figure 1, which implies yet higher incremental switch costs, is that an increase in household credit card debt raises $P_{A\&R}$ through its effect on the household's ratio of total debt-to-income (TDEBTINC). This effect will be particularly large for lower-income households.

³⁸One 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.

³⁹For a probit model: $y_i^* = \beta'x_i + u_i$, with y^* unobservable, $y = 1$ if $y_i^* > 0$ and $y = 0$ otherwise, and $u_i \sim N(0, \sigma^2)$. The probability that $y = 1$ is $F(\beta'x_i)$, where $F(\cdot)$ is the cumulative standard normal distribution function.

⁴⁰The percentage increase in the number of rejected applicants when card debt increases from x_0 to $x_1 = (\text{the change in } P_{A\&R} \text{ when card debt increases from } x_0 \text{ to } x_1) / (P_{A\&R} \text{ when card debt is } x_0)$. For an increase in card debt from \$2000 to \$3000, this is $0.01/0.95 = 10$ percent.

6. CONCLUSIONS

Through most of the 1980s and into early 1991, the credit card industry was characterized by sticky interest rates and abnormally high profits for many issuers. A plausible explanation for this performance is that consumers (cardholders) have not conformed to the behavioral assumptions of perfect competition, due to any or all of the following factors: (1) consumers face search costs; (2) consumers face switch costs; and (3) firms would face an adverse selection problem if they were to unilaterally reduce their interest rates.

The present paper presents empirical evidence in support of this view, drawing on data from the Federal Reserve's 1989 Survey of Consumer Finances. Overall, our analysis suggests that each of these three factors has contributed to the observed performance of the credit card market.

In addition, the paper advances two theoretical arguments supporting the contention that credit card issuers may face an adverse selection problem. First, we argue that consumers who face high search costs tend to maintain higher credit card balances than consumers who face low search costs. Second, we argue that consumers with high credit card balances (especially those who represent low default risks and who would forfeit a high credit limit if they switched cards) may face relatively high switch costs. Either way, a firm that competes on interest rates will disproportionately draw customers who maintain lower balances and hence yield lower profits. These arguments augment Ausubel's (1991) reasoning that consumer irrationality in the credit card market may induce an adverse selection problem.

Our principal empirical findings can be summarized as follows. Holding constant demand for and access to credit, 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. We interpret this result as evidence that card issuers face an adverse selection problem induced by search costs. Although this result may also be consistent with Ausubel's reasoning that consumers holding large balances are often irrational or naive in their search behavior, we find no direct evidence (no inconsistencies in consumer responses) to indicate that consumers may be underestimating their propensity to borrow.

In addition, we 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, other factors held constant. These findings suggest that holding large card balances signals credit risk and makes it harder for a consumer to obtain alternative credit. We interpret these findings as evidence that card issuers face an adverse selection problem induced by switch costs.

Thus, our empirical findings support the view that competition in the credit card market is imperfect. They help explain both the non-responsiveness 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' arguments that credit card rates are sticky because consumers are not responsive to rate cuts.

Currently, card issuers are subject to extensive disclosure rules aimed at reducing search costs for consumers. For instance, the 1988 Fair Credit and Charge Card Disclosure Act requires card issuers to disclose credit terms on applications and solicitations. This rule-making was based on the premise that consumers could not easily observe and compare available interest rates and credit terms and that the market is less competitive as a result. Our findings cast doubt on the efficacy of such regulation. To the extent that imperfect competition in the industry has been due to consumers' switch costs, their unwillingness to devote time to search, and associated adverse selection problems, market performance cannot be improved through increased disclosure. Rather, our findings suggest the focus should be on policies that can reduce switch costs for credit card borrowers; for instance, requiring card issuers to promptly notify credit reporting agencies when accounts are closed. Policymakers may want to investigate such alternative approaches.

TABLE 1. Means of Variables*

Variable		Mean
INC	household income	0.5856
INCD	interaction of income with a dummy variable which equals 1 for households earning < \$100,000, and equals 0 otherwise	0.3380
AGE	respondent's age	50.46
SEX	1 if male respondent, 0 if female	0.8340
MARI	1 if married respondent, 0 otherwise	0.7282
ED	respondent's highest level of schooling	13.90
RACE	1 if nonwhite respondent, 0 otherwise	0.1287
HSIZE	household size	2.802
CUREMP	years head of household has been at current job, 0 if unemployed or < year	9.262
CURADD	years household has been at current address	13.08
HOMEOWN	1 if household owns its home, 0 otherwise	0.7980
HOMECURR	1 if household owns its home but has lived there for less than 2 years, 0 otherwise	0.06554
MEXPINC	major monthly expenditures (rent, mortgage, auto loan and lease payments)/household income	0.3358
LIQS	household holding of liquid assets, including balances in checking, money market, and other passbook and savings accounts, CDs, and mutual funds	0.4294
STOBO	household holding of stocks and bonds, including publicly traded stocks, US savings bonds, mortgage-backed securities, US government bonds, municipal bonds, and other bonds	0.2899
DEBTINC	household debt net of bank card borrowing/household income	0.7626
TDEBTINC	household total debt/household income	0.7870
SHOP	1 if household often shops for best terms for borrowing and saving, 0 otherwise	0.3933
BELINST	1 if household feels it is a bad idea to use installment credit, 0 otherwise	0.3331
BELVACA	1 if household feels it is a bad idea to borrow for a vacation, 0 otherwise	0.8665
BELJEWE	1 if household feels it is a bad idea to borrow to buy jewelry, 0 otherwise	0.9248
AVAILBAL	credit line available on household's credit cards = household's total bank card credit line net of outstanding card debt	0.1127
DELINQUENT	1 if household has recently experienced difficulties in paying its debt, 0 otherwise	0.1221
CCB	household's bank card debt	0.008557
TURNDOWN	1 if household is credit constrained, 0 otherwise	0.1179

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

The mean of a dummy variable equals the fraction of respondents for which the variable equals 1.

TABLE 2. Estimates of Equations (3), (4), and (5)
(absolute value of t-statistics in parentheses)

Independent Variables	Dependent Variable		
	Equation (3)	Equation (4)	Equation (5)
	CCB	TURNDOWN	DELINQUENT
Constant	0.03775* (4.344)	-0.8428* (2.091)	0.1769 (0.4954)
SHOP	-0.01077* (5.412)	0.09040 (1.006)	-0.1014 (1.152)
BELINST	-0.004904* (2.269)	0.1395 (1.467)	
BELVACA	-0.009471* (3.413)	-0.1218 (0.9506)	
BELJEWE	-0.01076* (3.092)	0.01649 (0.1008)	
CCB		4.746* (2.631)	8.065* (4.812)
AVAILBAL		-0.3985 (0.8374)	
DELINQUENT		0.5202* (4.577)	
INC	0.004668** (1.648)	0.05320 (0.4196)	-0.09615 (0.7572)
INCD	0.01057* (2.469)	-0.3065 (1.555)	0.2630 (1.412)
DEBTINC	0.002105* (3.598)		
TDEBTINC		0.1220* (3.587)	0.03927 (1.500)
MEXPINC	-0.003260** (1.788)	-0.02831 (0.9313)	0.04547* (2.142)
HOMEOWN	-0.002252 (0.8034)	-0.2168** (1.692)	-0.1798* (1.473)
LIQS	-0.01537* (7.329)	-0.07220 (1.189)	0.01463 (0.2598)
STOBO	-0.009152* (3.551)	0.004225 (0.06142)	-0.02790 (0.3584)
H SIZE	0.002496* (3.079)	0.03428 (0.9587)	0.02184 (0.6214)

TABLE 2, continued.

Independent Variables	Dependent Variable		
	Equation (3)	Equation (4)	Equation (5)
	CCB	TURNDOWN	DELINQUENT
CUREMP	0.00008439 (0.8124)	-0.007706 (1.470)	-0.006263 (1.265)
CURADD	-0.0002265** (1.715)	-0.01050 (1.604)	0.006006 (0.9979)
HOMECURR	-0.001199 (0.2972)	-0.2520 (1.343)	-0.4215* (2.093)
AGE	-0.0003283* (3.547)	-0.01085* (2.528)	-0.02280* (5.221)
SEX	-0.006562** (1.733)	0.1110 (0.6688)	0.1399 (0.8474)
MARI	0.0009392 (0.2649)	-0.1170 (0.7753)	-0.07065 (0.4739)
RACE	0.01001* (3.762)	0.4071* (3.507)	0.2117** (1.830)
ED	-0.0005324 (1.329)	0.01674 (0.8806)	-0.03076** (1.722)
R ²	NA	0.1252	0.08985
% correct predictions	NA	0.8839	0.8785

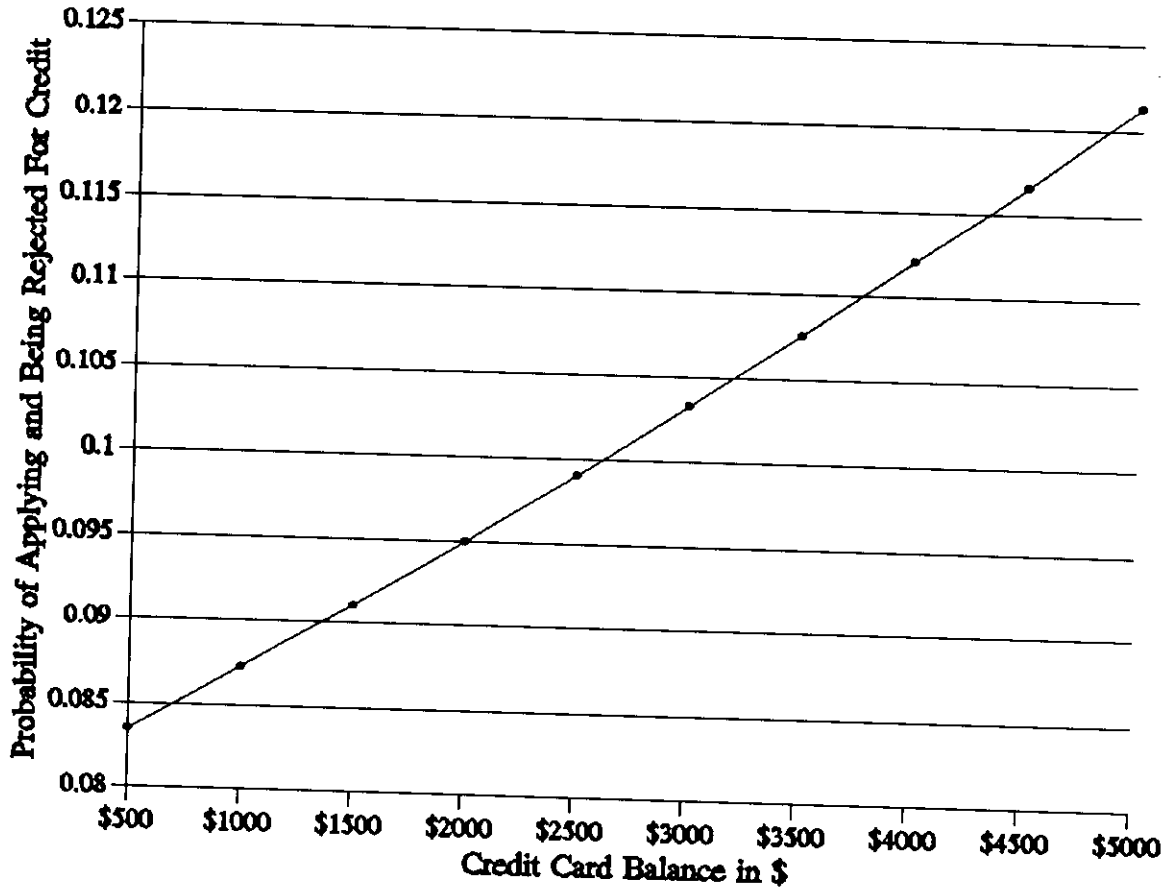
* Significantly different from 0 at the 5% level

**Significantly different from 0 at the 10% level

NA Not applicable

TABLE 3. Frequency of Full Repayment and Credit Card Balance

Frequency of Full Repayment	Number of Households (out of 1,663)	Percent of Households in the Sample	Average Credit Card Balance (in \$)
Households that <i>hardly ever</i> pay off the total balance owed on credit cards each month	351	21.11%	\$2,143
Households that <i>sometimes</i> pay off the total balance owed on credit cards each month	308	18.52%	\$1,414
Households that <i>almost always</i> pay off the total balance owed on credit cards each month	1004	60.37%	\$ 234

FIGURE 1. Probability of Applying and Being Rejected For Credit vs. Credit Card Balances

REFERENCES

- Ausubel, Lawrence M., "The Failure of Competition in the Credit Card Market," *American Economic Review*, 1991, 81, 50-81.
- Bizer, David S. and DeMarzo, Peter M., "Sequential Banking," *Journal of Political Economy*, 1992, 100, 41-61.
- Boyes, William J., Hoffman, Dennis L. and Low, Stuart A., "An Econometric Analysis of the Bank Credit Scoring Problem," *Journal of Econometrics*, 1989, 40, 3-14.
- Calem, Paul S., "The Strange Behavior of the Credit Card Market," *Business Review*, Federal Reserve Bank of Philadelphia, January/February 1992, 3-14.
- Canner, Glenn B. and Lueckert, Charles A., "Consumer Debt Repayment Woes: Insights from a Household Survey," *Journal of Retail Banking*, 1990, 12, 55-62.
- Canner, Glenn B. and Lueckert, Charles A., "Developments in the Pricing of Credit Card Services," *Federal Reserve Bulletin*, 1992, 78, 652-66.
- Canner, Glenn B. and Smith, Dolores S., "Expanded HMDA Data on Residential Lending: One Year Later," *Federal Reserve Bulletin*, 1992, 78, 801-24.
- DeMuth, Christopher C., "The Case Against Credit Card Interest Rate Regulation," *Yale Journal on Regulation*, 1986, 3, 201-42.
- Duca, John V. and Rosenthal, Stuart S., "Borrowing Constraints, Household Debt, and Racial Discrimination in Loan Markets," *Journal of Financial Intermediation*, October 1993, 3, 77-103.
- Farrell, Joseph and Shapiro, Carl, "Dynamic Competition with Switching Costs," *Rand Journal of Economics*, 1988, 19, 123-37.
- Gabriel, Stuart A. and Rosenthal, Stuart S., "Credit Rationing, Race, and the Mortgage Market," *Journal of Urban Economics*, 1991, 29, 371-79.
- Hansell, Saul, "Consumers Finally Respond to High Credit Card Interest," *The New York Times*, March 29, 1993, 1.
- Jappelli, Tullio, "Who Is Credit Constrained in the U.S. Economy?" *Quarterly Journal of Economics*, 1990, 105, 215-34.
- Kennickell, Arthur and Shack-Marquez, Janice, "Changes in Family Finances from 1983-1989: Evidence from the Survey of Consumer Finances," *Federal Reserve Bulletin*, 1992, 78, 1-18.
- Klemperer, Paul, "The Competitiveness of Markets with Consumer Switching Costs," *Rand Journal of Economics*, 1987, 18, 138-50.

- Mester, Loretta J., "Why Are Credit Card Rates Sticky?" *Economic Theory* (forthcoming).
- Rubin, Donald B., *Multiple Imputation for Nonresponse in Surveys*, New York: John Wiley and Sons, Inc., 1987.
- Sharpe, Steven, "Asymmetric Information, Bank Lending, and Implicit Contracts: A Stylized Model of Customer Relationships," *Journal of Finance*, 1990, 45, 1069-87.