Returns To Information Search:
Consumer Credit Card Shopping Decisions

Jinkook Lee[1] and Jeanne M. Hogarth[2]

Interest rate competition and risk-based pricing have created wide price dispersions in credit card interest rates. In this environment, searching for price information on credit cards is critical for many consumers, especially revolvers. Using the 1995 Survey of Consumer Finances, payoff to consumers' search was estimated. A measure of potential savings was calculated based on the range of credit card interest rates. The relationship between consumers' search and payoffs measured as annual percentage rate (APR) and dollar savings in interest payments was examined. Increased search paid off for revolvers using both measures.
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Credit card lending is a competitive market with thousands of card issuers, all free to establish their own prices and other lending terms (Federal Reserve Board, 1994, 1997). While competition in the 1980s focused on efforts to broaden customer bases by increasing the availability of credit to higher risk consumers, competition in the 1990s has focused on interest rates, resulting in declining credit card interest rates in the marketplace (Canner & Luckett, 1992; Cargill & Wendel, 1996; Federal Reserve Board, 1997). Also, with more sophisticated marketing tools based on credit scoring, more bankcard issuers exercise price discrimination with interest rates, segmenting the market into primary lending (so-called "A" credit) and sub-prime lending ("B/C" credit, and even "D/E" credit) (Federal Reserve Board, 1997). These recent changes in the credit card market have created greater price dispersion in interest rates, providing an important reason for consumers to shop around -- the greater the price dispersion, the greater the expected savings from search.

Several researchers (Ausubel, 1991; Cargill & Wendell, 1996; Chang & Hanna, 1992) have argued that borrowers do not search for low credit card interest rates. Some of these non-shoppers are convenience users. For them, interest rates are irrelevant because they pay the balance in full each month. Others perceive a low expected value of savings. However, recent data show that between 1992 and 1995 a higher proportion of consumers revolved balances, and the average value of those balances has increased (Chimerine, 1997; Kennickell, Starr-McCluer & Sundén, 1997). If credit cards are used as a financing mechanism instead of a medium of convenience, the interest rate should be an important determinant of consumers' choice of which credit card to hold.

Furthermore, the cost of information about credit cards has declined. In 1988 the U.S. Congress passed the Fair Credit and Charge Card Disclosure Act (D'astous & Miquelon, 1991; Federal Reserve Board, 1994). This act amended the Truth in Lending Act to expand disclosure requirements for applications and mail solicitations for credit cards, making consumers' comparison shopping easier. More information comes directly to consumers in the form of direct marketing mail solicitations, which reduces consumers' information acquisition costs. During 1998, card issuers sent an all-time record high of 3.45 billion direct mail solicitations, representing a significant 15% increase over 1997 (BAIGlobal, 1999).

In this credit card market with wider price dispersion, greater anticipated savings, and lowered search cost, consumers' search activities are expected to payoff in terms of finding a card with a lower APR. The purpose of this paper is to explore whether consumers who revolve shop for credit and the relationship between search and the payoff to search as measured by the APR

of the major credit card a consumer holds. Findings can help consumer educators and financial counselors communicate the potential savings more effectively to consumers.

Previous Studies

Consumer Credit Card Search Behavior
Numerous researchers have investigated consumer information search behavior. However, there have been few studies of search behavior as it relates to services (Schostack, 1977), such as credit borrowing and savings accounts (Chang & Hanna, 1992).

Stigler's (1961) seminal work on the economics of information explained market price dispersion as the major reason for consumers to engage in information search. Consumers can close price gaps by searching for price information, but at some cost in terms of time and money. According to the economics of information theory, a consumer will search for lower prices as long as the expected marginal benefits from additional search exceed the expected marginal costs of search.

Chang and Hanna (1992) discussed the benefits and costs of search for credit, including immediate benefits such as a lower interest rate and finance charge and indirect benefits including better money management, greater savings and convenience from using appropriate credit, and gains in financial knowledge and experience gathered from the search process. The costs of search include the opportunity cost of time (lost wages) and physical and mental effort spent in search process.

Chang and Hanna (1992) noted that in today's complex financial market, the cost of information search may be much greater for a money borrower than a goods buyer because the cost of this service may not be fully or clearly disclosed until application and the language of the creditor is difficult to understand for many consumers. However, in the credit card market, the cost information is fully disclosed at the time of solicitation and the information often comes directly to the consumer rather than the consumer needing to search for it. In order to ensure consumers' ability to do comparison shopping, the Fair Credit and Charge Card Disclosure Act requires the credit card industry provide cost information at the time of solicitation. Also, the terms used in credit cards are less complicated than other credit products such as mortgages and home equity loans.

Additionally, there are other benefits and costs involved in searching for a credit card. First, at the time of application, consumers may not be sure of how much credit they will use in the future. Because consumers tend to underestimate their use of credit and the probability of revolving at the time of application, they underestimate the benefits of searching for a lower APR. Also, "high-risk" consumers may be less willing to engage in search due to fear of being turned down. Finally, psychological dislike or enjoyment of search influences consumers' perception of the benefits and costs of search (Babin, Darden & Griffin, 1994; Holbrook & Hirschman, 1982).

Using a sample from the 1983 Federal Reserve's Survey of Consumer Finances data set of consumers who obtained at least a $500 loan in the previous year, Chang and Hanna (1992) investigated the factors associated with consumer search behavior. They found that consumers engage in little information search and that the size of loan and education had a positive relationship with search, while income had a non-linear effect on search.

It is important to distinguish between "convenience" and "revolving" credit card users since information search patterns may depend on how consumers plan to use their credit cards. Mathews and Slocum (1969; 1970) were among the first who distinguished between convenience and revolving users. The former utilize credit cards mainly as a mode of payment and typically pay their balance in full upon receiving the account statement. Revolvers, on the other hand, use the card principally as a mode of financing and elect to pay interest charges on the unpaid balance. Thus, for revolvers, it is preferable to have a card with a low interest rate, while for convenience users, a low interest rate is not as important. Lee and Hogarth (1998) argued that search behaviors of revolvers and convenience users were in fact different.

Given this distinction, Ausubel (1991) argued that consumers do not search for low credit card interest rates because they expect to use the cards only for convenience, rather than as a source of credit. They substantially underestimate the probability they will accrue outstanding balances, and thus they pay unnecessarily high rates of interest on these unanticipated balances. Furthermore, Ausubel assumed that consumers do not learn from their experiences, so that they continually expect to carry zero balances even after carrying outstanding balances.

However, Ausubel's (1991) hypothesis of consumers' "irrationality" contradicts learning theory, which

hypothesizes that consumers learn from their experience. Learning theory has been well accepted in the research community (Engel, Blackwell & Miniard, 1986), and it is not very plausible that a majority of consumers never learn. Furthermore, Ausubel tested his hypothesis by comparing data from two sources: (1) data from a survey of 21 bank card issuers that indicated that 75% of accounts carry outstanding balances, averaging over $1,000 at any point in time and (2) data from the 1983 Federal Reserve Survey of Consumer Finances that indicated that 47% of bank card holders report they nearly always pay monthly balances in full. Ausubel interpreted this discrepancy as an evidence of consumer irrationality when in fact he may have been measuring two different constructs that were not exactly comparable.

Pozdena (1991) characterized a consumer's decision to use bankcard debt as a moral hazard because cardholders choose to borrow at high bankcard interest rates when their financial conditions are relatively weak. Over the last several years, amounts revolved on credit cards have grown faster than any other type of consumers loan, indicating consumers' conscious use of credit cards as a means of financing (Chimerine, 1997). In particular, many consumers view the convenience, ease, and flexibility of credit card borrowing more favorably than the lengthy application and approval process associated with other types of loans. Most credit cards are unsecured, so collateral is not required. Also, some consumers use revolving credit cards as a financing mechanism rather than spending down other resources under financial pressure.

Consumers' limited search for credit cards may be due in part to their use of credit cards as a convenience medium (Canner & Luckett, 1992; Pozdena, 1991). If the majority of cardholders use credit cards for convenience rather than as a source of borrowing funds, the benefits of search will be limited. However, as revolving balances increase, the benefits of search, and the associated search activity, are expected to increase.

Payoffs to Search
Previous researchers indicated that a positive relationship exists between the overall amount of information search undertaken and consumer efficiency. Sproles, Geistfeld, and Badenhop (1978) provided empirical evidence that information improves consumers' abilities to evaluate product quality. Therefore, in the credit market it can be hypothesized that consumers' search enhances their abilities to evaluate alternative credit cards. However,

what consumers shop for can be different for convenience and revolving users (Canner & Luckett, 1992; Lee & Hogarth, 1998). Revolving users may search in order to obtain a lower APR, while convenience users shop for other features such as annual fees, rebates, and other enhancements. Consequently, the revolvers who search more extensively should find and choose a credit card with a lower interest rate, while the convenience users who engage in extensive search should find a card with the desired feature such as no annual fee.

Morris and Bronson (1970) and Cude (1987) estimated the returns to search using data from 637 *Consumer Reports* product tests between 1961 and 1968 and data from 929 product tests in *Consumer Reports* between 1975 and 1984, respectively. Their payoff to search measure (percent monetary loss) captured the percentage difference between the prices of the "best" choice and the "worst" choice, a concept we will adapt in this present study.

In summary, information search theory posits that consumers will search when the expected benefits of search equal or exceed the expected costs. The benefits to shopping for a credit card are different for convenience and revolving credit card users. Revolvers search for a lower APR which translates to lower interest costs, while convenience users search for other features such as annual fee, rebates, and other enhancements. In this study, we will empirically investigate whether information search pays off for revolvers by examining the relationship between APR and the extent of information search.

Methods
Theoretically, consumers' search improves consumer efficiency. In this paper, payoffs to search are explored in a variety of ways. First, a variation of Cude's (1987) potential payoff to search measure, percent APR search payoff, is calculated. This reflects the range of interest rates available in the marketplace. For current credit holders, payoffs to search consist of the potential gains from substituting a new, lower price for a current higher price. In this case, the "best choice" is the credit card with the lowest APR, and the "worst choice" is to continue to use the current credit card. Mathematically,

$$\text{Percent APR Search Payoff} = \frac{\text{Current APR} - \text{Lowest APR}}{\text{The Lowest APR}} \times 100$$

It should be noted that credit card price also involves

other elements, including annual fees, fees for cash advances, rebates, minimum finance charges, over the limit fees, and late payment charges. In addition, the length of the interest free grace period, if any, and the type of billing cycle can be important. Information on these features was not available to include in the analysis; however it is likely that APR is one of the primary search characteristics for revolvers.

Second, we explore returns to information search for revolvers by describing the APRs and the potential savings in interest payments associated with different levels of search. Since Lee and Hogarth (1998) reported that searching was not associated with a lower interest rate for convenience users, the present study focuses on estimating returns to information search for revolvers only. Revolvers are defined as credit card holders who carried outstanding balances after their last payment.

Third, we explore the effects of search on APR and dollar savings in interest in a multivariate analysis, using Ordinary Least Squares (OLS) analyses including information search and other influencing factors as independent variables. In the remaining portion of this section, a description of the data set is presented, and variables and analytical procedures employed in the OLS analyses are discussed.

Data
The 1995 Survey of Consumer Finances (SCF) is a triennial survey sponsored by the Federal Reserve with the cooperation with the Statistics of Income Division of the Internal Revenue Service (Kennickell, McManus & Woodburn, 1996). It is designed to provide detailed information on U.S. families' balance sheets, their use of financial services, and demographics; there is some limited information on shopping behaviors with respect to credit and savings decisions. For the 1995 SCF survey, 4,299 households were interviewed in face-to-face personal interviews by staff from the National Opinion Research Center at the University of Chicago between July and December. Respondents were encouraged to consult their records as necessary during the interviews. The dual sampling frame employed in the survey requires that data be weighted in descriptive analyses (Kennickell, McManus & Woodburn, 1996); Kennickell & Woodburn, 1997). The SCF also uses multiple imputation techniques to deal with missing data. This procedure creates five data sets (called "implicate" data sets) that require special handling in any multivariate analyses (Kennickell, et al., 1997; Kennickell, 1997).

The SCF collects information on whether consumers "almost always, sometimes, or hardly ever pay off the total balance owed on the account each month." Another question asks: "after the last payment was made on this account, what was the balance still owed on this account?" We use the later, more objective measure to classify respondents. In this study, households with a positive balance were classified as "revolvers." About 60% were revolvers; this is comparable to industry figures of about 60% of account holders who are classified as revolvers (Luckett, 1997; Newton, 1997). Most of the analyses presented here are restricted to the subsample of revolvers.

Dependent Variables
As payoffs to search, two dependent variables were investigated in separate OLS analyses. The first dependent variable was the APR of revolvers' primary credit card, including bank-type cards, store-related cards, and other credit cards (Table 1). If consumers held only one card, this card was considered their primary card. If consumers reported outstanding balances on their credit cards, the card with the largest balance was considered the primary card.

The second measure of search payoff was the estimated dollar savings in interest payments for revolvers for one year. It was calculated in order to illustrate the payoff to search in terms of dollar savings. Mathematically,

$ Savings in Interest Payment =
(Average APR - Current APR) × (Outstanding Balance)

where average APR refers to the average interest rate paid by all revolvers. This is a modification of the Cude (1987) measure that uses the "best" and worst" choices. Our rationale for using the current APR as the worst choice is that consumers may not be starting the search without a credit card -- they would necessarily consider their current card as a baseline. We used the average APR as our best choice to control for the effects of teaser or introductory rates; otherwise, our estimates could be biased too far upward. Following Stigler's (1961) information search approach, if a consumer does not conduct any search when choosing a credit card, the expected value of the APR is the average APR in the market. The difference between the consumer's current APR and the average APR is a function of the consumer's information search. Thus, by multiplying any difference in APRs by the outstanding balance, we can estimate the dollar savings attributable to search.

Independent Variables

Independent variables in the multivariate analysis included information search, credit history, credit card use pattern, and demographics.

Information Search To identify the extent of information search, the following question was asked: "When making major decisions about credit or borrowing, some people shop around for the best terms while others don't. What number would you/your family be on the scale?" The extent of information search was measured on a five-level scale (1 = almost no shopping, 5 = a great deal of shopping). We hypothesize a negative relationship with the APR and a positive relationship with the dollar savings in interest payment; the more consumers search, the lower the APR should be, and the more they save in their interest payments.

Credit history Borrowers with bad credit histories may face a higher interest rate because of poor credit records, despite information search efforts. The SCF gathered data on whether respondents had been turned down for a loan application or obtained a smaller loan than they applied for. The borrowers who reported either of these incidents were identified as having a bad credit history. This was coded as a 0-1 dummy; a positive relationship with the APR and a negative relationship with the dollar savings in interest payment are hypothesized.

Credit Card Use Patterns Credit card issuers price discriminate according to consumers' credit card use patterns. Previously, a discrepancy has been found between consumers' reported intentions to payoff credit card balances and observed use of credit cards as a financing medium (Ausubel, 1991). Although the payoffs to search were investigated only for revolvers, in order to capture this potential discrepancy between intentions and actions, respondents' reported level of payoff was also included as an explanatory variable. Level of payoff is measured based on the respondents' answer to the question: "Do you almost always, sometimes, or hardly ever pay off the total balance owed on the account each month?" The answers are recorded on a three-level scale (1 = almost always, 3 = hardly ever). The relationship between this variable and APR should be negative -- that is, one expects consumers who hardly ever pay off their balances to search for a low APR credit card. The number of credit cards is another measure of credit card use patterns; it is the absolute number of bank-type credit cards reported by the respondent. If consumers have more than one credit card, they are more likely to put their outstanding balance on the credit card that has the lowest interest rate. Therefore, a negative relationship between the number of credit cards and APR is hypothesized.

Table 1
Variables

Variables	Description
Dependent Variables	
APR on primary credit card	Actual APR on only card, or card with highest outstanding balance
Dollar savings in interest payment	(Average APR - Actual APR) x (Outstanding balance)
Independent Variables	
Information Search	ordinal, 1 (almost none) to 5 (a great deal)
Credit History	1 if turned down for loan or obtained smaller loan than applied for
Credit Card Use Patterns	
Level of payoff	ordinal, 1 (almost always) to 3 (hardly ever)
Number of credit cards	actual number of bank type credit cards
Demographics	
Age	age of reference person
Household income	log of annual total household income
Female-headed household	1 if female head
Race-ethnicity	
Hispanic	1 if Hispanic
African American	1 if African American
Other non-white	1 if other non-white
Non-Hispanic white	1 if non-Hispanic white; omitted category
Education	
Less than H.S.	1 if years of education<12 and no GED
H.S/GED degree	1 if respondents report a high school diploma or GED; omitted category
Some college	1 if years of education >12 and #16 but no B.S.
Bachelor's degree	1 if a college degree is earned
Graduate degree	1 if years of education >16
Marital status	
Divorced/separated	1 if divorced or separated
Widowed	1if widowed
Never married	1 if single, neve rmarried
Married	1 if married or living with partner; omitted category
Household size	number of people in household
Region	
Northeast-New England	1 if live in CT, ME, MA, NH, RI, VT
Northeast-Mid. Atlantic	1 if live in NY, NJ, PA
South-So. Atlantic	1 if live in DE, DC, FL, GA, MD, NC, SC, VA, WV
South-East So. Central	1 if live in AL, KY, MS, TN
South-West So. Central	1 if live in AR, LA, OK, TX
Midwest-East No.Central	1 if live in IL, IN, MI, OH, WI
Midwest-West No.Central	1 if live in IA, KS, MN, MO, NE, ND, SD
West-Mountain	1 if live in AZ, CO, ID, MT, NV, UT, WY, NM
West-Pacific	1 if live in AK, CA, HI, OR, WA; omitted category

Demographic Variables A set of demographic variables were included to capture their possible impacts on interest rate:

1. *Age* of the reference person: The respondent's reconciled age was employed.
2. *Household income*: In order to reduce heteroskedasticity (unequal variance of the disturbances), the natural logarithm of the reconciled annual total household income before taxes was used (Montalto & Sung, 1996). Although the original data set included negative income (e.g. business losses in self-owned business), negative income is closer to a measure of assets (debts) rather than income. Therefore, for households whose income was negative, the natural logarithm of income was recoded as zero.[a]
3. *Female headed household*
4. *Race-ethnicity*: The respondent's race was categorized into Hispanics, African-American, other nonwhites, and non-Hispanic whites (base).
5. *Education*: a set of dummies were included with high school graduates or equivalent as the base: other categories were less than high school, some college, bachelor's degree, and graduate degree.
6. *Marital status*: Three dummy variables, divorced or separated, widowed, and never been married, were included (married or living with a partner as base.)
7. *Size of household*: The number of people in household was employed.
8. *Region*: 9-level Census Division code was employed for region (Table 1).

Analysis
Because of the sampling frame, the data must be weighted when generating descriptive statistics. In the multivariate analysis, special techniques must be employed to account for the five implicate data sets created by the multiple imputation procedure used by the Federal Reserve. The multiple imputations are repetitions drawn to simulate a Bayesian distribution of the missing values under a model. Therefore, appropriately combining analyses of each data set completed by imputation yields an approximately valid Bayesian inference under that model (Rubin, 1987). This repeated-imputation inferences (RII) technique provides "averaging" rules for the analysis. More specifically, the multiple imputed values are averaged to produce the best estimate of what the results would have been if the missing data had been observed, and the variance estimates are corrected for the uncertainty due to missing values. Montalto and Sung (1996) provide a more detailed discussion of practical applications of RII in the

analysis of SCF data sets.

Table 2
Descriptive Statistics of Sample

Variables	Revolvers (59.2%)	Convenience Users (40.8%)	All Card Holders
Information Search †			
Almost no shopping	11.7%	23.0%	16.3%
Little	6.4%	5.7%	6.1%
Moderate	44.0%	36.4%	40.9%
Good amount	15.4%	11.8%	13.9%
A great deal	22.6%	23.2%	22.8%
Bad Credit History †	24.7%	7.5%	17.7%
Level of Payoff †			
Almost always	22.5%	95.4%	52.2%
Sometimes	32.0%	3.0%	20.2%
Hardly ever	45.5%	1.6%	27.6%
Number of Bank-Type Credit Cards †			
Mean	2.4	2.2	2.3
Median	2	2	2
Age †			
18-29	4.6%	2.1%	3.6%
30-44	50.1%	30.7%	42.2%
45-54	22.8%	16.6%	20.3%
55 or older	22.5%	50.6%	34.0%
Mean	44.5	54.8	48.7
Median	43	55	46
Household Income†			
Less than $30,000	35.2%	33.6%	34.6%
$30,000 - $44,999	25.0%	22.0%	23.8%
$45,000 - 69,999	23.0%	19.0%	21.4%
More than $70,000	16.8%	25.4%	20.4%
Mean	$46,676	$69,010	$55,784
Median	$38,000	$40,000	$38,000
Female Headed*	23.3%	22.7%	23.1%
Race†			
Non-Hisp. whites	78.7%	91.7%	84.0%
Blacks	11.3%	2.8%	7.9%
Hispanics	6.2%	1.4%	4.2%
Others	3.8%	4.1%	4.0%
Education †			
Less than H.S./GED	9.5%	10.0%	9.7%
High school or GED	32.3%	25.2%	29.4%
Some college	23.1%	16.3%	20.3%
Bachelor's degree	23.3%	28.0%	25.2%
Graduate degree	11.8%	20.5%	15.4%
Marital Status †			
Married	66.1%	65.3%	65.8%
Separated/divorced	17.3%	9.9%	14.3%
Widowed	5.4%	13.4%	8.7%
Never married	11.2%	11.5%	11.3%
Household Size †			
Mean	2.8	2.3	2.6
Median	2	2	2

Region †			
NE-New England	5.8%	5.0%	5.5%
NE-Mid Atlantic	13.9%	17.9%	15.6%
South-South Atlantic	17.8%	17.4%	17.6%
South-E. S. Central	6.0%	5.1%	5.7%
South-W. S.Central	9.8%	5.9%	8.2%
Midwest-E. N.Central	17.1%	17.9%	17.4%
Midwest-W. N. Cent.	7.2%	8.4%	7.7%
West-Mountain	7.5%	8.1%	7.7%
West-Pacific	14.9%	14.4%	14.7%

* p<.10   † p<.001 between revolvers and convenience users

Two separate OLS analyses were run to estimate the APR and the potential dollar savings for revolvers. Separate OLS analyses were run for each of the five implicates. Then, using the RII technique, estimates were derived from all five implicates, and the variability in the data due to missing values and imputation was incorporated in the estimation. SAS/IML programming was utilized for implementing the RII.

Results
Descriptive Statistics
Among the 4,299 consumers, 75% of all respondents said that they had at least one credit card, and 89% of the credit card holders reported the APR of their primary credit card.[b] The demographic characteristics of the credit card holders who reported an APR are presented in Table 2.

Information Search Respondents showed diversity in their information search behavior. When making major decisions about borrowing, 16% of credit card holders did almost no shopping, while 23% did a great deal of shopping. The biggest proportion of credit card holders, 41%, reported a moderate amount of shopping. Comparing the revolvers' extent of information search with that of the convenience users, the revolvers seem to search more extensively than the convenience users; 12% of the revolvers did almost no shopping, compared to 23% of the convenience users.

There are several issues that need to be noted in order to fully explain the results of the extent of search. First, the respondents' extent of search indicates their general tendency to search for information in borrowing decisions rather than specific search activities when shopping for credit cards. Second, because of the wording of the survey question (i.e., when making <u>major</u> decisions), the respondents' responses might be skewed to suggest heavier search. Finally, it is noteworthy that more respondents marked their responses in almost no shopping (1), moderate (3), and a great deal of shopping (5). This result can be at least partly attributed to the fact

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that in the original survey, the responses of "2" and "4" did not include verbal description of "little" and "a good amount." The authors added these verbal descriptions.

Credit History   About 18% of credit card holders reported that they had an experience of being turned down for a loan or obtaining a smaller loan than applied for.   A higher proportion of revolvers reported being turned down or obtaining a smaller loan.

Credit Card Use Pattern More than half of credit card holders reported that they almost always paid off their credit card charges, while 27.6% of them said that they hardly ever paid off. Consistent with their zero outstanding balances, 95% of convenience users said that they almost always paid off their credit card charges. On the other hand, among the revolvers, 22.5% said that they almost always paid off, and 45.5% said that they hardly ever paid off. Those revolvers who said they almost always paid off credit card charges may be either consumers who temporarily carried an outstanding balance or consumers who underestimate their tendency to carry outstanding balances, as described by Ausubel.

Demographics Revolvers tended to be younger than convenience users (45 versus 55, respectively). Revolvers also tended to be slightly less educated and less affluent compared to the convenience users; the mean income of revolvers was $46,676 compared to $69,010 for convenience users. No differences were noted between revolvers and convenience users in terms of the proportion of female-headed households and household size. Regarding marital status, a greater proportion of the convenience users was widowed compared to the revolvers, while a greater proportion of the revolvers was separated or divorced compared to the convenience users. With respect to race-ethnicity, non-Hispanic whites were less likely to carry outstanding balances, while African Americans and Hispanics were more likely to carry outstanding balances. A higher proportion of revolvers lived in the West South Central region, and a smaller proportion of revolvers lived in the Mid-Atlantic region compared to convenience users.

Payoff from Percent APR Search
As expected, consumers reported wide price dispersion in terms of the APR of their primary credit card. Among all respondents with credit cards, interest rates ranged from 2.9% to 29.0%. The mean and median APR were 14.5%   and   15.0%,   respectively (see percentile distribution in Table 3).

Adapting Cude's (1987) measure of the potential payoff, the percent APR search payoff was calculated based on the distribution of respondents with credit cards. Across the full range of APRs, the highest calculated value for the percent APR search payoff in the credit card market was 900% (i.e. 2.9% vs. 29%, column 3 in Table 3), indicating a huge potential payoff to search. At the median APR (15%), the percent of APR search payoff is over 400%.   However, these calculated values may overstate the benefits somewhat because these rates may include "teaser" introductory rates on some credit cards at the lower end and may include some non-traditional lending in the sub-prime markets at the upper end. Also, for high-risk consumers, the lowest credit card rates may not be available. If the 90th percentile (19% APR) is compared to the 10th percentile (7.9% APR), perhaps a more realistic market comparison, the potential payoff is 140%. If the median is compared to the 10th percentile, the payoff would be 89%. Thus, the savings with respect to search are still substantial, even when teaser rates are eliminated from the calculation.

Table 3
Percent APR Search Payoff Across Percentiles of Current APR

Percent APR Search Payoff =
$$\frac{(N^{th} \text{ Percentile APR - Lowest APR})}{\text{Lowest APR}} \times 100$$

Percentile	Current APR	Percent APR Search Payoff	
		Based of Full Range (2.9% to 29%)	Based on 10th to 100th Percentile (7.9% to 29%)
100%	29.0	900%	267%
90%	19.0	555	140
80%	18.0	521	128
70%	18.0	521	128
60%	17.0	486	115
50%	15.0	417	89
40%	14.0	382	77
30%	12.0	313	52
20%	9.9	241	25
10%	7.9	172	0
0%	2.9	0	--

Payoff from APR Search
The average APR for revolvers across each level of information search is presented in Table 4. Confirming the effect of search, the revolvers who did a great deal of shopping had a mean APR of 13.65, while the revolvers who did almost no shopping had a mean APR of 15.17. In the multivariate analysis, the extent of information

search, having a bad credit history, marital status, and the

regional variables were found to significantly influence the revolvers' APR (Table 5).[c]

The extent of information search lowered the revolvers' interest rate significantly. Table 5 reads, for example, a movement from 1 (almost no shopping) to 2 (little shopping) reduces the interest rate reported by 37 basis points, other factors held equal for revolvers.[d] Holding all other variables constant, revolvers who did a great deal of search paid 146 basis points less than those who did no shopping and 73 points less than those who did a moderate amount of shopping.

As expected, having a bad credit history raised the revolvers' APR by 95 basis points, holding all else constant. This finding is consistent with current trends toward risk-based pricing and reinforces the need for consumers to check their credit reports to make sure these are accurate (an inaccurate credit report may lower a consumer's credit score, resulting in a higher interest rate under a risk-based pricing scheme). In terms of credit card use patterns, neither the self-reported level of payoff nor the number of credit cards were significant for the revolvers.

Among the demographic variables, marital status of the reference person was found to be significant. Widowed revolvers were found to pay a lower APR than married revolvers. While there is no *a priori* reason to expect this finding, it may be the case that some widows are establishing -- or re-establishing -- credit in their own names. Finally, the residents of Pacific West were found to pay more than 131 basis points more than New England and West North Central residents. The reason for this regional difference is not obvious, calling for further research.

Payoff from Dollar Savings in Annual Interest Search
The dollar savings in one year's interest payments based on the current versus average APR was calculated for the

Table 4
Mean APR and Dollar Savings for Revolvers Across the Extent of Search

	Almost no shopping	Little	Moderate	Good amount	A great deal	Total
Mean APR for Revolvers	15.17%	14.10%	14.34%	13.86%	13.65%	14.19%
Mean $ Savings in Interest Payment for Revolvers*	-30.75	-3.51	-10.50	17.09	36.18	2.37

* Negative number indicates paying more in interest; i.e. negative savings.

respondents who carried outstanding balances. The mean and median of outstanding balances were $2,959 and

$1,500, respectively with a range of $1 to $108,000. The first year's estimated dollar savings on interest ranged

from -$2,731.17 to $4,013.40 (a negative number indicates paying more interest, i.e. negative savings). The first year's dollar savings in interest payment across the level of information search are presented in Table 4. Confirming the effect of search, the revolvers who searched a great deal "saved" the largest sum of money, $36.18, in interest payments, while those who did not search at all paid $30.75 more for their interest charges. However, among the other borrowers who searched a little to a good amount, the relationship between the dollar savings in interest payment and the extent of search is less obvious.

The OLS results are presented in Table 5. Among the independent variables the extent of information search, having a bad credit history, number of credit cards, and age of reference person were found to significantly influence the dollar savings in interest payments. Consistent with the previous findings on the APR, the extent of information search lowered the interest charges significantly. Holding all other variables constant, the revolvers who did a great deal of search paid $64.32 less than those who did no shopping and $32.16 less than those who did a moderate amount of shopping.[e]

Revolvers with a bad credit history paid $59.42 more on interest payments, holding all else constant. This result, that persons with poor credit histories pay more, points out an interesting "Catch 22" with risk-based pricing -- persons with higher risk pay higher prices, which may, in turn, place them at higher risk of being delinquent or defaulting.

In contrast to the results on the APR, the number of credit cards had a significant impact on the dollar savings in the interest payment. It may be that revolvers with multiple credit cards carry larger outstanding balances, which consequently increases the payoff to search. Age was negatively correlated with the dollar savings in interest payment: older consumers saved less on interest charges. It may be that older consumers carry over smaller balances, so that the savings are smaller in terms of dollars.

Conclusions and Implications

Payoffs to consumer search in credit card markets were investigated using the 1995 Survey of Consumer Finances data. Credit card holders showed diversity in their search behavior. Facing major borrowing decisions, 16% of borrowers did almost no shopping, while 23% did a great deal of shopping. Also, revolvers were found to search for information more extensively than

convenience users.

Table 5

OLS Regression Results of APR and Dollar Savings in Interest Payment for Revolvers -- Parameter Estimates (p-value)*

Variables	APR	Dollar Savings
Intercept	17.228 (0.00)	85.23 (0.24)
Extent of information search	**- 0.366 (0.00)**	**16.08 (0.00)**
Bad credit history	**0.946 (0.00)**	**-59.42 (0.00)**
Level of balance payoff	0.085 (0.27)	- 6.52 (0.09)
Number of bank type credit cards	- 0.098 (0.15)	**- 6.85 (0.04)**
Demographics		
Age	0.004 (0.69)	**- 1.69 (0.00)**
Household income	- 0.117 (0.22)	- 0.79 (0.87)
Female headed	- 0.238 (0.53)	- 6.58 (0.71)
Race-ethnicity (non-Hispanic white as base)		
Hispanic	0.443 (0.42)	-3.66 (0.89)
African American	0.023 (0.96)	8.59 (0.69)
Other	1.055 (0.09)	-47.84 (0.12)
Education (high school/GED as base)		
Less than high school	-0.423 (0.45)	-7.96 (0.75)
Some college	-0.196 (0.11)	0.32 (0.98)
Bachelor's degree	-0.380 (0.28)	5.21 (0.76)
Graduate degree	-0.489 (0.25)	-8.01 (0.69)
Marital status (married or living with partner as base)		
Divorced/separated	-0.696 (0.11)	16.47 (0.44)
Widowed	**-1.553 (0.03)**	60.30 (0.08)
Never married	-0.066 (0.89)	-24.71 (0.29)
Household size	0.062 (0.53)	-3.57 (0.47)
Region (West-Pacific as base)		
NE-New England	**-1.310 (0.02)**	40.10 (0.16)
NE-Mid Atlantic	-0.275 (0.55)	-11.21 (0.62)
South-South Atlantic	-0.801 (0.06)	16.86 (0.43)
South-E. S. Central	-0.008 (0.99)	-4.65 (0.88)
South-W. S.Central	-0.432 (0.39)	11.75 (0.64)
Midwest-E. N.Cent.	-0.588 (0.15)	8.68 (0.67)
Midwest-W.N. Cent.	**-1.309 (0.02)**	13.77 (0.60)
West-Mountain	-0.581 (0.36)	24.95 (0.36)
F-Statistic	2.352 (0.00)	2.183 (0.00)
Degrees of Freedom	26	26

* RII techniques used in parameter estimation

More importantly, those revolvers who reported doing more shopping also reported lower APRs, consistent with information search theory. Using Repeated Imputation Inferences (RII) techniques with OLS analyses, the relationship between the extent of information search and its payoffs was found to be positive for revolvers: revolvers who searched more tended to have credit cards with lower APRs and saved more money in annual interest payments.

Calculations on price dispersion in credit card markets show that consumers can save substantially by shopping more for credit cards with lower interest rates. Consumer educators can help consumers understand the benefits of saving even a few basis points on their interest rates. For example, for current credit card holders, the potential savings in interest rates ranged up to 900 percent. If consumers even moved from 90th percentile (19.0%) to the median (15.0%) they could save $5.00 per month in interest charges if they had average balances. Carrying out this calculation over a year could help consumers understand the opportunity cost of not shopping for the best --or even an average-- interest rate. And as Maynes (1976) has pointed out, a dollar saved is worth more than a dollar earned since consumer savings are "tax-free."

Information on current credit card interest rates is available from a variety of sources. Several popular press financial management magazines publish information monthly on cards with low interest rates and fees. The Federal Reserve Board publishes a monthly report on credit card interest rates (www.federalreserve.gov/releases/G19/current) and every six months publishes a survey of credit card rates and fees (www.federalreserve.gov/pubs/shop). Consumer educators can provide this information to consumers, along with an example of potential savings from moving to a card with a lower rate.

From a policy perspective, it seems that disclosures have been effective in helping consumers who revolve shop for credit cards with lower interest rates. However, even though we used APR as our outcome measure, we do not really know if consumers understand what the APR is and how it can be used in shopping for credit. Open end credit products like credit cards are relatively easy to understand because the APR is identically the contract interest rate consumers pay, although cash advance fees, late fees, over-the-limit fees and annual fees are also a part of the total cost of credit. In many other closed end credit products, such as mortgages and installment loans, the APR and the contract interest rate are not the same, and there is evidence of consumer confusion about the meaning of the APR (Lee & Hogarth, 1999).

This project suffered from some limitations that may not face other researchers. Our measure of payoff to search was in terms of obtaining a lower APR, which is highly relevant to revolvers. It is possible for consumers to shop for other features such as annual fees, rebates, and other enhancements, but our data did not capture these behavioral choices.[f] While the APR may be the primary

consideration for revolvers, it is also important for those who typically pay off but carry a balance on occasion. While two-fifths (41%) of our sample were convenience users, half of the sample (52%) indicated they "almost always pay off" their credit card bills. Consumers may tend to underestimate the probability of carrying outstanding balances. This underestimation is partly due to the fact that unlike other types of credit, there is a time interval between the decision to acquire a credit card and the decisions to use the card and how to use it (i.e. as medium of convenience or credit).

The APR measure reported in the Survey of Consumer Finances is most probably the interest rate for goods and services charged on the credit card. However, often there is a different interest rate for cash advances, and interest begins to accrue immediately on these advances, unlike goods and service charges for which there is a grace period before interest accrues. If people are using their credit cards more as financing mechanisms (Chimerine, 1997), then researchers will also want to study consumer shopping for cash-advance APRs in addition to purchase APRs.

Some of the lower APRs in this study may have been "teaser rates," which usually change after a certain introductory period. Teaser rates have been around since the early 1990's (Canner and Luckett, 1992) and consumers have learned to switch from one card to another, turning these "introductory" rates into long-term rates that can last over several years (e.g., *Hudson Valley Business Journal*, 1999; Bloom, 1999; and Souccar, 1998). Some financial institutions now offer to extend low rates or provide other "loyalty incentives" to prevent switching (Nadler, 1999; Sanders, 1999b) or offer permanent low rates (7.99%) to their best customers (Sanders, 1999a). While deals like these are available in the market place, it may take substantial search to find them. Similarly, some of the higher rates (e.g. 29%) may reflect sub-prime lending or secured credit card interest rates. However, sensitivity tests with sub-samples of the respondents show that the model is robust with respect to the effects of information search on the resulting APR.

Finally, the measure of the extent of search was cast in the light of a "major borrowing decision" which may not apply to credit cards. It would be helpful to have more detailed search measures particular to credit cards to better discern the relationship between search and payoffs.

Nonetheless, consumer educators and policy makers can

take heart that there is evidence that consumers are shopping for credit and that this shopping results in consumers obtaining lower Annual Percentage Rates on their credit cards, thus saving them money.

Endnotes

a. *Less than 1% of the sample had negative income and were subjected to this recoding. Since households with negative incomes may be more likely to have credit card debt, they may experience more benefits from shopping. Thus, we elected to retain these households in our sample.*

b. *The SCF collects information on APR for credit cards such as Visa/MasterCard, Discover, and Sears, but not for charge cards such as American Express and Diners Club. The sample consists of the respondents who reported an APR, responding to the following question: "what interest rate do you pay on the card where you have the largest balance?" If a respondent did not carry any balance, the respondent was asked: "what is the interest rate on the card you got most recently?"*

c. *We performed sensitivity testing, using respondents with APR's between 6.9% and 20% (i.e. eliminating the top and bottom 5% of the sample [analysis was performed on the remaining 90% of the sample] who may have teaser rates or sub-prime rates) and again using respondents with APR's between 7.9% and 19% (i.e. eliminating the top and bottom 10% of the sample [analysis was performed on the remaining 80% of the sample]). Results from these two tests were consistent with analysis of the full sample, which we've chosen to report here in order to be as broad-based as possible.*

d. *One percentage point equals 100 basis points. The marginal effect was calculated using the coefficient for information search (-0.366) evaluated at different levels of search from 1 (almost none) to 5 (a great deal). 37 basis points equals 0.37 percentage points. Thus, someone moving from almost no search (1) to a little shopping (2) could expect, for example, to move from a 10% APR to a 9.63% APR.*

e. *The marginal effect was calculated using the coefficient for information search (16.08) evaluated at different levels of search from 1 (almost none) to 5 (a great deal).*

f. *In a separate study using a different data set, two-thirds of consumers report comparing interest rates for outstanding balances, APRs and annual fees when shopping for a credit card. Less than half (47%) reported comparing grace periods, and one-third reported comparing other fees, interest rates for cash advances, and awards or discounts (Hogarth & O'Donnell, 1998). This data set, however, provided no opportunity to distinguish revolvers from convenience users. To the extent that revolvers are among the two-thirds who compare interest rates, the outcome measure of APR used in our analysis may be robust relative to our sample of revolvers.*

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