Credit Card Borrowing, Delinquency, and Personal Bankruptcy

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Credit card delinquencies and personal bankruptcy rates increased during the mid 1990s, despite the strength of the U.S. economy. Even though per capita income rose during that period, household borrowing grew at an even faster pace. The ratio of consumer debt (excluding real estate) to disposable income increased, and it has remained above 20 percent, despite rising incomes. The rise in revolving debt—mainly credit card loans[1] —was especially noticeable, resulting in an increase in the share of revolving debt in total consumer debt (Figure 1).

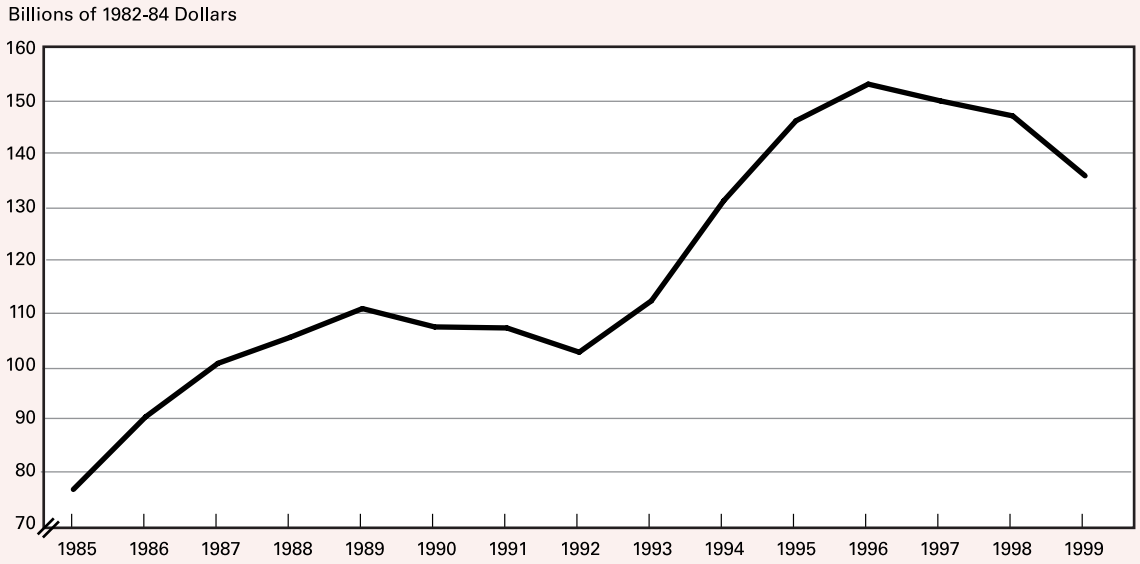
The increase in personal bankruptcy rates was also substantial. From 1994 to 1998, the number of nonbusiness bankruptcy filings in the United States increased faster than during the four-year period that included the 1991 recession (Figure 2), reaching more than one filing per 100 households in 1998. The good news is that the number of filings dropped in 1999, and in the first quarter of 2000 was 5.8 percent lower than a year earlier.[2]

The high rates of credit card delinquency and bankruptcy have generated much discussion about their causes. Some blame credit card default rates on lenders, whose more lenient standards have allowed consumers to borrow more than they can repay; others blame borrowers. The discussion has extended to the Congress, where a bankruptcy reform bill has been debated for the past few years. This article examines the relationship between consumer credit card borrowing, delinquency rates, and personal bankruptcies. It looks at developments involving borrowers, the demand side, and lenders, the supply side.

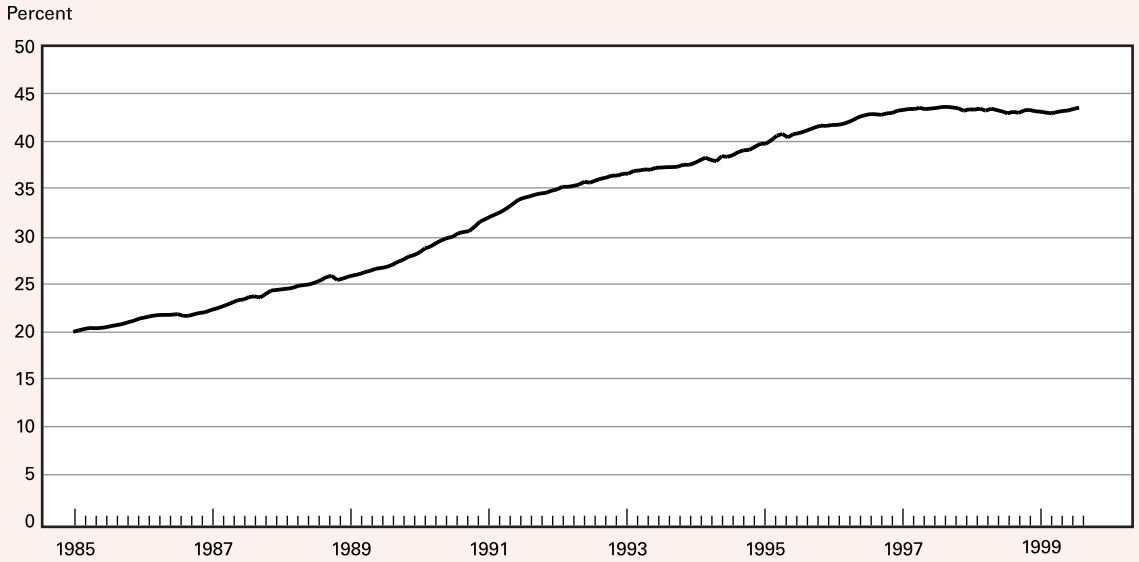
Section I of the article presents background information and summarizes previous literature showing that credit card loans have been extended to higher-risk consumers over time. Section II analyzes borrowers' or the demand side of the credit card market. Using data collected in the 1998 Survey of Consumer Finances, we examine the effect of credit card borrowing on consumer payments delinquency. We also examine

Figure 1

A. Credit Card Loans Outstanding



B. Revolving Debt as a Percent of Total Consumer Debt



Source: Data on credit card loans from *FDIC Historical Statistics of Banking*. Data on consumer debt from *Federal Reserve Statistical Release G. 19.*

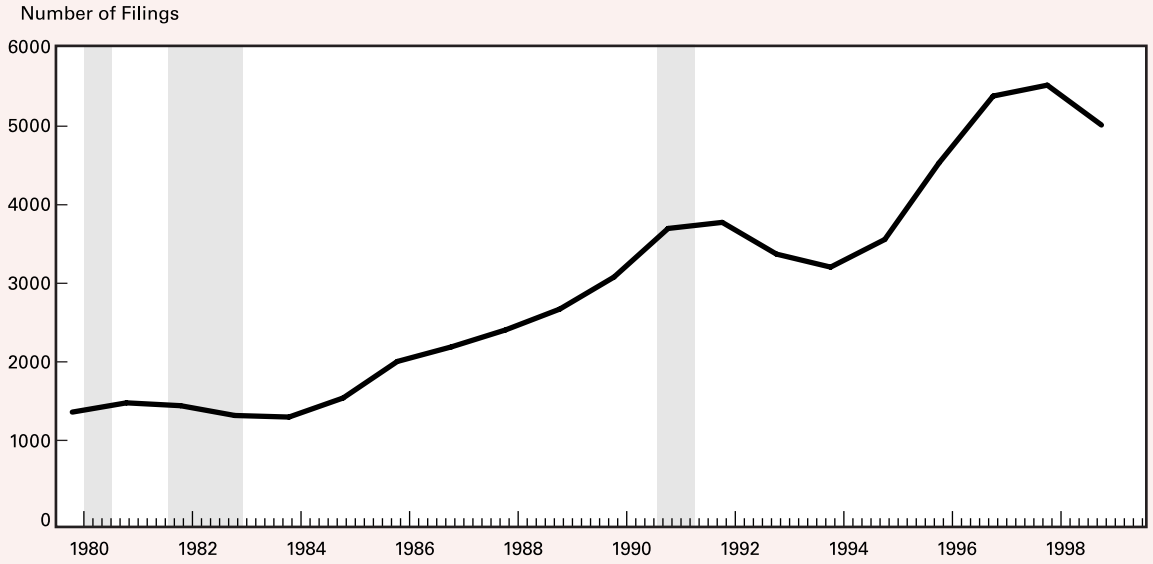
[1] Revolving debt is debt that has flexible repayment schedules. Besides credit card debt, revolving debt includes overdraft plans on checking accounts. Non-revolving debt includes closed-end loans, such as car and education loans.

[2] Data from American Bankruptcy Institute: http://www.abiworld.org/stats/newstatsfront.html.

the relationship between credit card debt and the increase in bankruptcy rates. On average, households that had filed for bankruptcy in the past carried higher unpaid credit card balances and had significantly higher ratios of credit card debt to income than those

Figure 2

Individual Bankruptcy Filings per Million Population



Note: Shaded areas indicate NBER-dated recessions.
Source: Bankruptcy data from American Bankruptcy Institute, based on data from Administrative Office of the U.S. Courts. Population data from U.S. Bureau of the Census.

that had not filed. People who had filed for bankruptcy in the past were also more likely to default on their payments, even after controlling for their income and credit card debt. Regions with higher credit card debt relative to income were more likely to have higher rates of bankruptcy filing.

Section III shifts to the analysis of lenders, to examine the supply side of the credit card market. Many blame lenders for the increase in credit card default rates, as they extend credit to higher-risk individuals. Their liberal lending standards may have induced cardholders to borrow more than they could afford, raising default rates. While lenders may be able to compensate for higher default rates by charging higher interest rates and fees, Ausubel (1999) found that banks face adverse selection—consumers who accept worse credit card offers are more likely to default on their credit card loans and to file for bankruptcy. If that is the case, then lenders that offer worse "packages" of interest rates and fees on credit card plans would have higher delinquency and charge-off rates and potentially lower net revenues from credit cards than those that offer more attractive packages.

Using detailed panel data on individual credit card issuers in the United States between 1990 and 1999, we test whether credit card lenders face an adverse selection problem, whereby banks making worse credit card offers attract more risky customers and have higher delinquency and charge-off rates than others. We find that banks that charge higher interest rates and some fees have higher delinquency rates (the fraction of outstanding credit card loans that is at least 60 days overdue), but not higher charge-off rates (the fraction of outstanding credit card loans that is written off as losses). Moreover, banks that charge higher interest rates were found to have higher net revenues from credit card lending than other issuers. Thus, despite the adverse selection the lenders face, extending credit to riskier individuals may still be profitable, at least in the period of good times considered here. The article concludes with a brief discussion of the recently debated bankruptcy reform.

I. Background

Credit cards have become a common form of payment. Average balances have increased and use of credit cards is more widespread across income groups (Yoo 1998). Figure 1 shows that outstanding credit card loans increased steeply during the mid 1990s. Based on data from Surveys of Consumer Finances, Evans and Schmalensee (1999) show that credit cards have become more common over time: Between 1970 and 1995, the fraction of households with at least one credit card rose from 16 percent to 65 percent, the average ratio of credit card charges to income increased from 4 percent to 16 percent, and the average amount owed on a credit card went up fourfold, in 1995 dollars.

Strong competition among credit card lenders in the 1990s induced them to offer credit cards to riskier households. Black and Morgan (1999) compare cardholders in 1995 with those in 1989 to show that credit card holders became more risky customers over time. The 1995 cardholders were poorer, more likely to be single and blue-collar and to rent rather than own their home, carried higher credit card balances, and had a higher debt-to-income ratio. While the mean unpaid household credit card balance increased from $1,100 to $1,700, the median family income among credit card holders dropped from $43,000 to $38,000 (all in 1995 dollars).

In another analysis of the Survey of Consumer Finances, Bird, Hagstrom, and Wild (1999) found that although credit card debt has increased among all income groups, it has increased disproportionately among the poor and near poor. From 1983 to 1995, the percent of low-income families (those with incomes below the poverty line) with at least one credit card more than doubled, and the average credit card balance held by those families nearly doubled from $780 to $1,380 (in 1995 dollars). During the same period, the fraction of households in the highest income bracket holding at least one credit card increased only 9 percent, mainly because nearly all families in the highest income bracket already held at least one card by 1983. Compared to the 1995 survey, Kennickell, Starr-McCluer, and Surette (2000) found that by 1998 the median credit card balances owed by households in the lowest income bracket (less than $10,000 a year) almost doubled, from $600 to $1,100 (in 1998 dollars).

Among the poor, the increase in credit card debt was greater than the increase in consumer debt in general. Canner, Kennickell, and Luckett (1995) show that the fraction of low-income households with any consumer debt rose from 40 percent in 1983 to 45 percent in 1992, a much smaller increase than the increase in the fraction of those with credit card debt.

These studies show that although credit card borrowing increased throughout the income distribution, it has increased disproportionately among poorer households. All these changes could simply indicate more equal access to credit by poorer households. The findings do not indicate whether these poorer households are more likely to be delinquent on their payments. In the next section we examine the relationship between credit card borrowing and the probability of delinquency and bankruptcy, controlling for various characteristics of the borrowers.

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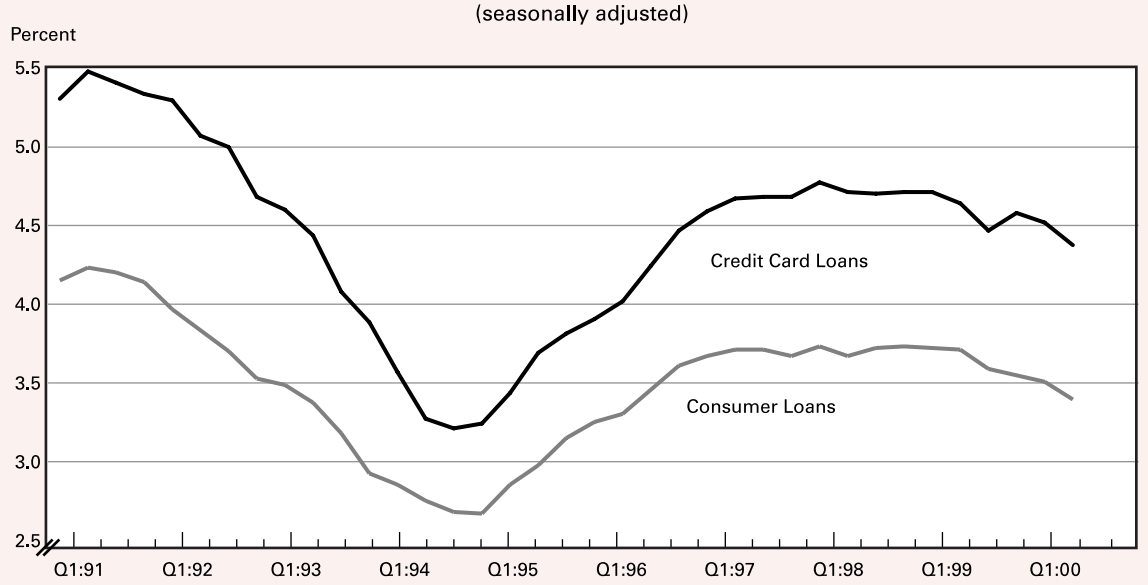
II. Credit Card Borrowing—the Demand Side

Researchers disagree on whether and to what extent credit card borrowing leads to bankruptcy. Aggregate data indicate that a higher fraction of consumers are delinquent on their credit card loans than on consumer loans in general (Figure 3) and that both credit card delinquency and charge-off rates have been closely correlated with bankruptcy rates over time (Figure 4).

We use data from the Survey of Consumer Finances (SCF) to analyze the effect of households' credit card debt on their likelihood of being behind on payments (see the Box). To properly measure the effect of credit card debt on the probability of filing for bankruptcy, consumer data would have to be collected *before* the filing took place. However, the SCF does not follow the same group of respondents over time; it simply asks whether or not the respondents have filed for bankruptcy in the past. Therefore we test whether consumers having certain attributes are more likely to have filed for bankruptcy.

Figure 3

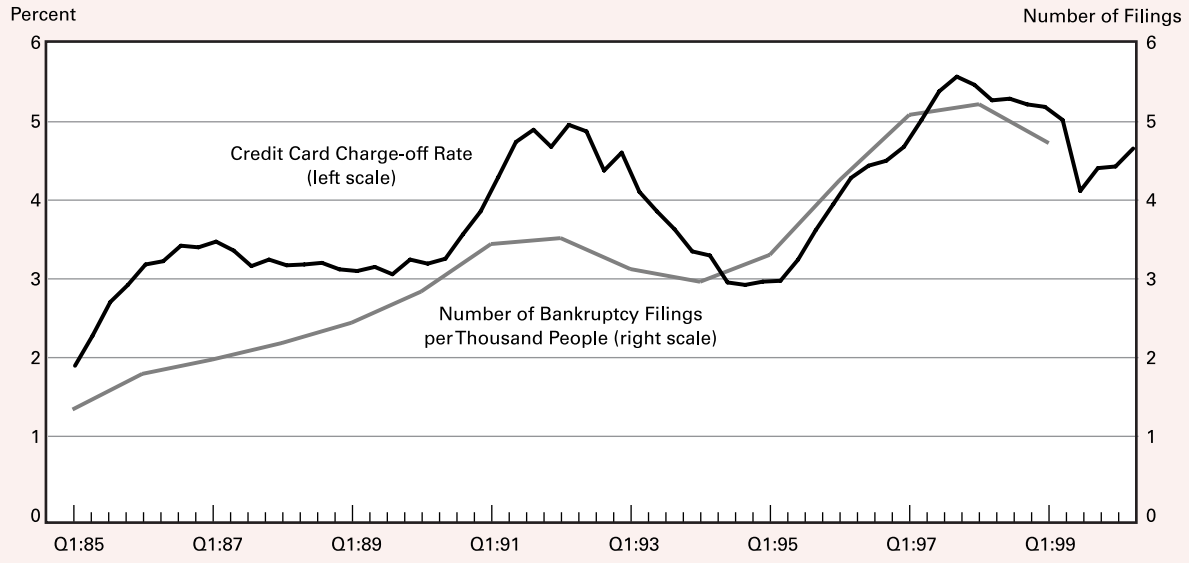
Delinquency Rates
(seasonally adjusted)



Source: Federal Financial Institutions Examination Council (FFIEC).

Figure 4

Credit Card Charge-off Rate versus Bankruptcy Rate



Source: Credit card charge-off rate from Federal Financial Institutions Examinations Council. Bankruptcy rate from American Bankruptcy Institute, based on data from Administrative Office of the U.S. Courts. Population data from U.S. Bureau of the Census.

The Survey of Consumer Finances

The Survey of Consumer Finances is a survey of U.S. households sponsored by the Board of Governors of the Federal Reserve System. It is conducted every three years, and the data are collected by the National Research Center at the University of Chicago. To account adequately for assets held by U.S. households, the SCF oversamples relatively wealthy households that hold a disproportionately large share of all assets. In other words, a wealthy household has a higher probability of being selected for the survey than a lower-income household. The survey collects detailed information on family finances, including assets and liabilities, income, and the use of financial instruments such as credit cards. Detailed information is collected on the type, number, and balances on credit cards held by each household, as well as on other types of debt. Although the data on credit card delinquency and bankruptcy are not nearly as extensive—the only bankruptcy questions ask whether and when the household filed for bankruptcy—the data allow us to estimate the effect of credit card spending on the likelihood of delinquency and the correlation between credit card borrowing and past bankruptcy, controlling for household income and demographic characteristics.

The most recent survey, conducted in 1998, interviewed 4,305 families. To deal with missing data, the survey employs the multiple imputation technique, whereby missing data are imputed five times by drawing repeatedly from an estimate of the conditional distribution of the data. (For details on the techniques, see, for example, Kennickell 1998.) The technique produces five complete data sets, or implicates. As a result, the 1998 survey data contain 21,525 observations, or five times the number of respondents. The variable means reported in Table 1 were computed after adjusting for the imputation technique and for unequal probabilities of selection in the original data (the relative oversampling of wealthy households). Each observation was weighted according to the number of similar households in the population. As a result, the means represent averages for all U.S. households. In the regression estimation described below, we use the same weights to adjust for the multiple implicates and for the unequal sampling probabilities. In general, binary variables were coded as 1 if the answer was "yes," and 0 if the answer was "no." If the answer was labeled "inappropriate," we coded the variable as missing.

The average surveyed person was 49 years old. Sixty percent of respondents were married, and 66 percent owned their home. Almost three-quarters (73 percent) of households had at least one credit card. The average household carried 3.5 different credit cards and owed $1,817 on them (combined) after the last payment. In other words, that is the amount that the average household pays interest on (the average interest rate paid on the credit card with the highest balance was 9.76 percent). Given that the average credit card charges were $529 in the most recent month, the average household carried more than three months of unpaid charges on its cards.

At the same time, 58 percent of households stated that all their payments were paid in full each month in the past year and, out of the remaining group, only 6 percent stated that any of their payments were late by two months or more. In addition to credit card debt, the average household owed $33,485 in mortgage loans, over $3,000 on car loans, $1,468 in educational loans, $983 in consumer loans, $87 on charge accounts at stores (not shown), and $530 in other forms of debt. The total average household debt was $47,552.[3]

The survey gives little indication that household debt will diminish in the near future. Half of households could foresee major expenses in the next five to 10 years (such as a purchase of a new home or children's education), but only 29 percent stated that they were saving for those expenditures.

The average 1997 wage and salary income was $37,589, and total income (from all sources) was $52,295 per household. Average total assets, including financial assets, real estate, and other nonfinancial assets, amounted to $333,583. Among people who had requested a loan during the previous five years, 22

[3] In addition to the itemized types of credit card and installment debt, the survey asks about other debt, such as loans from retirement plans or from life insurance.

Table 1
Weighted Means for Total Sample of 21,525 and Samples Based on Bankruptcy History
The means represent U.S. population

Variable	Variable Name in Regression	Total Sample	Has Filed for Bankruptcy (8.5% of Total)	Never Filed for Bankruptcy
Age	Age	48.73	45.43	49.03
Number of grades completed	Education	13.05	12.78	13.08
Unemployed in the previous 12 months	Unemployed	11.82%	16.01%	11.43%
Total income	Income	$ 52,295.47	$ 40,951.06	$ 53,351.27
Salary		$ 37,589.39	$ 35,452.32	$ 37,788.29
Net worth	Networth	$286,030.60	$110,301.70	$302,358.30
Total assets		$333,582.60	$158,128.90	$349,911.70
Total debt		$ 47,552.02	$ 47,827.20	$ 47,526.41
Credit rejected in last 5 years		21.82%	49.91%	19.21%
Ever filed for bankruptcy	Bankrupt	8.51%	100.00%	0.00%
All payments made on time last year		58.25%	53.42%	58.70%
Behind by 2 months or more last year		5.98%	14.66%	5.17%
Have at least one credit card		72.52%	65.77%	73.15%
Credit card debt	Cardbal	$ 1,817.06	$ 1,897.83	$ 1,809.54
New charges on credit card bill		$ 528.67	$ 259.46	$ 553.72
Number of credit cards	Cards	3.52	2.91	3.58
Amount owed on car loans		$ 3,065.84	$ 4,813.41	$ 2,903.20
Amount owed on educational loans		$ 1,467.65	$ 1,155.02	$ 1,496.75
Amount owed on mortgages		$ 33,484.88	$ 33,862.00	$ 33,449.79
Amount owed on other consumer loans		$ 983.03	$ 404.17	$ 1,036.90
Amount owed on other debts		$ 530.27	$ 823.16	$ 503.01
Total debt/total income	Debtinc	90.93%	116.79%	89.08%
Total credit card debt/total income		3.31%	4.51%	3.23%
Has foreseeable major expenses		51%	64%	50%
Is saving for foreseeable major expenses		29%	31%	29%
Has health insurance coverage for family	Health	69.40%	70.73%	69.27%

Among those who filed for bankruptcy:

Number of Years Ago Filed	Mean Credit Card Debt ($)	Total Mean Debt ($)	Mean Assets ($)
1 to 2	1,759	49,763	97,490
3 to 4	1,123	43,435	122,423
5 to 6	1,305	26,130	124,919
7 to 8	1,096	42,860	134,984
9 or more	2,630	54,315	215,386

percent were rejected, mainly because of their credit history and payments records. Over 40 percent of rejections were applications for credit cards.

Approximately 8.5 percent of the households had ever filed for personal bankruptcy. Table 1 reports means for households that had filed for bankruptcy any time before the survey was conducted and for those that had never filed. As the table shows, the average filer was somewhat younger, had higher balances on his or her credit cards and higher other debts, but much lower assets. Note that the average total debt was almost identical for the two groups, although the average debt to income ratio was 89 percent for the non-filers and 117 percent for the filers, and the average ratios of credit card debt to income were 3.23 percent and 4.51 percent, respectively. (The average income was substantially higher for those who had never filed for bankruptcy.) Moreover, the filers most likely discharged their unsecured debt when they filed for bankruptcy, so the difference underestimates the ex ante difference between a household that will file for bankruptcy and one that will not. Almost 15 percent of filers were delinquent on at least one payment during the previous year, compared to only 5 percent of non-filers.

Filing for personal bankruptcy under Chapter 7

Table 2
Credit Card Debt versus Delinquency and Bankruptcy—Comparisons by Region, 1998

Census Division	Household Income ($)	Net Worth ($)	Delinquency[a] (%)	Bankruptcy[b] (%)	Total Debt ($)	Credit Card Debt ($)	Total Debt/ Income (%)	Total Debt/Net Worth (%)	Credit Card Debt/ Income (%)	Credit Card Debt/ Net Worth (%)
New England	61,018	349,661	2.87	4.34	55,664	1,407	91.23	15.92	2.31	.40
Middle Atlantic	59,384	315,781	7.01	5.57	46,499	1,518	78.30	14.72	2.56	.48
South Atlantic	51,386	297,973	5.70	7.49	49,428	1,706	96.19	16.59	3.32	.57
E S Central	40,686	189,344	7.49	13.17	28,224	1,499	69.37	14.91	3.68	.79
W S Central	48,203	225,484	8.24	7.79	36,917	2,099	76.59	16.37	4.35	.93
E N Central	52,296	287,838	3.91	8.81	45,044	1,506	86.13	15.65	2.88	.52
W N Central	41,959	206,317	2.24	12.35	35,457	1,830	84.50	17.19	4.36	.89
Mountain	45,988	212,832	8.78	13.25	39,090	1,845	85.00	18.37	4.01	.87
Pacific	60,814	389,435	6.82	7.61	75,082	2,129	123.46	19.28	3.50	.55
				Correlation with Delinquency:	−.12	.40	−.13	.14	.31	.36
				Correlation with Bankruptcy:	−.61	.17	−.32	.22	.71	.76

Census Division	States
New England	CT, ME, MA, NH, RI, VT
Middle Atlantic	NY, NJ, PA
South Atlantic	DE, DC, FL, GA, MD, NC, SC, VA, WV
East South Central	AL, KY, MS, TN
West South Central	AR, LA, OK, TX
East North Central	IL, IN, MI, OH, WI
West North Central	IA, KS, MN, MO, NE, ND, SD
Mountain	AZ, CO, ID, MT, NV, UT, WY, NM
Pacific	AK, CA, HI, OR, WA

[a]Delinquency indicates the percentage of consumers who were behind on payments by two months or more.
[b]Bankruptcy indicates the percentage of consumers who ever filed for bankruptcy in the past.

prevents future filing for several years. Therefore credit card issuers face relatively low risk by extending credit to those who filed very recently. The table at the bottom of Table 1 shows that those who filed for bankruptcy a year or two before the survey was conducted had, on average, a high unpaid credit card debt, probably because they receive many credit card offers during that initial post-bankruptcy period. The average debt is lower for those who filed between three and eight years ago, and increases again for those who filed even earlier, perhaps because a bankruptcy flag that could limit access to credit lasts no more than 10 years.

Domowitz and Sartain (1999) found that while the ratio of credit card debt to income was the largest contribution to bankruptcy at the margin, health problems leading to medical debt were the most important factor in a household's decision whether or not to declare bankruptcy. The self-rated health profile in our sample (not shown in table) is consistent with their finding: 21 percent of filers rated their health as excellent, compared to 36 percent of non-filers, and 24 percent of filers rated their health as fair or poor, compared to 19 percent of non-filers. On the other hand, our data showed no notable difference between the two groups in the fractions with health insurance.

Although the data do not allow us to test for causality, the above comparison shows that credit card borrowing and bankruptcy filing are correlated. Aggregate statistics also indicate that credit card default rates and personal bankruptcy rates are correlated over time (Figure 4), but other factors need to be controlled for. We present regression analysis below.

Regional Data

The fraction of people who file for bankruptcy or default on their loans varies across regions. Some of the variance is likely due to differences in laws and social values that do not change substantially over time, but some may be due to differences in debt and credit card borrowing patterns. We examined the data to test whether the fraction of people who had delinquent loans or had filed for bankruptcy is correlated with the average household credit card debt in each region. Table 2 shows regional averages and correla-

tion coefficients based on the data for the nine Census divisions.[4] The regions with the highest fractions of households with delinquent loans are Mountain, West South Central, and East South Central, while the highest proportions of bankruptcy filers were in the Mountain, East South Central, and West North Central divisions. Recall that in order to be classified as being delinquent on a loan, a person must have been late on his payments for at least two months during the past year. Approximately one-fourth of the sample had no loans at all; they are not included in the denominator when the statistic is computed.

To examine which measures of debt are most strongly associated with bankruptcy and delinquency, we calculated correlation coefficients of the two variables with total debt and credit card debt. As shown in the bottom two rows of Table 2, credit card debt is more closely correlated with delinquency and bankruptcy rates in a region than is total debt. In fact, the correlation coefficients for total debt are negative. Because the divisions with the highest bankruptcy rates also have the lowest average household incomes, the ratio of credit card debt to household income or to household net worth is even more closely correlated with regional bankruptcy rates, with correlation coefficients of 0.71 and 0.76, respectively. The correlations indicate that regions with high credit card debt relative to income typically have high rates of bankruptcy filing.

Individual Regression Results

The bankruptcy patterns in Table 1 and regional results in Table 2 are based on aggregated data and do not control for other factors. This section shows the results of regression estimation to test the effect of credit card borrowing on the probability of having delinquent loans and on the probability of having filed for bankruptcy. We use logit regressions to estimate the following equation:

$$\begin{aligned}\text{delinquent} = {} & \beta_0\ \text{age} + \beta_1\ \text{income} + \beta_2\ \text{networth} \\ & + \beta_3\ \text{unemployed} + \beta_4\ \text{homeowner} + \beta_5\ \text{family} \\ & + \beta_6\ \text{married} + \beta_7\ \text{education} + \beta_8\ \text{health} \\ & + \beta_9\ \text{cards} + \beta_{10}\ \text{cardbal} + \beta_{11}\ \text{debtinc} \\ & + \beta_{12}\ \text{bankrupt} + \bar{\beta}\ \text{census} + \omega \qquad (1)\end{aligned}$$

where:

delinquent equals 1 if the respondent was behind on payments by two months or more;
age is the respondent's age;
income is the respondent's annual household income;
networth is the respondent's household net worth;
unemployed equals 1 if the respondent was unemployed at any time during the previous 12 months;
homeowner equals 1 if the respondent and family own their house or farm;
family is the number of people in the respondent's household;
married equals 1 if the respondent is married;
education is the highest grade of school or college completed by the respondent;
health equals 1 if the respondent's family is covered by health insurance;
cards is the number of credit cards owned by the respondent;
cardbal is the total balance still owed after last payment on credit cards;
debtinc is the ratio of total debt to annual income;
bankrupt equals 1 if the respondent had ever filed for bankruptcy;
census is a set of dummy variables denoting each of the nine Census divisions but one;
β are coefficients to be estimated; and
ω is a random error term.

As mentioned earlier, we apply weights to compensate for unequal probabilities of selection of households. The weights, provided in the SCF data, are equal to the inverse probability of observing each case, based on a comparison of each surveyed household to aggregate control totals estimated from the Current Population Survey.[5]

The regression results are reported in the first column of Table 3. Because we use logit estimation, the estimated coefficients are interpreted according to the formula:

$$\Delta \log \frac{P}{1-P} = \beta\, \Delta x$$

where P is the probability of default on loans, β is the estimated coeficient, and x is the variable whose effect we are trying to evaluate. Rewriting the above equation, the effect of an increase in x by 1 is:

$$\Delta P \approx \beta\, [P(1-P)].$$

[4] Census division is the only indication of the place of residence of the surveyed households. The data do not show states.

[5] For a summary description of the weights provided with the 1998 SCF data, see http://www.bog.frb.fed.us/pubs/oss/oss2/98/codebk98.txt. For more details, see http://www.federalreserve.gov/pubs/oss/oss2/method.html (Kennickell and Woodburn 1997 and Kennickell 1999).

Table 3
Individual Bankruptcies and Delinquencies

Variable	Effect on Delinquency	Effect on Bankruptcy
Intercept	−1.613	−3.111
	(−4.56)	(−10.16)
Age	−.009	−.003
	(−3.28)	(−1.59)
Income	$-8.00e^{-6}$	$-1.9e^{-6}$
	(−4.48)	(−3.63)
Net Worth	$-1.65e^{-6}$	
	(−4.41)	
Unemployment: Respondent	.541	.091
	(5.50)	(1.01)
Unemployment: Spouse	.238	.285
	(1.83)	(2.44)
Homeowner	−.140	−.314
	(−1.42)	(−4.03)
Family Size	.152	.196
	(5.45)	(9.54)
Married	−.311	−.199
	(−3.21)	(−2.56)
Years of Education	−.033	−.007
	(−2.05)	(−.61)
Health Insurance	−.439	.249
	(−5.32)	(3.49)
Number of Credit Cards	−.078	−.034
	(−4.90)	(−2.76)
Credit Card Balance	.00004	.00001
	(6.52)	(1.93)
Debt/Income Ratio	−.003	
	(−3.20)	
Other Debt		$9.15e^{-7}$
		(4.42)
Bankruptcy Status	.862	
	(8.58)	
Census 2	.935	.156
	(4.00)	(.70)
Census 3	.485	.502
	(2.06)	(2.33)
Census 4	.640	1.161
	(2.54)	(5.16)
Census 5	.861	.513
	(3.61)	(2.24)
Census 6	−.046	.647
	(−.19)	(3.02)
Census 7	−.722	1.073
	(−2.41)	(4.81)
Census 8	.688	1.127
	(2.79)	(5.05)
Census 9	.588	.438
	(2.45)	(1.99)
Chi-Squared	690.26	418.05
N	16,190	21,525

t-statistics in parentheses.

Having more credit cards reduces the likelihood of delinquency, while higher unpaid balances on credit cards increases the probability of being behind on payments. A respondent holding one additional credit card ($\Delta x = 1$) has a 0.44 percent lower probability of being delinquent on payments (evaluated at the mean probability $P = .06$). If the respondent's unpaid credit card balance increases by $1,000, his probability of delinquency rises by 0.23 percent. Therefore, even doubling the average unpaid credit card balance of $1,817 would lead only to a 0.42 percentage point increase in the likelihood of default, not an economically significant amount, despite the statistical significance of the variable.

The strongest factors increasing the probability of being behind on payments were having filed for bankruptcy in the past and having been unemployed at any time during the previous 12 months. Although having a spouse who had been unemployed during the previous year also raises the probability of delinquency, the effect of the spouse's unemployment is smaller. On the other hand, having health insurance and being married significantly reduce the likelihood of delinquency. As could be expected, having higher income or net worth lowers the probability of having delinquent payments. Older and more educated consumers also were found to have a lower probability of being behind on their payments, holding all other factors constant. Recently widowed or divorced respondents could be expected to have a higher probability of delinquency. However, while the data include a code indicating whether the participant is divorced and whether he or she is widowed, no information is given about the time each of the events took place. Except for the married/not married variable, none of the other marital status indicators were significant in the regression. Interestingly, homeownership was not significant in predicting the likelihood of delinquency, when controlling for income, net worth, and other characteristics.

Credit bureaus are allowed to report bankruptcy filing for up to 10 years following the filing. Musto (1999) found that following the removal of the "bankruptcy flag" from the filers' credit reports, their access to credit increases rapidly, leading to an increase in their credit card borrowing and in delinquency rates. We tested whether there is a difference in the effect of past bankruptcy filing on the probability of delinquency between those who filed for bankruptcy 10 years or more prior to the survey, as compared to the sample of respondents who filed for bankruptcy more recently. Our results show that past bankruptcy filing increases the probability of having delinquent loans

whether the respondent filed 10+ years ago or more recently. In fact, the general bankruptcy indicator was found to have a somewhat stronger effect on the probability of delinquent loans than the 10+ indicator.

Next, we performed regression analysis to test whether these individual characteristics are associated with a past filing for bankruptcy. The following equation was estimated:

$$\begin{aligned}\text{bankrupt} = {} & \delta_0 \text{ age} + \delta_1 \text{ income} + \delta_2 \text{ unemployed} \\ & + \delta_3 \text{ homeowner} + \delta_4 \text{ family} \\ & + \delta_5 \text{ married} + \delta_6 \text{ education} + \delta_7 \text{ health} \\ & + \delta_8 \text{ cards} + \delta_9 \text{ cardbal} + \delta_{10} \text{ othdebt} \\ & + \bar{\delta} \text{ census} + \eta. \end{aligned} \quad (2)$$

As in the case of the delinquency regression above, we used weighted logit estimation. Compared to the delinquency equation (1), we dropped the household's net worth, because net worth is measured *after* a respondent filed for bankruptcy, and post-bankruptcy net worth tends to be low, all else constant. We replaced debt to income ratio with "other debt," because the latter provided a better fit. The results of the regression are reported in the last column of Table 3.

The strongest factors increasing the probability of being behind on payments were having filed for bankruptcy in the past and having been unemployed at any time during the previous 12 months.

Households with higher unpaid credit card balances today are more likely to have filed for bankruptcy in the past than those with lower balances. Note that the coefficient on credit card debt is higher than the coefficient on other debt.[6] Although both coefficients are small in magnitude, the result is notable because past filers are likely to have discharged their credit card debt at the time of filing and may still have binding constraints on their credit card limits (Musto 1999). Recall that the bankruptcy signal remains in credit reports for up to 10 years, whereas the median number of years since filing in our sample is eight.

Homeowners, married or older individuals, and those with higher incomes are less likely to have filed for bankruptcy, while persons having a large family are more likely. Unlike the case of the delinquency regression above, spouse's unemployment during the previous 12 months is more likely to be associated with a person having filed for bankruptcy in the past than the filer's own unemployment. Surprisingly, those with health insurance are more likely to have filed, although they may have acquired health insurance after the filing. Regional effects are found to be strong: New England residents (the omitted region) are significantly less likely to have filed for bankruptcy than residents of other regions, holding the demographic attributes constant. The strong regional effects indicate that factors other than individual characteristics play a role in bankruptcy decisions. They include differences in state bankruptcy exemption levels.[7]

We found that having filed for bankruptcy in the past or having been unemployed during the past year significantly raised the probability of delinquency, controlling for other characteristics. Households that had filed for bankruptcy in the past were found to carry higher unpaid credit card balances and have significantly higher ratios of credit card debt to income than those who had not filed. People who had filed for bankruptcy in the past were also more likely to default on their payments, even after controlling for their income and credit card debt.

III. Credit Card Lending—the Supply Side

Based on pre-approved credit card solicitations mailed out by a credit card issuer, Ausubel (1999) found that credit card issuers face adverse selection. Consumers who accept credit card offers are worse credit risks than consumers who do not, and consumers who accept inferior credit card offers (that is, those

[6] Other debt (othdebt) is calculated as total debt minus credit card debt and includes mortgages, educational and car loans, consumer and home improvement loans, loans on retirement plans, on life insurance, margin loans, and general other debt.

[7] Exemption levels vary widely across states, and higher levels could provide incentives to file for bankruptcy. For example, Texas and Florida have unlimited homestead exemptions. Massachusetts has a homestead exemption of $100,000, and the federal homestead exemption is $7,500. In addition, various exemption levels are specified for personal property, retirement accounts, and motor vehicles.

Table 4
Credit Card Issuers' Data: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
Annual Percentage Rate (%)	16.67	2.49	7.4	23.99
Annual Fee (1999 $)	20.08	11.11	0	101.98
Grace Period (days)	24.25	5.64	0	30
Minimum Finance Charge (1999 $)	.55	.94	0	13.01
Fee for Cash Advances (1999 $)	2.65	3.41	0	52.19
Late Payment Fee (1999 $)	14.69	6.23	0	51.79
Over the Credit Limit Fee (1999 $)	15.23	5.92	0	52.19
1 if Rebates on Purchases	.05	.22	0	1
1 if Extension of Product Warranty	.15	.35	0	1
1 if Purchase Protection	.16	.37	0	1
1 if Travel Accident Insurance	.57	.50	0	1
1 if Travel Discounts	.16	.37	0	1
1 if Car Rental Insurance	.18	.38	0	1
1 if Discounts on Products	.05	.22	0	1
1 if Other Enhancements	.24	.43	0	1
Credit Card Loans 90+ Days Past Due (1999 $)	6,433	26,253	.00	338,540
Credit Card Loans Past Due, Non-accrual (1999 $)[a]	1,736	16,223	.00	390,283
Total Credit Card Loans, Domestic (1999 $)	419,563	1,404,008	.00	15,200,000
Total Assets (million 1999 $)	6,841	17,600	2.70	475,000
Total Deposits (million 1999 $)	4,501	11,100	0	291,000
Interest & Fees Income from Credit Cards (1999 $)	20,924	59,043	0	563,233
Net Charge-offs (1999 $)	6,217	20,395	−2,208	241,913
Net Charge-offs as % of Total Credit Card Loans	2.49%	51.66	−168.37	2,756.99
Credit Card Loans 90+ Days Past Due as % of Total Loans	1.04%	1.84	0	37.5
Non-accrual Credit Card Loans as % of Total Loans	.24%	1.53	0	53.24

N = 5,536.
[a]Non-accrual loans are those for which a bank decides to no longer accrue interest or finance charges.

with higher interest rates) are worse credit risks than consumers who accept superior offers—they turn out to have higher delinquency, charge-off, and bankruptcy rates. Ausubel concludes that an "inferior offer yields inferior customers."

We test the adverse selection hypothesis using detailed data on the terms of credit card plans offered by many bank issuers over a long period of time: from January 1990 to July 1999. Both delinquency and charge-off rates increased substantially in the mid 1990s (Figures 3 and 4). Because our data include the period of steep increase in both rates but are not limited to it, using panel data allows us to isolate intertemporal shifts from individual issuers' lending strategies.

Besides the annual percentage rate of interest (APR), the data used in this study measure other attributes of credit card plans, such as annual fee, minimum finance charge, late fee, and over-the-limit fee. Our findings partly support the adverse selection hypothesis: Banks that offer inferior terms on credit card plans have higher delinquency rates. However, we find much weaker effects on charge-off rates.

In this part of the study we use data from a survey on the Terms of Credit Card Plans (TCCP), collected semiannually by the Federal Reserve Board from approximately 200 of the largest issuers of bank credit cards. The survey was conducted each January and July during the 1990–99 period. Smaller banks are not included in the sample. Although smaller institutions may offer systematically different terms of credit card plans, the sampled banks issue nearly all outstanding credit.[8]

For each credit card plan, the data include APR and fees, as well as indicators showing whether the plan included additional "enhancements," such as automobile insurance, travel discounts, extended warranty, and the like (see Table 4 for a list of attributes and their descriptive statistics). The data set was merged with information from bank financial statements filed with the Federal Deposit Insurance Corporation. These Consolidated Reports of Condition and Income (Call Reports) include each bank's deposits, assets, outstanding credit card loans, income from credit card interest and fees, and credit card delinquency and

[8] According to an American Bankers Association annual survey, the outstanding credit on credit cards was $257 billion at the end of 1994 (American Banker, 1/4/96, p. 12). The TCCP sample issuers' outstanding credit amounted to $246 billion in January of 1995, or about 96 percent of the total.

charge-off rates. The Call Report data are collected quarterly. Data from March Call Reports were merged with the January TCCP data, and data from September Call Reports were merged with the July TCCP data.[9]

We tested how terms of credit card plans affect banks' delinquency and charge-off rates. Delinquent loans are defined as those that are at least 90 days past due, and charge-offs are loans that banks write off as uncollectible. The respective rates are calculated as fractions of total outstanding credit card loans. We begin by estimating the effect of terms of credit card plans on each issuer's delinquency rate. The data provide one credit card plan per bank in any given time period. Bank size is measured as bank assets.

$$\text{delrate} = \alpha_0 + \alpha_1\,\text{asset} + \alpha_2\,\text{APR} + \alpha_3\,\text{fee} + \alpha_4\,\text{grace} + \alpha_5\,\text{minfin} + \alpha_6\,\text{cash} + \alpha_7\,\text{late} + \alpha_8\,\text{over} + \alpha_9\,\text{enhance} + \bar{\alpha}_{10}\,\text{time} + \varepsilon \quad (3)$$

where:

delrate is the delinquency rate, calculated as the ratio of delinquent loans over total outstanding loans;
assets are the bank's assets;
APR is the annual rate of interest the bank charges on its credit card plan;
fee is the annual fee;
grace is the grace period, measured as the number of days after the statement is issued before interest is accrued;
minfin is the minimum finance charge;
cash is the fee for cash advances;
late is the late payment fee;
over is the fee charged if the customer exceeds his credit limit;
enhance is the number of enhancements included in the plan;
time is a vector of time dummy variables;
α are coefficients to be estimated; and
ε is the residual.

The results of the estimation are shown in the first column of Table 5. Consistent with the adverse selection hypothesis, banks that charged higher interest rates were found to have higher delinquency rates. Even after controlling for the interest rates, banks that charged higher annual fees, minimum finance charges, or late fees had higher delinquency rates.[10] In particular, banks with a 1 percent higher APR are estimated to have delinquency rates that are 0.0021 higher, or 16.5 percent higher, than the mean delinquency rate of 0.0127. The effect of other attributes is smaller: Raising an annual fee by $1 is estimated to lead to a 0.0004 increase in delinquency rate (3 percent of the mean), and increasing the late fee by $1 is estimated to lead to a 0.0007 increase in delinquency rate (5.5 percent of the mean). Bank size had no significant effect on delinquency rates.

Table 5
Bank Delinquency and Charge-off Rates as Functions of Terms of Credit Card Plans

	Bank Delinquency Rate	Bank Charge-off Rate
Intercept	−.069	−.007
	(−5.33)	(−.317)
Total Assets (in $ billions)	−.000408	−.000104
	(−1.41)	(−.94)
APR	.002	.001
	(4.93)	(1.00)
Annual Fee	.0004	.00003
	(5.62)	(.26)
Grace Period	.001	−.00001
	(4.27)	(−.02)
Minimum Finance Charge	.009	.008
	(2.38)	(1.39)
Cash Advance Fee	.00001	−.00008
	(.07)	(−.18)
Late Payment Fee	.0007	−.001
	(2.65)	(−1.56)
Over the Limit Fee	−0.00006	.001
	(−.25)	(1.42)
Number of Enhancements	−.0002	−.001
	(−.33)	(−.62)
Time Dummies Included?	Yes	Yes
R-squared	.335	.093
F	5.74	1.76
N	336	512

t-statistics in parentheses.

Although the results are consistent with Ausubel's (1999) finding that consumers who accept worse offers generate higher delinquency rates, one can also conclude that banks successfully screen their potential customers. High-risk customers are offered worse plans than low-risk customers. The high-risk borrow-

[9] Quarterly flow variables were adjusted to correspond to the six-month period ending in March or September.

[10] The data are constructed in such a way that the financial Call Report data lag behind the Terms of Credit Card Plans. Therefore the results cannot disclose any reverse effects—for example, that banks raise their credit card charges following their high losses.

Table 6
Mean APR by Ratio of Credit Card Balance to Income, by Delinquency, and by Bankruptcy

	Mean APR
Ratio of credit card balance to income	
0–0.2	14.50
0.2–0.4	14.96
0.4–0.6	15.79
Over 0.6	16.22
Any delinquent payments last year?	
No	14.46
Yes	16.37
Filed for bankruptcy in the past?	
No	14.46
Yes	15.46

ers, however, have a higher probability of generating losses for the issuer, as we showed in Section II. The stratification of borrowers is also apparent in the Survey of Consumer Finances data. Survey respondents were asked what annual percentage rate they were charged on the credit card where they carried the highest balances. We compared the average annual rate of interest across groups of consumers and found that consumers with higher ratios of unpaid credit card debt to income, and thus worse credit risks for the issuers, were charged higher interest rates. Moreover, those who were delinquent on their loans or had filed for bankruptcy in the past were charged higher rates than the rest of the sample. Table 6 compares the annual rates of interest charged to the various groups of cardholders.

Although banks with worse terms of credit card plans were found to have higher rates of delinquent loans, we did not find the same effect on charge-off rates. Higher interest rates or fees charged on credit card plans were not associated with higher losses due to bad credit card debt written off (that is, charge-off rates). When equation 3 was estimated with the net charge-off rate (that is, charge-offs less recovered losses as a fraction of outstanding loans) as a dependent variable, the effect of the interest rate was not statistically significantly different from zero (see the last column of Table 5).

Thus, we found that worse terms of credit card loans are associated with worse credit risks—either because of adverse selection, where banks unwillingly get "stuck" with bad borrowers, or because of intentional screening on the part of the lenders. Next, we try to distinguish between the two hypotheses. Since worse plans are more likely to have higher delinquency rates, but not more likely to have higher charge-off rates, banks may be better off accepting more risky customers. Credit card borrowers form three basic groups. The first group are convenience customers who pay their balance each month and generally are not profitable to the lenders unless they charge a fairly large amount every month. The second group are revolvers, who carry a balance on their cards but pay at least the minimum required payment each month. That group is the most profitable and therefore the most desirable to the lenders. And the third group are borrowers who carry a balance, but default on their loans and generate losses. If worse credit card plans are offered to and accepted by the second *and* third groups, raising interest rates and fees may generate higher income to the issuers, especially if lenders cannot successfully separate the two groups.

We tested whether worse credit card packages lead to higher net revenues from interest rates and fees to the issuing banks. The following reduced-form equation was estimated:

$$\begin{aligned}\text{revenue} = {} & \lambda_0 + \lambda_1 \text{ deposits} + \lambda_2 \text{ APR} + \lambda_3 \text{ fee} \\ & + \lambda_4 \text{ grace} + \lambda_5 \text{ minfin} + \lambda_6 \text{ cash} + \lambda_7 \text{ late} \\ & + \lambda_8 \text{ over} + \lambda_9 \text{ rebate} + \lambda_{10} \text{ warrant} \\ & + \lambda_{11} \text{ protect} + \lambda_{12} \text{ accid} + \lambda_{13} \text{ tradisc} \\ & + \lambda_{14} \text{ auto} + \lambda_{15} \text{ buydisc} + \lambda_{16} \text{ regis} \\ & + \lambda_{17} \text{ other} + \lambda_{18} \text{ time} + \nu \end{aligned} \quad (4)$$

where:

revenue is the bank's quarterly income from credit card interest and fees minus net charge-offs;[11]
time a continuous time counter.

Bank deposits were found to be a better size measure than assets. Besides the variables listed earlier, the following enhancements to credit card plans were included in the regression:[12]

rebate rebates on purchases;
warrant extension of manufacturer's warranty;
protect purchase protection;
accid travel accident insurance;
tradisc travel related discounts;
auto automobile rental insurance;

[11] The results were similar when the ratio of revenue to total outstanding loans was used as a dependent variable.

[12] All of the enhancements were coded as dummy variables equal to 1 if the feature was provided by the plan.

Table 7
Bank Net Income from Credit Card Interest and Fees

Variable	Estimated Coefficient	T-statistic
Intercept	−63440.23	−3.10
Total Deposits	.001	5.24
APR	4026.574	5.76
Annual Fee	−816.00	−5.57
Grace Period	−29.663	−.07
Minimum Finance Charge	21184.61	3.62
Cash Advance Fee	−236.24	−.52
Late Payment Fee	1005.766	2.11
Over the Limit Fee	254.858	.57
Rebate	19894.82	2.46
Warranty	−19343.07	−2.62
Protect	34429.41	4.79
Accident	−4412.58	−1.20
Travel Discounts	5453.6	1.00
Auto Insurance	−13,450.59	−2.38
Buying Discount	19489.7	3.05
Registration	6401.872	1.07
Other	2010.396	.47
Elapsed Date	−300.778	−.75
R-squared	.2396	
F	8.7	
N	516	

buydisc purchase discounts (other than travel);
regis credit card registration;
other any other enhancements.

We found that the net revenues from credit cards were higher for banks that charged higher interest rates, minimum finance charges, and late fees (Table 7). Despite a higher probability of default, maintaining high interest rates may be profitable for banks. As banks raise their interest rates, some customers may switch to other credit card issuers. Because switching may be easier for cardholders in good standing, those who remain are more likely to be behind on their payments and may end up generating higher income from interest and fees. Raising the annual fee, however, was estimated to lower the issuer's net revenues. The annual fee is the only charge that must be paid by all three groups of cardholders, and even the borrowers who do not intend to carry balance on their cards (and therefore are not sensitive to interest rates or other fees when selecting a credit card plan) may be discouraged by high annual fees. It is not surprising, therefore, that the fee has been eliminated on many credit card plans.

The mean quarterly net revenues from credit card interest and fees for the sample were $14.78 million (in 1999 dollars). Evaluating at the mean, banks with an APR that was 1 point higher than the average (approximately one-half of a standard deviation) were estimated to have $4 million higher net revenues (one-tenth of a standard deviation). An increase in the late fee of one-half of a standard deviation would raise the net revenues by $3 million, and a similar increase in the minimum finance charge would raise the net revenues by over $8 million. Some enhancements were found to lower net revenues, but others increased them. The most profitable enhancement was found to be purchase protection.

In summary, banks offering worse terms on credit card plans were found to have higher delinquency rates on their loans, but we did not find similar results on bank losses. Because those institutions were also found to have higher net revenues from credit card loans, we conclude that it may be more profitable for them to charge higher interest rates, even if they face adverse selection.

IV. Conclusion: Reforming the Bankruptcy Laws

The rise in bankruptcy filings has stimulated interest in reforming bankruptcy laws, leading to the drafting of a bankruptcy reform bill, which has been considered by the Congress for the past few years. The bill is designed to discourage high-income debtors who can afford to repay some of their debt from filing for bankruptcy and "walking away from their debts." Under Chapter 7 of the current U.S. personal bankruptcy code, debtors can discharge all of their eligible debt (student loans and child support are not dischargeable) by paying a fraction of their debt from their assets. Chapter 7 is very favorable to debtors, because they do not have to use any of their future income, regardless of how high their income is, and they can keep their assets, up to an allowed exemption level set by the state in which they live. It is not surprising, therefore, that most debtors in the United States file under Chapter 7 (approximately 70 percent).

Because credit card loans can typically be discharged when a creditor files for bankruptcy, credit

[13] The number of plans with zero annual fee in our sample increased from six in 1990 to 51 in 1999.

card issuers tend to bear the losses of the debt discharged by cardholders. Therefore, credit card issuers have been strong proponents of the bankruptcy reform bill. If credit card borrowers had to bear a larger share of their debt (as a result of the bankruptcy reform bill or some other measure), such a change might provide a sufficient incentive to more closely align credit card borrowing with the ability to repay the debts. Because it is typically cheaper for the borrowers to determine their ability to repay their debts than it is for their creditor, social costs might be lower if some of the burden of proof was transferred onto the credit card holders.

If credit card issuers indeed relaxed their credit standards in the 1990s and extended credit to riskier housholds, their looser standards might have contributed to the increase in the number of personal bankruptcy filings. Tighter lending strategies by the issuers could curtail delinquencies, possibly leading to lower rates of bankruptcy. The data used in this article do not allow us to establish the relationship between lending strategies on the part of credit card issuers and the number of bankruptcy filings. Future research should focus on establishing that link.

We found that despite the adverse selection the lenders face, extending credit to more risky individuals might still be profitable. However, the results may change during a recession. Credit card debt was found to increase the likelihood of delinquency, which may lead to bankruptcy if the factors that induce delinquent loans persist. Even if bankruptcy laws are not changed, lenders' strategies that were profitable during a period of prosperity may have to be reevaluated in less favorable economic conditions.

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