



**Credit
Research
Center**

**WORKING PAPER: The Use of Department Store
Revolving Credit: Account Use Patterns, Customer
Profitability, The Value of Revolving Credit, and
The Probable Incidence of Credit Rationing**

No. 1

1975

THE USE OF DEPARTMENT STORE REVOLVING CREDIT:

**ACCOUNT USE PATTERNS
CUSTOMER PROFITABILITY
THE VALUE OF REVOLVING CREDIT
THE PROBABLE INCIDENCE OF CREDIT RATIONING**

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PART I: ANALYZING CUSTOMER PROFITABILITY THE DECISION TO GRANT CREDIT

The decision to grant credit to an applicant depends primarily on the grantor's assessment of the probability that the, particular customer will become a "bad debt." This is true whether the decision is made by individuals, or by sophisticated point scoring techniques. Currently, there are two major problems with this approach. First, for most grantors, a number of "good" customers must be turned down in order to insure that enough "bad debts" are turned away to keep bad debt losses at some targeted percentage of credit sales. The second problem is that many of the customers that are granted credit will not be profitable customers for the grantor, due to the way they use the line of credit made available to them. This paper deals with the latter of these two issues, examining the account use behavior that is typical of various types of department store credit card users, and the costs and revenues that are associated with this usage.

I. A MODEL OF CUSTOMER PROFITABILITY

The basic objective of the retail firm is to sell goods and services. To do this, the firm engages in numerous activities including the extension of credit. Thus, profits from sales represent the major return to the capital invested in the enterprise. When customers take advantage of the extension of credit, the firm receives another set of revenues in the form of finance charges, and, at the same time, incurs the additional costs associated with the extension of this credit. Abstracting from other miscellaneous revenues, then, the firm earns profits on goods sold and finance charge revenues from the extension of credit, while incurring the costs of providing these goods and services (including credit).

Since the focus of this paper is on the credit function, all costs associated with the sale of goods and not directly attributable to the credit function will be netted against revenues from the sale of goods.¹ Profit from sales will then be net (before tax) profits on sales. This simplification permits revenues to be described as follows:

$$(1) \quad \text{Revenues}_i = sS_i + F_i$$

s = pretax profit rate on goods sold (average)²

S_i = the dollar volume of goods sold in a given period (net of returns and credits) for the i^{th} individual

F_i = finance charge revenues accrued during the period for the i^{th} individual.

¹ It has been suggested that the profit on goods for goods sold on credit should be allocated to the credit function. This is a complex issue which encompasses the following considerations: (i) many goods purchased on a credit card would also be purchased for cash in the absence of the card. The card is a convenience as a cash substitute, and balances are paid off as they are billed; (ii) no firm can sell more goods (i.e., have a competitive advantage) because it offers credit if all its competitors offer (or could offer) the same plans; (iii) consumers do not necessarily buy more because credit is available, but they may alter the timing of purchases and buy a different mix of goods (more durables, less non-durables) than they would in the absence of credit. Spending is still constrained overall by income receipts. Some consumers can "earn" more if they have access to credit; (iv) any firm unilaterally withdrawing credit would likely lose a substantial volume of sales. In this sense, credit is "profitable"; M the introduction of credit (or an increase in its use) can raise the growth path of GNP if it is used to accelerate purchases and the economy has the capacity to meet the demand.

² Consumers may buy a mix of goods which would yield different apparent profit rates on sales in a given period. However, high mark-up items usually turn over more slowly and once other costs (such as inventory cost, lower volume price differentials etc.) are accounted for there may be no reason to expect any one individual's profit rate over a one-year period to be very different from the average. In any case, the data did not permit such distinctions to be made, so the assumption is necessary unless differential rates can be approximated by customer characteristics such as income or age.

Having abstracted from the normal costs associated with the sale of goods, only the costs associated with the credit function remain. These depend on account use patterns.

For any given customer, costs are as follows:

$$(2) \quad \text{Costs}_i = kB_i + pN_i + C_i$$

where $B_i =$ the average amount of credit used by the customer in a given period³

$N_i =$ the number of charge slips, returns and credits and payments

$k =$ the average cost of capital

$p =$ the cost of processing a charge slip, payment or credit

$C =$ the average (ex ante) collection cost per account

This formulation does not include all costs associated with the credit function but focuses on those which can vary across consumers. Overhead costs are not included nor are charges for sending out monthly account statements. These costs are assumed to be the same for all credit customers, affecting only the level of costs and not its distribution across consumers.

³ The amount of credit used is a function of the volume of sales, but related by a parameter which is itself a function of customer characteristics

$$(i) \quad 0 \leq B_i \leq S_i$$

$$(ii) \quad B_i = q_i S_i$$

$q_i =$ fraction of sales revolved in a given period. The parameter q_i should be incorporated in a behavioral model that predicts net contribution. In this study, B_i is directly observed, and the specification of net contribution (NC) is simplified as an accounting measure.

A behavioral model might be specified as follows:

$$Nc_i = f [S_i, r \times q_i \times S_i, k \times q_i S_i, C_i, pN_i]$$

$q_i =$ the fraction of sales revolved

$r =$ the effective yield on revolved balances

$$f_{11}^1 = s$$

$$f_{22}^1 = r[q_i dS_i + dq_i S_i]$$

$$f_{33}^1 = k[q_i dS_i + dq_i S_i]$$

$$f_{44}^1 = 1$$

$$f_{55}^1 = p$$

The parameter q_i will depend on the characteristics of the consumer and may also depend on the level of S itself for a given customer ($dq_i/dS_i > 0$). C_i is determined ex ante, based on customer characteristics and is treated as a constant for a given individual. N_i will vary with customer characteristics and the level of S for a given customer.

Combining the revenue and cost equations provides a measure of the net contribution (NC) of a customer to the firm's operation:⁴

$$(3) \quad NC_i = sS_i + F_i - kB_i pN_i - C_i$$

NC_i = net contribution for the i th individual

For cash customers (or cash purchases by credit customers), all but the first term are zero. For credit customers that pay their bills in time to avoid finance charges, F_i is zero, but processing & collection costs remain.⁵ For customers that revolve some part of their charges, all terms are non-zero.

In most cases, the granting of credit hinges on an estimate (however arrived at) of the likelihood that a customer will repay any obligation incurred. The firm's objective is to keep bad debt expense in some predetermined relationship to credit sales. Bad debt expense for retailers usually amounts to less than 2% of credit sales. In a study of credit costs conducted in New York, bad debt expense amounted to 1.4% of revolving sales or about 12% of all costs associated with the provision of credit (Table 1, lower panel, columns 1 and 2 respectively).

Equation (3) incorporates these costs in the problem account expense variable, C_i . Bad debt expense is about 60% of estimated problem account expense (Table 1, lower panel, column 3). But NC_i also includes other elements of expense that affect customer profitability. For example, other things equal, \$100 in sales generated by 20 separate charges will provide a lower net contribution than the same sales volume generated by only 5 charges. If variables such as the average amount borrowed, the number of charge slips processed, the number of payments, and the number of credits and returns all depend on the same customer characteristics that default probability is related to, then perhaps better credit decision models can be developed based on the information currently used to evaluate default risk. Further, new variables or criteria for evaluation may be discovered.

II. THE DATA

The results presented in this paper are based on two studies of retail credit card use, one conducted in California in 1971, the other in New York in 1973. The basic elements of these studies were the same, and are summarized in Exhibit I. The collection of data proceeded in three stages:

- (A) A survey of a sample of department store credit card users to ascertain socio-economic characteristics.
- (B) The construction of one year account histories (purchases, payments, credits, finance charges, and balances) for each sample member.
- (C) An analysis of "problem accounts" (accounts requiring other than regular billings to collect. In the California study, this included any account more than two months past due on any expected payment).

⁴ Many customers will at times not use their charge cards and make purchases for cash at stores where they have accounts. No measure of cash purchases is available. If the frequency and/or volume of such purchases is dependent on customer characteristics, the measure of relative contribution will be biased.

⁵ For each customer, the expected (ex ante) collection cost based on historical performance for similar consumers is assigned in the net contribution calculation. Not all consumers in a group will become problem accounts, but those that do will cost much more than the average for all accounts in a group. Thus, the cost assignment for the group will be "correct," although individual predictions will be incorrect.

The response rate to the mail questionnaire was about 70% in California and about 60% in New York. A brief analysis of data from applications indicated no major differences between those responding and those refusing in California for information common to the survey and the application. The analysis has not been done in the New York study.

TABLE 1
THE COST OF REVOLVING CREDIT
(17 Retail Stores in New York)

<u>COST ITEM</u>	<u>PERCENT OF REVOLVING SALES</u>
New Accounts	.94%
Existing Accounts	8.06
Problem Accounts	<u>2.31</u>
Total Credit Costs	11.31%
Finance Charge Revenues	7.60%

Detail on problem Account Expense^a

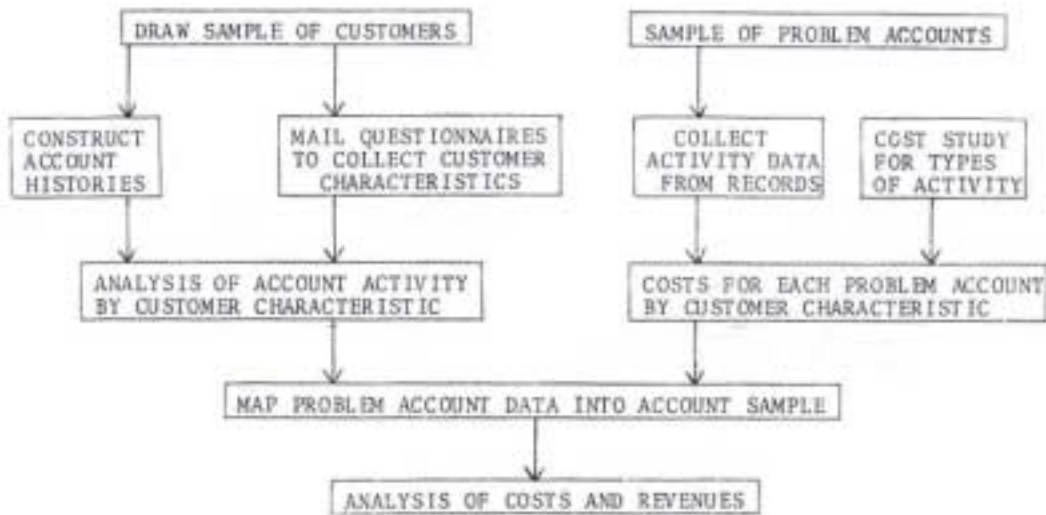
<u>Cost Item</u>	<u>Percent of:</u>		
	<u>Revolving Sales</u>	<u>Credit Costs</u>	<u>Problem Acc't Exp.</u>
Personnel	.48%	4%	21%
Bad debt expense	1.40%	12%	61
Postage; supplies; Communication	.14%	1%	6
Space and equipment	.08%	1%	3
Agency fees & investigation	<u>.21%</u>	<u>2%</u>	<u>9</u>
	2.31%	20%	100%

^a some items had to be arbitrarily divided between regular and problem accounts, including investigation, space & equipment, postage communication & supplies. All these totaled 1.5% of revolving sales, so that judgmental errors in allocating these costs are not likely to seriously affect the figures for problem account costs.

Source (16)

EXHIBIT 1

-STRUCTURE OF CREDIT STUDY-



III. ACCOUNT USE ANALYSIS

Tables 2a (New York) and 2b (California) illustrate some of the basic findings obtained from the surveys and the account histories. Treating all credit users with \$7500 or less in income as one group (referred to as "low income") one observes the following:

1. Credit users with incomes between \$7500 and \$10,000 revolve the highest proportion of the purchases charged on their cards and revolve those balances for the longest period of time. The low income group and those with incomes in excess of \$20,000 revolve their balances for the shortest period of time.
2. Taken as a group, customers with incomes between \$7,500 and \$20,000 generate finance charge revenues disproportionately larger than the share of net sales attributable to this group. The low income credit user is not the one paying large finance charges in relation to sales as is commonly believed.

The detailed data underlying these summaries provided the bulk of the data needed to permit estimation of net contribution as specified in Equation (3). Information about the number of slips processed was not available in the California study and has not been developed from the New York data at the present time.

TABLE 2a
Account Data by Family Income Groups
(NEW YORK)

			<u>Account</u>	<u>Averages</u>	<u>(12-month</u>	<u>Period)^a</u>	
<u>Total Household</u> <u>Income</u>	<u>Number of</u> <u>Accounts^b</u>	<u>Percentage</u> <u>Distribution</u>	<u>Total</u> <u>Sales</u>	<u>Net</u> <u>Sales^c</u>	<u>Net Revolving</u> <u>Sales</u>	<u>Finance</u> <u>Charges</u>	<u>Number of</u> <u>Revolving</u> <u>Months^d</u>
\$5,000 or under	39 (50)	2.3%	\$101	\$92	\$72	\$10.27	4.3
\$5,001-7,500	115 (70)	6.7	172	169	107	5.18	4.1
\$7,501-10,000	153 (90)	8.9	263	250	172	21.26	6.6
\$10,001-15,000	454 (252)	26.5	246	219	138	18.95	5.9
\$15,001-20,000	449 (212)	26.2	253	232	136	14.95	5.2
\$20,001-25,000	212 (103)	12.4	269	205	85	6.74	4.0
\$25,001 or more	294 (120)	<u>17.1</u>	239	224	115	17.36	4.8
All	1,716 (897)	100.0%	\$243	\$218	\$126	\$15.21	5.2

				<u>Ratio of Finance</u>	<u>Charge Revenues to:</u>
<u>Total Household</u> <u>Income</u>	<u>Percent of</u> <u>Net Sales</u> <u>Revolved</u>	<u>Share of</u> <u>Net Sales</u>	<u>Share of</u> <u>Finance</u> <u>Charges</u>	<u>Net Sales</u>	<u>Revolving Sales</u>
\$5,000 or under	78.2%	1.0%	1.5%	11.2%	14.3%
\$5,001-7,500	63.2	5.2	2.3	3.1	4.9
\$7,501-10,000	68.7	10.3	12.5	8.5	12.4
\$10,001-15,000	63.1	26.6	33.0	8.7	13.7
\$15,001-20,000	58.5	27.8	25.7	6.4	11.0
\$20,001-25,000	41.4	11.6	5.5	3.3	7.9
\$25,001 or more	51.6	<u>17.6</u>	<u>19.6</u>	7.8	15.1
All	58.0%	100.0%	100.0%	7.0%	12.0%

^a Data weighted according to each store's relative share of sales among the 17 stores in the sample. Based on months accounts were open.

^b Actual number of accounts is shown in parentheses. Percentages may not add to 100 because of rounding.

^c Total sales less returns and allowances

TABLE 2b
Account Data by Family Income Groups
(CALIFORNIA)

			<u>Account</u>	<u>Averages</u>	<u>(12-month Period):</u>	
<u>Total Household Income</u>	<u>N^a</u>	<u>Percentage Distribution</u>	<u>Total Sales</u>	<u>Net Sales^b</u>	<u>Net Revolving Sales</u>	<u>Finance Charges</u>
\$5,000 or under	21 (24)	4.1%	\$80	\$74	\$43	\$4.30
\$5,001-7,500	53 (26)	10.3	226	200	104	8.20
\$7,501-10,000	137 (45)	26.5	156	151	122	12.60
\$10,001-15,000	126 (87)	24.4	200	194	124	12.50
\$15,001-20,000	67 (79)	12.9	176	164	105	15.90
\$20,001-25,000	56 (63)	10.8	166	157	85	7.50
\$25,001 or more	57 (52)	11.0	294	272	158	11.50
All	517 (376)	100.0%	\$190	\$179	\$112	11.60

			<u>Ratio of Finance</u>	<u>Charge Revenues to:</u>
<u>Total Household Income</u>	<u>Share of Net Sales</u>	<u>Share of Finance Charges</u>	<u>Net Sales</u>	<u>Revolving Sales</u>
\$5,000 or under	2.3%	2.1%	5.8%	10.1%
\$5,001-7,500	6.1	3.9	4.1	7.9
\$7,501-10,000	12.1	15.5	8.3	10.3
\$10,001-15,000	26.5	26.5	6.5	10.1
\$15,001-20,000	19.4	29.0	9.7	15.2
\$20,001-25,000	13.8	10.2	4.8	8.8
\$25,001 or more	19.7	12.8	4.2	7.3
All	100.0%	100.0%	6.5%	10.3%

<u>Total Household Income</u>	<u>Percent of Net Sales That Were Revolving</u>	<u>Number of Revolving Months</u>	<u>Average Net Sales Per Month^c</u>
\$5,000 or under	58.0%	3.0	\$6.20
\$5,001-7,500	52.3	3.3	16.70
\$7,501-10,000	80.6	5.3	13.30
\$10,001-15,000	64.1	3.9	16.90
\$15,001-20,000	63.9	4.0	15.50
\$20,001-25,000	54.2	2.4	13.40
\$25,001 or more	58.2	3.3	24.00
All	62.6%	3.7%	\$15.50

^a Data weighted by relative store share of credit sales in California. Actual number of accounts in ().

^b Net Sales = Total sales less returns and allowances

^c Based on months accounts were open

TABLE 3b
Average Cost per Problem Account for Collection Activities

	<u>Annual</u>	<u>Income</u>	<u>of</u>	<u>Account</u>	<u>Holder</u>		
	Under \$5,000 (4.4%)	\$5001- \$7500 (17.1%)	\$7501- \$10000 (17.8%)	\$10001- \$15000 (27.1%)	\$15001- \$20000 (5.4%)	\$20001- or more (4.2%)	Not Ascertained (29.0%)
<u>Average Cost:</u>							
Entries	\$9.50	\$9.75	\$9.23	\$8.87	\$8.80	\$7.47	\$9.43
Calls (R)	2.58	2.07	2.82	2.98	2.62	1.67	2.64
Calls (NR)	0.05	0.41	0.46	0.30	0.23	0.37	0.38
Letters	1.39	1.92	2.00	1.65	1.42	1.27	1.79
Skip Traces ^a	4.42	19.85	2.21	2.26	1.83	0.00	9.76
Credit Reps. ^b	3.26	2.55	2.11	2.28	1.48	1.78	2.24
Repossession Attempts	2.10	0.55	0.26	0.43	0.00	0.00	0.42
Supervisor Entries ^c	6.36	2.08	1.74	1.83	1.48	1.41	2.05
Total Cost:	31.74	42.51	22.51	23.74	20.43	15.60	32.53
Write Off	45.47	32.62	28.72	22.99	51.96	24.17	37.02
Size of Balance Delinquent	212.90	256.49	250.91	275.09	360.61	226.67	261.52
TOTAL:	77.21	75.13	51.23	46.73	72.39	39.77	69.55

(R) Account holder was reached when called.

(NR) Account holder was called but not reached.

^a efforts to locate delinquent account holders through central information agencies.

^b The firm sends one of its own representatives to try to collect the account.

^c Since supervisor salaries are higher, their time is counted separately.

The cost data for "problem accounts" were developed from a special study of these accounts in California. [4] A problem account is any account that requires special attention of any sort, attention that leads to costs over and above the usual costs of billing. In this case, these are accounts that are more than two months past due on any payments expected. Table 3a shows the average frequency and share for each type of collection activity by income of the problem account when known. The data suggest that for most activities, the share of effort applied to each particular income group is about equal to its representation in the sample of problem accounts. Skip traces (attempts to locate account holder's that have moved and left no new address) are the major exception. Efforts were concentrated in the low income group and on those accounts for which income (and most other information) was not known.⁶

Average costs for each activity (Table 3b) were estimated multiplying the frequency of occurrence of each activity in each group by the estimated marginal cost of that activity.⁷ Costs do vary by income group,

⁶ Information about problem accounts was taken from internal records. No attempt was made to reach these accounts with a mail questionnaire. Much information is collected and updated during the collection process.

⁷ Activity costs used for estimation were:

Entries:	
Regular	.30
Supervisor	1.10
Telephone calls:	
reached	.35

declining with increasing income. The amount written off also declined with rising income, with the exception of the \$15,000-20,000 group, which shows the highest average write-off. This result may be a result of too small a sample size.

Except for those problem accounts where income is not known, the data also suggest that lower income credit users become problem accounts more frequently than do higher income credit users (compare the income distributions in Table 2a and Table 3a). This information was used to "map" the findings from the problem account study into the regular sample for California and New York.⁸ Combined with the account use data, this permits the estimation of net contribution as specified in Equation (3) and the analysis of this measure's relationship to the characteristics of the account holders.

not reached	.05
Letters	.30
Skip Traces	21.00
Credit	
Representatives	2.00
Repossession attempts	20.00
Bankruptcy	
proceedings	24.50
Claim & Delivery	185.00
Small Claims Action	5.00

⁸ The probability that collection costs will be incurred for each income group were inferred from the joint distributions of income in the account sample and in the problem account sample. About 30% of the regular sample did not respond to the questionnaire, and income was not ascertained for about 1/3 of the problem account sample. A check against applications data suggest that the non-response bias in the regular sample was negligible for income. No outside information was available in the problem account study, and it was assumed that the known income distribution represented that of all "problem accounts." The probabilities were constructed as follows, taking the overall frequency of problem accounts in a year at 4 percent of active accounts:

Income Group	Income Distribution: Regular Sample	Income Distribution: Problem Acct. Sample	Probability of Problem Expense, Given Income Group
\$5000 & under	.058	.063	.044
\$5001-7500	.055	.241	.175
\$7501-10000	.143	.251	.070
\$10001-15000	.245	.310	.051
\$15001-20000	.212	.076	.012
\$20001 or more	<u>.287</u>	<u>.059</u>	<u>.008</u>
All	1.000	1.00	.04
	p(b _i)	p(b _i /a)	p(a/b _i)

$$\text{where } P(a/b_i) = \frac{p(b_i/a) - p(a)}{p(b_i)}$$

and p(a) = overall probability of an account becoming a problem account, estimated at .04

p(b_i) = probability of an account being in the ith income group

p(b_i / a) = probability of an account being in the ith income group, given that it is a "problem" account.

IV. NET CONTRIBUTION

The actual number of charges underlying credit sales were not available in the California study (only monthly data were collected) and have not been developed (from dated transactions data) in the New York study at this time. Consequently, it was necessary to approximate the number of slips as a function of sales in order to estimate net contribution. The modified equation used was:

$$(4) NC_i = sS_i + E_i - kB_i - pN^*_i - p(GS_i/10) - C_i$$

where N^* = the number of payments, credits and returns

GS_i = gross sales

	<u>New York</u>	<u>California</u>
s =	.06	.06
k =	.08	.054
p =	.05	.05

In this specification, the average charge is assumed to be \$10. The number of charge slips is determined by dividing gross sales by the assumed average, \$10.

Tables 4a and 4b show the relationship between the measure of net contribution and the characteristics of the account user. In both cases, several factors stand out:

- (i) Other things equal (in the regression), the lower income credit user contributes significantly less to the operation of the firm than the middle and upper income groups (\$7,500 or more).
- (ii) In the California study, sex and marital status did not make a significant contribution to the analysis. In the New York study, differences in marital status were significant, and sex of the respondent added no information.
- (iii) Housing status and occupation were weak discriminators in both studies.

TABLE 4a
Determinants of Net Total Contribution
(NEW YORK)

	(1)	(2)	(3)	(4)	(5)
<u>Income</u>	Number of Accounts ^a	Group Mean NC	<u>Coefficient (\$)</u>	<u>Standard Error (\$)</u>	<u>F</u>
\$5,000 and under	8	\$38	-6.2	8.5	.5
\$5,001-7,500	78	-5	-25.3	2.9	77.8
\$7,501-10,000	131	19	-2.7	2.3	1.3
\$10,001-15,000	380	21	--	--	--
\$15,001-20,000	407	21	3.9	1.7	5.1
\$20,001 and over	460	19	-.8	1.7	.2
<u>Age</u>					
Under 25	83	\$13	2.6	3.0	.7
25-34 years	375	14	-2.6	1.8	2.2
35-44 years	371	17	--	--	--
45-54 years	371	20	2.1	1.6	1.6
55-64 years	235	26	9.8	1.9	26.7
65 and over	29	54	27.6	4.8	33.4
<u>Years with Present Employer</u>					
Under 1 year	119	\$15	3.4	2.4	2.0
1-2 years	124	8	-6.2	-2.3	7.0
3-5 years	290	20	4.6	1.7	7.5
6-10 years	293	22	6.9	1.6	17.6
11 or more years	638	20	--	--	--
<u>Marital Status</u>					
Married	1,135	\$20	--	--	--
Single	208	5	-9.9	2.0	23.6
Separated	19	27	13.0	5.1	6.5
Divorced	36	37	16.8	3.9	18.9
Widowed	66	29	14.5	3.0	23.0
<u>Housing Status</u>					
Own home	935	\$20	--	--	--
Rent; other	529	16	1.4	1.5	.8
<u>Sex of Respondent</u>					
Male	946	\$21	--	--	--
Female	518	15	-.8	1.6	.3
<u>Occupations</u>					
Professional	267	\$18	--	--	--
Technical	100	11	-6.1	2.6	5.6
Supervisors; managers; Self-employed	344	23	2.7	1.8	2.7
Clerical; sales	308	14	-4.9	2.0	5.7
Craftsmen; foremen	141	24	4.6	2.5	3.5
Service workers	117	19	3.4	2.4	1.9
Operatives; unskilled	117	19	3.4	2.4	1.9
Misc. (students; housewives, retired)	62	5	-9.8	3.4	8.1
N/MEAN/CONSTANT	1,464	\$15.5	11.9		

Note: F = 15.2; SEE = 21.3; R² = .20

^a 1,464 weighted accounts, 722 unweighted

TABLE 4b
Determinant of Net Total Contribution
(CALIFORNIA)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<u>Income</u>	<u>N^a</u>	<u>Sub-Group Mean NC</u>	<u>Coefficient (\$)</u>	<u>Standard Error (\$)</u>	<u>F</u>	<u>Adj. Coeff.</u>	<u>Cell Mean Dev.</u>
\$5,000 and under	14	\$4.2	-15.7	8.4	3.5	-15.0	-12.5
\$5,001-7,500	17	-12.3	-29.8	8.2	13.3	-29.1	-29.0
\$7,501-10,000	59	15.2	-3.4	4.6	.6	-2.7	-1.5
\$10,001-15,000	110	17.7	--	--	--	.7	1.0
\$15,001-20,000	102	21.1	4.2	3.6	1.2	4.9	4.4
\$20,001 and over	137	18.5	1.4	3.5	.2	2.1	1.8
<u>Age</u>							
Under 25	7	\$2.2	1.5	11.1	0	4.8	-14.5
25-34 years	89	13.7	-4.7	3.9	1.5	-1.4	-3.0
35-44 years	120	20.4	--	--	--	3.3	3.7
45-54 years	145	15.7	-7.3	3.3	5.0	-4.0	-1.0
55-64 years	64	17.6	-7	4.3	0	2.6	.9
65 and over	14	20.6	4.5	8.8	.3	7.8	3.9
<u>Years with Present Employer</u>							
Under 1 year	55	\$16.3	1.7	4.1	.2	2.6	-.4
1-2 years	40	3.7	-11.8	4.8	6.2	-10.9	-13.0
3-5 years	72	20.3	4.2	3.7	1.3	5.1	3.6
6-10 years	67	15.4	-4.7	3.9	1.5	-3.8	-1.3
11 or more years	204	18.6	--	--	--	.9	1.9
<u>Marital Status</u>							
Married	350	\$18.8	--	--	--	-.4	2.1
Single	32	4.6	-.2	6.0	0	-.6	-12.1
Separated	7	17.0	3.0	9.9	.1	2.6	.3
Divorced	29	9.4	5.7	6.2	.9	5.3	-7.3
Widowed	20	11.4	-.2	6.6	0	-.6	-5.3
<u>Housing Status</u>							
Own home	333	\$18.7	--	--	--	1.2	2.0
Rent; other	106	10.6	-5.1	3.6	2.0	-3.9	-6.1
<u>Sex of Respondent</u>							
Male	363	\$18.5	--	--	--	1.1	1.8
Female	76	8.3	-6.4	4.4	2.1	-5.3	-8.4
<u>Occupations</u>							
Professional	103	\$18.5	--	--	--	1.7	1.8
Technical	49	20.1	-4.5	4.7	.9	-2.8	3.4
Supervisors; managers; Self-employed	110	15.0	-6.0	3.7	2.6	-4.3	-1.7
Clerical; sales	44	15.1	6.2	5.2	1.4	7.9	-1.6
Craftsmen; foremen	63	19.0	-.9	4.3	0	.8	2.3
Service workers	28	11.3	-3.5	5.7	.4	-1.8	-5.4
Operatives; unskilled	33	16.7	2.2	5.4	.2	3.9	0
Misc. (students; housewives, retired)	9	9.9	-5.2	11.1	.2	-3.5	-6.8
N/MEAN/CONSTANT	439	\$16.7	\$25.0				

^a 22 retired cases omitted due to non-conforming data. It was not possible to construct problem account cost for this group.

$$R^2 = .13 \quad \text{S.E.E.} = 25.0 \quad F = 2.2$$

Differences in Effective Rates Paid

The effective rate paid by a customer depends on how the credit account is used. Tables 2a and 2b illustrate how use varies across income groups. Calculating actuarial rates (based on actual number of days credit is used) yields much the same results (McAlister [14]). Thus, a free rider will pay nothing, while some customers may actually pay 18%.⁹

Perhaps the most important aspects of revolving credit are its convenience characteristics, and not the actual cost of credit. The credit card provides a line of credit that can be exercised at the discretion of the user. The amount of debt outstanding can be adjusted each month. Credit search and associated transactions costs are eliminated. The value of these services may far outweigh the finance charge costs (if incurred), and would likely rise with income.

Differences in marginal tax rates will also affect the actual finance charge cost for those that revolve their balances. Actual dollar charges (whatever effective rate they represent based on how the account was used) can be deducted in calculating taxable income.

Thus, three major determinants of credit use, all related to income, can be identified: the "convenience" effect, the role of marginal tax rates and the opportunity cost of funds. The convenience effect would encourage the use of this type of credit since getting alternative financing would be much more expensive in terms of time and transportation. The tax effect would also encourage use, as it reduces the actual cost of this source of credit. Offsetting these effects are those related to the opportunity price of funds. At each billing, the consumer decides whether or not to continue the credit extended based on the need for funds. In general, the higher the level of income, the more likely the consumer is to pay off credit card obligations (perhaps in lieu of making additions to already large savings accounts), given the level of expenditure commitments.

Table 5 represents a regression analysis of the effective rate paid on average for the one year period studies, before and after tax adjustment of the rate paid. Eliminating the tax effect may more clearly show the net effect of convenience and the marginal cost of funds as approximated by the variables included in the analysis.

The average yield on balances before taxes was significantly higher for account users who:

- (a) Had a loan at a finance company or from a private individual
- (b) Did not have a savings account
- (c) Used their credit cards less than 5 times per month
- (c) Had a low score on the retail credit evaluation measure.

⁹ Most methods of rate computation now used provide some "free" time, at least the period between the purchase and the billing, so the actuarial rate will be less than 18% except in some cases for the Previous Balance method.

No significant differences were observed by income group. Some occupational differences were quite significant.

Adjusting the yields for taxes does not significantly alter the overall findings.¹⁰ The same relative sub-group differences are observed. In addition, the results show the highest income group paying a significantly lower effective rate.¹¹ Again customers who had taken out loans from finance companies or from private individuals paid higher effective rates, consistent with the hypothesis that these people face higher marginal borrowing rates and find revolving credit a good source of credit.

Those with savings accounts paid lower (but not significantly) effective rates pre- and post-tax, other things equal, consistent with an increased ability to repay these obligations from savings and the correlation of savings account ownership with income. Customers who rarely use credit cards (of all kinds) pay a significantly higher rate while there is a tendency for better educated users to pay less, even with income and occupation accounted for in the equation.

The effective yield varies inversely with the retail evaluation score, other things equal, dropping .02 percentage points (.02 of 1 percent) for each increase in the point score.¹² Many of the variables used in this

¹⁰ The marginal rates used were as follows:

<u>Income Class</u>	<u>Single</u>	<u>Married</u>
Under 5000	15%	14%
\$5001-7500	19%	17%
\$7501-10000	21%	19%
\$10001-15000	24%	19%
\$15001-20000	27%	22%
\$20001 or more	40%	36%

¹¹ The coefficient for the \$5000 and under group was qualitatively significant at the 10% level, missing only in the decimal place in the two tail t-test.

¹² The distribution of the retail score in the various samples is shown below:

evaluation score are already present in the equation, suggesting that the weighting of these factors implicit in the score yields additional information.

Lower Rates and Annual Fees

The analyses to this point make clear the fact that consumers neither pay the same effective rates, nor make the same contribution to a firm's overhead. The results presented in Tables 4a and 4b suggest that some credit users may be subsidized by others. This section examines what effect rate changes and the imposition of fixed charge annual fees might have on the distribution of net contribution.

<u>Score</u>	Department store Card Holders in <u>California</u>	Department Store Card Holders in <u>New York</u>	1967 <u>Cross-Section</u>
Under 70	22	4%	32%
70-109	26	14%	22%
	32	24%	19%
150-189	20	47%	14%
190 or more	<u>20</u>	<u>11%</u>	<u>13%</u>
	100%	100%	

**TABLE %
Differences in Effective Rates
(CALIFORNIA)**

	(1)	(2)	
<u>Predictors</u>	<u>Average Rate Before Taxes</u>	<u>Average Rate After Taxes</u>	<u>Number Of Cases</u>
<u>Income</u>			
\$5,000 and under	.0187	.0243	32
\$5,001-7,500	-.0068	.0008	24
\$7,501-10,000	-.0066	-.0032	72
\$10,001-15,000	-.0004	-.0016	102
\$15,001-20,000	.0062	.0020	85
\$20,001 and over	-.0018	-.0243**	37
<u>Sex of Respondent</u>			
Male	.0013	.0014	284
Female	-.0056	-.0057	69
<u>Occupation</u>			
Professional; Technical	.0130	.0080	83
Scientific; Supervisors	-.0071	-.0048	37
Self-employed	-.0128**	-.0088*	80
Clerical; sales	.0044	.0040	35
Craftsmen; foremen	-.0076	-.0056	42
Service workers	.0226	.0174	25
Operatives; unskilled	.0431	.0360*	27
Students; Housewives	.0546**	-.0437**	25
<u>Loan</u>			
Yes	.0193**	.0188**	157
No	-.2420	-.0150	197
<u>Savings Acct.</u>			
Yes	-.0056	-.0015	304
No	.0013	.0089	50
<u>Education</u>			
0-11 grades	.0024	.0018	48
High school & non-college	.0061	.0031	184
College-BA	-.0185	-.0143	38
College-advanced	-.0064	-.0015	83
<u>Frequency of Card Use (per month)</u>			
Under 5	.0153**	.0126**	120
5-9	.0639	.0023	121
10-14	-.0153	-.0122	64
15-19	-.0127	-.0084	21
20 or more	-.0179	-.0299	28
Retail Point Score	-.0003**	-.0002**	--
R2	.231	.254	
Constant	.1518	.1084	

* Significant 10% level, two tail test

** Significant 5% level, two tail test

The basic assumption behind these analyses is that consumers do not alter their account use behavior in response to the changes:

- (i) Finance charges paid are reduced by 1/3
- (ii) Finance charges paid are increased by 1/2
- (iii) An annual fee of either \$5 or \$10 is imposed, depending on the credit evaluation of the customer:

<u>Point Score</u>	<u>Fee</u>
0-99	\$10
100-199	\$5
200 or more	\$0

Since this distribution of finance charges paid differs from the distribution of sales and other account variables, altering the size of F in equation (4) can alter the distribution of net contribution (NC). Total revenues could also be decreased or increased by legislative mandate for example, affecting the size & direction of the subsidy between cash buyers & credit card users.

The assumption of unchanged behavior is obviously necessary since the data show only how consumers actually used their accounts under the existing system and do not reveal how such behavior might change with a change in cost. But, since the use of consumer credit has been found to be fairly rate-inelastic, this may not be terribly unrealistic for (i) and (ii) above. For the \$5 and \$10 charge (case iii), one might expect account use to be unaffected by a fixed fee. However, not all customers currently using the credit cards would continue to use them if there were an annual charge.

Each of the changes had the expected effect on the level of the net contribution (Table 6). Cutting actual finance charges paid by 1/3 reduced the mean to \$13 (from \$17), while raising the rate to yield a 50% increase produced an average net contribution of \$23. Applying an annual fee graduated by risk score yielded the same increase in average net contribution as raising finance charges by 50%. None of these changes had a large effect on the relative contributions of income, age and other population subgroups. The regression coefficients changed only slightly. Two factors would seem to be primarily responsible for this: (i) the middle- upper income credit users pay relatively more of the finance charges. Thus, any changes in the finance charge rate will impact most heavily on them. This is suggested by the changes in the coefficients that actually do occur for the \$10,000-15,000 and the \$15,001-20,000 income groups; (ii) the store evaluation score measure bears little relationship to net contribution. Using it to assign annual charges consequently had little effect on the distribution of net contribution. This will be discussed in more detail in a later section of this paper. These changes did have, as noted above, a large impact on average net contribution, and would have a major impact on the subsidy between cash buyers and credit users.

PART II: THE VALUE OF REVOLVING CREDIT AND THE IMPACT OF RATE REGULATION

Most revolving credit is extended to consumer under a rate ceiling established by statute and based upon the legal acceptance of the time price doctrine. From time to time, the ceiling has been changed in some states, always "in the interest of the consumer." This part of the paper is concerned with the probable effects of reductions in these ceiling rates (as have recently occurred in Washington, 1968 and Minnesota, 1971, and several other states). The most obvious way for the ceiling rate to be lowered is through legislative or litigative action. However, it should be pointed out that the effective real rate can be lowered in two other ways:

- (i) Forcing the use of a method of rate computation that yields less revenue than those currently used (for example, a legal requirement that the adjusted balance method be used instead of the previous balance method)
- (ii) Setting the ceiling in nominal terms, resulting in a continuous erosion of the yield in real terms during periods of inflation when the costs of capital and other credit activities usually rise, reducing or eliminating any margin that might have existed.¹³

Thus, the discussion here really encompasses all these cases, as each describes a reduction in the real revenue associated with the extension of credit.

Overall, the basic effects of a decline in the real yield on revolving credit would include to some degree or another the following:

1. A decline in revenues with no offsetting decline in costs. If sales decline and fewer inventories and sales personnel are needed, costs decline as revenues fall (although not dollar for dollar). This is not the case for a rate reduction on credit, as only revenues decline. But, the same number of accounts with the same balances and payment habits must be serviced. It is not feasible to cancel credit accounts simply because the ceiling rate is changed.
2. A tightening of credit standards to bring the quality of new applicants in line with the lower ceiling rate. Perhaps standards for new applicants will be overly tight to try to compensate for the more costly customers now on the books (in Minnesota, standards became very high, as banks stopped issuing cards!).¹⁴
3. An increase in the price of goods and services and/ or a reduction in the provision of other "free" services, and/or a deterioration in the quality of service provided and/or a change in the mix of merchandise offered. Retail firms will attempt to make up the revenue decline in other ways, increasing the burden on the cash customer. Banks can rely only on a higher merchants discount or an annual fee to make up for the effect of a reduced ceiling on revenues.

¹³ As the price of goods rises, other things equal, the average balance revolved will also rise, yielding more finance charge revenues in nominal terms. However, the margin is still reduced if the cost per dollar of capital rises &/or the other costs of credit operations rise faster than the prices of goods and services.

¹⁴ "Business Week," May 1, 1971, page 32.

TABLE 6
Dependent Variable—Net Contribution With:¹

<u>Predictor</u>	<u>Basic Model*</u>	<u>Finance Lower by 1/3</u>	<u>Charges Higher by 1/2</u>	<u>Annual Fee (\$5/\$10)</u>	<u>Number of Cases</u>
<u>Income</u>					
\$5,000 and under	-14.2	-11.1	-18.8	-13.2	14
\$5,001-7,500	-28.7	-27.4	-30.6	-25.8	17
\$7,501-10,000	-2.6	-2.2	-3.3	-1.9	59
\$10,001-15,000	.9	.8	1.2	1.1	110
\$15,001-20,000	48	3.4	6.9	4.6	102
\$20,001 and over	2.0	2.5	1.3	1.3	137
<u>Age</u>					
Under 25	5.0	1.7	9.9	4.9	7
25-34 years	-1.5	-1.9	-.8	-1.2	89
35-44 years	3.3	2.5	4.5	3.6	120
45-54 years	-4.2	-2.9	-6.0	-4.2	145
55-64 years	3.1	2.7	3.7	2.4	64
65 and over	7.9	7.7	8.1	7.2	14
<u>Years with Present Employer</u>					
Under 1 year	2.5	1.8	3.5	3.4	55
1-2 years	-11.0	-7.9	-15.6	-11.4	40
3-5 years	5.1	4.3	6.3	5.1	72
6-10 years	-3.9	2.8	-5.6	-4.7	67
11 or more years	1.0	.5	1.7	1.1	204
<u>Marital Status</u>					
Married	-.3	-.2	-.5	-.7	350
Single	-.8	-2.6	1.9	.4	32
Separated	2.5	3.7	.6	1.9	7
Divorced	5.0	4.7	5.5	6.6	29
Widowed	-1.0	0.0	2.4	.9	20
<u>Housing Status</u>					
Own home	1.3	1.2	1.4	1.1	333
Rent	-3.9	-3.7	-4.3	-3.4	106
<u>Sex of Respondent</u>					
Male	1.1	.8	1.6	1.2	363
Female	-5.4	-3.9	-7.7	-5.7	76
<u>Occupation</u>					
Professional	2.0	2.1	1.7	2.6	103
Technical; scientific	-3.0	-2.0	-4.3	-3.1	49
Supervisors; Self-employed	-4.3	-3.7	-5.2	-4.3	110
Clerical; sales	7.9	7.0	9.2	7.3	44
Craftsmen; foremen	.6	-.4	2.2	.5	63
Service workers	-2.0	-1.3	-3.2	-3.4	28
Operatives; unskilled	3.7	2.4	5.6	3.8	33
Students; Housewives	-4.0	-4.1	-3.8	-3.4	9
Mean (constant term)	\$17.1	\$13.0	\$23.3	\$23.7	
R ²	.13	.15	.11	.11	

¹ Regression coefficients expressed as deviations from the sample mean.

The Incidence of Credit Rationing Among Consumers

Credit rationing was noted as one of the responses of retail firms to reductions in the ceiling rate applicable to revolving credit. This section of the paper estimates the probable incidence of this rationing in the population of consumers by isolating the types of consumers that are "marginal" under current evaluation criteria.

Point-scoring schemes vary noticeably from company to company, but most are based on much the same set of variables. Two models, one for a bank card, and one for a major retailer, were used to score members of a cross-section sample of U.S. families. The variables in the models are described in Exhibit 2. In the case of the retail card, two items of information were not available: previous company experience with the customer, and whether or not the consumer had been involved in judgments, garnishments, or repossessions.

The results of scoring the sample are shown in Table 7. Mean scores are shown for each income class along with the average number of credit cards owned. The income distribution in the cross-section sample for each score category is shown in Table 8 for the retail score, and Table 9 for the bank score.

Table 10 summarizes the effect of credit rationing that takes the form of raising cutoff scores. It shows the incomes earned by those who became unqualified for credit as the minimum score is raised. The results are summarized from Table 8 and Table 9. For the bank score, essentially all (96%) the families that qualified at 15 points but not at 20 had incomes below \$7500 (recall that the survey was taken in January of 1967., Incomes have risen in nominal terms since then). However, only 55% of the population had incomes this low, indicating that changes in credit availability of this form would have had a disproportionately large effect on the lower income consumer. He is primarily the loser when credit rationing of this type takes place, whether a rapid shift of credit policy in response to a rate change, or an upward drift in requirements over time as credit operations are squeezed by inflation. The story is the same for the retail score (even though income was not part of the scoring scheme!) and held true at all levels of cut-off changes considered. Table 11 shows similar results for a study conducted in New York in 1973. Here, the sample is not all consumers, but only those with retail credit cards.

EXHIBIT 2

<u>Major Retailer</u>	<u>Major Bankcard</u>
Age of Applicant	Age of Applicant
Housing Status (own/rent)	Marital Status
Telephone Ownership	Dependents
Marital Status	Length of Time on Job
Source and Amount of Outside Income (wife, property)	Housing Expenditure (monthly rent/ mortgage)
Length of Time on Job	Monthly Salary
Bank References (has checking &/or saving acct.)	Housing
Total Indebtedness	Total Indebtedness
Finance Co. References	Telephone Ownership
* Previous Account History with Company	Length of Time in the Area
Department Store References	Bank References
Number of Dependents	Education
* Number of Judgments, Garnishments, Repossessions	Type of Employment (broad occupation)

* Not available for score construction

TABLE 7
Credit Eligibility and Availability by Income Level
(U.S. Families, 1967)

Total Family Income Bracket: 1967	No. of Families	Average	Point Scores	Average No.	of Credit Cards
		Bank Card	Retailer	Gas	Other
Less than \$1,000	115	20	55	.1	.2
\$1,000-1,999	320	20	56	*	.3
\$2,000-2,999	291	23	68	*	.5
\$3,000-3,999	283	24	83	.1	.6
\$4,000-4,999	276	26	89	.2	.5
% 5,000-5,999	282	28	95	.3	.9
\$6,000-7,499	179	31	104	.5	1.0
\$7,500-9,999	662	35	119	.6	1.3
\$10,000-14,999	694	40	138	.9	1.8
\$15,000 and over	324	44	143	1.6	2.6

* Less than .05

TABLE 8
Distribution of Families by income Level and Retail Score

Retail Point Score	Distribution of Families	Total	Family	Income							
		Under \$1000	\$1000 -1999	\$2000 -2999	\$3000 -3999	\$4000 -4999	\$5000 -5999	\$6000 -7499	\$7500 -9999	\$10000 -14999	\$15000 or more
Under 10	4.0	3.3%	13.4%	17.5%	12.1%	934%	6.0%	13.4%	14.1%	8.1%	2.7%
-9 to 9	5.0	4.39	31.4	15.7	10.8	4.9	9.7	8.6	9.7	2.2	2.1
10 to 29	6.1	7.0	17.1	11.0	13.6	8.3	11.4	11.0	9.2	7.9	3.5
30-49	7.8	10.6	18.5	8.2	8.2	11.3	8.6	14.1	10.6	7.5	2.4
50-69	8.6	6.2	12.1	15.0	8.1	6.5	5.9	12.8	18.1	10.0	5.3
70-89	10.8	2.2	4.5	9.5	10.4	9.7	10.9	15.7	18.2	14.9	4.0
90-109	11.1	1.9	5.6	7.0	8.9	7.5	6.3	15.2	16.9	20.0	9.7
110-129	10.6	1.3	7.6	6.3	8.6	13.7	8.4	10.6	17.0	19.7	6.8
130-149	8.7	1.8	6.4	5.5	6.7	6.1	4.6	9.5	24.5	25.9	8.9
150-169	8.3	1.0	3.2	5.5	6.7	6.1	4.6	9.5	24.5	25.9	8.9
170-189	6.0	.9	2.6	2.2	1.8	3.5	7.1	15.0	21.7	24.8	20.4
190-209	5.5	.5	1.0	1.5	2.9	3.9	6.3	11.6	23.3	28.6	20.4
210 or more	7.5	*	*	1.4	2.8	2.1	5.0	10.3	23.4	40.5	14.5
All	100.0	3.1	8.6	7.8	7.8	7.4	7.5	12.8	17.7	18.6	8.7

* Less than one half of one percent. 3726 cases.

TABLE 9
Distribution of Families by Income Level and Bank Score

Bank Point Score	Distribution of Families	Total Under \$1000	Family \$1000 -1999	Income \$2000 -2999	\$3000 -3999	\$4000 -4999	\$5000 -5999	\$6000 -7499	\$7500 -9999	\$10000 -14999	\$15000 or more
Under 14	3.0%	11.9%	36.5%	25.5%	13.7%	1.9%	7.4%	1.0%	1.0%	1.0%	*
15-19	8.4	13.5	28.8	14.7	15.1	11.8	7.4	4.2	3.5	1.0	*
20-24	14.9	7.2	22.1	20.5	11.9	11.7	7.9	10.8	5.4	2.0	.5
25-29	16.3	1.6	7.7	9.4	14.8	13.9	12.5	16.6	15.9	5.6	2.0
30-34	17.1	1.1	2.5	4.9	7.2	9.3	12.4	23.2	24.0	12.4	3.1
35-39	15.9	.2	.7	2.2	2.3	3.9	6.2	16.7	33.4	26.8	7.6
40-44	12.2	.4	*	.4	1.1	11.1	3.1	10.8	23.6	45.2	14.3
45-49	8.3	*	*	*	*	*	.3	2.9	18.5	50.0	28.3
50 or more	3.9	*	*	*	*	*	*	*	4.8	32.6	62.6
	100.0%										
Number of cases	1726	3.1	8.6	7.8	7.6	7.4	7.6	12.8	17.8	18.6	8.7

* Less than one half of one percent. 3726 cases.

The Cost of Rationing to the Consumer

To say much about the cost of rationing to the consumer, one must first say a little about the value of the credit that they use. Some consumers will be getting cheaper credit while others will be forced to pay more or to use less credit:

- (1) Consumers can finance the purchase of goods over time as they consume the services of such items as cars and durables. This helps match the flow of income to that of consumption, an important consideration for capital poor families. This permits better timing of capital investments, as the consumer is in a better position to buy when items are needed (have the largest present value).
- (2) For many consumers, installment debt is a useful budgeting device.
- (3) Credit insulates liquid assets from unexpected expenditures that can be financed out of current income. A large proportion of consumers are observed to hold both debt and liquid assets. This must be a preferable alternative, or the consumer would presumably repay his obligations.
- (4) Revolving credit is more than an extension of credit. It is a line of credit that can be exercised at the discretion of the consumer without constant reapplication and red tape. Transactions and search costs are eliminated or drastically reduced.
- (5) Cash and debt management are made much easier as obligations can be paid off monthly, and purchases can be made without the need for large cash balances.

The value of these factors to consumers may make the nominal rate of charge look small in magnitude.

TABLE 10
Effects of Raising Qualification Score for
Credit Evaluation Procedures
(based on sample of U.S. families, 1967)

BANK SCORE

<u>Raising the Minimum Score</u>		<u>Incremental percentage Refused Credit with</u>	<u>of Families that Incomes Below:</u>		<u>Would be</u>	
<u>From</u>	<u>To</u>		<u>\$4,000</u>	<u>\$5,000</u>	<u>\$6,000</u>	<u>\$7,500</u>
15	20	72	84	91	96	
20	25	62	73	81	92	
25	30	33	47	60	77	
30	35	16	25	37	60	

RETAIL SCORE

<u>Raising the Minimum Score</u>		<u>Incremental percentage Refused Credit with</u>	<u>of Families that Incomes Below:</u>		<u>Would be</u>	
<u>From</u>	<u>To</u>		<u>\$4,000</u>	<u>\$5,000</u>	<u>\$6,000</u>	<u>\$7,500</u>
-9	10	63%	68%	77%	86%	
10	30	49	57	68	79	
30	50	46	57	65	79	
50	70	41	48	54	67	
Percent of all families Below this income level		27%	35%	42%	55%	

TABLE 11
Simulated Rejections of Credit Cardholders
by Credit Score Cutoff Points

<u>Retail Score</u>	<u>Percent of Account Holders Affected</u>	<u>Percent</u> <u>\$7,500</u>	<u>with</u> <u>\$10,000</u>	<u>Income</u> <u>\$15,000</u>	<u>Under</u> <u>\$20,000</u>
Raise to 70 (70 to 80)	3.9% (1.0)	29% (53)	32% (53)	48% (76)	84% (99)
Raise to 80 (80 to 90)	4.9 (3.7)	35 (17)	37 (31)	55 (64)	89 (70)
Raise to 90 (90 to 100)	8.6 (3.5)	27 (36)	34 (44)	59 (53)	81 (69)
Raise to 100 (100 to 110)	12.1 (5.9)	29 (7)	37 (32)	57 (74)	78 (85)
Raise to 110 (110 to 120)	18.0 (6.3)	22 (7)	36 (28)	62 (46)	80 (71)
Raise to 120	24.3	18	34	58	78
<u>Bank Score</u>					
Raise to 24 (24 to 29)	1.6% (5.0)	89% (36)	89% (48)	100% (75)	* (85)
Raise to 29 (29 to 34)	6.6 (11.8)	50 (19)	58 (53)	82 (74)	89 (92)
Raise to 34 (34 to 39)	18.4 (17.9)	30 (8)	55 (29)	77 (58)	91 (84)
Raise to 39	36.3	19	42	68	87
Sample Income Distribution		8.9%	17.3%	42.0%	68.4%

As an example of the benefits of being able to purchase on credit, consider the ownership of a washer and dryer. The rate of return to ownership (in comparison to using a laundromat) have been estimated by Dunkelberg and Stephenson [6] and are shown in Table 12.

TABLE 12
Average Annual Savings from Ownership
of a Washer & Dryer*

<u>Loads Per Week</u>	<u>Rate of Return</u>	<u>Average Annual Savings^a</u>
1	-2.7%	-\$5
2	2.1	\$4
3	6.7	15
4	10.9	25
5	14.8	35
6	22.0	54
7	29.0	74
8	35.8	92
9	42.9	112
10	50.1	131
11	57.1	150

* Based on data presented in Dunkelberg & Stephenson [3]

^a Assumes an average investment of \$181

The rates of return were based on estimates of the net cash savings that result from ownership, converted to the rates that discounted the net cash savings to zero over the life of the equipment. The average savings by number of loads washed per week are shown in Table 12. The distribution of these returns was not related to the level of income (time was valued at \$1.00 per hour for all families), only to the size and age composition of the family, which shows little relationship to income.

If the benefits of ownership are distributed more or less independently of income,¹⁵ but credit rationing affects lower income consumers disproportionately, then regulation imposes a real cost on these consumers when it denies them access to relatively lower cost sources of credit and forces the use of more expensive sources or prevents the use of credit entirely. For example, assume two consumers, each doing 7 loads of wash per week (corresponding to a 29% rate of return), each having access to retail credit at 18% (APR) and planning to purchase a washer and dryer on credit, the only feasible way at the present time. Then, the ceiling rate on credit is lowered from 18% to 12% and one of the consumers can now find financing only at 36%. Where formerly each would have received a "surplus" of 11% (29% - 18%), the consumer qualifying for 12% credit receives a surplus of 17% while the other finds the investment unprofitable at available rates. Clearly, the change in the ceiling has brought about a redistribution of income, broadly conceived, as the less creditworthy consumer is forced to pay more for the same laundry services than his better qualified counterpart.

Of course, the lowering of the legal ceiling will not have its full impact on credit availability if past experience is any indicator. The evidence suggests that since it is very difficult to adjust the quality of existing accounts to such a change; the deficiency in revenues is made up by raising cash prices. This means that (to a greater extent than before) cash buyers will be paying part of the cost of providing credit. Whether this is paid by high or low income consumers depends on the proportion of these groups using credit and the size of their cash and credit purchases. At the present time, there is little evidence available regarding the cash/credit purchase behavior of consumers.

Net Contribution and Credit Rationing

The last section examined the probably incidence of credit rationing among consumers. Assuming that this rationing will take place to some degree, it is interesting to examine what impact this will have on the firm in terms of customer profitability. The point scoring schemes used were designed to minimize bad debt losses. The measure of net contribution discussed earlier in this* paper provided an expanded view of customer quality. This section examines the potential effectiveness of this type of rationing in eliminating the unprofitable or more expensive customer.

Tables 3a and 3b present the distribution of the net contribution measure by retail score and bank score in the New York study. The overall impression given by the results is that net contribution bears little relationship to either scoring system. In fact, the most frequent occurrence of the profitable customer is in the lower score categories. With the exception of the high score categories in both groups, the proportion of consumers with a "negative" net contribution does decline steadily, but so does the proportion of customers with contributions of \$40 or more. The story is the same for the California data (not shown).

¹⁵ If time were valued at some opportunity price based on the (potential earning power of the wife, the measure of return would be more closely related to family income. However, entry into the labor force must usually be made in discrete increments (1/2 time, full time, etc. Such blocks of time are not likely to be freed up by one or even by all durables commonly owned. Thus, the cost of hiring help to perform the same chores was taken as a better measure of the value of time, and \$1.00. was taken as a very conservative measure of this.

TABLE 3a
Net Contribution by Store Score
(NEW YORK)

Store Score	Pct. Dist.	Net Contribution									
		Less Than 0	\$0-4.99	\$5.00 -9.99	\$10.00 -14.99	\$15.00 -19.99	\$20.00 -29.99	\$30.00 -39.99	\$40.00 -49.99	\$50.00 or more	All
Under 70	4%	41%	15%	1%	10%	4%	2%	8%	8%	11%	100%
70-109	14%	37	18	6	5	4	8	3	3	16	100%
110-149	24%	25	18	15	11	4	10	10	1	6	100%
150-189	47%	16	28	14	9	10	10	6	3	4	100%
190 or more	11%	24	27	10	18	14	2	5	*	*	100%
All	100%	23	24	12	10	8	8	6	3	6	100%

* less than .5%

TABLE 3b
Net Contribution by Bank Score
(NEW YORK)

Bank Score	Pct. Dist.	Net Contribution									
		Less Than 0	\$0-4.99	\$5.00 -9.99	\$10.00 -14.99	\$15.00 -19.99	\$20.00 -29.99	\$30.00 -39.99	\$40.00 -49.99	\$50.00 or more	All
Under 35	19%	38	19	7	6	7	7	4	5	6	100%
35-39	18%	28	5	9	6	7	10	6	1	8	100%
40-44	23%	15	28	14	15	6	4	9	5	4	100%
45-49	23%	14	25	16	8	13	12	5	1	6	100%
50 or more	17%	25	20	14	12	8	9	6	*	6	100%
All	100%	23	24	12	10	8	8	6	3	6	100%

* less than .5%

Essentially identical patterns are observed for finance charge revenues paid (Tables 4 a and 4 b). Raising minimum score criteria eliminates numerous high revenues as well as low revenue customers, and leaves many low revenue credit users on the books.

The scoring schemes do seem to do a better job of sorting out the expensive "problem" accounts based on predicted average expense from the cost study (Tables 5a and 5b). Since bad debt losses make up about 60% of problem account expense, the systems were designed to eliminate customers who are likely to be bad debts, this is to be expected.

The final two tables (6a and 6b) show the distribution of annual purchases in the New York study by score classification. Overall, it appears that the two systems do not effectively differentiate between large and small purchasers, an important element of customer profitability.

Thus, it appears that firm's efforts to reduce costs by raising minimum criteria may not be especially successful because of the inability of scoring schemes to isolate "expensive" (in the "net contribution"- sense) consumers. To reduce costs by some pre-specified amount, credit would have to be contracted much more than-necessary due to the lack of discriminatory power embodied in these models.

TABLE 4a
Finance Charges Paid by Store Score
(NEW YORK)

Store Score	Pct. Dist.	Finance Charges		\$5.00	\$7.50	\$10.00	\$15.00	\$20.00	\$25.00	\$30.00	All
		None	Under \$5.00	-7.49	-9.99	14.99	-19.99	-24.99	-29.99	or more	
Under 70	4%	32%	12%	12%	*%	3%	4%	*%	8%	29%	100%
70-109	14%	29	25	3	6	4	3	2	3	25	100%
110-149	24%	20	32	2	5	6	9	4	4	18	100%
150-189	47%	21	35	7	7	4	4	4	5	13	100%
190 or more	11%	41	42	*	2	8	*	4	*	3	100%
All	100%	25	33	4	5	5	4	4	4	16	100%

* less than .5%

TABLE 4b
Finance Charges Paid by Bank Score
(NEW YORK)

Bank Score	Pct. Dist.	Finance Charges		\$5.00	\$7.50	\$10.00	\$15.00	\$20.00	\$25.00	\$30.00	All
		None	Under \$5.00	-7.49	-9.99	14.99	-19.99	-24.99	-29.99	or more	
Under 35	19%	26	35	4	1	5	10	*	4	15	100%
35-39	18%	25	33	6	4	2	4	2	3	21	100%
40-44	23%	22	27	6	6	5	3	8	8	15	100%
45-49	23%	26	35	2	6	5	2	5	2	17	100%
50 or more	17%	25	35	4	10	8	5	2	2	9	100%
All	100%	25%	33%	4%	5%	5%	4%	4%	4%	16%	100%

* less than .5%

TABLE 5a
Predicted Value of Problem Account Cost by Store Score
(NEW YORK)

Store Score	Pct. Dist.	Problem Account Costs		\$2.00	\$2.50	\$3.00	\$3.50	\$4.00	\$4.50	\$5.00	All
		Less Than 0	\$0-1.99	-2.49	-2.99	-3.49	-3.99	-4.49	-4.99	or more	
Under 70	4%	32%	12%	12%	*%	3%	4%	*%	8%	29%	100%
70-109	14%	29	25	3	6	4	3	2	3	25	100%
110-149	24%	20	32	2	5	6	9	4	4	18	100%
150-189	47%	21	35	7	7	4	4	4	5	13	100%
190 or more	11%	41	42	*	2	8	*	4	*	3	100%
All	100%	25	33	4	5	5	4	4	4	16	100%

* less than .5%

TABLE 5b
Predicted Vale of Problem Account Cost by Bank Score
(NEW YORK)

		<u>Badcosts</u>									
<u>Bank Score</u>	<u>Pct. Dist.</u>	<u>Less Than 0</u>	<u>\$0-1.99</u>	<u>\$2.00-2.49</u>	<u>\$2.50-2.99</u>	<u>\$3.00-3.49</u>	<u>\$3.50-3.99</u>	<u>\$4.00-4.49</u>	<u>\$4.50-4.99</u>	<u>\$5.00 or more</u>	<u>All</u>
Under 35	19%	20%	21%	5%	7%	4%	3%	2%	5%	33%	100%
35-39	18%	21	42	1	1	4	2	2	1	26	100%
40-44	23%	19	62	4	5	*	*	*	*	10	100%
45-49	23%	14	77	4	3	1	1	*	*	*	100%
50 or more	17%	24	74	1	1	*	*	*	*	*	100%
All	100%	25	33	4	5	5	4	4	4	16	100%

* less than .5%

TABLE 6a
Net Sales Charged by Store Score
(NEW YORK)

		<u>Net</u>	<u>Sales</u>									
<u>Store Score</u>	<u>N</u>	<u>% Distribution</u>	<u>Under \$25</u>	<u>\$25-49</u>	<u>\$50-99</u>	<u>\$100-149</u>	<u>\$150-199</u>	<u>\$200-249</u>	<u>\$250-299</u>	<u>\$300-399</u>	<u>\$400 or more</u>	<u>All</u>
Under 70	67	4%	16%	10%	34%	2%	2%	12%	1%	12%	11%	100%
70-109	243	14%	9	12	20	19	6	5	6	6	17	100%
110-149	412	24%	9	9	16	13	14	9	3	11	16	100%
150-189	803	47%	8	11	15	18	10	7	5	10	15	100%
190 or more	190	<u>11%</u>	14	15	14	12	10	6	4	11	14	100%
All	1715	100%	9%	11%	17%	16%	10%	7%	5%	10%	15%	100%

TABLE 6b
Net Sales Charged by Bank Score (NEW YORK)

		<u>Net</u>	<u>Sales</u>									
<u>Bank Score</u>	<u>N</u>	<u>% Distribution</u>	<u>\$0-24.00</u>	<u>\$25-49</u>	<u>\$50-99</u>	<u>\$100-149</u>	<u>\$150-199</u>	<u>\$200-249</u>	<u>\$250-299</u>	<u>\$300-399</u>	<u>\$400 or more</u>	<u>All</u>
Under 35	317	19%	8%	12%	22%	14%	10%	2%	7%	12%	13%	100%
35-39	306	18%	9	11	11	19	11	8	3	10	18	100%
40-44	403	23%	11	9	19	15	9	13	3	8	13	100%
45-49	393	23%	8	11	15	17	12	9	7	8	13	100%
50 or more	296	<u>17%</u>	11	14	17	13	9	2	3	11	20	100%
All	1715	100%	9%	11%	17%	16%	10%	7%	5%	10%	15%	100%

SELECTED BIBLIOGRAPHY

- Chapman, John M., and Shay, Robert P., The Consumer Finance Industry; Columbia University Press, New York, 1967.
2. Dunkelberg, William. On Assessing the Impact of Rate Regulation in the Consumer Credit Industry. Graduate School of Business, unpublished manuscript, Stanford University, 1972.
 3. Dunkelberg, William. "A Lower Rate Maximum for Retail Credit: The Impact on Consumers," National Commission on Consumer Finance, Technical Studies Vol. VI, Government Printing Office, Washington, 1974.
 4. Dunkelberg, William and Smiley, Robert., "The Subsidy Issue in the Use of Consumer Credit," Graduate School of Business, Research Paper # 191, Stanford University, 1972, forthcoming, *Journal of Money, Credit & Banking*.
 5. Dunkelberg, W., and F. Stafford. "Debt in the Consumer Portfolio: Evidence from a Panel Study," *American Economic Review*, September, 1971.
 6. Dunkelberg, W., and J. Stephenson. "The Rate of Return on Consumer Durables," National Commission on Consumer Finance, Technical Studies, Vol. VI, Government Printing Office, Washington, 1974.
 7. Gordon, Guy, et.al. "The Impact of a Consumer Credit Interest Limitation Law," Graduate School of Business Administration, University of Washington, Seattle, 1970.
 8. Havighurst, Clark C., ed. Consumer Credit Reform. Oceana Publications, New York, 1970.
 9. Johnson, Robert W., "Economic Analysis of Credit Revenues and Costs in Department Stores" in Economic Characteristics of Department Store Credit, National Retail Merchants Association New York, 1969.
 10. Johnson, Robert W. "Regulation of Finance Charges on Consumer Installment Credit," *Michigan Law Review*, University of Michigan, 1967, pages 81-114.
 11. Katona, George, et.al. The 1967 Survey of Consumer Finances, Survey Research Center, University of Michigan, 1967 (and later volume).
 12. Lindsay, Robert. "The Economics of Interest Rate Ceilings," *The Bulletin* (New York University, Graduate School of Business Administration), December, 1970.
 13. Lynch, Gene C. "Consumer Credit at Ten Per Cent Simple: The Arkansas Case," College of Business, University of Arkansas, Fayetteville, Arkansas, 1969.

14. McAlister, Ray "Alternative Rate Calculation Procedures for Retail Revolving Credit" forthcoming, Monograph 1, Credit Research Center, Purdue University, 1974.
15. Peterson, Richard and W. Dunkelberg. Short Run Variations in the Aggregate Savings Rate, Graduate School of Business, Research Paper No. 61. 1971.
16. Shay, Robert and W. Dunkelberg. Retail Store Credit Card Use in New York, forthcoming, Columbia University Press, New York, 1974.
17. Stafford, Frank and W. Dunkelberg. "The Cost of Financing Automobile Purchases," Review of Economics and Statistics, November, 1969.
18. Stucki, Roland. "Utah Consumer Credit Report," University of Utah,,1970.