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Bank and Retail Credit Card Yields Under Alternative Assessment Methods 1978

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BANK AND RETAIL CREDIT CARD YIELDS UNDER ALTERNATIVE ASSESSMENT METHODS

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Abstract

This paper presents extensive empirical data to Analyze the differences in yields resulting from the various methods used by banks and retailers to assess finance charges on revolving credit. Not only does the yield vary with the method of assessment (including the presence or absence of a "free" period or a minimum monthly finance charge), but it is also affected by the timing of consumers' purchases and payments and the period of time over which the yield is calculated. Consequently, it is only with records of actual account use patterns over an extended period of time that the revenues produced by alternative billing methods can be properly discerned.

The first port of the paper presents precise definitions and descriptions of seven different methods of assessing charges, including the most recent innovation: average daily balance retro. (Simulations are not provided for the latter method.) The basic methods are categorized as nonaveraged daily balance methods (previous, ending, and adjusted balance) and average daily balance methods (average daily balance excluding debits, average daily balance including debits, true overage daily balance, and average daily balance retro). The relationships among these methods are carefully explained.

The empirical analysis is based on data from over 8,400 account histories drawn randomly from 28 different retail revolving charge operations in five states and from over 3,800 accounts from bank card operations at 24 banks in three states. Average daily balances and average monthly finance charges for the banks were almost triple those of the stores, although there was no significant difference between the average number of times finance charges were assessed per year and the gross yield index. However, there was considerable variance among individual stores and banks.

Simulation of the yields that would have been obtained under different methods was necessarily based on the assumption that consumers' purchase and payment habits would remain unaffected by different billing methods.

Of note is the conclusion that monthly finance charges under the previous balance method and average daily balance, including debits differed by only pennies among retailers. In general, the variation among all of the billing systems narrowed the more frequently accounts were revolved.

The empirical data show that many of the methods yield less in practice than the nominal annual percentage rate or the rate disclosed to consumers under truth in lending. While these differences become highly significant to a creditor with a large investment in accounts receivable, they are less significant when displayed as mean monthly finance charges paid by consumers. Actual, mean yields and mean monthly finance charges based on simulations of actual account histories at retailers are shown below for the six basic billing methods under the assumption that the disclosed or nominal annual percentage rate was, 18 percent:

* North Texas State University and Sartain & DeSpain, Inc. respectively.

	Mean annual yield to retailer	Mean monthly finance charge paid by consumers
Previous balance	16.04%	$1.56
Adjusted balance	13.61	1.38
Ending balance	17.92	1.66
Average daily balance including debits	16.22	1.57
Average daily balance excluding debits	15.10	1.49
True actuarial average daily balance	18.54	1.71

The experienced yield under the true average daily balance method slightly exceeds the disclosed yield principally because a 50-cent minimum charge was included in the simulations for those creditors that assessed such a monthly charge.

The authors conclude with a number of observations concerning creditor policies and legislative implications.

Bank and Retail Credit Card Yields Under Alternative Assessment Methods

In recent years many credit card grantors have been pressured to change the basis upon which finance charges are assessed. Lawsuits have challenged the legality of certain billing methods under existing state statutes. Most of these have involved a billing method commonly known as the Previous Balance System, under which finance charges are based on the beginning balance of a billing cycle before deducting payments and credits. In contention are two points: Is the Previous Balance System authorized under statutory language; and does the finance charge yield produced exceed that maximum rate permitted by statute? Several states have adopted new laws specifying use of certain billing methods, circumventing the Previous Balance System.

Creditors have become increasingly aware of mounting criticisms surrounding certain billing methods. Changes resulting from these events have prompted a desire on the part of national concerns to display a greater degree of uniformity in their credit operations from state to state. In addition, escalating credit costs have forced renewed attention to the necessity for credit operations to produce new revenues or to reduce credit costs.

Much of the legal activity concerning billing methods has been based on conjecture about the effect on credit card revenues and customer costs. The primary objective of the studies presented here was to obtain extensive empirical data to analyze the impact of the methods used by retailers and banks to assess finance charges on revolving credit.

As most grantors of revolving credit are aware, the method by which finance charges are assessed may result in substantial variation in gross finance charge revenues and in the revenue yield of any single account. For any given billing method the factors that influence this variation are: (1) the presence or absence of "free" time (time for which no finance charges are assessed if the balance is paid in full); (2) the presence or absence of a minimum finance charge (usually 50 cents assessed on unpaid balances of less than $33.33); and (3) the size and timing of purchases and payments; and (4) the period of time over which the yield is calculated.

Since all of these factors influence finance charges, no analytical or hypothetical determination of the level of distribution of finance charges is possible apart from a description of actual account activity or from a model of account usage patterns. Only with records of actual account use patterns over an extended period of time can the revenue produced by the various alternative billing methods be properly discerned.

Billing Methods-Definition and Descriptions

The general form of a billing method may be represented by the following equation: $f = B(b) + C(n_t c_t) + D(m_s d_s)$ where,

f = the finance charge assessed on a single account in a given billing period
b = the balance at the beginning of the billing period in question
n_t = the number of days the t^{th} credit or payment is in the system
c_t = the amount of the t^{th} debit is in the system
m_s = the number of days the s^{th} debit is in the system
d_s = the amount of that debit

The parameters of the function are:

(1) the number of days in the billing period,

(2) the finance charge periodic rate of assessment,

(3) a break-point[1] of balances that determine different rates of assessment,

(4) whether a debit or credit is considered to be in the system[2] all, part, or none of the billing period,

(5) whether a full payment of the beginning balance (balance on previous month's statement) will cause omission of a finance charge.

To isolate the impact of variations in the method of finance charge assessment on the amount and distribution of dollar finance charges, one must describe the derivation of the precise balance upon which finance charges are levied. No attempt has been made to be exhaustive in the survey of possible methods of assessment. Minor variations would make these possibilities infinite. The methods under consideration are paradigms of methods in current use and are the methods most often mentioned in legislation or litigation. Monthly billing periods are assumed. A common attribute of the methods reviewed is that the level of the finance charge is completely controllable by the users of the accounts, although the means of control are different for each method.

Let us define the following identifiers:

P =	previous balance method
A =	adjusted balance method
E =	ending balance method
ADBW =	average daily balance including (with) debits method
ADBX =	average daily balance excluding debits method
TADB =	true actuarial average daily balance and variables
FC =	finance charge
FR =	periodic finance rate (for accounts less than the break point)
FB =	periodic finance rate (for amounts greater than the break point)
N =	number of days in the billing period

[1] An example of a break-point would be a 1.5 percent monthly charge on balance up to $500 and one percent on that part of the balance over $500.

[2] "In the system" refers to the date a purchase or payment was posted to the account and affected the balance upon which finance charges might be assessed.

NC_i = number of days the i^{th} payment or other credit was in the system,

ND_j = number of days the i^{th} purchase or other debit was in the system,

NM = number of payments and other credits

NP = number of purchases and other debits

BP = break point (dollar amount above which a different finance rate applies)

B = beginning balance

D_j = j^{th} debit or purchase, j = 1,…., NP

U = Accumulated unpaid finance charges from prior periods

* Denotes multiplication.

We can also define the following quantities:

(1) Sum of the daily credit balances

$$SDCB = \sum_{i=1}^{NM} C_i \, NC_i$$

(2) Sum of the daily debit balances

$$SDDB = \sum_{j=1}^{NP} D_j \, ND_j$$

(3) Sum of the daily balances during a billing period

$$SDB = N*B - SDCB + SDDB$$

(4) Sum of credits

$$SC = \sum_{i=1}^{NM} C_i$$

(5) Sum of debits

$$SD = \sum_{j=1}^{NP} D_j$$

The billing methods involved are thus defined as follows:

1) Previous Balance. Also known as the "beginning balance." Finance charges are calculated on any beginning unpaid balance shown on the current month's statement before deducting payments or credits received during the billing period and before adding purchases made during the billing period. Thus, the period's credits and debits are treated symmetrically in that both are excluded from the balance upon which the finance charge is assessed. Payments are applied first to any unpaid finance charges and then to principal. If the previous balance is paid in full, no finance charge is assessed. If no payment is made, the unpaid finance charge may become part of the principal balance owed, although the practice varies among creditors.

The algorithm for calculating finance charges under the Previous Balance method may be expressed as:

$$
\begin{aligned}
FC &= FR*B && \text{for } O<B<BP \\
&= FR*B + FB* (B-BP) && \text{for } B \geq BP \\
&= 0 && \text{for } B \leq SC
\end{aligned}
$$

2) Adjusted Balance. Finance charges are calculated on the basis of any beginning unpaid balance shown on the current month's billing statement less payments and credits received during the current billing period, but before adding the current month's purchases. The date of payment on an account is irrelevant to the calculation. On the closing date of the account payments are first applied to any unpaid finance charges and then to principal. If no payment is made, the unpaid finance charge may become part of the new balance owed.

The algorithm for calculating finance charges under the adjusted balance method may be expressed as:

$$
\begin{aligned}
FC &= FR*(B-SC) && \text{for } O< (BS-SC)<BP \\
&= FR*BP+FB*(B-BP-SC) && \text{for } (B-SC) \geq SP \\
&= 0 && \text{for } B \leq SC
\end{aligned}
$$

3) Ending Balance. Finance charges are based on the balance owed at the end of each billing period, including purchases, payments, and credits occurring during the current month. Thus, the period's credits and debits are treated symmetrically in that both are included in the balance upon which the finance charge is assessed. Payments are applied first to any unpaid finance charges before application to principal. In the event no payment is made, the unpaid finance charge may become part of the principal balance owed. Note that no "free ride" is given the customer who pays the account in full unless there is, indeed, no outstanding balance at the end of the month.

The algorithm for calculating the finance charge under the ending balance method is:

$$
\begin{aligned}
FC\ E &= FR*(B-SC+SD) && \text{for } 0 <(B-SC+SD) <BP \\
&= FR*BP+FB* (B-SC+SD-BP) && \text{for } (B-SC+SD) \geq BP
\end{aligned}
$$

4) Average Daily Balance Including Debits (ADBW). Finance charges are based on the "average" unpaid balance owed during the billing period. This includes all purchases, payments, and credits transacted during the billing period. It is calculated by dividing the sum of the daily-unpaid balances, excluding unpaid finance charges, by the number of days in the billing period. Payments are applied first to any unpaid finance charges then to principal. In the event no payment is made on the account, the finance charge is carried forward as a memo balance (i.e., a balance upon which no finance charges are assessed) until a payment sufficient to

cover the unpaid finance charge is made.[3] Under this method no finance charge is imposed if the account has a zero balance at the beginning of the billing cycle or if at any time in the billing period the total of payments and other credits equals or exceeds the opening balance.

The algorithm for calculating the finance charge under ADBW billing

method is:

$$FC = FR^* \frac{(SDB - N^*U)}{N} \quad \text{for } 0 < \frac{SDB - N^*U}{N} \leq BP$$

$$= FR^*BP + FB^* \frac{(SDB - N^*U - N^*BP)}{N} \quad \text{for } \frac{SDB - N^*U}{N} > BP$$

$$= 0 \quad \text{for } B \leq SC$$

5) Average Daily Balance Excluding Debits (ADBX). Sometimes referred to as the "modified" average daily balance, this method calculates finance charges on the basis of an "average" monthly balance, which is computed by dividing the sum of the daily-unpaid balances (excluding the sum of the daily debit balances and unpaid finance charges) by the number of days in the billing cycle. Thus, unlike the Adjusted Balance method (A), the timing of the payment will affect the size of the finance charge. Payments usually are applied first to any unpaid finance charge, then to principal. In the event no payment is made, the unpaid finance charge is carried forward separately, not as part of the principal balance, until payment in sufficient amount to cover the unpaid finance charge is made. No finance charge is imposed if the account has a zero balance at the beginning of the billing period or if the total of payments and credits during the period equals or exceeds the opening balance.

The algorithm for computing finance charges under the ADBX billing method is:

$$FC = FR^* \frac{(SDB - SDDB - N^*U)}{N} \quad \text{for } O < \frac{SDB - SDDB - N^*U}{N} \leq BP$$

$$= FR^*BP + FB^* \frac{(SDB - SDDB - N^*U - N^*BP)}{N} \quad \text{for } \frac{SDB - SDDB - N^*U}{N} > BP$$

$$= 0 \quad \text{for } B \leq SC$$

6) "True" (Actuarial) Average Daily Balance (TADB). Finance charges are based on the "average" unpaid balance during the billing period, including all purchases, payments, and credits on the account during the period. It is calculated in exactly the same way as ADBW except that finance charges are assessed on the average daily balance whether or not the account was paid off during the month; i.e., there is no "free ride" under this billing method as there was with ADBW.

[3] The descriptions of the various billing methods represent the practices simulated in this study. Not all firms' use the methods analyzed here in exactly the same way. This is particularly true of (1) application of the payment first to the unpaid finance charges, and (2) whether or not unpaid finance charges become part of the unpaid balance upon which subsequent finance charges are based.

The algorithm for calculating finance charges under the "true" average daily balance method is:

$$FC = FR*\frac{(SDB-. - N*U)}{N} \qquad \text{for } 0< \frac{SDB - N*U}{N} <BP$$

$$= FR*BP + FB* \frac{(SDB - N*U - N*BP)}{N} \qquad \text{for } \frac{SDB - N*U}{N} >BP$$

Other useful definitions are:

7) Billing Cycle. A billing cycle is a collection of accounts (in this case randomly selected) which have their finance charges computed on a specific day of a month (cycle date).

8) Billing Month. A billing month is a time period usually ranging from 28 to 31 days which begins on the cycle date and ends the day before the cycle date of the following calendar month. Some systems, however, do not follow calendar months and have billing months displaying somewhat greater variation. A criticism sometimes made regarding revolving credit billing systems is that finance charges may be assessed during the period between closing date of a cycle and the date the statement is actually received by the customer (i.e., the time required to complete the billing process and mail the statement to a customer). To counter this criticism, a few institutions have begun to base their finance charge assessments on something less than a full 30-day month.

Relationships Among Billing Methods

In the most general sense, the six billing methods analyzed are but variations on a theme. They are related to one another--sometimes in obvious ways, often in more obscure ways.

Non-Average Daily Balance Methods

For example, Adjusted Balance is Previous Balance with credit being given for payments made during the billing month. Ending Balance is identical to Adjusted Balance with all purchases debited to-the account prior to billing. Previous Balance is the Ending Balance, lagged one month to create a "free period."

The elimination of "free time" under both the True Actuarial ADB method and the Ending Balance method is the most important reason why these methods generate higher revenues, in general, than the other methods. This is not, however, universally true. Unless the account is paid off, Previous Balance charges will exceed Ending Balance charges whenever payments and other credits exceed purchases and other debits over the billing period. Note also that finance charges under Adjusted Balance can at no time exceed those assessed under either of the other methods, although it is often possible that they will be equal.

Average Daily Balance Methods

The three ADB methods are also closely related. The ADBX method disregards increases in the average daily balance resulting from the current month's purchases, but gives the consumer credit for decreases in the average daily balance due to the current month's payments and credits. ADB and ADBW take both debits and credits into account in figuring finance charges. The two latter methods differ only in that TADB assesses a finance charge whenever there is any balance active within the month, while ADBW makes no assessment when the account is paid off.

These constructions dictate certain relationships between the three ADB methods. First ADBX finance charges can never exceed ADBW charges. However, they can equal one another; for instance, when there are no purchases during a billing period.

Second, ADBW finance charges can never exceed TADB charges. These can also be equal and are, in fact, whenever the account is not paid off, regardless of any other activity. The main argument against ADB as compared to ADBW is its acceptability to customers and its administrative complexity. When a TADB account is paid in full and no new purchases are made, a finance charge assessed on the average daily balance during the month would be billed alone in the subsequent month. This amount would, typically, be small relative to usual monthly payments and would often be disregarded by consumers. In addition, the collection expense associated with these amounts would usually be large relative to the possible revenues.

ADB vs. Non-ADB Methods

Non-ADB methods can be thought of as ADB methods applied under a set of very restrictive assumptions about the timing of debits and credits to the account. For example, Previous Balance works the same as ADBX when all payments are assumed to be on the last day of the billing cycle. Likewise, the Adjusted Balance method can be thought of as analogous to the ADB method in which all payments are applied to the account on the first day of the billing period. In essence, under the Adjusted Balance method the consumer receives credit for the entire period regardless of when payments are received.

The Ending Balance method is analogous to a TADB or ADBW method in which payments are applied to the account on the last day of the billing period and purchases are added as of the first day of the period. Thus the consumer receives no credit for payments made early in the period but may be charged for carrying receivables associated with purchases as if they had been made at the first of the month, regardless of actual date of purchase.

Perhaps the most interesting relationship is that between ADBW and Previous Balance, because (1) many recent changes in billing methods have involved switches to ADBW, and (2) the two methods are functionally equivalent under certain commonly encountered circumstances. Whenever purchases and payments are spaced evenly on an individual account over a billing period and the balance is allowed neither to decline nor increase, the finance charges assessed under either method will be equal. Such behavior does, of course, result in an average daily balance equal to the previous balance.

This rigid requirement is not frequently met, since purchases are often bunched on one or several days, and usually no more than one payment is made per month. In large samples, however, it is quite possible for the average behavior to closely approximate the requirements just described. For example, if, once again, the average balance for all accounts neither increases nor decreases, and if purchases and payments are symmetrically distributed about the middle of the billing period, the average daily balances and hence the finance charges will be equal. The results of the study bear out this approximate behavior. The difference between the average finance charges under the two methods is insignificant.

A few other relationships are noteworthy. First, since Adjusted Balance is operationally analogous to an ADB system with all credits applied on the first day of the billing period, it is obvious that Adjusted Balance can never exceed any of ADB methods. In fact, finance charges under an Adjusted Balance system cannot exceed those under any other method since the base of assessment under Previous Balance or Ending Balance is at least equal to the base of assessment under Adjusted Balance.

Second, ADBX finance charges can never exceed those assessed under Previous Balance since at most the average daily balance is equal to the initial balance in the billing period.

Sample Design and Description

The following analysis is based on a total of eight studies performed over the past five years. Altogether, data were obtained from 8,433 one-year account histories drawn randomly from 6-1/2 million accounts in 28 different retail revolving charge operations in five states and from 2,841 accounts from bank card operations at 24 banks in three states.

Individual store[4] samples ranged from 27 to 2,700 accounts and bank samples ranged from 17 to 50.0 accounts. These samples consisted of the following items:

(1) balance at the beginning of the study year;

(2) all transactions to these accounts, including amount and date; and

(3) dollar amounts of finance charges assessed.

All account information was punched on cards and run through a special purpose simulation program. [1] The program balanced each account according to the billing method in actual use by the creditor. It then simulated the finance charges that would have been obtained by applying alternative billing methods to the individual account on the assumption that consumers' purchases and payments remained unchanged. These results were used in computing a variety of descriptive statistics on the final sample.

Survey and Simulation Results

There are at least two different approaches that could be used in analysis of the data obtained. One approach emphasizes the effect of billing method from the point of view of an individual customer. The other is concerned with the impact on the firm. Both approaches have merit, but the primary emphasis of this discussion will be from the point of view of the credit grantor rather than the customer. Particular attention will be given to two topics: (1) the distribution of dollar finance charges by billing methods and (2) the distribution of gross yields under alternative billing methods.

General Characteristics of the Sample

Of the 28 stores studied, eight operated in a state (Arkansas) where the maximum nominal annual percentage rate is ten, percent; the remainder were allowed to assess charges at a nominal annual rate of 18 percent (1.5 percent per month). This rate differential was reflected in the simulations developed for each sample of accounts. National chains were represented in each state and one national chain had stores in all five states studied. Ten of the 28 retail operations could be classified as units of national chains. Average monthly finance charges assessed per account ranged from 18 cents to $3.71. Finance charges for national chains were more consistent, ranging from 47 cents to $2.22 per account.

[4] "Store" refers to a retail revolving credit operation comprised of all retail outlets owned by the business entity within the boundaries of a state employing a consistent accounting procedure. In two cases, an entity had two separate and definable accounting systems within a state. Thus, each was included as a "store." "Bank" refers to a separate, identifiable accounting unit. Two of the banks had nine geographically separate accounting units, each of which was counted as a "bank." Also, one bank carried two plans, each of which was counted as a "bank."

Store credit operations ranged from nearly 700,000 accounts to less than 2,500. Average sales per month were fairly consistent, ranging from $30-44 per month to $10.01. However, more variation occurred in the number of yearly sales (5.3 to 16.7) and the size of the average sale ($11.79 to $42.95). One furniture store had an average sale of $276.73 but averaged only 1.3 purchases per year per account. Data in Table 1 indicate the diversity of the sample.

The sample of 24 banks was drawn from a slightly more homogeneous group of institutions (see Table IA). The Arkansas banks are single-unit banks, while those in California and Pennsylvania are branches. All of the banks were "large" in their respective markets, ranging in asset size from under $200 million through the very largest banks in California. All were leading banks for one or both of the major charge card plans (BankAmericard or Visa and MasterCharge). Two of the states where banks were sampled had a different nominal annual percentage rate ceiling--ten percent in Arkansas and 15 percent in Pennsylvania. California does not have a rate ceiling on bankcards, but the market has established a nominal rate of 18 percent. Part of the Arkansas sample consisted of accounts drawn from banks located in border cities which had a substantial customer base in Arkansas. In addition, one of the banks in Arkansas represented both major charge card plans and was counted as two "banks" while nine of the "banks" in California actually were different geographical segments of the systems of two major banks The samples taken from smaller banks were too limited to permit extensive comparisons with the larger institutions.

Actual Finance Charges and Billing Activity

Credit operations also displayed great diversity in the size of balances maintained, level of finance charges incurred, billing frequency, and other measures of credit activity. Table 2 illustrates the wide variation among the stores, and Table 2A displays similar data for the banks.

The mean true actuarial average daily balance, for all 28 stores was $113 with a $1.17 monthly finance charge based on the billing method actually in force, for a total finance charge revenue of about $14 a year on an average account. Charges were assessed in slightly more than one half of the billing months.

Average daily balances and average monthly finance charges for the 24 banks were almost triple those of the stores. The average number of finance charges assessed per year was almost identical to that of the stores, and the gross yield index differs by only 1.5 percentage points (82.6 for stores, 81.1 for banks).

These averages disguise to some extent the scope of activity. For example, the range of average daily balances in the store samples was nearly four times the mean and the range of actual finance charges was over three times the overall mean finance charge. For some stores, the average customer paid a finance charge almost every month. However, nearly three-fifths of the customers paid finance charges three to six times a year. Similar data from the bank sample in Table 2A display less variation than the retail data.

Two closely related but differing figures are important for a clearer description of the credit operations studied. These are the "gross yield" and the "average annual percentage rate paid per account" shown in Tables 2 and 2A. Gross yield[5] is defined as the ratio of the total finance charge revenues from all accounts (before expenses) to the average daily balance of receivables for each store or bank sampled.

[5] This term is not to be confused with profitability or net yield from credit operations because no allowance has been made for cost of capital on other expenses in providing credit services.

TABLE 1
DESCRIPTION OF STORES FROM WHICH SAMPLES WERE DRAWN

Store	Sample Size	Total Accounts	Billing Methods	Sales Per Month	Dollar Volume Per Month	Average Sale
New York						
A	88	601,992	P	.76	$26.78	$35.24
B	93	429,226	P	.52	17.79	34.21
C	55	664,692	P	1.01	26.22	25.96
D	98	4,000	A	.66	18.90	28.64
E	98	95,1388	P	.44	13-04	29.64
F	95	36,827	A	.50	10.01	20.02
G	108	16,800	P	.83	12.76	15.37
H	98	16,014	P	.90	20.75	23.06
I	99	131,378	P	1.31	15.44	11.79
L	103	54,303	A	.37	14.86	40.16
M	97	245,887	A 2	.69	15.19	22.01
N	97	656,600	P-X	.68	25.14	36.97
0	37	l?,225	P-A	.78	17.92	22.97
P	100	114,364	A	.85	117.56	20.66
Q	100	49-50,852	P	.45	18-17	40.38
R	42	(1)	E	.55	23.62	42.95
Arkansas						
AA	521	156,000	X	.61	22.76	37.31
AB	249	76,000	P	.52	13.37	25.71
AC	726	238,000	A-X	.82	12.75	15.35
AD	102	35,000	A	.78	18.11	23.22
AE	318	115,000	W	.98	16.54	16.88
AF	52	(1)	W	.63	11.10	17.62
AG	50	56,000	E	.11	30.44	276.73
AH	27	2,000	A-P	1.06	23.69	22.65
Texas						
TA	865	698,187	P	.95	19.85	20.89
TB	1155	679,927	P	.39	15.64	40.10
Florida						
FA	289	526,190	P	1.34	23.49	17.53
Michigan						
MA	2671	547,491	P	1.39	26.93	19.37
Total	8433	6,460,343				

1 figures from this "store" actually represent a second accounting system in one of the above stores.
2 P-X signifies that the store switched from Previous to ADBX during the year.

TABLE 1A
DESCRIPTION OF BANKS FROM WHICH SAMPLES WEREDRAWN

Bank	Sample Size[1]	Billing Methods	Sales Per Month	Dollar Volume Per Month	Average Sale
Arkansas					
AI	69	A	.79	$ 19.70	$24.94
AJ	151	A	1.45	30.33	20.92
AK	160	x	1.22	24.86	20.38
AL	103	P	1.23	22.47	18.27
AM	17	x	1.36	26.34	19.37
California [3,4]					
CA	88	X-W[2] (s)	3.06	$ 69.93	$22.85
CB	86	X-W (s)	2.73	62.49	22.89
CC	95	X-W (s)	2.91	62.15	21.36
CD	90	X-W (s)	2.45	64.30	26.24
CE	83	X-W (s)	2.83	67.98	24.02
CF	37	X-W (s)	3.40	65.35	19.22
CG	50	X-W (s)	3.04	68.91	22.67
CH	88	X-T (s)	2.56	61.73	24.11
CI	95	A	3.618	94.40	25.65
CJ	88	X-T (s)	3.64	82.93	22.78
CK	93	A	2.80	66.16	23.63
CL	94	A	3.11	70.05	22.52
CM	40	x	3.92	74.14	18.91
CN	50	x	3.73	74.19	19.89
CO	83	X-W (s)	2.38	68.53	28.79
CP	98	A	3.52	74.89	21.28
CQ	83	X-W (s)	2.14	45.71	21.36
Pennsylvania					
PA	500	P	.97	$ 19.51	$20.11
PB	500	P	1.20	23.99	19.99
Total	2,841				

Notes:

(1) Total accounts not available for most banks.

(2) X-W, X-T True ADB assessed indicates ADBX system for merchandise purchases, ADBW system or for cash advances; "s" indicates that finance charges were on a truncated month (i.e. less than 30-day month).

(3) California accounts contain cash advance debit Banks are merchandise purchases only.

(4) Two banks are presented by more than one geographical sample; one of the banks represents both of the major charge card plans.

TABLE 2
FINANCE CHARGE ACTIVITY OF SAMPLE—STORES

Store	Average Daily Balance	Average Monthly Finance Charge	Number of Finance Charges Paid Per Year	Average Annual Percentage Rate Paid Per Account	Gross Yield	Yield As % of Nominal Finance Rate
New York						
A	$148.41	$2.09	8.15	16.20%	16.90%	93.9
B	61.27	.72	4.10	10.56	14.10	78.3
C	99.84	1.20	5.40	10.32	14.42	80.1
D	49.02	.45	4.95	7.44	11.02	61.2
E	33.43	.36	3.34	9.84	12.92	71.8
F	22.09	.18	3.23	8.04	9.78	54.3
G	79.50	1.04	8.96	12.48	15.70	87.2
H	119.92	1.66	6.75	16.44	16.61	92.3
I	93.22	1.36	8.26	15.36	17.51	97.3
L	40.29	.36	3.98	6.00	10.72	59.2
M	66.90	.74	6.04	10.92	13.27	73.7
N	122.92	1.56	5.77	11.64	15.23	84.6
0	85.13	1.02	5.92	11.52	14.38	79.9
P	49.41	.43	4.74	10.20	10.44	58.0
Q	221.63	3.11	10.91	16.92	16.84	93.6
R	255.46	3.60	10.52	18.24	16.91	93.9
Arkansas						
AA	203.94	1.58	8.48	7.68	9.30	93.0
AB	152.92	1.23	7.69	7.80	9.65	96.5
AC	72.91	.47	5.21	4.44	7.74	77.4
AD	36.15	.18	3.51	3.00	5.90	59.0
AE	71.26	.52	4.83	5.04	8.76	87.6
AF	40.24	.30	3.96	5.88	8.95	89.5
AG	455.66	3.71	8.66	9.48	9.77	97.7
AH	77.28	.57	7.04	6.86	8.85	88.5
Texas						
TA	93.22	1.24	5.16	11.64	15.92	88.4
TB	179.92	2.59	7.40	13.68	17.34	96.3
Florida						
FA	109.38	1.46	5.62	11.04	16.02	89.0
Michigan						
MA	122.50	1.65	5.99	11.64	16.16	89.8
Mean	112.99	1.26	6.73			82.6
Standard Deviation	89.62	.99	2.11			13.5

TABLE 2A
FINANCE CHARGE ACTIVITY OF SAMPLE--BANKS

Bank	Average Daily Balance	Average Monthly Finance Charge	Number of Finance Charges Paid Per Year	Average Annual Percentage Rate Paid Per Account	Gross Yield	Yield As % of Nominal Finance Rate
Arkansas						
AI	$ 96,51	.66	4.54	4.20%	8.21%	82.1
AJ	192.11	1.34	8.17	6.48	8.37	83.7
AK	165.64	l.20	6.76	6.00	8.69	86.9
AL	158.52	1.23	7.61	6.96	9.31	93.1
AM	185.07	1.39	8.35	6.96	9.01	90.1
California						
CA	$312.98	$3.72	6.25	9,82%	14.26%	79.2
CB	342.12	4.25	6.90	10.45	14.91	82.8
CC	370,36	4.57	6.83	10.41	14.81	82.3
CD	315.75	3.82	6.26	9.54	14.52	80.7
CE	379.83	4.61	7.37	11.07	14.56	80.9
CF	302.23	3.50	7.86	11.37	13.90	77.2
CG	398.68	5.07	6.96	10~75	15.26	84.8
CH	278.18	3.24	5.82	9.12	13-98	77.7
CI	337.50	3.53	8.61	11.16	12.55	69.7
CJ	370.29	4.43	7.99	11.66	14.36	79.8
CK	242.29	2.49	5.80	8.44	12.33	68.5
CL	327.73	3.58	6.87	9.37	13.11	72.8
CM	487.87	5,82	5,80	8.93	14.32	79.6
CN	676.30	8.64	7.20	10.47	15.33	85.2
CO	301,33	3.62	7.84	11.80	14.42	80.1
CP	335.12	3.59	6,11	8.58	12.86	71.4
CQ	280.80	3.58	6,00	10.16	15.30	85.0
Pennsylvania						
PA	$116.34	$1.30	5.45	8.82%	13.41%	89.4
PB	96.01	.99	4.35	8.69	12.37	82.5
Mean	$294.57	$3.34	6.74			81.1
Standard Deviation	$130.49	$1.84	1.14			6.2

The annual percentage rate (APR) on an individual account is the total finance charges paid during the year on that account divided by its true actuarial average daily balance. The latter figure (the denominator) is merely the sum of the daily debit balances divided by 365. In this instance, the sum of daily debit balances is equal to the total, of each day's unpaid balance (less unpaid finance charges.). The APR thus calculated is a measure of the cost of the account based on the exact amount owed for the exact length of time (number of days) the amount was owed. The “average annual percentage rate paid per account" is the arithmetic mean of the individual APRs for the entire sample.

Although closely related, the two figures are not the same. Consider the following example:

	Customer A	Customer B
Total Finance Charge Paid	$18.00	00
Average Daily Balance	$100.00	$200
APR:	18%	0%

Gross Yield:	$18 ÷ $300	= 6%
Average APR:	18% + 0%	= 18% ÷ 2 = 9%

Average APR and a gross yield were calculated for each of the stores and banks in the overall sample. Data in Tables 2 and 2A are shown at the rates allowed by law in each state (which was 18 percent except for Arkansas at 10 percent and Pennsylvania at 15 percent). Again, there is no rate ceiling on bankcard revolving credit in California. With Arkansas and Pennsylvania rates adjusted to a nominal, or calculating, rate of 18 percent, the average APR ranged from a low of 5.4 percent to over 18 percent. The contradictory appearance of the latter figure was a result of the application of the 18 percent base rate (actually 1.5 percent per month) to some balance other than the average daily balance. That is, if the balance on which the charge is based exceeds, in general, the true actuarial average daily balance (which can occur under such billing systems as Previous Balance and Ending Balance), the APR may be more than the nominal rate. It should be noted that the lower figure (5.4 percent) was computed for the firm at an 18 percent rate in a state with a maximum allowable rate of ten percent. Thus, in actuality, the average APR was a modest three percent (5.4 x 10/18).

A more consistent picture of credit performance can be drawn from an index of actual gross yield to the nominal annual rate in force in the state in question (see Tables 2 and 2A). This type of index depicts the ratio of realized finance charges to "maximum" permissible charges under local regulations.

On the average, the index displayed a value of 82.6 for stores and 81.1 for banks (nominal APR 100), ranging from 54.3 to 97.7 among the stores and from 68.5 to 93.1 among the banks. In all, nine stores had yield indexes above 90, and 19 were above 80; only two banks were over 90, while 15 were above 80. Thus, the gross yields realized by these firms were consistently below the nominal rate disclosed to consumer under Truth in Lending regulations. Arkansas stores had an average index of 86.1, slightly higher than the average store index (81.2) in the 18 percent states. Banks averaged 81.1 with higher indexes occurring in the lower rate states. National chains averaged 87.7. Among those six stores using the Adjusted Balance method of assessing finance charges, the yield index was 60.9, while those using the Previous Balance system had an index averaging 88.8. A similar pattern was displayed by the bank samples when comparing Adjusted Balance to Previous Balance.

Effect of Billing Method on Finance Charges

Considerable evidence has been gathered demonstrating the dramatic effect that choice of billing method may have on the gross yield to grantors of revolving credit, The simulations were very revealing from the standpoint of holding purchase and payment practices constant within a particular institution and varying only the terms of assessment on current account activity.

Data in Tables 3 and 3A show for each store and bank the level of average monthly finance charges under six different billing methods at a nominal or calculating annual rate of 18 percent. The figures for both stores

and banks in Arkansas and Pennsylvania have been inflated to a level "as if" they had been assessed at a rate of 18 percent instead of the 10 percent or 15 percent (for Pennsylvania) actually used.[6]

Some of the relationships displayed in Tables 3 and 3A are worth special attention. As noted earlier, substantial litigative and legislative activity has attacked the Previous Balance System. In particular, some type of average daily balance system is often put forth as a 11superior" or "fairer" basis on which assessment calculations are to be made.

One of the more interesting comparisons is that between charges under the average daily balance method, which includes current month's purchases in that balance (ADBW), and charges under a Previous Balance System. Generally, differences in average monthly finance charges under these two methods did not exceed more than one or two cents on the store samples. For many stores, there was no difference. In no instance did the difference between these two methods exceed six cents a month (three stores had six cents a month difference). Although the differences displayed were generally statistically insignificant, Previous Balance was more expensive than ADBW for only three of the 28 stores.

For bank samples, absolute dollar and cent differences between finance charges assessed under ADBW and Previous Balance were slightly larger than was true of the store samples, probably because of larger account balances on bankcards. The average monthly difference among the bank samples was four cents (compared to one cent for stores), with ADBW being the larger of the two. Monthly differences at the banks ranged from zero to 11 cents, with 14 banks experiencing differences of four cents monthly or less, and nine banks having differences ranging from six to 11 cents. For only one bank did the Previous Balance system produce higher monthly charges (by eight cents) than did ADBW.

In general, the variation in average revenues was inversely proportional to the number of times yearly an account was revolved. That is, if the balance remained large relative to the purchase or payment activity, cost differences between billing methods become substantially less.

The essence of revolving credit (open-end), however, is its allowance for randomly timed purchases and payments. As the variation in both timing and size of this activity increases, so does the variation in costs by the different billing methods. This point is discussed further in a later section.

[6] For Arkansas stores the level of finance charges at a nominal rate of 10 percent may be ascertained by multiplying the figure shown by 0.56 (10/18).

TABLE 3

SIMULATED MONTHLY FINANCE CHARGES UNDER VARIOUS BILLING METHODS--STORES (At Nominal Rate of 18 Percent)

Store	Previous Balance	Adjusted Balance	Ending Balance	Average Daily Balance Including Debts	Average Daily Balance Excluding Debts	True Actuarial Average Daily Balance
New York						
A	$2.10	$1.78	$2.18	$2.11	$1.98	$21.24
B	.75	.63	.90	.75	.69	.96
C	1.24	1.02	1.40	1.25	1.16	1.51
D	.61	.45	.72	.61	.55	.74
E	.38	.30	.51	.38	.35	.56
F	.28	.21	.40	.28	.25	.45
G	1 .07	.93	1.12	1.07	1 .01	1 .16
H	1.70	1.45	1.77	1.71	1.60	1.79
I	1.36	1.17	1.44	1.37	1.28	1.47
L	.50	.36	.58	.50	.45	.60
M	.90	.76	1.02	93	.86	1.09
N	1.66	1.42	1.80	1.65	1.56	1.85
0	1.15	.98	1.28	1.17	1.07	1.35
P	.65	.47	.77	.64	57	.84
Q	3.11	2.86	3.12	3,19	3.03	3.22
R	3.58	3.27	3.61	3.61	3.46	3.64
Arkansas						
AA	2.95	2.74	3.07	2.98	2.86	3.07
AB	2.21	2.06	2.27	2.25	2.16	2.30
AC	1.01	.88	1.06	1.02	.96	1.10
AD	.40	.32	.55	.41	.36	.55
AE	.93	.80	1.04	.94	.83	1.07
AF	.54	.47	.63	.55	.51	.61
AG	6.73	6.26	6.70	6.67	6.53	6.85
AH	1.06	.82	1.18	1.07	.98	1.16
Texas						
TA	1.24	1.09	1.41	1.24	1.18	1.47
TB	2.59	2.39	2.62	2.60	2.51	2.67
Florida						
FA	1.47	1.28	1.67	1.53	1.42	1.72
Michigan						
MA	1.65	1.42	1.85	1.66	1.56	1.91
Mean	1.56	1.38	1.66	1.57	1.49	1.71
Standard Deviation	1.32	1.25	1.29	1.32	1.29	1.31

TABLE 3A

SIMULATED MONTHLY FINANCE CHARGES UNDER VARIOUS BILLING METHODS--BANKS (At Nominal Rate of 18 Percent)

Store	Previous Balance	Adjusted Balance	Ending Balance	Average Daily Balance Including Debts	Average Daily Balance Excluding Debts	True Actuarial Average Daily Balance
Arkansas						
AI	$1.31	$1.19	$1.48	$1.33	$1.26	$1.45
AJ	2.67	2.42	2.85	2.70	2.58	2.89
AK	2.30	2.10	2.47	2.32	2.22	2.49
AL	2.23	2.02	2.36	2.23	2.14	2.38
AM	2.65	2.38	2.79	2.65	2.51	2.78
California						
CA	$3.95	$3.44	$4.59	$4.01	$3.77	$4.69
CB	4.48	3.96	5.05	4.52	4.30	5.11
CC	4.85	4.27	5.39	4.87	4.65	5.55
CD	3.98	3.58	4.61	4.05	3.86	4.74
CE	5.01	4.44	5.67	5.05	4.79	5.69
CF	3.80	3.26	4.45	3.81	3.56	4.53
CG	5.30	4.79	5.87	5.34	5.13	5.98
CH	3.41	3.02	3.99	3.44	3.28	4.18
CI	4.13	3.53	5.00	4.21	3.89	5.07
CJ	4.70	4.08	5.40	4.81	4.49	5.55
CK	2.88	2.50	3.52	2.91	2.75	3.63
CL	4.16	3.58	4.81	4.25	3.96	4.92
CM	6.28	5.49	7.26	6.20	5.89	7.32
CN	9.13	8.15	10.14	9.24	8.77	10.14
CO	3.91	3.35	4.53	3.97	3.70	4.57
CP	4.04	3.60	4.92	4.13	3.90	5.03
CQ	3.65	3.27	4.16	3.71	3.52	4.21
Pennsylvania						
PA	$1.55	$1.39	$1.69	1.55	$1.49	$1.74
PB	1.16	1.03	1.39	1.17	1.12	1.42
Mean	$3.81	$3.37	$4.35	$3.85	$3.65	$4.42
Standard Deviation	$1.71	$1.51	$1.94	$1.73	$1.64	$1.96

Effect of Billing Method on Gross Yields

Data in Tables 4 and 4A illustrate the gross yields of the store obtained by relating the average simulated finance charges under various billing methods to the calculated true actuarial average daily balance. The index columns in the table relate the gross yields obtained to the nominal, or calculating, APR.

As can be observed from the data in Tables 4 and 4A, some of the gross yields exceed 100 as compared to the nominal APR. This apparent anomaly stems from three different causes: (1) round off error which may come from several calculations, but is likely to have little influence on the overall results; (2) a 50 cent minimum charge was included in the simulations for those creditors that assessed such a monthly charge; and

(3) credit balances which may have existed for all or part of the year on certain individual accounts and upon which no (positive or negative) finance charge was applied, but which lowered the average daily balance.

To illustrate the second point above, consider that for stores E and F in Table 4 the average daily balances were $33.43 and $22.09, respectively. For all accounts with positive balances in any month less than $33.33, a 50-cent minimum finance charge was applied. This was, necessarily, a frequent occurrence in these two stores which had such small ADBs.

The third point is clarified by considering that customers occasionally overpay their accounts for a given month (several accounts sampled were found to have credit balances for the entire period studied). No finance charges are assessed in such situations, and the average daily balance is reduced.

The gross yield averages bare approximately the same relationship to one another under the various billing methods as do the realized average monthly finance charges as shown previously in Tables 3 and 3A. Several results bear special mention, however. First, there is no necessity that Previous Balance yields and ADBW yields be equivalent. Indeed, any number of structured situations may be envisioned in which they would display a wide divergence. Nevertheless, the gross yields resulting from these two methods for any given creditor differ only insignificantly throughout the entire sample.

Second, as the number of times an account revolves in a year declines, the gross yields under Previous, Adjusted, ADBW, and ADBX methods also generally fall, while those under Ending and TADB methods rise. Even more striking is the increase in the variability in finance charges among different methods as changes occur in the number of times an account revolves. Table 5, derived from Tables 3 and 4, illustrates this point for the store sample. The thrust of this finding is that it makes relatively less difference which billing method is chosen as more customers allow their accounts to revolve (that is to incur finance charges).

Third, the larger the store (or accounting unit), the more consistent its performance. National chains made up the bulk of the account population from which the samples were drawn and were among the largest accounting units. Table 6 provides data comparing national chains with the entire store sample. As can be seen, national chains experienced gross yields in relation to the normal finance rate ranging from 81.9 (under Adjusted Balance) to 101.2. On the other hand, for all stores, the range was from 75.6 to 103.0. Banks, which usually had larger systems than all but the very largest stores, had much less variation in gross yields than did retailers.

Recent Developments

In recent years a new type of average daily balance system has been initiated by a few firms. While this method was not simulated on the samples discussed in this paper, a few remarks are worthwhile in regard to its operational performance. For purposes of this discussion, this newer method will be referred to as ADBR, or simply "retro." The significance of this title will be evident upon description of the method in the following paragraphs.

ADBR operates much as an ADBX system insofar as finance charges are not assessed on purchase balances accrued during the current billing cycle of an account. However, if the total of credits and payments in a cycle are less than the previous statement balance (i.e., if the account is not paid off in full), finance charges are assessed retroactively in the succeeding month from original date of purchase on the current purchase balance. In other words, no finance charge is assessed during a month on current purchases; but if the account is not paid in full during the following cycle, those same purchases will accrue finance charges from their original date of purchase or date of posting to the account.

A number of worthwhile observations can be made about the finance charge yields produced by this method. First, the finance charge yields should be approximately the same as those produced by ADBW systems, provided that the time frame included in the calculations starts at the point of original purchase and continues until the account is paid off at some later date. However, if a shorter time frame is considered, such as a month, a few months, or even a year, the finance charge yields can be substantially larger than even the nominal annual percentage rate. This results from the fact that under a ADBR system a component of the average daily balance upon which the finance charge is based is attributable to balances arising from purchases in the previous month. Thus, the sum of daily debit balances for a current billing cycle can be inflated compared to what would exist if the average daily balance were based only on current month's purchases. This condition can lead to an average daily balance under "retro" that is larger than the beginning, ending, or even maximum balance within a given billing cycle.

This aspect of the retroactive method may cause anomalies in finance charge yields when such yields are calculated for shorter periods such as one month, a few months, or one year. However, this method cannot produce finance charge yields in excess of the nominal annual percentage rate when it is measured from zero balance to zero balance (i.e., the total cycle of an account).

These anomalies in finance charge yields may cause some difficulties for users in states where the rate per month is of major consequence as opposed to consideration of the "life" of an account. In some usury cases in the past, it has been very much an issue as to whether or not the finance charge imposed on an account in any given month ever exceeded the nominal annual percentage rate allowed by statute.

A simple example may illustrate the operation of an ADBR system. Assume the following transactions on a revolving account:

Jan. 1 . . . . 0 Balance
Jan. 2 . . . . $100 purchase — Finance Charge: 1.5% per month
Jan. 31 . . . . Billed for $100

Feb. 13 . . . . $10 payment on account — February ADBR = $201.79
Feb. 13 . . . . $100 purchase on account — ($100 x 30 + $100 x 28 - $10 x 15) / 28
Feb. 28 . . . . Finance Charge of $3.03 — February finance charge
Feb. 28 . . . . Billed for $190.03 — $201.79 x .015 = $3.03

March 1 …. Paid $190.03
March 31….0 Balance, 0 finance charge

In this example, it is clear that over this entire account history, the gross finance charge yield is less than the nominal finance rate since some "free,, time was realized in both January and March. That is, the true actuarial rate for the entire period would be less than 18 percent because of the number of days of credit extended in January and March for which no charge was made.

However, the average daily balance for February ($201.79) under ADBR is greater than either the previous months balance, the February ending balance, or the maximum balance owed at any time during February. The ADB for February as more traditionally calculated under an ADBW system, for example, would be $148.21 ($100 x 28 + $100 x 15 - $10 x 15)/28, and the resulting finance charge for the month would be $2.22 ($148.21 x .015). The ADBR balance of $201.79 is likely to prove confusing to many customers since it is greater than either the ADB ($148.21) or even the largest balance ever owed during the current month.

Further confusion can result if the dates on the retroactive purchases are given only on the previous month's statement (when the purchases actually occurred), rather than on the current month's statement (when the charge is actually imposed).

Thus, it should be evident that if the ratio of finance charges assessed to the true average daily balance exceeds the nominal disclosed rate in any given month, it may exceed that nominal rate over any arbitrary number of months that truncate either the leading month in which the initial purchase was made or the last month in which the account is paid off (or zeroes out). Furthermore, a sample of accounts drawn at any point in time will inevitably show that a certain number of accounts in any system were assessed finance charges in excess of the nominal annual percentage rate. This caveat is by no means a certain source of difficulties, but as a source of potential problems, it would seem risky to ignore this quirk which is characteristic of an ADBR billing system.

Concluding Remarks

The findings of these studies warrant several observations. Some of these relate to policy decisions by creditors; others should be of value in legislative decision-making.

Creditor Policy

Consideration of choice of assessment method should involve examination of four areas: (1) legal implications, particularly a growing concern over use of the Previous Balance method, (2) the effect on finance charge revenues, (3) the effect on sales volume, and (4) general community image.

The following observations are made with the above factors in mind:

1. The Previous Balance method has the advantage of being easy to explain to customers and at the same time easy to administer. It can be used with manual billing systems.

2. The Previous Balance method produces the greatest finance charge revenues of any non-ADB method that also allows use of the account on a 30-day charge basis with no finance charge, i.e., "free" time.

3. Previous Balance has an advantage of customer familiarity through longstanding customary use in the credit card industry.

4. Legal complications or other considerations could produce a need to adopt a method other than Previous Balance.

5. Average Daily Balance Including Debits provides for approximately the same level of finance charge revenues as Previous Balance.

6. Average Daily Balance Excluding Debits provides on the average approximately five to six percent less finance charge revenue than Previous Balance or ADBW but may offer a competitive advantage since current month's purchases are excluded from finance charge calculations (in contrast to Average Daily Balance Including Debits).

7. Adjusted Balance produces substantial reductions in total finance charge revenues.

TABLE 4

SIMULATED GROSS YIELDS (%) UNDER VARIOUS BILLING METHODS

Store	Previous Balance GY	Previous Balance *Index	Adjusted Balance GY	Adjusted Balance *Index	Ending Balance GY	Ending Balance *Index	ADB W GY	ADBW *Index	ADBX GY	ADBX *Index	TADB GY	TADB *Index
New York												
A	16.98	94.3	14.39	79.9	17.63	97.9	17.06	94.8	16.01	88.9	18.11	100.6
B	14.69	81.6	12.34	68.6	17.63	97.9	14.69	81.6	13.51	75.1	18.80	104.4
C	14.90	82.8	12.26	68.1	16.83	93.5	15.02	83.4	13.94	77.4	18.15	100.8
D	14.93	82.9	11.02	61.2	17.63	97.9	14.93	82.9	13.46	74.8	18.12	100.7
E	13.64	75.8	10.77	59.8	18.31	101.7	13.64	75.8	12.56	69.8	20.82	115.7
F	15.21	84.5	11.41	63.4	21.73	120.7	15.21	84.5	13.58	75.4	24.45	135.8
G	16.15	89.7	14.04	78.0	16.91	93.9	16.15	89.7	15.25	84.7	17.51	97.3
H	17.01	94.5	14.51	80.6	17.71	93.4	17.11	95.1	16.01	88.9	17.91	99.5
I	17.51	97.3	15.06	83.7	18.54	103.0	17.64	98.0	16.48	91.6	18.92	105.1
L	14.89	82.7	10.72	59.6	17.27	95.9	14.09	82.7	13.40	74.4	17.87	99.3
M	16.14	89.7	13.63	75.7	18.30	101.7	16.68	92.7	15.43	85.7	19.55	108.6
N	16.21	90.1	13.86	77.0	17.51	97.3	16.11	89.2	15.23	84.6	18.06	100,3
0	16.21	90.1	13.81	76.7	18.04	100.2	16.49	91.6	15.08	83.8	19.02	105.7
P	15.30	85.0	11.41	63.4	18.20	101.1	15.54	86.3	13.84	76.9	20.40	113.3
Q	16.84	93.6	15.49	86.1	16.39	93.8	17.27	95.9	16.41	91.2	17.43	96.8
R	16.82	93.6	15.36	85.1	16.96	94.2	16.96	94.2	16.25	90.3	17.10	95.0
Arkansas												
AA	9.59	95.9	8.88	88.8	10.00	100.0	99.71	97.1	9.29	92.9	10.00	100.0
AB	9.61	96.1	8.93	89.8	9.92	99.2	9.76	97.5	9.45	94.5	9.97	99.7
AC	9.15	91.5	7.97	79.7	9.66	96.6	9.15	91.5	8.64	86.4	9.71	97.1
AD	7.33	73.3	6.00	60.0	10.00	100.0	7.67	76.7	6.67	66.7	9.96	99.6
AE	8.81	88.1	7.46	74.6	9.66	96.6	8.81	38.1	8.31	83.1	9.94	99.4
AF	8.82	88.2	7.65	76.5	10.29	102.9	8.32	88.2	8.24	82.4	10.14	101.4
AG	9.84	98.4	9.13	91.3	9.79	97.9	9.74	97.4	9.53	95.3	9.98	99.8
AH	9.22	92.2	7.03	70.3	10.16	101.6	9.22	92.2	8.44	84.4	9.94	99.4
Texas												
TA	15.96	88.7	14.03	77.9	18.15	100.8	15.96	88.7	15.19	84.4	18.92	105.1
TB	17.27	95.9	15.94	88.6	17.47	97.1	17.34	96.3	16.74	93.0	17.81	98.9
Florida												
FA	16.13	89.6	14.04	78.0	18.32	101.8	16.79	93.3	15.58	86.6	18.87	104.8
Michigan												
MA	16.16	89.8	13.91	77.3	13.12	100.7	16.26	90.3	15.28	84.9	18.12	100.7
Mean		89.1		75.6		99.6		90.1		83.9		103.0
Standard Deviation		6.2		9.3		5.8		6.4		7.4		8.0
Maximum		97.3		91.3		120.7		98.0		95.3		135.8
Minimum		73.3		59.6		83.4		75.8		66.7		95.0
Range		24.1		31.7		37.3		22.2		28.6		40.8

*Nominal annual rate = 100

TABLE 4A

SIMULATED GROSS YIELDS M UNDER VARIOUS BILLING METHODS--BANKS

Bank	Previous Balance GY	Previous Balance *Index	Adjusted Balance GY	Adjusted Balance *Index	Ending Balance GY	Ending Balance *Index	ADBW GY	ADBW *Index	ADBX GY	ADBX *Index	TADB GY	TADB *Index
Arkansas												
AI	9.05	90.5	8.22	82.2	10.22	102.2	9.19	91.9	8.71	87.1	10.02	100.2
AJ	9.27	92.7	8.40	84.0	9.89	98.9	9.37	93.7	8.96	89.6	10.03	100.3
AK	9.26	92.6	8.45	84.5	9.92	99.2	9.34	93.4	8.93	89.3	10.02	100.2
AL	9.38	93.8	8.49	84.9	9.93	99.3	9.38	93.8	9.00	90.0	10.01	l00.1
AM	9.54	95.4	8.57	85.7	10.05	100.5	9.54	95.4	9.04	90.4	10.02	100.2
California												
CA	15.14	84.1	13.19	73.3	17.60	97.8	15.37	85.4	14.45	80.3	17.98	99.9
CB	15.71	87.3	13.89	77.2	17.71	98.4	15.85	88.1	15.08	83.8	17.92	99.6
CC	15.71	87.3	13.84	76.9	17.46	97.0	15.78	87.7	15.07	83.7	17.98	99.9
CD	15.13	84.1	13.61	75.6	17.52	97.3	15.39	85.5	14.67	81.5	18.01	100.0
CE	15.83	87.9	14.03	77.9	17.91	99.5	15.95	88.6	15.13	84.1	17.98	99.9
CF	15.09	83.8	12.94	71.9	17.67	98.2	15.13	84.1	14.13	78.5	17.99	99.9
CG	15.95	88.6	14.42	80.1	17.67	98.2	16.07	89.3	15.44	85.8	18.00	100.0
CH	14.71	81.7	13.03	72.4	17.21	95.7	14.84	82.4	14.15	78.6	18.03	100.2
CI	14.68	81.6	12.55	69.7	17.78	98.8	14.97	83.2	13.83	76.8	18.03	100.2
CJ	15.23	84.6	13.22	73.4	17.50	97.2	15.59	86.6	14.55	80.8	17.99	99.9
CK	14.26	79.2	12.38	68.8	17.43	96.8	14.41	80.1	13.62	75.7	17.98	99.9
CL	15.23	84.6	13.11	72.8	17.61	97.8	15.56	86.4	14.50	80.6	18.01	100.1
CM	15.45	85.8	13.50	75.0	17.86	99.2	15.25	84.7	14.49	80.5	18.00	100.0
CN	16.20	90.0	14.46	80.3	17.99	99.9	16.40	91.1	15.56	86.4	17.99	99.9
CO	15.57	86.5	13.34	74.1	18.04	100.2	15.81	87.8	14.73	81.8	18.20	101.1
CP	14.47	80.4	12.89	71.6	17.62	97.9	14.79	82.2	13.97	77.6	18.01	100.1
CQ	15.60	86.7	13.97	77.6	17.78	98.8	15.85	88.1	15.04	83.6	17.99	99.9
Pennsylvania												
PA	13.33	88.8	11.95	79.7	14.53	96.8	13.32	88.8	12.81	85.4	14.96	99.7
PB	12.08	80.6	10.73	71.5	14.48	96.5	12.18	81.2	11.67	77.8	14.79	98.6
Mean		86.6		76.7		98.4		87.5		82.9		99.99
Standard Deviation		4.4		5.0		1.5		4.2		4.4		.4
Maximum		95.4		85.7		102.2		95.4		90.4		101.1
Minimum		79.2		68.8		95.7		80.1		75.7		98.6
Range		16.2		16.9		6.5		15.3		14.7		2.5

*Nominal annual rate = 100

TABLE 5

GROSS YIELD AS A PERCENT OF NOMINAL FINANCE RATE BY NUMBER OF TIMES ACCOUNT REVOLVED—STORES

		Billing Method							
Number of Times Account Revolves Yearly	**Number of Stores**	**Previous Balance**	**Adjusted Balance**	**Ending Balance**	**ADBW**	**ADBX**	**TADB**	**Average**	**Standard Deviation**
10 or more	2	93.6	85.6	94.0	95.0	90.7	95.9	92.4	3.8
8 to 9.99	5	95.1	84.3	98.5	95.4	90.7	100.6	94.1	5.9
6 to 7.99	5	93.7	81.0	99.6	94.8	89.3	101.2	93.3	7.4
4 to 5.99	11	87.3	73.0	98.6	87.9	81.6	l02.9	88.5	10.9
less than 4	5	80.9	63.9	104.2	81.6	73.7	110.4	85.8	18.0

Nominal annual rate = 100

TABLE 6
GROSS'YIELD'AS A PERCENT OF NOMINAL FINANCE RATE,
ALL STORES VS. NATIONALCHAINS

Stores	N	Previous Balance	Adjusted Balance	Ending Balance	ADBW	ADBX	TADB
All	28						
Mean		89.1	75.6	99.6	90.1	83.9	103.0
Standard Deviation		6. 2	9.3	5.8	6.4	7.4	8.0
National Chains	10						
Mean		92.1	81.9	98.9	93.2	88.4	101.2
Standard Deviation		2.3	5.7	2.6	3.3	4.0	3.8

Nominal annual rate = 100

8. True Actuarial Average Daily Balance produces the highest possible finance charge revenues per account but, might reduce credit sales because of the loss of 30-day "free" time.

9. A somewhat newer development referred to in this paper as ADBR will probably produce finance charge yields similar to those realized under ADBW. However, this method may prove more confusing to customers than other types of ADB methods. Furthermore, potential problems could arise resulting from the fact that this method can produce finance charge yields in a given month or arbitrary period of time that are substantially greater than disclosed nominal annual percentage rates.

Legislative Implications

The following judgments may be of some interest to anyone concerned with the desirability of legislation affecting revolving credit:

1. Because cost differences under alternative methods of finance charge assessment have small annual dollar impact on an average customer, failure to mandate legislatively a specific billing method is not necessarily contrary to the best interest of consumers.

2. Specification of any single billing method by statute is fraught with many difficult, of not insoluble, problems involving administration and equity.

3. The Adjusted Balance method, while usually producing lower finance charges, frequently results in very small savings to an average customer. These small savings can be offset by higher cash prices or other measures designed to recover the substantial loss of finance charge revenue to creditors who use this method.

4. Mandating an Average Daily Balance method, while eliminating complaints about the Previous Balance system, provides great difficulty for smaller creditors who are not computerized. Among retailers the result could be forced discontinuation of in-house credit operations with substitution of bank credit card plans, private label plans, or elimination of credit privileges.

5. Requiring a method of assessment that results in generally lower finance charge revenues produces a need to reevaluate existing rate structures, since sharply lower revenues can produce higher cash prices or restriction of credit availability, both of which have greater impact on lower income groups.

6. Ideally, methods of finance charge assessment should be a matter of free choice by the creditor based on his competitive situation, financial condition, technical capabilities, and needs and desires of his customers.

7. There are two remaining areas in which both creditors and legislators should be interested. First, with more and more firms changing their method of assessment to an average daily balance type, much care should be given to the choice of language used in describing the technique. Of all methods, ADB types are the hardest to understand; and therefore, companies changing to one of the ADB types should make every reasonable effort to choose language that can be easily understood by their customers. If this is not done voluntarily, pressure could mount in legislative circles to abolish some ADB methods or to require softie type of "standard" language.

Adequate notice that a change will be made in billing method is a second area of concern. This is particularly important when the change may result in an. increase in finance charge costs for the customer. Under such circumstances, Truth in Lending regulations (see Section 226.7f of Regulation Z) require notice of such change not later than 15 days prior to the beginning date of the billing cycle in which the change is scheduled to occur.

Adherence to this requirement may leave consumers unaware of the effects of the proposed change. The notice given consumers need not explain the differences between the new and old billing systems and the effects on finance charges to be paid. To be fully aware of the nature of the shift, consumers would have to compare the new disclosure statement with the previous disclosure statement, looking carefully at every aspect of the two in an effort to find the differences.

Even though not required by federal statute or regulation, a better procedure may be to explain what changes are occurring and the reasons for each change (such as increasing costs of providing credit services). Only a few customers are likely to be interested in the before-and-after disclosure statement, since it has been shown earlier in this study that differences in average monthly finance charges paid under different billing systems generally amount to only pennies. However, fuller voluntary disclosure may counter allegations that firms are hoping that obscure language may prevent customers from understanding the effects of new billing systems. Also, such disclosure may reduce pressure in legislative halls to prohibit certain billing methods that appear to be more expensive to consumers or to require multiple and elaborate notification of changes, In any case, more understandable language describing assessment methods and more adequate notice of the nature of changes in assessment methods may be desirable from consumers' point of view.

REFERENCES

1. DeSpain, Edward. Program SRC--Background, Operation, and Description, July 1974 (Unpublished paper)
2. Economics of New York State Retail Store Revolving Credit Operations for the Fiscal Year Ended January 31, 1973, Touche Ross and Company, September 7, 1973.
3. McAlister, E. Ray. An Empirical Analysis of Retail Revolving Credit, Monograph No. 1, West Lafayette', Indiana: Credit Research Center, Krannert Graduate School of Management, Purdue University, 1975.