The Effect of Alternative Billing Methods Upon Retail Revolving Credit Yields

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THE EFFECT OF ALTERNATIVE BILLING METHODS UPON RETAIL REVOLVING CREDIT YIELDS

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Recent years have brought great pressure on many grantors of retail revolving credit to change the basis upon which finance charges are assessed. Numerous law suits 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: whether or not the Previous Balance System is authorized under statutory language and whether or not the finance charge yield produced exceeds that maximum rate permitted by statute. Some 10 states have adopted new laws specifying certain billing methods that may be used, having the effect of excluding others such as the Previous Balance System.

Creditors have become increasingly aware of mounting criticisms surrounding certain billing methods. Changes resulting from these events have also 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, particularly cost of capital, 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 as to the effect on store revenues and customer costs. The primary objective of the studies presented here was to obtain extensive empirical data to analyze the impact of methods of assessing finance charges.

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.

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 discerned.

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Billing Methods--Definition and Descriptions

The general form of a billing method may be represented by the following equation:

$$f = B(b) + C(n_t\ c_t) + D(m_S\ d_S) \text{ where,}$$

f = the finance charge assessed on a single account in a given month
b = the balance at the beginning of the billing month 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 month,
(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 month,
(5) whether a full payment of the beginning balance (balance on previous month's statement) will cause omission of a finance charge

In order to isolate the impact of variations in the method of finance charge assessment on the amount and distribution of dollar finance charges, it is necessary to 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 legislative or litigative connections. A common attribute is that the level of the finance charge is completely controllable by the users of the accounts, although the method of control is different for each method.

Let us define the following identifiers:

P = previous balance method

A = adjusted balance method

E = ending balance method

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[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.

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

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

$i = 1, \ldots, NM$

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

$j = 1, \ldots, NP$

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

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

(5) Sum of debits

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

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:

$FC = FR*B$ for $O<B<BP$

$= FR*B + FB* (B-BP)$ for $B \geq BP$

$= 0$ for $B \leq SC$

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:

$$FC = FR*(B-SC) \qquad \text{for } O< (BS-SC)<BP$$

$$= FR*BP + FB*(B-BP-SC) \qquad \text{for } (B-SC)\geq BP$$

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

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:

$$FC_E = FR*(B-SC+SD) \qquad \text{for } 0 <(B-SC+SD) <BP$$

$$= FR*BP+FB* (B-SC+SD-BP) \qquad \text{for } (B - SC + SD) \geq BP$$

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:

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

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

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

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:

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

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

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

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.

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

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

[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

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

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 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.

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 disallowance 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 so long as the account is not paid off. 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 this instance, in essence, 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, both because many recent changes in billing methods have involved switches to ADBW and because of the functional equivalence of the two methods 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 six studies performed over the past three years. Altogether, data was 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.

Individual store[4] samples ranged from 27 to 2,700 accounts and 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 store and then simulated the finance charges that would have been obtained by applying alternative billing methods to the individual account. 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 10 percent; the remainder as 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 nation4l chain had stores in all five states studied. Ten of the 28 retail operations could be classified as units of national chains. Average

[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."

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.

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 indicates the diversity of the sample.

Actual Finance Charges and Billing Activity

Credit operations alto 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.

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	601,922	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	95,388	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	.69	15.19	22.01
N	97	656,600	P-X[2]	.68	25.14	36.97
O	37	12,225	P-A	.78	17.92	22.97
P	100	114,364	A	.85	17.56	20.66
Q	100	250,852	P	.45	18.17	40.38
R	42	(1)[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)[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

[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.

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	6,461,343				

TABLE 2

FINANCE CHARGE ACTIVITY OF SAMPLE

Store	Average Daily Balance	Average Monthly Finance Charge	Number of Finance Charges Paid Per Year	Average Annual Percent Rate Paid Per Acct.	Gross Yield	Yield As Percent 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
O	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

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.

These averages disguise to some extent the scope of activity. For example, the range of average daily balances 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 three to six finance charges a year.

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 on each account as reflected in the data in Table 2. 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 sampled.

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

[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.

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 in the overall sample. Data in Table 2 is shown at the rates allowed by law in each state'(which was 18 percent except for Arkansas at 10 percent). With Arkansas 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 10 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 Table 2). 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 (nominal APR = 100), ranging from 54.3 to 97.7. In all, nine stores had indexes above 90 and 19 were above 80. Thus the gross yield realized by these retailers was below the rate disclosed to consumers under truth-in-lending regulations. Stores in Arkansas had an average index of 86.1, slightly higher than the average index (81.2) in 18 percent states. National chains averaged 87.7. Among those six stores using the Adjusted Balance method of assessing finance charges, the index was 60.9, while those using the Previous Balance System had an index averaging 88.8.

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 Table 3 shows for each store 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 stores in Arkansas have been inflated to a level "as if" they had been assessed at rate of 18 percent instead of the 10 percent actually used.[6]

[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).

Some of the relationship displayed in Table 3 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 "superior" 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. 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 tended to cost the same or less a greater percentage of the time (Previous Balance was more expensive for only three of the 28 stores).

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.

TABLE 3

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

Store	Previous Balance	Adjusted Balance	Ending Balance	Average Daily Balance Including Debits	Average Daily Balance Excluding Debits	True Acturial Average Daily Balance
New York						
A	$2.10	$1.78	$2.18	$2.11	$1.98	$2.24
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
O	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	.88	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

Effect of Billing Method on Gross Yields

Data in Table 4 illustrates 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 Table 4, 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 included in those simulations for which the store policy was to use such a calculation in its assessments, 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 tended to lower the overall daily balance calculation.

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 less than $33.33, 50 cent minimum finance charge was applied. This was, necessarily, a frequent occurrence in these two stores which had such small ADBs.

The latter 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). Since no finance charges are assessed in such situations and the average daily balance is reduced, the ADB is lower than would normally be apparent from comparing the two.

The gross yield averages bear approximately the same relationship to one another under the various billing methods as do the realized average monthly finance charges as shown previously in Table 3. Several results bear special mention, however. First, there is no real necessity for Previous Balance yields and ADBW yields to 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 store differ only insignificantly throughout the entire sample.

Second, as there is a decline in the number of times an account revolves in a year, the gross yields under Previous, Adjusted, ADBW, and ADBX methods generally decline, 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. 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 vast 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 sample. As can be seen, national chains experienced gross yields in relation to the nominal 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

TABLE 4

SIMULATED GROSS YIELDS (%) UNDER VARIOUS BILLING METHODS

	Previous Balance		Adjusted Balance		Ending Balance		ADB/W		ADB/X		TADB	
Store	**GY**	***Index**	**GY**	***Index**	**GY**	***Index**	**GY**	***Index**	**GY**	***Index**	**GY**	***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	98.4	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	14.89	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
O	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	16.89	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	8.98	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	88.1	8.31	83.1	9.94	99.4
AF	8.82	88.2	7.65	76.5	10.29	102.9	8.82	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	18.12	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.
Standard Deviation		6.2		9.3		5.8		6.4		7.4		8
Maximum		97.3		91.3		120.7		98.0		95.3		
Minimum		73.3		59.6		83.4		75.8		66.7		95.
Range		24.1		31.7		37.3		22.2		28.6		40.8

*Nominal annual rate = 100

TABLE 5

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

----------Billing Method----------

Number of Times Account Revolves Yearly	Number of Stores	Previous Balance	Adjusted Balance	Ending Balance	ADB/W	ADB/X	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	102.9	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

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 retail 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 5-6 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.

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 charge account privileges, i.e., free time.

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, if 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 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

TABLE 6

GROSS YIELD AS A PERCENT OF NOMINAL FINANCE RATE,
ALL STORES VS. NATIONAL CHAINS

			Billing Method					
Store		**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

for smaller retailers who are not computerized. The result could be forced discontinuation of in-house credit operations with substitution of bank charge 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 re-evaluate 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.

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