CONSUMER PASSBOOK SAVINGS VERIFICATION

by

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INTRODUCTION

. . . too often the consumer receives savings rhetoric rather than
savings information. . . . The American people have a right to
compare savings plans, and to know exactly what their savings will
bring. We need clarification, not confusion, at the teller's
window.

> --Virginia Knauer,
>   Special Assistant to the President
>   for Consumer Affairs
>   October 12, 1973

This quotation is taken from Mrs. Knauer's press release announcing

the introduction of the Administration's Financial Institutions Act of

1973 (S. 2591) which includes a special section on Truth in Savings. Mrs.

Knauer reiterates the concerns expressed by consumer leaders during a

special conference held Sept. 19, 1973 sponsored by the Office of Consumer

Affairs in cooperation with Treasury Secretary George P. Shultz and Deputy

Secretory William E. Simon to discuss the President's proposal for improv-

ing the Nation's financial system.

At this conference Dr. Richard L. D. Morse, one of 27 representatives

of consumer and public interest organizations invited to the consultation,

took the position that without full implementation of Truth in Lending and

inclusion of Truth in Savings, the purported benefits for the consumer of

restructuring the financial system could escape the consumer, leaving even

greater confusion (U.S. Dept. of the Treasury, 1973, p. 20). Mr. Simon

recognized the merits of the suggestion, but said that since Truth in

Savings was already before the House (H.R. 4985) and Senate (S. 1052),

there was no need for its inclusion in the Administration bill. Neverthe-
less, after being made aware of the importance of giving Truth in Savings
Administration backing, it was added as a special section. The addition of
Truth in Savings was featured by the Wall Street Journal in its news
coverage on the introduction of S. 2591 The Financial Institutions Act of
1973 by the headline: "Treasury Adds 'Truth-in-Savings' Provision to Bank-
ing Package, Sends It to Congress" (Wall Street Journal, October 15, 1973).
A comparative analysis of the two legislative proposals is in Appendix A.

This was the latest in the development of Truth in Savings that has
evolved over an extended period. In 1963 The Consumer Advisory Council,
in specifying the meaning of full disclosure of credit terms, recognized
that the same rate being quoted for savings would be appropriate for credit
(Morse, 1973, p. 154). At that time the appropriateness of the annual per-
centage rate was in question; the periodic percentage rate was well accepted
for credit, but not for savings. In the late 1960's intense competition
among institutions for saving deposits and with the advent of electronic
computing facilities which permitted daily and continuous compounding,
attention focused on the yield rate. Competitive advertising of yield
rates, in what appeared to be irresponsible and gross proportions, brought
attention to the need for regulation and the ultimate issuance of Regula-
tion Q (S. 1052, p. 217-23). However, it was the Pinson thesis (1970)
that brought national attention to how significantly computation methods
could affect the amount of earnings paid on active savings accounts.

Robert Harvey, Editor of Changing Times, and Dr. Morse who had
directed the Pinson study were members of the Consumer Advisory Council to
the American Bankers Association at which meeting the Pinson study was

discussed. Mr. Harvey, upon seeing the thesis, requested an opportunity to feature it in a future issue of Changing Times and the result was "Maybe We Need Truth in Savings Too" (Changing Times, 1971). Senator Hartke's legislative aid, Howard Marlowe, recognized the challenge and within a year the Truth in Savings Act was jointly introduced by Senator Vance Hartke (S. 1848) and Representative Dr. Bill Roy (H.R. 8365) (conversations with Dr. Richard L. D. Morse, 1974).

No hearings were held in the 92nd Congress. But the bill evoked considerable interest. The American Bankers Association (ABA) polled the state associations and concluded: (1) the amount and frequency of information to the consumer may overwhelm him--that it is more than he wants to know and perhaps more than he feels are needed to know for him to make intelligent decisions concerning his savings, (2) the term "Truth in Savings" has a certain sting to it and should be modified, (3) the cost of disclosure could be excessive, (4) the recision section was objectionable, and (5) the advertising requirements would be burdensome. In general, it was the position of the ABA that the regulatory agencies have sufficient authority to make any changes needed and that legislation would be unnecessary. Morse and Fasse, in consultation with the leadership of the Kansas Bankers Association, resolved many of the objectionable aspects of the bill (Price, p. 5). The modified disclosure standards were incorporated in an article by Morse and Fasse (1973).

In the 93rd Congress, the bill with most of these modifications was introduced by Senators Hartke, Bayh, Gravel, and Humphrey (S. 1052) in the Senate and simultaneously by Representatives Roy and Sullivan in the House (H.R. 4985). Again, no hearings were scheduled. At the insistence of

Senator Hartke, Senate hearings were held before the Subcommittee on Consumer Credit of the Committee on Banking, Housing, and Urban Affairs in June, 1973. Dr. Morse gave the legislative history of the bill and developed the rationale for the rate disclosure requirements. He also included with his testimony most of the printed literature on Truth in Savings, so the Hearings constitute the most voluminous if not valuable source of information to date about Truth in Savings (S. 1052, 1973).

The Federal Reserve Board and Federal Home Loan Bank Board endorsed the concept of full and uniform disclosure but differed as to what should be disclosed; the FRB favored the APR and PPR, but the FHLBB favored APR and APY. Banking and savings and loan representatives testified that legislation was unnecessary because sufficient power was vested with the regulatory authorities. They also disagreed that all information required for disclosure by the bill was necessary and were concerned that disclosure of it would entail undue cost to the financial industries. The subcommittee recommended the bill to the full Committee and at the same time wrote the Federal Reserve Board requesting that it study the possibility of developing a simplified method of interest computation. The Federal Reserve Board study begun February 3, 1974, is scheduled to be reported in June 1974. Thus, the status of legislation is pending.

American consumers saved $54.8 billion or 6.2% of their disposable incomes in 1973, yet countless savings decisions were made without access to the "facts of life" of savings accounts (U.S. Department of Commerce, 1974). The American savings scene is clouded by two deficiencies: (1) lack of standard terms to describe savings account features, thus limiting their comparison, and (2) lack of regulations requiring savings institutions to

disclose to consumers all of the terms and conditions related to the determination of earnings on savings accounts. As a result, conscientious consumers cannot judiciously choose and effectively manage their personal savings accounts.

This manuscript represents the fifth in a series of studies undertaken at Kansas State University to examine the inadequacies of current savings disclosures. The first study was undertaken by Pinson (1970) to determine the methods used to compute earnings on passbook accounts and the effect that computation methods and other variables have on the amount of earnings actually paid. The study by Osbaldiston and Morse (1971) was an analysis of the adequacy of information disclosed in savings advertisements. For his in-depth case study of an individual savings account, Price (1972) assessed the adequacy of information provided by the savings passbook itself, advertisements, and through personal correspondence in verifying the earnings paid to the account. Frey (1973) surveyed consumer practices in verifying passbook savings and accounts and in selecting savings plans. This study focuses on the need for adequate disclosure of savings terms and conditions for purposes of verifying earnings accruing to consumer passbook savings accounts.

Since 1962, three presidents have affirmed the consumer's right to be informed (President Kennedy's Message to Congress, March 15, 1962). Adequate information must be readily available to consumers if they are to make enlightened choices and act responsibly. This fundamental concept is an integral part of the basic philosophies of measures such as Truth-in-Lending, Truth-in-Packaging, Truth-in-Advertising, Truth-in-Insurance, and Truth-in-Savings.

The traditional approach to savings and investment education has been one of alerting the consumer to recognize three characteristics of a savings plan: safety, liquidity, and the rate of return. The first two characteristics are easily determined by the consumer-shopper; safety refers to accounts being insured by the Federal Deposit Insurance Corporation (FDIC) or Federal Savings and Loan Insurance Corporation (FSLIC); and liquidity refers to the availability of funds to the consumer. The third characteristic, rate of return, is more difficult for consumers to discern.

Institutions frequently use two rates, the annual percentage rate and the annual percentage yield, to describe the savings plan being offered. The APR is the most commonly quoted rate and the APY reflects the frequency of compounding and length of year. Although maximum rates for savings accounts are prescribed by law, not all financial institutions pay this maximum rate. Furthermore, the actual rate paid may be less than the advertised rate.

Lavely investigated regular savings deposits of Indiana commercial banks to determine the differences between the nominal rate quoted by institutions and the effective rate actually paid by institutions. Most of the 138 banks responding to the questionnaire had nominal rates of 4.0% and 4.5%, but the effective rates actually paid by the banks during the previous year ranged from 2.90% to 4.71% as indicated by the banks' own calculations. On the average, depositors received .40 percentage points less than the quoted rate (Lavely, 1973, p. 20).

In 1917 Wolfe revealed how banks could advertise one rate and actually pay another. Such "impossible generosity" was accomplished by "doctoring" the balance:

. . . for instance, a deposit made the third of the month does
not begin to draw interest until the first of the following month.
Or again, if the balance varies from day to day, interest is
allowed on the minimum rather than on the average balance. The
result is that the depositor actually receives no more interest
at "4%" than he would have received at 2% according to better
methods. Let it be understood, however, that there is nothing
unsound or unwarranted in making interest calculations according
to the methods above described. The objectionable feature is that
there is an element of deception involved, and competition on these
lines is both unfair and unethical. . . . (Wolfe, 1917, p. 235).

Wolfe held that consumers had a responsibility to verify their accounts but

added, "as a rule, the average depositor is unable to check the correctness

of interest calculations, with the result that banks sometimes take advan-

tage of this lack of technical knowledge by advertising one rate and

actually paying another" (Wolfe, 1917, p. 235).

The complexities in computing interest had their origin in less

affluent times when financial institutions struggled to attract and main-

tain deposits. Federal insurance to assure the safety of deposits had not

been established. Small deposits and frequent withdrawals were less lucra-

tive for the institutions, so conditions were established that would either

encourage the saver to make larger deposits or penalize the saver for with-

drawing his money. Harris mentioned that some banks placed a minimum

figure for balances, since otherwise a "raft" of very small accounts would

be expensive for the financial institution to process (Harris, 1915, p.

126).

According to Drebin (1963) excess savings account activity is costly

to banks. With the ultimate goals of increasing the average account

balance, decreasing the volume of transactions, and lengthening the life of

savings accounts Drebin offered six plans for increasing bank profits from

savings accounts: (1) impose account restrictions such as minimum

balances, limiting the number of free transactions, or threatening to close
an account because of excessive withdrawals, although Drebin warned that
the goodwill of the public might be lost if such measures were adopted;
(2) add interest incentives, such as offering to pay interest on accounts
with a balance of $500 or larger, or raising the interest rate; (3) offer
prizes and promotional efforts to attract additional deposits; (4) offer
additional services and conveniences to bank customers as an enticement to
save; (5) change interest computation methods within the limits established
by Regulation Q; and (6) assess service fees such as annual maintenance
fees, transaction charges, or fees for accounts closed before the end of
the normally expected account life.

Interest computation methods used by savings institutions are
numerous. Over 50 methods of calculating earnings at the same annual
percentage rate were reported in a survey conducted by the American Bankers
Association (ABA) in 1925 (Sutcliffe et al., 1930, p. 314). Cohen and
Hanson (1958) cited an ABA report published in 1958 which indicated that
over 100 different methods were in use. A 1960 survey reported at least
14 different basic methods (Cox, 1966), and a survey conducted by the ABA
in 1964 concluded that there are at least 54 ways in which interest is
commonly computed. The results of a current ABA survey have not been
published.

Because savings institutions are not required to disclose all of the
facts relating to interest computation, few consumers are aware of the
magnitude of difference one method may produce over another. Pinson sur-
veyed banks to gain an understanding of the various terms and conditions
affecting the interest paid on savings. She constructed a comprehensive

schedule of questions to obtain a fair description of the methods and terms governing savings accounts of banks. Although she succeeded in getting answers, she did not feel confident that the banker was fully knowledgeable or able to communicate with her. To test the accuracy of their communication, she developed a standard activity pattern of deposits and withdrawals. Two identically described systems should produce identical earnings. Initially, she calculated the earnings for the activity pattern by five basic methods using 40 different combinations of specific variables that can alter savings yield. Earnings for the 40 systems varied 171% between the highest and lowest-paying systems even though the same 6% annual rate of interest had been used in the computations. When seven savings institutions were requested to identify from the 40 systems, the system used by their institutions, all reported different systems from those described by Pinson. Yields calculated by the savings institutions had a 186% range between the highest and lowest paying systems (Pinson, 1970).

Consumer faith and trust have sustained the savings systems in the United States over the years. The prevalence of this faith was documented in a recent study by Frey (1973) in which she interviewed a sample of upper middle class households in Topeka, Kansas to assess consumer practices in checking the accuracy of earnings paid to their savings accounts. Of the 95 who affirmed that their earnings were correct, more than half believed that if the amount shown on Form 1099 or on a statement issued by the savings institution agreed with the amount posted in the passbook, then no error had been made by the institution in calculating earnings. Only three of the consumers surveyed had checked the actual calculations. When asked their reaction to the amount of information savings institutions supply to

consumers about savings accounts, nearly all expressed belief that suffi-
cient information was provided or accessible, thus demonstrating consider-
able faith and trust in financial institutions and little awareness of the
complexities of the savings issue.

Savings advertisements as a valid source of information were scruti-
nized intensely by Morse from 1966 to 1969, and as a result the Federal
Reserve Board issued Regulation Q governing advertising. Sixty-one docu-
ments related to advertising adequacy are reprinted in the Hearings on
S. 1052 (p. 173-217). Subsequently, advertisements were examined by Pinson
(1970), Osbaldiston and Morse (1971), and Price (1972) for their value to
consumers as a source of information. Pinson found a confusing array of
different terms used to describe savings plans and a lack of factual
information. Osbaldiston and Morse analyzed advertisements from fourteen
major newspapers during a twelve month period and graded the ads according
to the completeness of information provided the consumer. More than one-
half (53%) provided inadequate information according to the criteria
established. Neither size of advertisement nor type of institution was
related to information adequacy. Price surveyed advertisements from one
savings and loan institution appearing over a 42 month period to determine
if information needed by a consumer concerning earnings payable on savings
accounts was disclosed in the advertisements as implied by the institution.
All 164 advertisements were judged to be inadequate in the information dis-
closed. None gave sufficient information to enable a consumer to verify
earnings accruing to an account.

When a consumer chooses to save money and places it with a financial
intermediary for safekeeping and monetary return, he enters into a

contractual relationship with that institution. In writing about the practical operations of bank management, Corns maintains that "every person who does business with a bank generally does so because of an agency, fiduciary, debtor, or creditor relationship founded on a contract" (Corns, 1962, p. 308). The consumer has a right to expect full disclosure of the details of the contractual agreement so that he may fulfill his obligations relative to that contract. To permit rational decision-making and to exercise consumer responsibilities relative to the savings contract, consumers need information at three important times, according to Morse and Fasse (1973, p. 159):

1. at the time the consumer is shopping for a savings institution in which to place his funds so he can select the one which best meets his needs and thereby fulfill his responsibility of rewarding that savings institution;

2. during the life of the contract so he can exercise his responsibility to take advantage of opportunities in the market as they arrive; and,

3. when earnings are paid, to fulfill his responsibility to verify his account.

The focus of this thesis is on the third point, namely, the verification phase. The Truth in Savings Act, in anticipation of the need of consumers to have ready access to facts essential for verifying accounts, requires in Section 6 (b) that the following be disclosed with any earnings report, and annually: (1) the amounts of earnings paid, (2) the annual percentage rate, (3) the periodic percentage rate, (4) the principal balance to which the periodic percentage rate was applied, and the method by which that balance was determined, (5) any charges . . . , and (6) anything else that would or could affect the rates or earnings.

These disclosure requirements are directly comparable with those currently required by financial institutions on their credit accounts. In Appendix A appears a precise comparative analysis of Truth in Savings and Truth in Lending provisions. Many of the financial institutions or their representatives take the position that such disclosure requirements are impractical, not feasible, burdensome, costly, or unnecessary. But nevertheless for the consumer wishing to validate his accounts, these disclosures are essential.

The responsibility for checking the accuracy of earnings clearly rests with the consumer. The Federal Deposit Insurance Corporation (FDIC) when pressed in this matter stated that it depends on consumers to validate the earnings paid to individual bank deposits:

> We also agree that the federal bank regulatory agencies are unable to routinely validate the interest paid on individual deposit accounts and that the gap in this area can best be filled by the consumer. Since limitations on personnel preclude us from doing more than making a spot check on individual accounts from time to time, we must rely heavily on a bank's customers to call irregularities in their accounts to our attention (FDIC letter of August 18, 1971 in S. 1052, 1973, p. 234).

The need for emphasizing disclosure for purposes of verification can be illustrated by a number of examples:

One consumer discovered a 16% discrepancy between earnings that had been paid to two identical accounts maintained in the same institution. Both accounts had been opened at the same time and with identical deposits. One paid $18.96 and the other $22.04. Once brought to the attention of the institution, both accounts were credited with the correct amount of earnings, $22.04 (Morse et al., 1973, p. 159). If the accounts had not been identical, the discrepancy may well have gone unnoticed. Follow-up correspondence revealed that the contract terms were inadequate to

reconstruct the earnings calculation, that the factors used were not comparable with those used by the institution and that the regulatory authorities were not disposed to discover the error. This series of correspondence is documented in the Hearings on S. 1052 (1973, p. 223-226).

Price attempted to verify the earnings paid to a bonus certificate and companion passbook, but found the information on both insufficient for verifying the earnings. Only after extensive correspondence with the savings institution to determine how earnings had been derived could the payment of interest to the accounts be reconstructed (Price, 1972).

In a statewide survey conducted by 82 Kansas State University graduate students in 1971, respondents were requested to verify the earnings paid to their own accounts, but only 39% were able to verify earnings to their satisfaction. They reported that lack of sufficient information regarding the payment of interest prevented verification (Morse and Fasse, 1973, p. 159).

This researcher, in attempting to verify earnings of an account believed to compound earnings daily, discovered that earnings were actually computed daily and compounded semi-annually. Verification was possible only after an exhaustive consultation with institution personnel (S. 1052, 1973, p. 414).

One consumer corresponded over a five month period with a certified public accountant firm charged with auditing the accounts of a savings institution, requesting that they verify earnings paid to a very active savings account. The request was refused (S. 1052, 1973, p. 414).

During the Senate hearings on S. 1052, the California Savings and Loan League representative cited a hypothetical savings model to illustrate the

system used by her institution in computing earnings and what would be required to comply with S. 1052. She itemized those facts she believed would be required for purposes of verification under S. 1052 (1973, p. 467). Not only was some information required by S. 1052 missing, namely, the APR and the PPR, but two conflicting methods for determining the principal balance eligible for earnings were specified. The use of two conflicting methods for determining the amounts eligible for earnings presents an insoluble problem. The researcher has written for clarification of this apparent conflict, but has received no reply. Thus even this account exhibited by a major industry representative cannot be verified.

Two efforts have been made to develop model formats for financial institutions in compliance with S. 1052. Fasse edited an actual savings and loan statement to include those words and phrases and other disclosures required, thus proving at least to his satisfaction the practicality of this bill (S. 1052, 1973, p. 414). This researcher developed a sample disclosure statement to give a visual presentation of what would be required under S. 1052 (S. 1052, 1973, p. 159).

No study had been given to the procedures for verifying accounts and the significance of verification. It was in keeping with this felt need that this study was undertaken.

OBJECTIVES

1. To determine whether a need exists for consumers to verify their own passbook savings earnings, as measured by the frequency of agreement of posted earnings with verified earnings and the magnitude of the discrepancy.

2. To examine whether need varies by type of institution, level of account activity, method used to compute earnings, and size of account.

3. To measure the magnitude of difference between earnings computed by the DIDO method and earnings computed by the various methods employed by savings institutions.

4. To assess the communications gap between savings institutions and consumers regarding the terms and conditions of their savings contracts.

To accomplish these objectives, a system for verifying earnings must first be developed and tested for a reasonable variety of contractual conditions in current use. Also, a method for obtaining passbook savings records and information regarding the terms and conditions of the savings contract must be developed. The development and testing of verification systems and methods used to obtain savings records for verification are discussed in the Procedure.

PROCEDURE

The ability to verify earnings which have accrued to a savings account during an interest-paying period is directly related to knowledge of the specific variables affecting the computation of those earnings. A survey of earnings computation methods in current use was made to gain a better understanding of prevailing conditions. Systems to verify passbook earnings were developed and first tested on hypothetical and then on a few actual cases. Finally, passbook savings records were collected in sufficient number for testing the verification systems.

Development of Earnings Verification Systems

Survey of prevailing earnings computation methods

A search was conducted to collect materials revealing ways in which savings account earnings are computed. Examination of savings passbooks and earnings statements, conversations with local savings institution personnel, communication with the Kansas Bankers Association and the Kansas Savings and Loan League, and review of literature constituted the methods employed in the search for information.

Numerous savings passbooks and statements belonging to the researcher and other associates were analyzed, but none indicated ways in which the consumer might verify the earnings accruing to his account. Savings statements frequently contained the phrase, "please verify this statement and report any difference immediately," but no further explanations were given

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to enable the saver to verify the earnings paid. Furthermore, savings passbooks provided little or no useful information for verifying the account. For example, San Diego Trust and Savings Bank stated: "interest will be computed and credited to this account as of January 1, April 1, July 1, and October 1, at a rate, and on the conditions prescribed by the Board of Directors."

Various accounts accessible to the researcher were studied to determine how earnings had been calculated. Verification was attempted, but usually the result was unsatisfactory despite appeals to savings institution personnel for clarification. One exception was an account for which earnings were computed daily. Once the difference between earnings "computed daily" and "compounded daily" was explained, verification of the account was possible. A report of this experience which involved persistent interrogation of five people is cited in the published hearings on Truth-in-Savings held in June 1973 (S. 1052, 1973, p. 414). Other conversations revealed a general reluctance to discuss or demonstrate verification procedures and a tendency to claim ignorance when earnings were computer determined. Only those persons familiar with computer operations were found to be conversant about exact computational procedures. Institution personnel seemed better equipped to discuss general terms and conditions of savings accounts than to assist the saver in verifying a particular account.

A determined effort was made to work directly with banking and savings and loan representatives to obtain from them or through them information about the variety and extent of usage of passbook computation methods. The Kansas Bankers Association's president referred the request to his own bank, the Commercial National Bank of Kansas City, Kansas. They

provided a full and detailed disclosure of the four basic ways by which

accounts are handled and earnings are computed for the more than forty

institutions serviced by that bank. The Kansas Savings and Loan League

office did not provide information, preferring instead to conduct its own

survey and study. Copies of documents related to industry cooperation are

contained in Appendix B.

Literature was reviewed to locate specific examples of computational

procedures. Pinson's treatment of the variables which determine yield

(earnings) clearly illustrated the computations of various methods

(Pinson, 1970). Sutcliffe's chapter on dividends included a reprint of

the results of a 1925 study conducted by the American Bankers' Association

(ABA) on methods of computing interest on savings accounts in banks in the

U.S. (Sutcliffe, 1930). More than 50 interest computation methods were

described in detail. Sutcliffe's chapter on mechanical bookkeeping

described the method to be followed by the Burroughs Posting Machine

(Sutcliffe, 1930, pp. 210-211):

> In order to avoid the task of computing interest at the close
> of the interest period, a number of banks figure interest daily.
> At the start of the interest period they compute from a table
> the amount of interest each savings account balance will earn
> if there are no deposits or withdrawals during the interest period.
> They enter this amount in the interest column on the ledger card.
> The interest lost on any withdrawal during the period is
> subtracted from the interest balance; the interest earned on any
> deposit to the close of the interest period is added. Thus the
> interest balance is kept up to date and at the close of the
> period no further interest calculation is necessary.

This description was of special interest to the researcher because it

closely resembles one of the earnings verification systems developed and

reported in Appendix G.

This preliminary search for information: (1) revealed some problems consumers could encounter when attempting to verify earnings; (2) identified from the literature a variety of interest computation methods; (3) described in detail four earnings computation methods in current use by a major bank; and (4) made manifestly clear that the variables essential for verifying earnings must be identified.

Identification of variables affecting earnings verification

Variables related to earnings computation and verification were identified and organized in the format of the basic simple interest formula, $I = PRT$. In the formula, I refers to the amount of interest (earnings); P refers to the principal amount upon which interest is paid; R refers to rate and is usually expressed as a percentage; and T refers to the time period for which the rate pertains. Figure 1 illustrates the variables which affect earnings computation and verification.

Interest

Interest and earnings are used interchangeably and refer to the amount of money accruing to a savings account as compensation for the use of funds on deposit. Interest is determined by the amount of principal eligible to earn interest, the rate of interest, and time. A variety of variables influence principal, rate, and time.

Principal

The principal may or may not be the same as the amount on deposit because some funds on deposit may not be eligible to earn interest. Deposits eligible for earnings are affected by the size and timing of transactions, methods of computing interest, and specific institutional

Figure 1. Variables related to earnings computation and verification.

INTEREST	=	PRINCIPAL	×	RATE	×	TIME
• amount of posted earnings		• beginning balance		• periodic percentage rate		• length of year
		• transaction amounts		• annual percentage rate		• beginning and closing dates of period
		• principal balance eligible for earnings (bookkeeping methods)		• compounding frequency		• length of interest period

		– low balance
		   – FIFO-beginning bal.
		   – FIFO-first deposits
		   – LIFO
		   – DIDO
				• annual percentage yield		• posted dates

		• average daily balance		• interest factors		• effective transaction dates
		• minimum transaction size requirement				• earnings crediting dates
		• minimum balance requirement				• grace days
						• minimum time requirements for deposits

OTHER VARIABLES

  • charges and penalties

  • premiums and gifts

requirements. The following must be identified and considered in determining the eligibility of principal for earnings:

Beginning balance. The beginning balance is the amount of money on deposit at the start of the period.

Transactions amounts. The amounts of any deposits or withdrawals occurring during the interest-paying period.

Principal balance eligible for earnings - bookkeeping methods. Pinson (1970) listed five basic methods for determining the principal balance eligible for earnings. These five basic bookkeeping methods are:

1. Low balance. Only the lowest balance on deposit during the interest period is eligible for earnings. Deposits in excess of the lowest amount do not qualify for earnings. A variation of this method is the monthly low balance method.

2. FIFO, applied to beginning balance. FIFO stands for first in, first out. Withdrawals, regardless of when they occur, are deducted first from the beginning balance for the interest period, and later from subsequent deposits. The effect of this system is loss of interest on withdrawals from the beginning of the period rather than from the actual withdrawal date.

3. FIFO, applied to first deposits. Instead of being deducted from the beginning balance, withdrawals are deducted first from the first deposit made during the interest period, and later from subsequent deposits. The effect of this system is loss of interest on withdrawals from the time of the first and subsequent deposits rather than from the actual withdrawal date.

4. LIFO. LIFO stands for last in, first out. Instead of being deducted from the beginning balance or first deposit, withdrawals are deducted first from the last deposit made before the withdrawal, and later from previous deposits. The effect of this system is loss of interest on withdrawals from the time of the last deposit rather than from the actual withdrawal date.

5. DIDO. DIDO stands for day in, day out. This system pays interest for the actual number of days money remains on deposit. Eligibility for earnings originates on the day of deposit and ceases on the day of withdrawal.

Average daily balance. The average daily balance for the interest-paying period is determined by dividing the sum of the principal eligible for earnings each day by the total number of days in the period.

Minimum transaction size requirement. Some institutions require deposits to be of a certain size before they are eligible for earnings.

Minimum balance requirement. Some institutions require a minimum account balance to be maintained for the account to be eligible to earn interest.

Rate

Rate and time are intimately related since rate in the formula is the percentage rate per unit of time. Since it is the rate for the period, it is referred to as "the periodic percentage rate." From this rate are derived, other rate expressions such as "the annual percentage rate" and "the annual percentage yield."

Periodic percentage rate. The PPR is the rate applied to the principal balance for the period to determine the amount of earnings for the

period. The PPR is rarely disclosed to the consumer, despite its common usage in computations. It can be derived from the quoted annual percentage rate by dividing it by the number of periods in the year.

Annual percentage rate. The APR is the most commonly quoted rate, but is not the rate used for computing earnings except in the unique case in which there is no compounding. The periodic percentage rate, multiplied by the number of periods in a year, will equal the APR for that period.

Compounding frequency. The compounding frequency identifies how often earnings are actually determined and added to the principal balance to form a new principal amount. If compounding is done annually, this would be referred to as simple interest. However, earnings can be compounded semi-annually, quarterly, monthly, weekly, daily, hourly, by the minute, second, or infinitesimally smaller time units, in which case it is known as "continuous compounding."

Annual percentage yield. Annual percentage yield expresses, as a percentage, the amount of earnings which would accrue in one year to a principal amount of $100 as a result of the successive applications of the periodic percentage rate at the end of each period to the sum of the principal amount plus any previously accrued earnings. The APY, like the APR, is not a functional rate used for earnings computation, but it does reflect the effect of compounding frequency and length of calendar year used in computing earnings. A table showing the APY for selected annual rates and frequencies of compounding for a 365 day year is in Appendix C.

Factors. Factors are decimal expressions of the rate-time relationship for a principal amount of $1.00. They are used by some savings institutions to facilitate the computation of earnings. Since the factor

represents the earnings for $1 of principal for a given time and rate, earnings for any other principal amount are readily determined by multiplication. The availability of factors relieves the financial institution of the need to figure compound earnings for each rate and time for each principal amount. For interest compounded within an interest-paying period, a table of compound interest factors is constructed, and if there is no compounding within the period, a table of simple interest factors is constructed. No standardized table of compound interest factors for use by all savings institutions has been authorized (Morse and Fasse, 1973). As a result, many institutions have constructed their own tables, and therefore, discrepancies between earnings computed using different factors can occur. Selected pages from the factor tables published by Commerce Bank of Kansas City, Missouri, list compound daily factors for a 360 and a 365 day year at 5% and are reproduced in Appendix D. The factor tables constructed for use in this research are in Appendix E.

Time

Time is an integral and essential element. The periodic percentage rate is uniquely related to a time period. If the rate is to be expressed in annual terms such as APR or APY, then the length of year and number of time periods per year become essential.

Length of year. A calendar year may consist of 360, 365, or 366 days, depending on institutional practices (Code of Federal Regulations, Title 12, Section 217.3(e)). The Truth-in-Savings bill recognizes only the 365 day year. The periodic percentage rate, the annual percentage rate, and the length of year are interrelated. For a given APR, the PPR is higher

for a shortened year of 360 days and if this higher PPR is paid out over a full 365 or 366 days, the amount of earnings is greater.

Beginning and closing dates of period. The beginning and closing dates for an interest period must be identified in order to establish the length of the period.

Length of interest period. The exact length of time in an interest-paying period must be identified and may be measured in days, weeks, months, quarters, or semesters. When measured in days, care must be taken to determine if a period extends from the beginning date through or to the closing date for the period. Periods may not coincide with expected calendar quarters or semesters, and the number of days in each may vary. For example, there are 181 days from January 1st through June 30th, and 184 days from July 1st through December 31st. Customary calendar quarters contain 90, 91, or 92 days.

Posted dates. The dates shown in the passbook may reflect only the date the bookkeeper entered the activity in the passbook, regardless of the fact that the activity may have occurred on some other date. Or, the posted date could meaningfully disclose the date the deposit or withdrawal is recognized. Since no standards presently exist, the posted dates must be regarded with caution.

Effective transaction dates. Since posted dates may differ from the dates recognized as effective, the effective transaction dates must be determined before earnings can be verified. Some savings institutions honor transactions made before a certain hour as effective for that day, while transactions made after that hour become effective the next business day.

Earnings crediting dates. Earnings may be credited to an account several days before the end of the period, on the last day of the period, or on the first day of the next period. Regardless of when they are credited, they usually reflect the interest earned for the entire interest-paying period. Earnings may be compounded more frequently than they are credited. For example, an institution may compound earnings daily, but credit them only quarterly. Earnings would be available to the saver only on or after the crediting date.

Grace days. Deposit and withdrawal grace days may be offered by some savings institutions. Earnings deposited by a certain date each month or period may earn as if deposited on an earlier date, such as the first day of the month or period. Withdrawals made during a certain period, usually during the last few days of an interest-paying period, may not lose earnings. Likewise, deposits made during this final period may or may not begin to be eligible for earnings until the first day of the next period.

Minimum time requirements for deposits. Some institutions may require that new deposits remain on deposit for a specified length of time before they may be eligible for earnings.

Other variables

Any other variables which increase or reduce the amount of earnings need to be identified.

Charges and penalties. Charges may be made for activity in the account to discourage excessive withdrawals or deposits from an account during a specified period of time. Also, the methods of deducting charges or penalties must be identified. For example, institutions may deduct

charges from the principal amount either before or after determining earnings for the period.

Premiums and gifts. Rewards are often offered to entice consumers to open a new account or increase deposits of an old account. They vary in attractiveness and value. Their availability may fluctuate, depending on competition and the need for funds.

Earnings verification systems

The purpose of developing a standard earnings verification system is to provide a procedure that can be used to verify earnings paid to any savings account. Such a system should be: (1) easy to use and not require special equipment, except for convenience; (2) generally applicable to any earnings payment system; (3) reliable, that is, produces identical results if repeatedly used to verify an account; and (4) valid, that is, correctly applies the terms and conditions governing the payment of earnings for a given account.

Three verification systems were developed to accommodate the variables which affect the computation of earnings paid on passbook savings: (1) the Average Daily Balance System (ADBS)--a periodic percentage rate or a compound interest factor is applied to the average daily balance for the interest period; (2) the Accrued Earnings Potential System (AEPS)--the earnings potential to the close of the period of the beginning balance and each subsequent transaction are computed and summed; and (3) the Low Balance System (LBS)--a periodic percentage rate or compound interest factor is applied to the lowest balance for the period. Primary attention was focused on the development of the first two systems, since they are of more universal application.

Average Daily Balance System (ADBS)

This system involves two steps: (1) an average daily balance for the interest period is determined, and (2) a periodic percentage rate or an interest factor is applied to this figure. Compound and simple interest factor tables constructed for use with this system appear in Appendix E. The average daily balance is obtained by dividing the total dollar days, that is, the sum of the products of principal (dollars) and time (days) by the number of days in the interest-paying period. On page 33 is an example showing how withdrawals are assigned negative dollar days and the beginning balance and deposits are assigned positive dollar days to arrive at total dollar days. Detailed procedures for the use of this system are in Appendix F.

Accrued Earnings Potential System (AEPS)

This system involves two stages: (1) The periodic earnings potential of the beginning balance and each subsequent transaction are computed. The earnings potential is the future value of each transaction for the remainder of the period at an assumed rate and compounding frequency. (2) Total earnings for the period are obtained by subtracting the negative earnings potential figures for withdrawals from the sum of the positive earnings potential figures for the beginning balance and deposits. Such calculations are tediously performed by hand, but the use of the Hewlett-Packard calculator (Model HP-80) simplifies the task. Less sophisticated calculators can be used if factor tables are available. Detailed procedures for the use of this system are in Appendix G.

Low Balance System

Earnings are computed by multiplying the lowest balance for the period by the corresponding periodic percentage rate or factor for the period. The system is also suitable for use with the monthly low balance system whereby the lowest monthly balances are eligible for earnings instead of only the lowest balance for the entire period. A copy of the worksheet and detailed procedures for the use of this system are in Appendix H.

Unique features of the earnings verification systems

Two unique features were incorporated in the verification systems to facilitate the identification of the length of time the principal is eligible for earnings: (1) a Julian numbering procedure, and (2) a "days to end of period" determination.

Julian days. A Julian type numbering scheme for identifying dates during the interest-paying period eliminates the tedious determination of time intervals using the Gregorian calendar. Calendar dates are numbered consecutively from 1 through 365 or 366 beginning with January 1 (see Appendix I). It would be as convenient to begin the numbering with the first day of the first interest period of the year, or to begin each new period with number one. This numbering system facilitates identification of the exact length of the interest-paying periods and determination of time between transactions.

The Julian numbering process is illustrated in Table 1. Each posted date was assigned a Julian number and the length of the interest-paying period determined by subtracting the Julian number corresponding to April 1 (91) from the Julian number corresponding to the first day of the

next period, July 1 (182). This 91 day period is the total number of days in the three-month quarter of April (30), May (31), and June (30).

Table 1. Julian days.

Posted date	Julian	Deposit	Withdrawal	Earnings	Balance
April 1	91				500.00
April 9	99	100.00	-	-	600.00
May 3	123	100.00	-	-	700.00
June 15	166	-	50.00	-	650.00

The Julian numbers may be adjusted to reflect effective transaction dates if they differ from posted dates. For example, if the account in the example above had ten grace days per period, the April 9 deposit would have been assigned a Julian number of 91 to reflect the effect of the grace period. A separate column for adjusted Julian numbers might be warranted in actual practice.

Days to end of period. Given the effective transaction dates, transaction amounts, and bookkeeping method, the length of time the principal is eligible for earnings is readily determinable. Both the Average Daily Balance System and the Accrued Earnings Potential System employ a "days to end of period" concept. "Days to end" represent the length of time the beginning balance and each transaction either remain on deposit or are withdrawn from the account, that is, are eligible or ineligible for earnings. They are figured by subtracting the Julian number of the beginning balance and each transaction from the Julian number of the first day of the next period. Table 2 illustrates the "days to end" concept. Julian numbers were subtracted from 182, the number corresponding to July 1,

the first day of the next period. The beginning balance will earn interest

for 91 days, the first deposit for 83 days, the second deposit for 59 days,

and the withdrawal will lose 16 days' interest.

Table 2. Days to end.

Posted date	Julian	Deposits	Withdrawals	Days to End
April 1	91	500.00 (beginning bal.)		91
April 9	99	100.00	–	83
May 3	123	100.00	–	59
June 15	166	–	50.00	16

Adjustments in the "days to end" figures are necessary for with-

drawals when the LIFO or FIFO bookkeeping methods are used. No adjustment

is needed for the DIDO method. Table 3 illustrates the "days to end" con-

cept for all four bookkeeping methods.

Table 3. Days to end - DIDO, LIFO, FIFO systems.

Posted date	Julian	Deposits	Withdrawals	Days to End			
				DIDO	LIFO	FIFO fd	FIFO bb
April 1	91	500.00 (beginning bal.)		91	91	91	91
April 9	99	100.00	–	83	83	83	83
May 3	123	100.00	–	59	59	59	59
June 15	166	–	50.00	16	59	83	91

For the beginning balance and deposits, the same "days to end" numbers are

used for all systems. For withdrawals, "days to end" numbers reflect dif-

ferent numbers of days that interest is lost under the four systems. In a

DIDO account, the $50 withdrawal would lose earnings for the remaining 16

days of the period. With a LIFO account, the $50 withdrawal would lose

earnings for 59 days, because withdrawals lose earnings from the time of the last deposit under this system (last in, first out). With a FIFO-first deposits account, the $50 withdrawal would lose earnings for 83 days, because withdrawals lose earnings from the time of the first deposit. In a FIFO-beginning balance account, the $50 withdrawal would lose earnings for 91 days because withdrawals lose earnings from the beginning of the period under this system. To further complicate the situation, yet illustrate the flexibility of the system, had there been 10 grace days, the Julian number for the April 9 deposit would have been 91 instead of 99. The deposit would have been eligible for 91 days' earnings instead of 83 days, as shown in the Days to End columns. The withdrawal under the four systems would have lost earnings for 16, 59, 91, and 91 days, respectively.

Illustrations of the earnings verification systems

The activity pattern illustrated in Tables 1, 2, and 3 of the previous section would have earned $8.07 if earnings were compounded and credited quarterly at 5% and a DIDO method for calculating interest were used. The earnings of $8.07 can be verified using either the Average Daily Balance System or the Accrued Earnings Potential System. Worksheets illustrating procedures used to verify the $8.07 earnings using both the Average Daily Balance System and the Accrued Earnings Potential System are shown on pages 33 and 35, respectively. Exact procedures for the use of the verification system worksheets are contained in Appendices D and E.

Average Daily Balance System

Information about the activity pattern was entered on the worksheet. Also entered were: an APR of 5% compounding frequency of four times per

Illustration of earnings verified by the

AVERAGE DAILY BALANCE SYSTEM

1. APR __5__ % PPR quoted **none** %

2. Compounding frequency is __4__ times per year.

3. Earnings are figured for the __91__ day period from __Apr 1__

   through __Jun 30__ and are payable or credited on __Jun 30__.

4. Bookkeeping method __DIDO__.

5. Deposit grace days __----__ Withdrawal grace days __----__.

6. Penalties __----__.

7. Other __----__.

8. INTEREST FACTORS: SIMPLE __.012465753__ COMPOUND __----__
   (from table)   (from table)

9. EARNINGS: $ __8.07__ $ __----__ $ __8.07__
   (ADB × simple fac)   (ADB × cmpd. fac)   (posted earnings)

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DATE	JULIAN	TRANSACTIONS				DAYS TO END			DOLLAR DAYS		
		Deposits		Withdrawals		DIDO	LIFO	FIFO	±		
Apr 1	91	b bal 500	00			91			+	45,500	00
Apr 9	99	100	00			83			+	8,300	00
May 3	123	100	00			59			+	5,900	00
Jun 15	166			50	00	16			−	800	00
									Total 58,900	00

AVERAGE DAILY BALANCE = $\dfrac{\text{Total Dollar Days}}{\text{Total Days in Period}}$ $\dfrac{58,900}{91} = 647.25$

EARNINGS = ADB × Interest Factor   647.25 × .012465753 = $8.07

year, the beginning date of April 1 and closing date of June 30 for a period length of 91 days, the DIDO bookkeeping method, and the $8.07 posted earnings. From the Table of Simple Interest Factors in Appendix E, the simple interest factor for 91 days, .012465753, was obtained and entered. Note that this figure is less than one-fourth of the 5% APR; it is the daily rate of 1/365 of 5% APR for 91 days. The quarterly rate depends on the number of days in the quarter: 90, 91, or 92 days.

Dates and transaction amounts were entered in the spaces provided. Julian day numbers were assigned to the dates according to the Julian Calendar in Appendix I. Days to end of period were calculated and entered in the DIDO column by subtracting all Julian numbers from 182, the number corresponding to the first day of the next interest period. Dollar day amounts were determined by multiplying the transaction amounts by the "days to end" figures. Withdrawal dollar days were denoted by a negative sign and deposit dollar days were denoted by a positive sign to indicate whether dollar days must be added or subtracted. For example, $500 (beginning balance) multiplied by 91 is +$45,500.00. Total dollar days were calculated and the Average Daily Balance was determined by dividing the total dollar days by the total number of days in the period ($58,900.00 ÷ 91 = $647.25). The verified earnings were calculated by multiplying the Average Daily Balance by the simple interest factor ($647.25 × .012465753 = $8.07). Thus, posted earnings were correctly verified by use of the Average Daily Balance System.

Accrued Earnings Potential System

The procedure for verifying earnings by this system is identical to the Average Daily Balance System procedure with one important difference.

ACCRUED EARNINGS POTENTIAL SYSTEM

1. APR __5__ % PPR _quoted_ % (none)

2. Compounding frequency is __4__ times per year.

3. Earnings are figured for the __91__ day period from ____Apr 1____

   through ____Jun 30____ and are payable or credited on __Jun 30__ .

4. Bookkeeping method _____DIDO_____ .

5. Deposit grace days ___----___ Withdrawal grace days ___----___ .

6. Penalties _____----_____ .

7. Other _____----_____ .

8. EARNINGS: $ ___8.07___ $ ___8.07___
   (calculated earnings)   (posted earnings)

DATE	JULIAN	TRANSACTIONS				DAYS TO END			EARNINGS POTENTIAL		
		Deposits		Withdrawals		DIDO	LIFO	FIFO	±		
Apr 1	91	b bal 500	00			91			+	6	23
Apr 9	99	100	00			83			+	1	14
May 3	123	100	00			59			+		81
Jun 15	166			50	00	16			−		11
										Total	8	07

Instead of determining dollar days, as in the Average Daily Balance System, the earnings potential of each transaction is determined. These figures were calculated using the Hewlett-Packard 80 procedure described in Appendix G, but paper and pencil calculations would give the same results:

$$+ \, \$500.00 \times \frac{.05}{365} \times 91 = + \, \$6.23$$

$$+ \quad 100.00 \times \frac{.05}{365} \times 83 = + \quad 1.14$$

$$+ \quad 100.00 \times \frac{.05}{365} \times 59 = + \quad .81$$

$$- \quad 50.00 \times \frac{.05}{365} \times 16 = - \quad .11$$

$$+ \, \$8.07$$

The earnings potential of each transaction can also be determined by multiplying each transaction amount by an appropriate simple factor and summing the products. Simple interest factors for 91, 83, 59, and 16 days can be obtained from a factor table. The posted earnings of $8.07 were correctly verified by the Accrued Earnings Potential System using both the Hewlett-Packard 80 calculator and paper and pencil calculations.

Testing the Earnings Verification Systems

Confidence in the use of the earnings verification systems was developed by verifying hypothetical savings models and actual passbook savings statements.

Hypothetical savings models

The hypothetical savings models were from three sources: the Commercial National Bank of Kansas City, Kansas; the Changing Times Teachers'

Journal; and the Pinson standard activity pattern. Models from the first
two sources were verified by both the Average Daily Balance System and the
Accrued Earnings Potential System for the non-low balance accounts, and the
Pinson results were verified by the Accrued Earnings Potential System.

Commercial National Bank example

A complete description of the four ways in which Commercial National
Bank computes earnings is given in Appendix B. Two DIDO methods are
used: one compounds and credits earnings semi-annually; the other com-
pounds earnings daily and credits semi-annually. The other two methods
employed are the FIFO-beginning balance method and the LIFO method.

Both DIDO accounts were verified correctly by the Average Daily
Balance System and within a penny by the Accrued Earnings Potential System,
as shown in Table 4. Both FIFO and LIFO accounts were correctly verified
by modifying the Average Daily Balance System to an Average Monthly Balance
System in order to accommodate the way in which Commercial National Bank
computes earnings for FIFO and LIFO accounts. Instead of measuring the
length of time transactions are eligible or ineligible for earnings in
days, time is measured in months. Thus, dollar days become "dollar
months," and the average daily balance becomes the average monthly balance.
A different amount of earnings is obtained if time is measured in days
because of the varying number of days each month. When time is measured in
months, all months are recognized as equal.

The necessary modification underscores the consumer's need to know
the specifics of how interest was computed for an account in order to
successfully verify those earnings.

Table 4. Results of earnings verification of four hypothetical savings models and an actual savings account using the Average Daily Balance System (ADBS), the Accrued Earnings Potential System (AEPS), and the Low Balance System (LBS).

	Posted Earnings	Verified Earnings Verification Systems		
		ADBS	AEPS	LBS
Hypothetical savings models				
1. Commerce National Bank example				
a. FIFO-beginning balance	12.96	12.96*	--	--
b. LIFO	15.96	15.96*	--	--
c. DIDO-semi-annual compounding	18.10	18.10*	18.09	--
d. DIDO-daily compounding	18.32	18.32*	18.31	--
2. Changing times example				
a. Low balance	24.79	--	--	24.79*
b. FIFO-beginning balance	18.90	18.90*	18.91	--
c. LIFO	37.26	37.26*	37.26*	--
d. DIDO	37.95	37.95*	37.95*	--
3. Pinson standard activity pattern				
a. 20 cases*	*	--	*	--
Actual savings account - DIDO				
First quarter	7.92	7.92*	7.92*	--
Second quarter	7.44	7.45	7.45	--
Third quarter	10.50	10.58	10.57	--
Fourth quarter	17.08	17.15	17.14	--

* designates posted earnings correctly verified
-- not applicable or verification not attempted

Worksheets used for the verification of the Commercial models are in Appendix J.

Changing Times educational example

A model savings account appeared in the December 1973 issue of Teacher's Journal, a companion publication to Changing Times. Earnings were compounded and credited semi-annually and computed by the low balance, FIFO-beginning balance, LIFO, and DIDO methods. The annual percentage rate was 5%.

No difficulties were encountered in verifying the earnings using any of the systems developed, although an unexplainable one cent discrepancy appeared with the FIFO system if verified by the Accrued Earnings Potential System. Worksheets used for the verification of these model accounts are in Appendix K. Results are summarized in Table 4.

Pinson standard activity pattern

To provide further experience in the manipulation of variables affecting the verification process, earnings were computed for 68 different combinations of five basic variables: (1) compounding frequency; (2) length of year; (3) grace days; (4) penalties; and (5) bookkeeping method. An annual percentage rate of 6% was used. All computations were made using as the model account, the standard activity pattern developed by Pinson (Pinson, 1970, p. 23). Of the 68 combinations for which earnings were calculated, 20 combinations were identical to those used by Pinson. All 20 were verified correctly using the AEPS. The remaining 48 combinations were unlike Pinson's other variable combinations and served only to provide experience in manipulating variables in the calculation of earnings.

A copy of the special worksheet developed to facilitate computations is in Appendix L with representative test cases, a description of variable combinations, and a summary of the results of the 68 earnings computations.

An actual savings account

An actual account was verified by both the Accrued Earnings Potential System and the Average Daily Balance System to measure the systems' effectiveness for verifying actual account earnings. Earnings from four consecutive interest-paying periods of the account were verified. The annual percentage rate was 5% for the first quarter and 5 1/4% for the final three quarters. Earnings were computed by the DIDO method, compounded daily, and credited quarterly.

As shown in Table 4, earnings for the first quarter were correctly verified. Second quarter verified earnings were within one penny of posted earnings. For the last two quarters, earnings verified by the two systems disagreed with posted earnings and with each other. There was a one penny difference between systems and a 6 to 8 cent discrepancy between posted and verified earnings. Verification worksheets are in Appendix M. The researcher has been unable to determine reasons for the disparity between posted and verified earnings despite efforts to check the account conditions for accuracy with the savings institution. Either faulty communications or arithmetic error is responsible for the discrepancy. The institution did not offer to recompute the earnings. Thus it may be concluded that unless there is accuracy in communications as well as in computations, accounts cannot be satisfactorily verified.

Earnings Verification Systems Applied to Consumer

Passbook Savings Accounts

Hypothetical savings models are relatively simple to verify because the facts of interest computation are known, the activity illustrated is usually uncomplicated and there is no communications error. Actual savings accounts are more difficult to verify because the facts needed for interest computation are known with less certainty of accuracy. Yet, if a verification system is to be useful to consumers, its effectiveness in verifying actual account earnings must be measured. This required: (1) the development of a form to obtain account data and correct information about the account conditions from consumer passbook savings records for use in verification; (2) volunteers to provide the information; and (3) verification of the earnings records.

Instrument design

A form was designed to (1) obtain account data from consumer savings records and (2) tabulate the specific factors which influenced the payment of earnings. Space was provided on one side of the form for a transfer of account data as it appeared in the savings passbook or statement. On the other side, completion blanks were provided to obtain information regarding the annual percentage rate, compounding frequency, crediting dates, book-keeping method, grace days, charges for excessive withdrawals, and other factors which affected the earnings paid. The form was pre-tested for clarity by a group of advanced undergraduate and graduate students in Family Economics. Based on their recommendations, it was slightly revised. A copy of the form as used is presented in Appendix N.

Source of data

During the fall semester of 1973, students enrolled in courses
offered by the Department of Family Economics, Kansas State University,
were invited to participate in the research project by supplying passbook
savings records accessible to them. A brief presentation was made before
each class to explain the nature and purpose of the project. Specific
procedures for completing the form were orally explained and summarized in
a formal letter (see Appendix N). Students were requested to record data
for two complete interest paying periods from passbook savings accounts of
banks, savings and loan associations, or credit unions. Students were also
required to secure a complete description of the terms and conditions of
the account and were advised to seek assistance from the financial institu-
tion in completing this information. Completed forms were submitted by
two hundred eighty-one students.

Selection of accounts for verification

Of the 281 completed forms submitted, 156 accounts were selected for
verification. Accounts were selected if: (1) two complete interest-paying
periods were shown; (2) all transaction amounts, dates, and posted earnings
were clearly shown; (3) the account conditions were fully described; and
(4) no change in annual percentage rate (such as on July 1, 1973) occurred
during the middle of an interest period.

Verification of consumer savings

Prior to verifying earnings for the 156 consumer passbook savings
accounts, a worksheet for summarizing pertinent account facts and results
of the verification procedure was designed (see Appendix O). The worksheet

is a modification of the one designed for the Accrued Earnings Potential
System and was used exclusively for verifying all but the low balance
accounts. The Accrued Earnings Potential System was selected for verifying
earnings because of its simplicity and rapidity. All calculations were
made with the Hewlett-Packard Model 80 calculator.

Verified earnings

It was assumed that account descriptions provided by students cor-
rectly reflected the actual conditions by which earnings had been deter-
mined by the savings institutions.

Accounts selected for verification were required to show two complete
interest-paying periods, but only one period's earnings were verified.
However, two periods had to be shown to establish the beginning date and
beginning balance of the period to be examined.

The mathematical procedure for verifying one period's posted earnings
by the earnings verification systems developed was performed for 156 con-
sumer passbook accounts. Differences between posted and verified earnings
were summarized and are discussed in the Results section.

Potential earnings

Not only were posted earnings verified, but for each account, the
amount of earnings that would have been generated using the DIDO method of
computing earnings was also calculated and differences between posted
earnings and potential earnings were computed to measure the loss to the
consumer resulting from the institution's failure to determine earnings by
the DIDO method. The AEPS was used in computing potential earnings. The
following conditions were standardized for all accounts: (1) daily

compounding; (2) DIDO bookkeeping method; (3) no grace days; and (4) no penalties. The annual percentage rates and period lengths were not standardized, so that posted earnings and potential earnings under standard DIDO conditions could be compared. Differences between posted and potential earnings were summarized and are discussed in the Results section.

RESULTS AND DISCUSSION

The general characteristics of the consumer passbook savings accounts used in the study were analyzed according to their major account characteristics. Posted earnings were verified and a comparison of results made. Potential earnings were computed by a standard DIDO method and were contrasted with actual posted earnings. Each major segment of the study is discussed below, and data are summarized and presented in tabular form.

General Characteristics of Savings Accounts

Accounts selected for verification

Of the 281 passbook savings accounts submitted for verification, 156 or 56% met the selection criteria and were verified. Accounts were rejected if: (1) two complete interest-paying periods were not shown; (2) transaction dates or amounts of posted earnings were not clearly shown; (3) account descriptions were incomplete; or if (4) the annual percentage rate changed during the middle of an interest-paying period.

As shown in Table 5, over half of the selected accounts were from commercial banks and over one-third were from savings and loan associations. A relatively large number of bank accounts were discarded because the July 1, 1973, interest rate change occurred in the middle of an interest period. Inclusion of accounts with two different annual percentage rates for the same interest period would have complicated the verification procedure. In contrast, most savings and loan accounts had interest

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periods ending June 30, 1973, so the rate change did not complicate the verification of those accounts.

Table 5. Savings accounts verified and discarded by institution type.

Institution	Accounts				
	Verified			Discarded	
	n	%		n	%
All institutions	156	100		125	100
Commercial banks	85	54		95	76
Savings and loan associations	61	39		26	21
Credit Unions	10	6		2	2
Other institutions	0	0		2	2

The 156 accounts represented 112 different savings institutions. The 72 banks had an average of 1.2 accounts per bank. The 30 savings and loan associations had 2.0 accounts per bank, and each of the 10 credit unions had one account.

Major account characteristics

Major characteristics of the accounts are summarized by type of institution in Tables 6a and 6b and are discussed below.

Bookkeeping method

Of all accounts, 64% reported use of the DIDO method for determining earnings. An additional 10% were believed by the researcher to use this method although sufficient information was not provided by the student to establish this fact beyond doubt. The low balance method was reported for 13% of the accounts, of which 4% were monthly low balance accounts. The DIDO method was used by 89% of the savings and loan accounts and 72% of the

Table 6a. Major characteristics of consumer passbook accounts by type of
institution.

Account characteristics	Savings institutions			
	All	Banks	S&L	CU
	(number of accounts)			
Bookkeeping method	156	85	61	10
Low balance	14	9	2	3
Monthly low balance	7	2	0	5
FIFO-beginning balance	8	6	2	0
FIFO-first deposits	0	0	0	0
LIFO	11	7	3	1
DIDO	100	49	50	1
DIDO (assumed)	16	12	4	0
Level of account activity	156	85	61	10
Deposits only	61	31	27	3
Withdrawals only	15	10	4	1
Deposits and withdrawals	63	33	25	5
No activity	17	11	5	1
Size of posted earnings	156	85	61	10
Less than $1.00	10	8	1	1
1.01 - 5.00	50	32	17	1
5.01 - 10.00	33	14	18	1
10.01 - 25.00	31	14	13	4
25.01 - 50.00	20	15	4	1
50.01 - 75.00	4	0	3	1
75.01 - 100.00	3	1	1	1
more than 100.00	5	1	4	0
Compounding frequency	156	85	61	10
Annually	2	0	0	2
Semi-annually	51	43	3	5
Quarterly	36	24	10	2
Daily	66	18	47	1
Continuously	1	0	1	0
Annual percentage rate	156	85	61	10
4.00%	1	1	0	0
4.50%	74	72	0	2
4.75%	1	0	1	0
5.00%	32	12	20	0
5.25%	41	0	38	3
5.50%	1	0	0	1
5.75%	3	0	2	1
6.00%	3	0	0	3

Table 6b. Major characteristics of consumer passbook accounts by type of institution.

Account characteristics	Savings institutions			
	All n=156	Banks n=85	S&L n=61	CU n=10
	(percent)			
Bookkeeping method	100	100	100	100
Low balance	9	11	3	30
Monthly low balance	4	2	0	50
FIFO—beginning balance	5	7	3	0
FIFO—first deposits	0	0	0	0
LIFO	7	8	5	10
DIDO	64	58	82	10
DIDO (assumed)	10	14	7	0
Level of account activity	100	100	100	100
Deposits only	39	36	44	30
Withdrawals only	10	12	7	10
Deposits and withdrawals	40	39	41	50
No activity	11	13	8	10
Size of posted earnings	100	100	100	100
Less than $1.00	12	9	2	10
1.01 - 5.00	59	38	28	10
5.01 - 10.00	39	16	30	10
10.01 - 25.00	36	16	21	40
25.01 - 50.00	24	18	7	10
50.01 - 75.00	5	0	5	10
75.01 - 100.00	4	1	2	10
more than 100.00	6	1	7	0
Compounding frequency	100	100	100	100
Annually	1	0	0	20
Semi-annually	33	51	5	50
Quarterly	23	28	16	20
Daily	42	21	77	10
Continuously	1	0	2	0
Annual percentage rate	100	100	100	100
4.00%	1	1	0	0
4.50%	47	85	0	20
4.75%	1	0	2	0
5.00%	21	14	33	0
5.25%	26	0	62	30
5.50%	1	0	0	10
5.75%	2	0	3	10
6.00%	2	0	0	30

bank accounts. Most credit union accounts (80%) used a low balance method. Greatest variation in bookkeeping method was reported for banks.

Level of account activity

All but 11% of the accounts verified were active accounts. Activity was categorized by deposits only, withdrawals only, both deposits and withdrawals, or inactive. Greater deposit activity, as a percentage of total accounts by institution was evident for savings and loan accounts than for banks, whereas a larger percentage of bank accounts were either inactive or had only withdrawal activity.

Size of posted earnings

Posted earnings for the 156 accounts ranged from $.04 to $474.41, as shown in Table 7. The mean size of posted earnings for all accounts was $22.25 and the median was $7.19. Bank earnings had the largest range of earnings, but the smallest mean and median earnings, whereas credit union accounts had the largest median earnings. The low median earnings may be related to the fact that many of the accounts belonged to students. Accounts belonging to college students may be smaller, on the average, than those belonging to other consumers, and may be subject to frequent withdrawals.

Compounding frequency

Earnings were compounded daily for 42% of the accounts, semi-annually for 33%, and quarterly for 23%, as shown in Table 11. Most of the savings and loan accounts (77%) were compounded daily, compared to 21% of the bank accounts. In contrast, half of the bank accounts, but only 5% of the

Table 7. Mean, median, and range of posted earnings by type of
institution.

Posted earnings	Savings institutions			
	All	Banks	S&L	CU
Number of accounts	156	85	61	10
Mean	$ 22.25	$ 17.41	$ 28.14	$ 27.43
Median	7.19	5.62	8.82	18.71
Range				
lowest	.04	.04	.68	.38
highest	474.41	474.41	350.03	75.73

savings and loan accounts, compounded earnings semi-annually. Of the 66

accounts which compounded daily, 94% credited earnings quarterly.

Verification of Posted Earnings

The Accrued Earnings Potential System (AEPS) was used to verify the

posted earnings of passbook savings. The magnitude of any differences

between posted and verified earnings was determined and expressed in dollars

and as a percent of posted earnings. In applying the AEPS, the account

descriptions provided by the students of how earnings were computed by the

financial institutions were followed. If the students had correctly inter-

preted the institutions' computation systems, and there were no arithmetic

errors, the verified earnings were expected to agree with posted earnings.

Accounts whose posted and verified earnings agreed were declared to be

"correctly verified." If posted earnings exceeded the verified earnings,

the account was declared to have been "overpaid," and if verified earnings

exceeded the posted earnings, the account was declared to have been "under-

paid." Discrepancies between the posted and verified earnings were

summarized by type of institution, bookkeeping method, level of account

activity, size of posted earnings, and compounding frequency.

Reasons for discrepancies between posted and verified earnings

Discrepancies between posted and verified earnings can be attributed

to a number of causes: (1) The savings institution may have made errors in

computing earnings or in posting them to the passbook. (2) The student may

have made an error in transferring data from the passbook to the form.

(3) The full description of the conditions pertaining to the savings

account may have been erroneously reported because the information dis-

closed by the savings institution personnel may have been incomplete or

inaccurate. (4) The student may have misinterpreted the information.

(5) Posted dates of the account transactions may not have reflected the

effective transaction dates. (6) Rounding of figures by the financial

institution or in the verification process could result in a slight differ-

ence. There was a one penny difference between the ADB and the AEPS

examples illustrated in the procedure section (see page 38). A special

variant of rounding is the practice of some institutions to drop digits

beyond two decimal places instead of rounding. These figures are not lost,

but rather are carried in the computer records for use in computing future

earnings. Nevertheless, they could produce a difference of one penny.

(7) Differences in factors used could result in differences in earnings.

In the absence of a standard table of interest factors to be used in comput-

ing earnings, institutions use for the same rate and time, different factors

for computing earnings. Factors used by the savings institutions may have

differed from those used by the researcher.

Posted earnings - overpaid, correct, underpaid

Earnings were verified by the Accrued Earnings Potential System according to account terms and conditions described by students. Differences between posted and verified earnings were calculated and expressed as a percentage of posted earnings.

Posted earnings were correctly verified for 15% of the accounts, whereas 85% of the accounts were either underpaid or overpaid, as shown in Table 18. One-third of the accounts overpaid the saver, that is, had posted earnings greater than the verified earnings calculated according to the account descriptions provided by students. Half of the accounts underpaid the saver, that is, had posted earnings smaller than the verified earnings calculated according to the account descriptions. A summary of accounts according to overpayment and underpayment by the major account characteristics of institution, bookkeeping method, level of account activity, size of posted earnings and compounding frequency is presented in Table 8.

The deviation from correct verification expressed as a percent of posted earnings is shown in Table 9. If a tolerance level of 2% underpayment or overpayment is accepted, then 101 of the 156 accounts (two-thirds) were within these limits. All but 23 were within a tolerance of 10%. Data summarized by major account characteristics in Tables 8 and 9 are discussed below:

Institution

Of the savings and loan accounts, 28% were correctly verified, compared to 8% of the bank accounts. Of all accounts correctly verified, 71% were savings and loan accounts. More than half of the banks underpaid the

Table 8. Overpayment and underpayment of account earnings by major account
characteristics.

Major account characteristics	Accounts							
	Total		Overpaid		Correct		Underpaid	
	n	%	n	%	n	%	n	%
All	156	100	52	33	24	15	80	51
Institution								
Commercial Banks	85	100	25	29	7	8	53	62
Savings and Loan Associations	61	100	22	36	17	28	22	36
Credit Unions	10	100	5	50	0	0	5	50
Bookkeeping Method								
Low balance	14	100	9	64	2	14	3	21
Monthly low balance	7	100	2	29	0	0	5	71
FIFO-beginning balance	8	100	2	25	1	13	5	63
LIFO	11	100	4	36	1	9	6	55
DIDO	100	100	28	28	20	20	52	52
?DIDO	16	100	7	44	0	0	9	56
Level of account activity								
Deposits	61	100	18	30	4	7	39	64
Withdrawals	15	100	7	47	1	7	7	47
Deposits and withdrawals	63	100	22	35	10	16	31	49
No activity	17	100	5	29	9	53	3	18
Size of posted earnings								
Less than $5.00	60	100	13	22	12	20	35	58
5.00 – 25.00	64	100	28	44	7	11	29	45
More than 25.00	32	100	11	34	5	16	16	50
Compounding frequency								
Annually	2	100	0	0	0	0	2	100
Semi-annually	50	100	19	38	1	2	30	60
Quarterly	36	100	12	33	4	11	20	56
Daily	67	100	21	31	19	28	27	40
Continuously	1	100	0	0	0	0	1	100

Table 9. Accounts by major account characteristics and percent deviation from correct verification (0).

Major account characteristics	Total	Deviation from correct verification (0)								
		Overpaid				0	Underpaid			
		over 24%	11-24%	2-10%	under 2%		under 2%	2-10%	11-24%	over 24%
		(number of accounts)								
All	156	4	4	10	34	24	43	22	8	7
Institution										
Commercial Banks	85	2	2	6	15	7	27	16	5	5
Savings and Loan Associations	61	1	1	2	18	17	14	4	2	2
Credit Unions	10	1	1	2	1	0	2	2	1	0
Bookkeeping method										
Low balance	14	2	1	4	2	2	1	1	0	1
Monthly low balance	7	0	1	1	0	0	4	0	1	0
FIFO-beginning balance	8	1	1	0	0	1	1	3	1	0
LIFO	11	1	1	0	2	1	1	2	2	1
DIDO	100	0	0	4	24	20	30	14	3	5
?DIDO	16	0	0	1	6	0	6	2	1	0
Level of account activity										
Deposits	61	0	2	1	15	4	25	9	3	2
Withdrawals	15	1	0	0	6	1	4	3	0	0
Deposits and withdrawals	63	3	2	8	9	10	12	9	5	5
No activity	17	0	0	1	4	9	2	1	0	0
Size of posted earnings										
$1.00 or less	10	0	1	0	1	2	2	2	0	2
1.01 - 5.00	50	2	0	2	7	10	16	6	3	4
5.01 - 10.00	33	0	0	4	14	3	6	5	1	0
10.01 - 25.00	31	0	1	2	7	4	11	3	3	0
25.01 - 50.00	20	0	2	2	2	2	4	6	1	1
50.01 - 75.00	4	0	0	0	0	1	3	0	0	0
75.01 - 100	3	1	0	0	0	1	1	0	0	0
over $100	5	1	0	0	3	1	0	0	0	0

saver rather than overpaid, but savings and loan associations tended to overpay as often as they underpaid. If a tolerance of 2% error is allowed, 80% of all savings and loan accounts were correctly verified, compared to 58% of the bank accounts (Table 9).

Bookkeeping method

A larger percentage (20%) of the DIDO accounts were correctly verified than accounts using any other method. Of all correctly verified accounts, 83% were DIDO accounts. If a tolerance of 2% error is allowed, 74% of all DIDO accounts were correctly verified. All methods tended to underpay rather than overpay the saver, except for the low balance method, suggesting that perhaps "low balance" was incorrectly reported as the bookkeeping method for some accounts.

Compounding frequency

Accounts compounded daily were verified correctly more often than accounts whose earnings were compounded less frequently. The 19 correctly verified daily accounts represented 28% of all accounts compounded daily and 79% of all correctly verified accounts.

Size of posted earnings

Of the accounts with posted earnings less than $5.00, 20% were correctly verified. A larger proportion of the smallest accounts were underpaid than was true for larger accounts. Deviation from correct verification expressed as a percentage as in Table 9 involved significantly different dollar amounts. For example, verified earnings deviating 2% from posted earnings of $5.00 and $75.00 represent an actual difference of $.10 and $1.50 respectively.

Size of discrepancy. A special tabulation was made of accounts by

the dollar amount of discrepancy between posted and verified earnings.

Dollar amounts of underpayment and overpayment of individual accounts

ranged from - $21.60 to + $9.81. Posted and verified earnings were com-

pared to reflect one and two penny differences because such small differ-

ences may have been the result of different rounding practices. Table 10

presents a summary of the data by institution and bookkeeping method for

three categories of discrepancy: ± $.01, ± $.02, and greater than ± $.02.

Table 10. Discrepancy of posted and verified earnings by
selected account characteristics.

Selected account characteristics	Discrepancy between posted and verified earnings									
	None		± 1¢		± 2¢		Over 2¢		Total	
	n	%	n	%	n	%	n	%	n	%
All accounts	24	15	26	17	10	6	96	62	156	100
Institution										
Banks	7	8	15	18	8	9	55	65	85	100
Savings and Loan Associations	17	28	9	15	2	3	33	54	61	100
Credit Unions	0	0	2	20	0	0	8	80	10	100
Bookkeeping method										
Low balance	2	14	1	7	1	7	10	71	14	100
Monthly low balance	0	0	3	43	0	0	4	57	7	100
FIFO	1	13	0	0	0	0	7	88	8	100
LIFO	1	9	0	0	1	9	9	82	11	100
DIDO	20	20	20	20	8	8	52	52	100	100
?DIDO	0	0	2	13	0	0	14	88	16	100

Of all the accounts, 32% had verified earnings within one penny of

posted earnings. This ranged from 43% of all savings and loan accounts,

to 26% of all bank accounts and 20% of all credit union accounts. The two

penny range included 38% of all accounts, or 35% of all bank accounts, 48%

of all savings and loan accounts, and 20% of all credit union accounts,
that is, error greater than could be attributed to rounding occurred in
over half (62%) of the accounts, ranging from 54% for savings and loan
accounts to 65% of the bank accounts and 80% of the credit union accounts.

Forty percent of the DIDO accounts were within the ± $.01 range and
one-half had discrepancies greater than ± $.02. Accounts using the DIDO
method were most accurate. When 70 to 90% of the other accounts had dis-
crepancies greater than could be attributed to rounding, the DIDO system
was most frequently correct or within the two cent tolerance.

Verification and size of bank

A special analysis was made of the 85 accounts representing 72 dif-
ferent commercial banks to assess whether size of bank was related to
correctness of verification, and hence, greater accuracy of bank records
and quality of communication between the banks and the students. Four size
classifications were established based on size of deposits reported in The
1972 Kansas Bank Directory: (1) deposits less than $11 million;
(2) deposits between $11 - $20 million; (3) deposits over $20 million; and
(4) unclassified. Data are summarized in Table 11.

Ninety-two percent of the accounts failed to be correctly verified
and tended to be underpaid. Except for one account, all correctly verified
accounts were from medium size banks. No differences in earnings verifica-
tion by size of bank were evident from the data.

A savings and loan case study

A unique opportunity to examine the verification results of accounts
from a single savings institution was presented by having available for

Table 11. Bank accounts by size of bank and deviation from correct verification (O).

(number of accounts)

Size of bank deposits	Total	Overpaid				O	Underpaid			
		over 24%	11-24%	2-10%	under 2%		under 2%	2-10%	11-24%	over 24%
All banks	85	2	2	6	15	7	27	16	10	5
Less than $11 million	32	0	1	4	6	0	12	5	3	1
$11 - $20 million	29	2	1	2	3	6	6	4	1	4
Over $20 million	18	0	0	0	5	0	8	4	1	0
Unclassified	6	0	0	0	1	1	1	3	0	0

study 21 accounts from one savings and loan association. Since all accounts could be assumed to be identical with respect to rate and book-keeping method, the remaining sources of discrepancy were assumed to be institutional error in computation and misinterpretation of account terms and conditions by students. Student descriptions were identical and confirmed the specific conditions of daily compounding, quarterly crediting, and DIDO bookkeeping method for all accounts. Besides differences in individual account activity, the only remaining source of variation among accounts was location of the savings and loan association office. Six offices within a 120 mile radius of Manhattan were represented by the 21 accounts, as summarized in Table 12.

Table 12. Earnings overpayment and underpayment of 21 accounts from the same savings and loan association.

	Total n	Overpaid n	Correct n	Underpaid n
All accounts				
Number	21	5	13	3
Percent	100	24	62	14
Level of activity				
Deposits	6	3	2	1
Deposits and withdrawals	10	2	6	2
No activity	5	0	5	0
Location of Savings and Loan				
1.	8	2	5	1
2.	1	0	1	0
3.	3	2	0	1
4.	1	0	1	0
5.	2	0	2	0
6.	6	1	4	1

Over half of the accounts were verified correctly (62%) compared to 36% for all savings and loan accounts, and 15% for all 156 accounts verified. If a one penny tolerance is permitted, posted earnings were within one cent of verified earnings for five accounts. Therefore, 18 of the 21 accounts were either correct or off by just one penny. The inactive accounts were all verified correctly and 60% of the accounts with both deposit and withdrawal activity were correctly verified.

There were discrepancies from three of the six offices, suggesting that discrepancies may be due to inconsistencies in personnel training and delivery of services among offices.

The results of this case study demonstrate that there can be a high level of accuracy in communicating account terms and conditions, as indicated by the large proportion of correctly verified accounts. Specific account conditions of DIDO, daily compounding, and quarterly crediting can be accurately communicated by savings institutions and interpreted by consumers. If consumers are to verify their accounts as is expected of them, they should be informed of practices such as rounding or decimal carry-over that could cause discrepancies in their calculations. Institution personnel must be prepared to explain discrepancies greater than those attributable to rounding and decimal carry-over differences such as occurred for one in seven accounts from this institution. Finally, variation in the performance level of offices suggests that discrepancies may be occurring even if there is a standardization of earnings computation procedures within the institution.

Potential Earnings

The potential earnings of the accounts were computed to assess the difference in earnings over earnings actually paid to the account. Potential earnings were computed under the following assumptions: (1) an annual percentage rate equal to that currently paid to the account; (2) interest period equal in length to that of the account; (3) DIDO method for determining the principal balance eligible for earnings; and (4) daily compounding. Posted and potential earnings were perceived in three ways: (1) agreement of posted and potential earnings indicated that posted earnings had been derived by the standard DIDO formulation; (2) posted earnings in excess of potential earnings indicated that actual methods of calculation were more favorable to the saver than the standard DIDO method; and (3) posted earnings smaller than potential earnings indicated that actual methods of calculation resulted in less earnings for the consumer than the standard DIDO method. Table 13 summarizes the three categories of posted and potential earnings data, and Table 14 gives a more detailed view by type of institution, bookkeeping method, and level of account activity.

Comparison of posted and potential earnings

Two-thirds of all accounts would have yielded greater earnings for the interest-paying period examined if the standard DIDO method had been used to determine earnings. About one-fifth of the accounts earned more by their own methods than they would have under the prescribed system.

Institution

Savings and loan accounts had the greatest frequency of agreement between posted and potential earnings, reflecting a widespread use of the

Table 13. Comparison of posted and potential earnings by major account characteristics.

Major account characteristics	Accounts							
	Total		Posted < potential		Posted = potential		Posted > potential	
	n	%	n	%	n	%	n	%
All accounts	156	100	103	66	21	13	32	21
Institution								
Commercial banks	85	100	71	84	5	6	9	11
Savings and loan	61	100	23	38	16	26	22	36
Credit unions	10	100	9	90	0	0	1	10
Bookkeeping method								
Non-DIDO accounts	40	100	34	85	1	3	5	13
low balance	14	100	11	79	0	0	3	21
monthly low balance	7	100	7	100	0	0	0	0
FIFO-beginning balance	8	100	6	75	1	13	1	13
LIFO	11	100	10	91	0	0	1	9
DIDO accounts	116	100	69	59	20	17	27	23
compounded daily	65	100	25	38	19	29	21	32
compounded quarterly	23	100	19	83	0	0	4	17
compounded semi-annually	28	100	25	89	1	4	2	7
Level of account activity								
Deposits	61	100	44	72	4	7	13	21
Withdrawals	15	100	11	73	1	7	3	20
Deposits and withdrawals	63	100	40	63	8	13	15	24
No activity	17	100	8	47	8	47	1	6

Table 14. Accounts by selected account characteristics and percent deviation from agreement of posted and potential earnings (0).

Major account characteristics	Total	Deviation from 0 (posted and potential earnings agree)								
		Posted greater than potential				Posted = potential	Posted less than potential			
		over 24%	11-24%	2-10%	under 2%	0	under 2%	2-10%	11-24%	over 24%
		(number of accounts)								
All	156	1	1	7	23	21	41	39	9	14
Institution										
Commercial banks	85	0	0	3	6	5	27	28	7	9
Savings and Loan Associations	61	0	1	4	17	16	13	5	2	3
Credit unions	10	1	0	0	0	0	1	6	0	2
Bookkeeping method										
Low balance	14	1	1	1	0	0	1	3	2	5
Monthly low balance	7	0	0	0	0	0	0	4	0	3
FIFO-beginning balance	8	0	0	0	1	1	1	4	1	0
LIFO	11	0	0	1	0	0	4	3	2	1
DIDO	116	0	0	5	22	20	35	25	4	5
Level of account activity										
Deposits	61	0	0	3	10	4	21	18	3	2
Withdrawals	15	0	0	0	3	1	5	5	1	0
Deposits and withdrawals	63	1	1	3	10	8	10	13	5	12
No activity	17	0	0	1	0	8	5	3	0	0

DIDO method by savings and loan associations to determine earnings.
Savings and loan accounts were nearly evenly divided between those whose
posted earnings exceeded potential earnings and those which could have
earned more by the standard DIDO method. Eighty-four percent of bank and
90% of credit union accounts would have earned more under the standard DIDO
method.

Bookkeeping method

Posted earnings for the 65 DIDO accounts using daily compounding were
expected to agree with potential earnings since the computation methods
were identical but only 29% of these accounts were in agreement. Those in
disagreement were the same accounts that could not be correctly verified by
the AEPS. Unreported grace days or inaccuracies in computing posted earn-
ings may have caused the discrepancies. Eighty-five percent of the non-
DIDO accounts were paid less than the standard DIDO method would have paid
the accounts. One account reportedly used a FIFO–beginning balance method
to determine earnings, yet posted and potential earnings agreed, indicating
that perhaps the method was incorrectly reported by the student.

Level of account activity

For inactive accounts, the standard DIDO bookkeeping method would not
increase earnings over the method presently used by those accounts. Active
accounts, however, would benefit more from a DIDO method of earnings cal-
culation than would inactive accounts, thus confirming what had been
demonstrated by Pinson (1970) that bookkeeping method is an important
consideration for consumers who expect to maintain active savings accounts.

Relative difference between posted and potential earnings

Since 87% of the accounts would have experienced either increased or decreased earnings under the standard DIDO method, an examination of the range of variability is useful. Distribution of accounts by percent that potential earnings deviate from posted earnings and by type of institution, bookkeeping method, and level of account activity are presented in Table 14. A large number of cases tend to cluster within the 2% range, indicating relatively little deviation from agreement. But a substantial number of accounts are in the larger negative ranges for all but DIDO and savings and loan accounts. Observations must be made cautiously, however, since a 2% error may represent either pennies or dollars, depending on the size of posted earnings. The larger percentage differences tended to represent smaller posted earnings. An extraordinary ⁻8300% difference was recorded for one active account whose posted earnings derived by the low balance method were $.05 and whose potential earnings were $4.20 under the standard DIDO method. For a less active low balance account with posted earnings of $350.03 and potential earnings of $311.31, the ⁺11.06% difference tends to minimize the significance of the dollar difference.

Summary of Results

A very small percentage of accounts could be verified correctly. Even with a tolerance of two cents, less than half of the accounts were correctly verified. Nearly two-thirds of the accounts had discrepancies larger than what could be attributed to rounding. One-third of the accounts were either underpaid or overpaid by more than 2%, and of those, institutions tended to underpay the saver. There was less discrepancy between

posted and verified earnings for accounts using the DIDO method and daily compounding than with any other method.

Most accounts did not receive the maximum earnings possible. Two-thirds of the accounts could have received higher earnings at the same rate if the DIDO-daily compounding conditions had been employed.

SUMMARY

Passbook earnings can be computed in more than 100 different ways
because the variables affecting earnings can be combined in scores of
different ways. However, at the present time, savings institutions are not
required to and normally do not disclose to consumers the particular methods
employed. Consumers have the responsibility for checking the accuracy of
their accounts, but do not have easy access to all of the facts needed to
verify earnings. Also, a simplified method for consumers to use for
verifying their earnings is not available to them.

Three earnings verification systems were developed and tested using
hypothetical savings models. No problems were encountered in verifying
earnings with the three systems because all conditions governing the
accounts were known. Verification attempted with an actual savings case
revealed the types of problems that can result when all the facts are not
.available. Even after consulting the savings institution repeatedly for an
explanation of conditions it used to figure earnings, differences with
posted earnings were irreconcilable. This revealed two sources of dis-
crepancy: either all the facts regarding interest computation had not been
effectively communicated, or clerical error had been made.

One of the verification systems developed, the Accrued Earnings
Potential System, was used to verify earnings records obtained from 156
consumer passbook accounts representing banks, savings and loan associa-
tions, and credit unions. The accounts were provided by student volunteers

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at Kansas State University who submitted passbook savings records and descriptions of the conditions governing earnings computation for the passbooks. Verified earnings were expected to agree with posted earnings since students had consulted their savings institution to learn the exact account conditions. If communications between student and institution had been perfect, any discrepancies would be assumed to be a result of institutional error, student error in copying data, incorrect transaction dates, rounding differences, or differences in factors used to compute earnings. Discrepancies were expressed as overpayment when posted earnings exceeded verified earnings and underpayment when posted earnings were less than verified earnings.

The majority (85%) of earnings were not correctly verified, and would not have satisfied the consumer wanting zero error accuracy in verifying account earnings. However, the consumer tolerant of one and two cent discrepancies would have been satisfied with the verification results for 38% of the accounts. Accounts tended to be underpaid. Underpayment varied by institution (most by banks), bookkeeping method (least with DIDO), level of account activity (most for active), compounding frequency (least for daily), but not by size of posted earnings. Accounts from savings and loan associations, those compounded daily, those using the DIDO method to compute earnings, and inactive accounts were verified correctly with greatest frequency. Even for accounts from the same institution, there were discrepancies between posted and verified earnings although they were less than for all other accounts.

Potential earnings for all accounts were computed using a standard DIDO method to compare the differences that would result over earnings

actually paid. If earnings for all accounts had been computed by the DIDO system and compounded daily, two-thirds of the accounts would have received higher earnings. Earnings potential varied by institution, bookkeeping method, and level of account activity. Earnings for nearly all banks, credit union and non-DIDO accounts would have been increased by use of the DIDO method and daily compounding.

Standard earnings verification systems can be used to verify earnings of consumer passbook savings accounts. The verification of earnings provides an assessment of the conformity of actual earnings to the contractual savings agreement between the consumer and the savings institution. The results of the study underscore the need for purposes of verification, for disclosure of all conditions bearing upon the computation of earnings so that the conscientious consumer can monitor his own passbook savings account. No problems were encountered in verifying the hypothetical account earnings because all facts regarding interest computation were clearly known. In contrast, the discrepancies between actual earnings and the verification results reflect a communications gap that would not exist if the specific account variables affecting interest computation were routinely and openly disclosed.

RECOMMENDATIONS

As a result of this study, the following recommendations are suggested:

(1) Because the earnings verification systems developed proved useful in verifying passbook earnings, their potential value for use by conscientious consumers who wish to verify their accounts should be assessed.

(2) Because the earnings verification systems developed were useful in verifying earnings, savings institutions should examine the feasibility of providing consumers with a worksheet to use in verifying their savings statements.

(3) If a uniform method for computing earnings is desired, the potential value of the DIDO method should be considered. This method was found to be widely used among savings institutions and earnings determined by the DIDO method were verified correctly with greater frequency than for other methods.

(4) The cost to consumers of the delay in enacting S. 1052 Truth in Savings to require full and standardized disclosure of savings information for purposes of earnings verification should be assessed.

(5) As one means of eliminating discrepancies in earnings computations, a standard table of interest factors should be adopted for use by all savings institutions using factors in the computation of earnings.

(6) Efforts should be made to develop and test educational materials for classroom and home use to develop greater familiarity with verifying and monitoring passbook savings accounts.

ACKNOWLEDGMENTS

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APPENDICES

ILLEGIBLE DOCUMENT

THE FOLLOWING
DOCUMENT(S) IS OF
POOR LEGIBILITY IN
THE ORIGINAL

THIS IS THE BEST
COPY AVAILABLE

LET'S HAVE SOME TRUTH - IN - SAVINGS

7.36%

7.18%

7.25%

MONEY AT 7% ?

* HOW ARE EARNINGS ON YOUR SAVINGS FIGURED?

* HOW MUCH OF YOUR MONEY DOESN'T EARN INTEREST?

* HAVE YOU EVER TRIED CHECKING THE ACCURACY OF
  EARNINGS PAID?

TRUTH - IN - SAVINGS IS ANALAGOUS TO TRUTH - IN - LENDING

EARNINGS/FINANCE CHARGE

Truth-in-Savings

6(b)(1) The amount of earnings paid;

3(a)(4) "earnings" means any amount accruing to or for the account of any individual as compensation for the use of funds constituting an individual savings deposit. Such terms include dividends and interest on any individual savings deposit.

Truth-in-Lending

226.7(b)(4) The amount of any finance charge, using the term "finance charge," debited to the account during the billing cycle, itemized and identified to show the amounts, if any, due to the application of periodic rates and the amount of any other charge included in the finance charge, such as a minimum, fixed, check service, transaction, activity, or similar charge, using appropriate descriptive terminology.

PERIODIC PERCENTAGE RATE

Truth-in-Savings

6(b)(3) The periodic percentage rate:

4(a) Sec 4 (a) Periodic percentage rate is the rate applied each period to the principal amount for that period to determine the amount of earnings for that period and may be referred to as the PPR

6(a)(4) The periodic percentage rate and the method used to determine the balance to which this rate will be applied.

Truth-in-Lending

226.7(b)(5) Each periodic rate, using the term "periodic rate" (or "rates"), that may be used to compute the finance charge (whether or not applied during the billing cycle), and the range of balances to which it is applicable.

METHOD USED TO DETERMINE BALANCE TO WHICH RATE IS APPLIED

Truth-in-Savings

6(a)(4) The periodic percentage rate and the method used to determine the balance to which this rate will be applied.

6(b)(4) The principal balance to which the periodic percentage rate was applied, and the method by which that balance was determined;

Truth-in-Lending

226.7(b)(8) The balance on which the finance charge was computed, and a statement of how that balance was determined. If the balance is determined without first deducting all credits during the billing cycle, that fact and the amount of such credits shall also be disclosed.

DATES EARNINGS PAYABLE OR FINANCE CHARGE ASSESSED

Truth-in-Savings

6(a)(6) The dates on which earnings are payable:

Truth-in-Lending

226.7(b)(9) The closing date of the billing cycle and the outstanding balance in the account on that date, using the term "new balance," accompanied by the statement of the date by which, or the period, if any, within which, payment must be made to avoid additional finance charges.

OTHER CHARGES

Truth-in-Savings

6(a)(7) Any charges initially or periodically made against any deposits;

6(b)(5) Any charges made against the account during the period covered for purposes of computing the payment of earnings and making the report;

Truth-in-Lending

226.7(b)(4) The amount of any finance charge, using the term "finance charge," debited to the account during the billing cycle, itemized and identified to show the amounts, if any, due to the application of periodic rates and the amount of any other charge included in the finance charge, such as a minimum, fixed, check service, transaction, activity, or similar charge, using appropriate descriptive terminology.

OTHER FACTORS AFFECTING YIELD

Truth-in-Savings

6(b)(6) Any other terms or conditions which increased or reduced the earnings payable under conditions as disclosed under item (1) or (3) of subsection (a).

Truth-in-Lending

not applicable

ANNUAL PERCENTAGE RATE

Truth-in-Savings

6(a)(1) and 6(b)(2) The annual percentage rate:

4(b) Annual percentage rate is the periodic percentage rate multiplied by the number of periods in a calendar year of 365 days for all years including leap year, and may be referred to as the APR.

Truth-in-Lending

226.7(b)(6) The annual percentage rate determined under 226.5(a), ...(i) by multiplying each periodic rate by the number of periods in a year;

TIME ALLOWANCE

Truth-in-Savings

6(a)(2) The minimum length of time a deposit must remain on deposit so that earnings are payable at that percentage rate;

Truth-in-Lending

226.7(b)(9) The closing date of the billing cycle and the outstanding balance in the account on that date, using the term "new balance," accompanied by the statement of the date by which, or the period, if any, within which, payment must be made to avoid additional finance charges.

NUMBER OF TIMES EACH YEAR EARNINGS ARE COMPOUNDED

Truth-in-Savings

6(a)(5) The number of times each year earnings are compounded,

Truth-in-Lending

not applicable

ANNUAL PERCENTAGE YIELD

Truth-in-Savings

6(a)(3) The annual percentage yield:

4(c) Annual percentage yield is the amount of earnings which accrue in one year to a principal amount of $100 as the result of the successive applications of the periodic percentage rate at the end of each period to the sum of the principal amount plus any earnings theretofore credited and not withdrawn during that year, and may be referred to as the APY.

Truth-in-Lending

not applicable

Source: Truth-in-Savings (Section S. 1052 or H.R. 4985) and Truth-in-Lending (Section of Regulation Z)

ILLEGIBLE

THE FOLLOWING DOCUMENT (S) IS ILLEGIBLE DUE TO THE PRINTING ON THE ORIGINAL BEING CUT OFF

ILLEGIBLE

* <u>HOW ARE EARNINGS ON YOUR SAVINGS FIGURED?</u>

- Compounded continuously, daily, quarterly, semi-annually?
- Based on a 360, 365, 366 or 360/365 day year?
- Do you know? Do they know? If they know, will they tell you?

* <u>HOW MUCH OF YOUR MONEY DOESN'T EARN INTEREST?</u>

- What balance do they use in figuring earnings?
  . . . FIFO, LIFO, Low Balance, DIDO . . .
- Do you know that earnings can vary as much as 171%
  on accounts quoting the same annual rate?
- Do you know the system used on your account?
- Shouldn't your savings contract disclose all the facts?

* <u>HAVE YOU EVER TRIED TO CHECK THE ACCURACY OF EARNINGS PAID?</u>

MOST people haven't, but MOST savings passbooks and
statements don't tell enough about the account for
the consumer to re-figure earnings.

SPECIAL TERM SAVINGS ACCOUNT

CERTIFICATE NO. 11 - 16 22 51 3

IN ACCT. WITH: _____

MATURITY DATE: 2/1/74 RATE OF INTEREST: 5 3/4

DATE	REPAYMENT	DEPOSIT	INTEREST	TOTAL	TELLER
APR 16		****500.00		****500.00	5 R
JUL 15			**18.96	****518.96	A R

SPECIAL TERM SAVINGS ACCOUNT

CERTIFICATE NO. 41 - 19 22 55 4

IN ACCT. WITH: Richard L. D. Morse

MATURITY DATE: 4/1/71 RATE OF INTEREST: 5 3/4

DATE	REPAYMENT	DEPOSIT	INTEREST	TOTAL	TELLER
APR 16		****500.00		****500.00	5 R
JUL 20			**22.04	****522.04	A R

- Obviously an error was made in one of these identical accounts. (<u>Same</u> deposits on <u>same</u> date at <u>same</u> rate).
- Why were <u>earnings</u> (stamped on different dates) <u>different</u> when both were for the <u>same period</u> ending Dec. 31?
- Which of these amounts was correct?

STATUS OF TRUTH IN SAVINGS

Introduced early in 92nd Congress, but no hearings were held. Again introduced in 93rd by Senators Hartke, Bayh, Gravel and Humphrey (S. 1052), and by Representatives Roy and Sullivan with 26 co-sponsors (H. 4985). At Senate Hearings held in June, 1973, all agencies (FDIC, FRB, and FHLBB) testified in support, but differed on details of what need be disclosed and how it should be administered.

Administration support came with the addition of Sec. 106 to the Financial Institutions Act of 1973 (S. 2591) by U.S. Treasury Deputy Secretary Bill Simon and Virginia Knauer. Left out, however, were important disclosures such as YIELD, PERIODIC PERCENTAGE RATE, METHOD OF FIGURING BALANCE WHICH QUALIFIES FOR EARNINGS AND THE NUMBER OF DAYS IN A YEAR. Also, coverage was limited to specific institutions and does not include all consumer savings.

The FRB, at the request of the Senate, is studying ways by which savings schemes might be simplified. Some limitation in freedom of financial institutions to offer a wide range of consumer choice may seem desirable. Nevertheless, full disclosure of defined terms will still be needed for the consumer at three critical stages:

- Initially, to determine when to save, and what savings plan is most advantageous at that time.
- Later, to assess costs or benefits of shifting savings as conditions change.
- Also, to check if amount of interest paid by the savings institution agrees with the original terms of the savings contract.

Richard L. D. Morse
Department of Family Economics
Kansas State University
Manhattan, Kansas 66506

Hartke (S. 1052) and Rov-Sullivan (H. 4985)	COVERAGE	Sec. 106 of Financial Institutions Act of 1973 (S. 2591)
Broad. Includes all who in the regular course of business receive and hold or issue individual savings deposits and pay earnings. (3) (6)	Scope	Limited to insured and member banks and savings and loans. Not applicable to credit unions nor to all of those savings institutions not now regulated. (c) (2)
Listed 3 (b) (1) (2) & (3)	Exclusions	Same list

DEFINITIONS

All-inclusive definition 3 (4)	Earnings	Not defined, but term is used (a) (1) (2) & (3)
Defined 4 (a)	Periodic Percentage Rate	Not defined, yet used to define annual percentage rate and yield (a) (3) (A) & (B)
Defined 4 (b)	Annual Percentage Rate	Same definition (a) (3) (A)
Defined 4 (c)	Annual Percentage Yield	Same definition (a) (3) (B)
Issued by Federal Reserve Board 5	Regulations	Same, after consultation with others (c) (1)

DISCLOSURES

Disclosure upon request of any individual

Full disclosure in writing of all information required at the time initial deposit is made (6) (a)	No provision

Disclosure---at the time funds are initially placed

All the information with respect to the individual savings deposit being opened (6) (a)	Information with respect to all of the types of interest-bearing deposit accounts offered at that time by such institution .
(1) annual percentage rate	(A) same
(2) minimum length of time	(B) same
(3) annual percentage yield	No provision for APY
(4) Periodic percentage rate and the method used to determine the balance to which this rate will be applied	No provision for PPR No provision for disclosure of method of determining the balance eligible for earnings.
(5) the number of times each year earnings are compounded	(C) same
(6) the dates on which earnings are payable	(D) same
(7) any charges initially or periodically made against any deposits	(E) same
(8) any terms or conditions which increase or reduce the rate of earnings payable as disclosed under items (1) and (3); and	(F) same, with elimination of reference to (1) and (3), comparable, but incomplete: "Any terms or conditions which increase or reduce the rate of earnings payable; and
(9) any restrictions ... penalties ...	(G) same

Disclosure... Annually and at the time any earnings report is made in person or by mailing to the depositor's last known address

6 (b) same as above	(a) (2) same as above
(1) the amount of earnings paid	(A) same
(2) the annual percentage rate	(B) same
(3) the periodic percentage rate	no provision
(4) the principle balance to which the periodic percentage rate was applied, and the method by which the balance was determined	no provision
(5) any charges ...	(C) same
(6) any other terms or conditions which increased or reduced the earnings payable under conditions as disclosed under (1) or (3) of subsection ( )	(D) same, with elimination of all words beginning with "any or conditions ...."

6 (d) no notice required if change is directed
by a regulatory authority

(b) no exemption

Disclosures in Advertising

Sec. 7

(Note: Since the yield must be disclosed
for every type of account, the
advertised yield for account should
be no different from the manner
in which it is calculated.)

(c) (1) differs only in its treatment of the
annual percentage yield --
The yield need not be disclosed
But the yield may be disclosed provided
that it be "calculated in the same
manner in which interest is credited
to the account for one year".

Administrative Enforcement

Sec. 8 Consistent with the broad scope
and utilizes language comparable
to Truth in Lending

(e) (2) consistent with the limited scope

Civil Liability

Sec. 9

(f) same with the addition of assessing the
liability as "(A) twice the amount of
interest in connection with the trans-
action, that the liability under this
paragraph ..." The limits are the
same as under S. 1052 and H. 4565.

Other Provisions

Sec. 10 Criminal liability for willful
and knowing violation

Sec. 11 Views of other agencies

Sec. 12 Effect on other laws·

Sec. 13 Report to Congress

SUMMARY

In summary, the two measures are quite similar. They differ significantly, however, in their concepts of the needs of consumers:

(1) The consumers' need for full information about available types of savings in order to make a knowledgeable decision about where to save, and whether to shift savings with changing conditions.

(2) The consumers' need to have access to the accounting mechanics so they can verify their records.

Specifically, Sec. 106 ---

Fails to give the consumer information until the initial deposit is made. - And then it strangely requires information about all the other types of savings offered by that institution. Thus information is disclosed after the consumer has made the savings decision, and not before;

Fails to give the consumer full information:

- the yield, which portrays the effect of compounding, is not required.

- the periodic percentage rate and the balance to which it is applied are not mentioned. Both are useful because they alert the consumer to ways of getting maximum benefit from the account and whether the account type is incomprehensibly complex. The periodic percentage rate is the "unit price" for time-money.

Fails to cover all savings plans. Credit unions are not covered. Finance companies and others offering debentures certificates and countless other forms to attract savings will be free of comparable regulation. As a result the consumer will continue to be confused by the myriad of terms and unable to weigh the merits of competing options.

Richard L. D. Morse
Department of Family Economics
Kansas State University
Manhattan, Kansas 66506

DEPARTMENT OF FAMILY ECONOMICS
JUSTIN HALL

APPENDIX B

Aug. 17, 1973

Mr. Harold Stones
Kansas Bankers Association
Merchants National Bank Bldg.
8th & Jackson
Topeka, Kansas   66600

and

Mr. James R. Turner
Kansas Savings & Loan League
612 Capitol Federal Bldg.
Topeka, Kansas   66603

Dear Jim and Harold:

I would like to test the feasibility of compliance with the Consumer Savings Disclosure Act under realistic conditions. To do this I need a collection of actual savings plans and savings accounts to draw upon and work with to test:

1. The feasibility of drafting clear, simple and complete disclosures.
2. Forms and aids designed to facilitate validation of earnings by consumers.

This will greatly assist those financial institutions which believe in full disclosure and would make full disclosure if practical guidelines were available. It will also reveal any impracticalities of existing ideas and give some idea of the costs involved.

I have a student who is challenged by this problem and is willing to work on it. What we need now are several examples of what you consider to be representative of the variety of savings plans currently available from your member institutions. Your cooperation is essential for with your knowledge of your own industry we could be assured of reliability.

Specifically we would like for each type of account:

. Literature from the savings institution describing the account.
. At least two ledgers, passbooks or whatever showing actual activity of the account over at least one earnings payment period. (The account should be edited to render it anonymous).
. Completion of the enclosed Standard Disclosure Model for Savings Accounts, or your own edited version. We think that this form can be used to supply all the information needed to understand the account, but we need to put it to a test.

Finally, if the savings institution is willing, we would like name and telephone number of the individual at that institution whom we can contact to clarify any points of confusion as we work out solutions.

Thank you for your interest and cooperation.

Sincerely yours,

Richard L. D. Morse
Professor and Head

RLDM:cmh

Enclosures

KANSAS
SAVINGS LOAN
LEAGUE

JAMES R. TURNER
EXECUTIVE VICE PRESIDENT

612 CAPITOL FEDERAL BLDG. • TOPEKA, KANSAS 66603 • PHONE (913) 232-8215

RECEIVED

AUG 2 4 1973

FAMILY ECONOMICS
College of Home Economics

August 23, 1973

Dr. Richard L. D. Morse
Professor and Head
Department of Family Economics
Justin Hall
Kansas State University
Manhattan, Kansas 66506

Dear Dick:

　　We appreciate receipt of the xeroxed copy of your
August 17 "Jim and Harold" letter. We will present
your letter to various League committees within the
next month in an effort to secure some volunteers for
your latest project.

　　Regards.

Sincerely,

James R. Turner
Executive Vice President

JRT:ems

KANSAS SAVINGS LOAN LEAGUE

JAMES R. TURNER
EXECUTIVE VICE PRESIDENT

612 CAPITOL FEDERAL BLDG. • TOPEKA, KANSAS 66603 • PHONE (913) 232-8215

October 4, 1973

Dr. Richard L. D. Morse
Department of Family Economics
Justin Hall
Kansas State University
Manhattan, Kansas

Dear Dick:

As per your request, enclosed find a copy of
"Helpful Hints on Managing Your Money For Retirement."
These books are distributed through the Savings and Loan
Foundation. Accordingly, should you need additional
copies just let me know.

We have not reduced our plans to writing as yet,
but apppears that we will pursue two areas on Truth-in-
Savings: (1) Several pilot studies on the cost of dis-
closure under proposed "Truth-in-Savings" legislation,
and (2) An investigative research study on the nature
and scope of current disclosure procedures by our
members. Look forward to meeting with you in the future
to discuss these plans.

Regards.

Sincerely,

James R. Turner
Executive Vice President

JRT:ems

Encl.

KBA *KANSAS BANKERS ASSOCIATION*

September 6, 1973

Dr. Richard L. D. Morse, Head
Department of Family Economics
Kansas State University
Manhattan, Kansas 66502

Dear Dick:

I'm sorry to be so late in delaying my answer to the joint letter you wrote to Jim Turner and me concerning need for savings plan information. It was necessary to bring your request before an appropriate body of the KBA, and this was accomplished yesterday.

Dick, we discussed your request at some length. We are in sympathy and want to give you all cooperation possible in your request to devise a simple, workable, but effective tool in allowing the consumer saver as much complete information as he needs in making intelligent decisions on the placement of his savings account.

Your specific request presented some mechanical problems for us, and we have an alternative plan to suggest to you which we believe would be perhaps even more effective than your original request. As you know, correspondent banks in Kansas do data processing for large numbers of their customer banks. Included among these services is a program for the particular savings deposit of that bank. If you were to have access to the various program materials in the data center, it seems to me that you would automatically come up with a wide range of representative savings plans---much more representative than someone in the KBA office just picking at random a few banks and a few plans.

Our KBA president, Henry Blanchard, has indicated that his bank will be happy to cooperate with you. The head of his commercial data division is John E. French, Vice President. Mr. French's telephone number is 913/371-0035 and I would suggest you call him for your specific method of procedure. The specific bank on any of these programs will, from necessity, remain anonymous but it will certainly give you detailed and precise information concerning the various savings plans of quite a large number of banks.

I'm afraid I have some bad news to report concerning the grant from ABA.

• • •

Dr. Richard L.D.Morse
September 6, 1973
Page 2

I hope this may be helpful to you and please let us know if we may be of assistance in any further way.

Cordially,

Harold A. Stones
Director of Research

HAS:fg
copies to: Henry Blanchard
Bob Jennison
John French
Carl Bowman
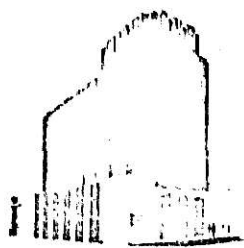
COMMERCIAL NATIONAL BANK

KANSAS CITY, KANSAS 66101   601 MINNESOTA AVENUE   371-0035

September 25, 1973

Dr. Richard L. D. Morse, Head
Department of Family Economics
Kansas State University
Manhattan, Kansas 66502

Dear Dr. Morse:
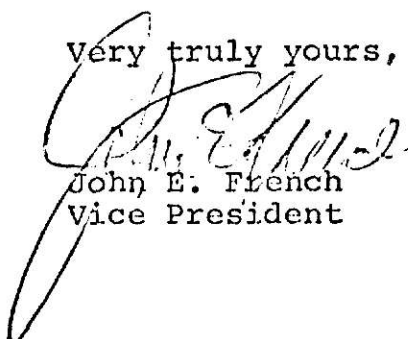
I am sorry for the delay in obtaining the information that
was requested from me last week. I have however completed
some of the work and thought I should send it to you early.

Attached you will find a copy of the Savings Interest Payment
Methods that our bank utilizes on our computer system. Each
bank has an option to utilize one of these four different types.
I believe that they are discussed in enough detail to understand
them. As soon as I can accumulate different types of Savings
Statements that reflect each of these methods I will forward
them on to you so you can see that these are the true calcu-
lations.

I have also obtained from the Union National Bank of Wichita
their rules and regulations describing their Savings accounts.
I hope this will be of assistance to you.

If I can be of any further assistance please feel free to
call on me.

Very truly yours,

John E. French
Vice President

JEF/dc

UNIBANK PLAN 5 ACCOUNT
(A TIME DEPOSIT OPEN ACCOUNT)
RULES AND REGULATIONS
REVISED EFFECTIVE JANUARY 1, 1970

UNION NATIONAL BANK
OF WICHITA
WICHITA, KANSAS
MEMBER FDIC

On making the first deposit of at least One Dollar ($1.00), the depositor shall execute the signature card of the Bank provided for that purpose, evidencing the depositor's agreement to these Rules and Regulations and any amendments which the Bank may hereafter make to the same. Subsequent deposits of at least One Dollar ($1.00) will be received.

This account shall bear interest, computed daily, from the date of deposit to the date of withdrawal, and paid and compounded quarterly as described below, at such rate as may be fixed, from time to time, by the Bank by rule or regulation. Payment of interest shall be effected by a credit to the depositor's account. The applicable rate of interest so fixed by the Bank shall be subject to any rule or regulation issued by the Board of Governors of the Federal Reserve System. Any rule or regulation of the Bank fixing the applicable rate of interest may be amended, modified, or revoked at any time by a subsequent rule or regulation of the Bank, provided that no rule or regulation which shall effect a reduction in the rate of interest on existing account balances shall take effect until after notice of such rule or regulation has been posted in the Bank's premises for not less than ninety (90) consecutive days. After the expiration of such ninety (90) days, such rule or regulation shall bind such depositor as fully as though such rule or regulation had been expressly assented to by them in writing. All other rules and regulations governing accounts may be amended, modified, or revoked at any time without prior notice to a depositor.

Interest will be credited on the books of the Bank quarterly on March 31, June 30, September 30, and December 31 of each year, or such other dates, determined on a quarterly basis, as the Bank may designate. If not withdrawn, interest shall be added to the principal on the above quarterly basis and bear interest the same as other deposits.

Withdrawals of any part or all of the account balance shall be permitted only through payment to the depositor, but not to any other person whether or not acting for the depositor, in the following manner:

(a) Withdrawals of funds that have been on deposit for a FULL CALENDAR QUARTER or more may be made without written notice during the first TEN (10) days following any quarterly interest paying date (March 31, June 30, September 30, and December 31); or

(b) Withdrawals of funds may be made at a time other than during the first ten (10) days following a quarterly interest paying date by giving at least NINETY (90) days written notice of such intent to withdraw. Such notice shall be given the Bank by means of a form of written withdrawal notice to be furnished the depositor by the Bank on request and shall relate only to funds on deposit on the date such notice is received by the Bank. Interest will accrue on the amount specified for withdrawal until, but not after, the date when it becomes available for withdrawal pursuant to the above notice. When a written notice of intent to withdraw is given, the right to withdraw the amount specified during the first ten (10) days following the next quarterly interest paying date is revoked and cancelled. The depositor may give the Bank written notice prior to the specified withdrawal date revoking the intention to withdraw, and in that event, the designated amount shall continue to accrue interest. If a depositor revokes his intention to withdraw, the depositor is prohibited from withdrawing the specified amount during the first ten (10) days following the next quarterly interest paying date unless the notice of intent to withdraw is cancelled at least NINETY (90) days before the next quarterly interest paying date.

In case of the death of any depositor, the amount in the account will be transferred to the legal representative of the depositor and payment shall be subject to the laws relating to inheritance, estate and succession taxes, and all rules and regulations made pursuant thereto.

The Bank may at any time and in its sole discretion, without consent of the depositor, refuse any deposit, limit the amount which may be deposited, return any part or the whole of the amount to the credit of the depositor, or close the account.

No passbooks will be issued in connection with this account, but statements, including any interest paid, will be rendered for each quarterly interest period set out above. Statements will be mailed by first-class mail to the depositor at the depositor's last address shown by the records of the Bank or personally delivered to the depositor.

All transactions relating to this account are made expressly subject to all applicable laws and to all rules, orders, and regulations of supervisory authorities, now in effect or hereafter promulgated.

SAVINGS ACCOUNT
RULES AND REGULATIONS
EFFECTIVE JUNE 1, 1971

UNION NATIONAL BANK
OF WICHITA, KANSAS
MEMBER FDIC

On making the first deposit, the depositor shall subscribe his or her name on the signature card of the Bank provided for that purpose, evidencing his or her agreement to these Rules and Regulations, and all changes therein and additions thereto that may thereafter be duly made. Deposits of One Dollar ($1.00) and upwards will be received.

Savings accounts shall bear interest at such rate as may be fixed, from time to time, by the Bank by rule or regulation. The rate so fixed shall be subject to any rule issued by the Board of Governors of the Federal Reserve System under the provisions of any present or future Act of Congress. Any rule or regulation of the Bank fixing the rate of interest may be altered, amended, modified, revoked or superseded at any time by a subsequent regulation, provided that no regulation affecting the rate of interest on savings accounts shall take effect until after notice of such regulation has been posted in the Bank for not less than five (5) consecutive business days, after the expiration of which such rule or regulation shall bind all depositors as fully as though such rule or regulation had been expressly assented to by them in writing. All other rules and regulations governing accounts, in the Savings Department, may be altered, amended, modified, revoked, or added to at any time without prior notice to the depositor.

Interest will be credited on the books of the Bank on March 1, June 1, September 1, and December 1 of each year, or such other dates as the Bank may designate, at such rate as may be established, from time to time by the Bank. If not withdrawn, interest will be added to the principal and bear interest on it the same as other deposits.

Withdrawals are permitted only through payment to the depositor himself or herself, but not to any other person whether or not acting for the depositor. Payment may be made to the depositor over the counter, through the mails, or otherwise.

In case of death of any depositor, the amount standing to the credit of the deceased will be paid to his or her legal representative.

When an account stands in the name of two depositors payable to either or to "the survivor", then payment to either shall be a full discharge, whether the other be living, incompetent or dead.

The Bank may pay depositors at its discretion, without notice, but the right is reserved of requiring thirty (30) days written notice of intention to withdraw funds on deposit.

The Bank may, without the consent of the depositor, return, at any time, any part or the whole of the amount to the credit of such depositor, or stop the interest thereon, by giving ten (10) days written notice, mailed to the depositor at the address given on the books of the Bank, and shall in such event allow interest thereon up to the date fixed in the notice for the payment or stopping of interest.

No Pass Books will be issued, but statements, including any interest credit earned, will be rendered for each three-month (3) interest period. Statements will be mailed by regular first class mail to the depositor to the last address shown by the records of the Bank.

A charge of One Dollar ($1.00) may be made against any savings account closed within sixty (60) days from the date the account was opened. Depositors will be allowed three (3) withdrawals in any one month, or nine (9) within a quarterly interest period without charge. A service charge of Twenty-Five Cents (25c) for each additional withdrawal may be made at the end of each interest period. Any such charge or charges may be deducted from the interest earned.

Whenever any savings account has a balance of $1.99 or less and in the preceding 12 months there has not been a deposit or withdrawal from the account, the Bank may charge the account at the rate of 50c quarterly. All savings accounts are subject to any and all service charges now in effect or which may be established by the Bank from time to time.

All transactions of every kind are made expressly subject to all applicable laws and to all rules, orders and regulations of the supervisory authorities, now in effect or hereafter promulgated, to which this bank, its officers, agents or employees may be expected or required to conform.

There are four basic methods of Savings interest calculation
techniques used by banks. These are (1) First In First Out
(FIFO), (2) Last In First Out (LIFO), (3) Daily Simple and
(4) Daily Compounded. The examples which follow assume 5%
semi-annual interest payments.

1.   FIRST IN FIRST OUT (FIFO)

     This technique involves the use of seven balance accumulators
which are established for each account. The accumulators are
used to record deposit and withdrawal activity during the
interest period. For an interest period January 1 through June 30
the accumulators would be used to record activity as follows:

ACCUMULATOR NUMBER	ACTIVITY PERIOD
6	Jan 1 to Jan 10
5	Jan 11 to Feb 10
4	Feb 11 to Mar 10
3	Mar 11 to Apr 10
2	Apr 11 to May 10
1	May 11 to June 10
0	June 11 to June 30

The balance carried forward from December 31 is placed in
accumulator number 6 on the first day of the new interest period.
Assuming a customer had a beginning balance of $500, the
accumulators would look like this on January 1

6	5	4	3	2	1	0
500	0	0	0	0	0	0

Deposits are then added to the appropriate accumulators depending
upon the deposit date. A $50 deposit made on Jan 2 would add
to accumulator 6 and result in the following accumulator totals

6	5	4	3	2	1	0
550	0	0	0	0	0	0

A deposit of $100 on Jan 11 would add to accumulator 5 and
result in the following accumulator totals

6	5	4	3	2	1	0
550	100	0	0	0	0	0

A deposit of $150 on Mar 12 would add to accumulator 3 and
result in the following accumulator totals

6	5	4	3	2	1	0
550	100	0	150	0	0	0

A deposit of $60 on May 24 would add to accumulator 1 and
result in the following accumulator totals

6	5	4	3	2	1	0
550	100	0	150	0	60	0

Any withdrawals made during the period must be subtracted from
the accumulators. The FIFO method begins this subtraction from
accumulator 6 and works from left to right. For instance, a
withdrawal of $200 made on June 14 is subtracted from
accumulator 6 and results in the following accumulator totals

6	5	4	3	2	1	0
350	100	0	150	0	60	0

If the withdrawal had been larger than the total in
accumulator 6 then the remainder would have been subtracted
from accumulator 5, then 4, etc., until the entire amount of
the withdrawal had been subtracted from the balance accumulators.

Now following our example account to the end of the interest
period, the account balance is $660 and the balance accumulators
look like this on June 30

6	5	4	3	2	1	0
350	100	0	150	0	60	0

The customer then receives six months interest on the total in
accumulator 6, five months interest on the total in accumulator 5,
four months on accumulator 4, etc.

At 5% he would receive:

6 months interest on $350	=	8.75
5 months interest on $100	=	2.08
4 months interest on $0	=	.00
3 months interest on $150	=	1.88
2 months interest on $0	=	.00
1 months interest on $60	=	.25
0 months interest on $0	=	.00
		=====
		12.96

2. LAST IN FIRST OUT (LIFO)

This technique utilizes the same balance accumulator method as the FIFO method. All deposits are handled in a like manner. Following our previous example, our customers balance accumulators after the May 24 deposit of $60 would look like this

6	5	4	3	2	1	0
550	100	0	150	0	60	0

The difference between LIFO and FIFO is in the way withdrawals are handled. Once again, any withdrawals made during the period must be subtracted from the balance accumulators. The LIFO method, however, begins this subtraction from accumulator 0 and works from right to left. The example withdrawal of $200 made on June 14 would be subtracted from accumulator 0. Since the withdrawal is larger than the total in accumulator 0 the subtractions must be made from accumulators 1, then 2, then 3, etc., until the entire amount of the withdrawal has been subtracted from accumulators. Under the LIFO method then the $200 withdrawal on June 14 would result in the following accumulator totals

6	5	4	3	2	1	0
550	100	0	10	0	0	0

At the end of the period, on June 30, the customer would receive

6 months interest on $550	=	13.75
5 months interest on $100	=	2.08
4 months interest on $0	=	.00
3 months interest on $10	=	.13
2 months interest on $0	=	.00
1 months interest on $0	=	.00
0 months interest on $0	=	.00
		———
		15.96

3. DAILY SIMPLE

The daily interest routine utilizes a single accumulator which represents accumulated interest on the account. Each day, a calculation is made of one days interest on the current balance. That interest is added to the accumulated interest total. At the end of the interest period, the customer receives whatever interest has accumulated for the period.

In our example account it would work like this

DATE	ACCOUNT BALANCE	DAILY INTEREST	ACCUMULATED INTEREST
Jan 1	$500.00	$.06849	$.06849
Jan 2	550.00	.07534	.14383
Jan 3	550.00	.07534	.21917
Jan 4	550.00	.07534	.29451
Jan 5	550.00	.07534	.36985
Jan 6	550.00	.07534	.44519
Jan 7	550.00	.07534	.52053
Jan 8	550.00	.07534	.59587
Jan 9	550.00	.07534	.67121
Jan 10	550.00	.07534	.74655
Jan 11	650.00	.08904	.83559
Jan 12	650.00	.08904	.92463

This procedure would continue through June 30 at which time the customer would receive the total accumulated interest, and the calculation would begin again on the new balance. In our example account this payment method would yield an interest total of $18.10.

4. DAILY COMPOUND

This routine is similar to daily simple in that it utilizes a single accumulator which represents accumulated interest on the account. Again, each day, one days interest is calculated and added to the accumulated interest. The difference is that the compound daily method calculates interest each day on the current balance for each day plus the accumulated interest to date.

Using our example account it would look like this

DATE	BALANCE	BALANCE PLUS ACCUMULATED INTEREST	DAILY INTEREST	ACCUMULATED INTEREST
Jan 1	$500.00	$500.00000	$.06849	$.06849
Jan 2	550.00	550.06849	.07535	.14384
Jan 3	550.00	550.14384	.07536	.21920
Jan 4	550.00	550.21920	.07537	.29457
Jan 5	550.00	550.29457	.07538	.36995
Jan 6	550.00	550.36995	.07539	.44534
Jan 7	550.00	550.44534	.07540	.52074
Jan 8	550.00	550.52074	.07541	.59615
Jan 9	550.00	550.59615	.07542	.67157
Jan 10	550.00	550.67157	.07543	.74700
Jan 11	650.00	650.74700	.08914	.83614
Jan 12	650.00	650.83614	.08916	.92530

This procedure would continue through June 30 at which time the customer would receive the total accumulated interest and the calculation would begin again on the new balance. In our example account the compound daily method would yield an interest total of $18.32.

5. RECAP

To recap, our example account had the following activity

DATE	ACTIVITY		BALANCE
Jan 1	Balance Forward	$500.00	$500.00
Jan 2	Deposit	50.00	550.00
Jan 11	Deposit	100.00	650.00
Mar 12	Deposit	150.00	800.00
May 24	Deposit	60.00	860.00
June 14	Withdrawal	200.00	660.00

The interest paid by each method

FIFO	12.96
LIFO	15.96
Daily Simple	18.10
Daily Compound	18.32

APPENDIX C

ANNUAL PERCENTAGE YIELD

Annual Percentage Rate	Compound Period (1 year = 365 days)						
	Annual 1 yr.	Semi 1/2 yr.	Quarter 1/4 yr.	Month 1/12 yr.	Week 1/52 yr.	Day 1/365 yr.	Continuous $\rightarrow \frac{1}{\infty}$ yr.
4.00	4.00	4.040000	4.060401	4.074154	4.079473	4.080848	4.081077
4.25	4.25	4.295156	4.318215	4.333771	4.339791	4.341333	4.341606
4.50	4.50	4.550625	4.576509	4.593983	4.600747	4.602470	4.602786
4.75	4.75	4.806406	4.835281	4.854788	4.862344	4.864257	4.864620
5.00	5.00	5.062500	5.094534	5.116189	5.124582	5.126737	5.127110
5.25	5.25	5.318906	5.354267	5.378189	5.387463	5.389836	5.390256
5.50	5.50	5.575625	5.614481	5.640786	5.650989	5.653586	5.654062
5.75	5.75	5.832656	5.875177	5.903982	5.915161	5.918038	5.918527
6.00	6.00	6.090000	6.136355	6.167781	6.179981	6.183110	6.183655
6.25	6.25	6.347656	6.398016	6.432181	6.445450	6.448841	6.449446
6.50	6.50	6.605625	6.660161	6.697184	6.711571	6.715276	6.715902
6.75	6.75	6.863906	6.922790	6.962794	6.978338	6.982338	6.983026
7.00	7.00	7.122500	7.185903	7.229008	7.245765	7.250066	7.250818
7.25	7.25	7.381406	7.449502	7.495829	7.513848	7.518498	7.519281
7.50	7.50	7.640625	7.713587	7.763260	7.782587	7.787567	7.788415
7.75	7.75	7.900156	7.978158	8.031299	8.051985	8.057302	8.058223
8.00	8.00	8.160000	8.243216	8.299950	8.322045	8.327755	8.328707

Definitions: Annual percentage yield (APY) is a rate expressing the amount of earnings which accrue in one year as a result of successive applications of the periodic percentage rate at the end of each period to the principal sum of $100 plus earnings of previous periods. Annual percentage rate (APR) is the number of periods in a year multiplied by the periodic percentage rate (PPR). The rate actually applied each period is the periodic percentage rate (PPR). Definitions are from the Truth in Savings Act, a bill introduced in the 93rd Congress by Representatives Roy and Sullivan (H. 4985) and Senator Hartke (S. 1052).

Education Committee
KSU Federal Credit Union
110 Fairchild Hall

Source: Department of Family Economics
Justin Hall, Kansas State University
Manhattan, Kansas 66506

APPENDIX D

Factor Tables for Daily Compounding Interest
Commerce Bank
Kansas City, Missouri

TABLE OF INTEREST FACTORS
DAILY COMPOUNDING
5.00% 360 DAY BASIS

DAYS ON DEPOSIT	INTEREST FACTOR	DAYS ON DEPOSIT	INTEREST FACTOR	DAYS ON DEPOSIT	INTEREST FACTOR	DAYS ON DEPOSIT	INTEREST FACTOR
1	.0001388859	51	.0071079849	101	.0141256421	151	.0211921993
2	.0002777971	52	.0072478620	102	.0142664929	152	.0213340316
3	.0004167236	53	.0073877565	103	.0144073633	153	.0214758836
4	.0005556714	54	.0075276715	104	.0145482532	154	.0216177553
5	.0006946375	55	.0076676059	105	.0146891627	155	.0217596467
6	.0008336239	56	.0078075597	106	.0148300918	156	.0219015578
7	.0009726276	57	.0079475330	107	.0149710404	157	.0220434886
8	.0011116526	58	.0080875257	108	.0151120086	158	.0221854391
9	.0012506949	59	.0082275379	109	.0152529964	159	.0223274093
10	.0013897575	60	.0083676695	110	.0153940038	160	.0224693992
11	.0015288394	61	.0085078206	111	.0155350308	161	.0226114089
12	.0016679406	62	.0086479911	112	.0156760773	162	.0227534383
13	.0018070612	63	.0087877811	113	.0158171434	163	.0228954874
14	.0019462011	64	.0089278805	114	.0159582291	164	.0230375562
15	.0020853603	65	.0090680194	115	.0160993344	165	.0231796448
16	.0022245388	66	.0092081677	116	.0162404593	166	.0233217531
17	.0023637367	67	.0093483355	117	.0163816038	167	.0234638811
18	.0025029539	68	.0094885528	118	.0165227679	168	.0236060289
19	.0026421904	69	.0096287296	119	.0166639516	169	.0237481964
20	.0027814463	70	.0097689558	120	.0168051549	170	.0238903837
21	.0029207215	71	.0099092015	121	.0169463778	171	.0240325907
22	.0030600161	72	.0100494667	122	.0170876204	172	.0241748175
23	.0031993300	73	.0101897514	123	.0172288826	173	.0243170640
24	.0033386633	74	.0103300555	124	.0173701644	174	.0244593303
25	.0034780159	75	.0104703791	125	.0175114658	175	.0246016163
26	.0036173879	76	.0106107222	126	.0176527868	176	.0247439221
27	.0037567792	77	.0107510848	127	.0177941275	177	.0248862477
28	.0038961899	78	.0108914669	128	.0179354878	178	.0250285930
29	.0040356199	79	.0110318680	129	.0180768677	179	.0251709581
30	.0041750693	80	.0111722896	130	.0182182673	180	.0253133430
31	.0043145381	81	.0113127302	131	.0183596865	181	.0254557476
32	.0044540262	82	.0114531603	132	.0185011254	182	.0255981720
33	.0045935337	83	.0115936099	133	.0186425839	183	.0257406162
34	.0047330605	84	.0117341090	134	.0187840620	184	.0258830802
35	.0048726068	85	.0118746876	135	.0189255598	185	.0260255640
36	.0050121724	86	.0120152255	136	.0190670773	186	.0261680676
37	.0051517576	87	.0121557835	137	.0192086144	187	.0263105910
38	.0052913620	88	.0122963507	138	.0193501712	188	.0264531341
39	.0054309860	89	.0124369574	139	.0194917476	189	.0265956970
40	.0055706293	90	.0125775737	140	.0196333437	190	.0267382797
41	.0057102920	91	.0127182095	141	.0197749595	191	.0268808823
42	.0058499742	92	.0128588648	142	.0199165949	192	.0270235047
43	.0059896756	93	.0129995397	143	.0200582500	193	.0271661469
44	.0061293966	94	.0131402341	144	.0201999248	194	.0273088089
45	.0062691369	95	.0132809480	145	.0203416192	195	.0274514907
46	.0064088966	96	.0134216815	146	.0204833133	196	.0275941923
47	.0065486758	97	.0135624345	147	.0206250671	197	.0277369137
48	.0066884743	98	.0137032271	148	.0207668206	198	.0278796549
49	.0068282923	99	.0138440492	149	.0209085938	199	.0280224160
50	.0069681297	100	.0139848109	150	.0210503867	200	.0281651969

TABLE OF INTEREST FACTORS
DAILY COMPOUNDING
5.00% 360 DAY BASIS

DAYS ON DEPOSIT	INTEREST FACTOR	DAYS ON DEPOSIT	INTEREST FACTOR	DAYS ON DEPOSIT	INTEREST FACTOR	DAYS ON DEPOSIT	INTEREST FACTOR
201	.0283079976	251	.0354733794	301	.0426886905	351	.0499542776
202	.0284508182	252	.0356171952	302	.0428335084	352	.0501291056
203	.0285936586	253	.0357610309	303	.0429723464	353	.0502499523
204	.0287365188	254	.0359048866	304	.0431122045	354	.0503318223
205	.0288793989	255	.0360487623	305	.0432600827	355	.0505377081
206	.0290222988	256	.0361926580	306	.0434129811	356	.0506336161
207	.0291652186	257	.0363365737	307	.0435578296	357	.0508295444
208	.0293081582	258	.0364805093	308	.0437022332	358	.0509275470
209	.0294511177	259	.0366244649	309	.0438477359	359	.0511214618
210	.0295940970	260	.0367684405	310	.0439327758	360	.0512674509
211	.0297370962	261	.0369124361	311	.0441377748		
212	.0298801153	262	.0370564517	312	.0442827939		
213	.0300231542	263	.0372004873	313	.0444278332		
214	.0301662130	264	.0373445429	314	.0445728926		
215	.0303092917	265	.0374886185	315	.0447179722		
216	.0304523902	266	.0376327142	316	.0448629719		
217	.0305955086	267	.0377768299	317	.0450721912		
218	.0307386469	268	.0379209656	318	.0451533318		
219	.0308818051	269	.0380651213	319	.0452934920		
220	.0310249831	270	.0382092970	320	.0454435724		
221	.0311631810	271	.0383534027	321	.0455588729		
222	.0313113988	272	.0384977085	322	.0457340935		
223	.0314546365	273	.0386419443	323	.0458730345		
224	.0315978941	274	.0387862001	324	.0460245955		
225	.0317411716	275	.0389304760	325	.0461698767		
226	.0318844690	276	.0390747719	326	.0463151781		
227	.0320277863	277	.0392190879	327	.0464694997		
228	.0321711235	278	.0393634239	328	.0466059414		
229	.0323144806	279	.0395077799	329	.0467512033		
230	.0324578576	280	.0396521560	330	.0468965854		
231	.0326012545	281	.0397965521	331	.0470419877		
232	.0327446714	282	.0399409683	332	.0471874102		
233	.0328881082	283	.0400854046	333	.0473325529		
234	.0330315649	284	.0402298609	334	.0474783158		
235	.0331750415	285	.0403743373	335	.0476237989		
236	.0333185380	286	.0405188337	336	.0477690722		
237	.0334620545	287	.0406633552	337	.0479148257		
238	.0336055909	288	.0408078868	338	.0480605094		
239	.0337491472	289	.0409524435	339	.0482055334		
240	.0338927235	290	.0410970202	340	.0483515176		
241	.0340363197	291	.0412416170	341	.0484971229		
242	.0341799359	292	.0413862339	342	.0486427466		
243	.0343235720	293	.0415308709	343	.0487933914		
244	.0344672281	294	.0416755280	344	.0489340565		
245	.0346109041	295	.0418202052	345	.0490797418		
246	.0347546001	296	.0419649025	346	.0492254473		
247	.0348983160	297	.0421096199	347	.0493711731		
248	.0350420519	298	.0422543574	348	.0495169191		
249	.0351858078	299	.0423991150	349	.0496626854		
250	.0353295836	300	.0425438927	350	.0498084719		

TABLE OF INTEREST FACTORS

DAILY COMPOUNDING

5.00% 365 DAY BASIS

DAYS ON DEPOSIT	INTEREST FACTOR
1	.0001369863
2	.0002739914
3	.0004110152
4	.0005480578
5	.0006851192
6	.0008221993
7	.0009592983
8	.0010964160
9	.0012335525
10	.0013707078
11	.0015078818
12	.0016450747
13	.0017822863
14	.0019195168
15	.0020567660
16	.0021940341
17	.0023313209
18	.0024686265
19	.0026059511
20	.0027432944
21	.0028806564
22	.0030180374
23	.0031554371
24	.0032928556
25	.0034302930
26	.0035677492
27	.0037052243
28	.0038427181
29	.0039802308
30	.0041177624
31	.0042553127
32	.0043928820
33	.0045304700
34	.0046680769
35	.0048056827
36	.0049433473
37	.0050810108
38	.0052186931
39	.0053563943
40	.0054941144
41	.0056318533
42	.0057696111
43	.0059073877
44	.0060451832
45	.0061829976
46	.0063208309
47	.0064586831
48	.0065965541
49	.0067344440
50	.0068723529
51	.0070102804
52	.0071484272
53	.0072861927
54	.0074241771
55	.0075621804
56	.0077002026
57	.0078382437
58	.0079763037
59	.0081143827
60	.0082524807
61	.0083905973
62	.0085287330
63	.0086668876
64	.0088050610
65	.0089432536
66	.0090814650
67	.0092196953
68	.0093579445
69	.0094962127
70	.0096345002
71	.0097728059
72	.0099110310
73	.0100494749
74	.0101878379
75	.0103262197
76	.0104646205
77	.0106030404
78	.0107414791
79	.0108799368
80	.0110184141
81	.0111569091
82	.0112954237
83	.0114339573
84	.0115725099
85	.0117110814
86	.0118496719
87	.0119882814
88	.0121269099
89	.0122655574
90	.0124042249
91	.0125429094
92	.0126816138
93	.0128203373
94	.0129590797
95	.0130978412
96	.0132366217
97	.0133754211
98	.0135142397
99	.0136530772
100	.0137919352
101	.0139308209
102	.0140697174
103	.0142086297
104	.0143475618
105	.0144865035
106	.0146254744
107	.0147644544
108	.0149034425
109	.0150424697
110	.0151815477
111	.0153206136
112	.0154596974
113	.0155988123
114	.0157379354
115	.0158770680
116	.0160162286
117	.0161554092
118	.0162946101
119	.0164338316
120	.0165730649
121	.0167123088
122	.0168515971
123	.0169908921
124	.0171302065
125	.0172695386
126	.0174088902
127	.0175482604
128	.0176876494
129	.0178270577
130	.0179664895
131	.0181059364
132	.0182454027
133	.0183848881
134	.0185243928
135	.0186639169
136	.0188034601
137	.0189430229
138	.0190826051
139	.0192222066
140	.0193618241
141	.0195014624
142	.0196411207
143	.0197807977
144	.0199204932
145	.0200602084
146	.0201999420
147	.0203396950
148	.0204794670
149	.0206192585
150	.0207590712
151	.0208989032
152	.0210387537
153	.0211786232
154	.0213185118
155	.0214584178
156	.0215983442
157	.0217382889
158	.0218782518
159	.0220182341
160	.0221582337
161	.0222982549
162	.0224382953
163	.0225783556
164	.0227184350
165	.0228585338
166	.0229986525
167	.0231387905
168	.0232789484
169	.0234191258
170	.0235593139
171	.0236995306
172	.0238397633
173	.0239800152
174	.0241202861
175	.0242605741
176	.0244008848
177	.0245412145
178	.0246815637
179	.0248219305
180	.0249623146
181	.0251027228
182	.0252431480
183	.0253835925
184	.0255240553
185	.0256645370
186	.0258050375
187	.0259455567
188	.0260860947
189	.0262266513
190	.0263672384
191	.0265078358
192	.0266484533
193	.0267890913
194	.0269297497
195	.0270704284
196	.0272111275
197	.0273518374
198	.0274925715
199	.0276333250
200	.0277740877

TABLE OF INTEREST FACTORS

DAILY COMPOUNDING

5.00% 365 DAY BASIS

DAYS ON DEPOSIT	INTEREST FACTOR
201	.0279148785
202	.0280556893
203	.0281965196
204	.0283373686
205	.0284782367
206	.0286191239
207	.0287600306
208	.0289009566
209	.0290419020
210	.0291828659
211	.0293238498
212	.0294648527
213	.0296058743
214	.0297469155
215	.0298879739
216	.0300290529
217	.0301701526
218	.0303112715
219	.0304524103
220	.0305935749
221	.0307347514
222	.0308759477
223	.0310171633
224	.0311583981
225	.0312996541
226	.0314409286
227	.0315822220
228	.0317235348
229	.0318648670
230	.0320062174
231	.0321475871
232	.0322889771
233	.0324303863
234	.0325718150
235	.0327132645
236	.0328547318
237	.0329962193
238	.0331377259
239	.0332792524
240	.0334207963
241	.0335623597
242	.0337039437
243	.0338455486
244	.0339871711
245	.0341288136
246	.0342704745
247	.0344121550
248	.0345538550
249	.0346955737
250	.0348373142
251	.0349790735
252	.0351208522
253	.0352626491
254	.0354044656
255	.0355463012
256	.0356881560
257	.0358300301
258	.0359719236
259	.0361138364
260	.0362557737
261	.0363977273
262	.0365397003
263	.0366816930
264	.0368237051
265	.0369657367
266	.0371077874
267	.0372498543
268	.0373919451
269	.0375340530
270	.0376761777
271	.0378183198
272	.0379604789
273	.0381026554
274	.0382448490
275	.0383870593
276	.0385292870
277	.0386715322
278	.0388137945
279	.0389560947
280	.0390985281
281	.0392408710
282	.0393832336
283	.0395256157
284	.0396680175
285	.0398104394
286	.0399528808
287	.0400953419
288	.0402378228
289	.0403803237
290	.0405229285
291	.0406653653
292	.0408079227
293	.0409504997
294	.0410930964
295	.0412357136
296	.0413783501
297	.0415210071
298	.0416636836
299	.0418063801
300	.0419490808
301	.0420918158
302	.0422345678
303	.0423773395
304	.0425201308
305	.0426629418
306	.0428057724
307	.0429486227
308	.0430914928
309	.0432343827
310	.0433772922
311	.0435202213
312	.0436631704
313	.0438061392
314	.0439491279
315	.0440921364
316	.0442351647
317	.0443782128
318	.0445212807
319	.0446643685
320	.0448074543
321	.0449505796
322	.0450937239
323	.0452368880
324	.0453800721
325	.0455232721
326	.0456664940
327	.0458097306
328	.0459529918
329	.0460962739
330	.0462395801
331	.0463830048
332	.0465262434
333	.0466696038
334	.0468129836
335	.0469563836
336	.0470998030
337	.0472432421
338	.0473867011
339	.0475301802
340	.0476736686
341	.0478171873
342	.0479607257
343	.0481042838
344	.0482478618
345	.0483914595
346	.0485350767
347	.0486787138
348	.0488223705
349	.0489660470
350	.0491097231
351	.0492534481
352	.0493971829
353	.0495409374
354	.0496847115
355	.0498285050
356	.0499723181
357	.0501161508
358	.0502600033
359	.0504038755
360	.0505477657
361	.0506916762
362	.0508356063
363	.0509795562
364	.0511235252
365	.0512674959

APPENDIX E

TABLE OF COMPOUND INTEREST FACTORS
Daily Compounding
365 day basis

APR:	4.5%	4.75%	5.0%	5.125%	5.25%	5.5%	
Days							Days
1	.000123287	.000130136	.000136986	.000140410	.000143835	.000150684	1
88	.010907646	.011517036	.012126882	.012431850	.012737007	.013347482	88
89	.011032278	.011648671	.012265529	.012574005	.012882674	.013500177	89
90	.011156925	.011780323	.012404196	.012716181	.013028362	.013652895	90
91	.011281588	.011911992	.012542881	.012858376	.013174071	.013805636	91
92	.011406266	.012043678	.012681585	.013000591	.013319801	.013958401	92
93	.011530959	.012175381	.012820308	.013142827	.013465552	.014111188	93
178	.022186268	.023433033	.024681502	.025306116	.025931311	.027182608	178
179	.022312290	.023566219	.024821869	.025450079	.026078876	.027337388	179
180	.022438328	.023699422	.024962255	.025594063	.026226462	.027492192	180
181	.022564381	.023832642	.025102661	.025738066	.026374070	.027647018	181
182	.022690450	.023965879	.025243086	.025882090	.026521698	.027801868	182
183	.022816534	.024099134	.025383530	.026026134	.026669348	.027956741	183
184	.022942634	.024232406	.025523993	.026170198	.026817019	.028111638	184
185	.023068750	.024365696	.025664475	.026314283	.026964711	.028266558	185
(APY) 365	.046024702	.048642570	.051267374	.052581835	.053898363	.056535859	365 (APY)

APR:	5.75%	6%	6.5%	7.0%	7.5%	8.0%	
Days							Days
1	.000157534	.000164383	.000178082	.000191780	.000205479	.000219178	1
88	.013958422	.014569633	.015793232	.017018208	.018244733	.019472719	88
89	.014118155	.014736411	.015974127	.017213252	.018453961	.019696166	89
90	.014277913	.014903217	.016155053	.017408333	.018663232	.019919660	90
91	.014437697	.015070050	.016336012	.017603452	.018872546	.020143204	91
92	.014597505	.015236910	.016517003	.017798608	.019081903	.020366797	92
93	.014757339	.015403798	.016698027	.017993801	.019291303	.020590439	93
178	.028435633	.029689984	.032203426	.034722800	.037248471	.039780270	178
179	.028597647	.029859248	.032387243	.034921239	.037461604	.040008167	179
180	.028759686	.030028539	.032571092	.035119716	.037674780	.040236114	180
181	.028921750	.030197859	.032754974	.035318231	.037888001	.040464111	181
182	.029083841	.030367206	.032938890	.035516785	.038101265	.040692158	182
183	.029245956	.030536580	.033122837	.035715376	.038314573	.040920255	183
184	.029408097	.030705983	.033306818	.035914006	.038527925	.041148401	184
185	.029570264	.030875414	.033490831	.036112673	.038741321	.041376598	185
(APY) 365	.059180381	.061831097	.067152756	.072500657	.077875672	.083227546	365 (APY)

TABLE OF SIMPLE INTEREST FACTORS
Quarterly, Semi-annual, and Annual Compounding
365 day basis

APR:	4.5%	4.75%	5.0%	5.125%	5.25%	5.5%	
Days							Days
1	.000123288	.000130137	.000136986	.000140411	.000143836	.000150685	1
Quarterly:							
88	.010849315	.011452055	.012054795	.012356164	012657534	.013260274	88
89	.010972603	.011582192	.012191781	.012496575	.012801370	.013410959	89
90	.011095890	.011712329	.012328767	.012636986	.012945205	.013561644	90
91	.011219178	.011842466	.012465753	.012777397	.013089041	.013712329	91
92	.011342466	.011972603	.012602740	.012917808	.013232877	.013863014	92
93	.011465753	.012102740	.012739726	.013058219	.013376712	.014013699	93
Semi-annually:							
178	.021945205	.023164384	.024383562	.024993151	.025602740	.026821918	178
179	.022068493	.023294521	.024520548	.025133562	.025746575	.026972603	179
180	.022191781	.023424658	.024657534	.025273973	.025890411	.027123288	180
181	.022315068	.023554795	.024794521	.025414384	.026034247	.027273973	181
182	.022438356	.023684932	.024931507	.025554795	.026178082	.027424658	182
183	.022561644	.023815068	.025068493	.025695205	.026321918	.027575342	183
184	.022684932	.023945205	.025205479	.025835616	.026465753	.027726027	184
185	.022808219	.024075342	.025342466	.025976027	.026609589	.027876712	185
Annually:							
365	.045000000	.047500000	.050000000	.051250000	.052500000	.055000000	365

APR:	5.75%	6%	6.5%	7%	7.5%	8%	
Days							Days
1	.000157534	.000164384	.000178082	.000191781	.000205479	.000219178	1
Quarterly:							
88	.013863014	.014465753	.015671233	.016876712	.018082192	.019287671	88
89	.014020548	.014630137	.015849315	.017068493	.018287671	.019506849	89
90	.014178082	.014794521	.016027397	.017260274	.018493151	.019726027	90
91	.014335616	.014958904	.016205478	.017452055	.018698630	.019945205	91
92	.014493151	.015123288	.016383562	.017643836	.018904110	.020164384	92
93	.014650685	.015287671	.065651644	.017835616	.019109589	.020383562	93
Semi-annually:							
178	.028041096	.029260274	.031698630	.034136986	.036575342	.039013699	178
179	.028198630	.029424658	.031876712	.034328767	.036780822	.039232877	179
180	.028356164	.029589041	.032054795	.034520548	.036986301	.039452055	180
181	.028513699	.029753425	.032232877	.034712329	.037191781	.039671233	181
182	.028671233	.029917808	.032410959	.034904110	.037397260	.039890411	182
183	.028828767	.030082192	.032589041	.035095890	.037602740	.040109589	183
184	.028986301	.030246575	.032767123	.035287671	.037808219	.040328767	184
185	.029143836	.030410959	.032945205	.035479452	.038013699	.040547945	185
Annually:							
365	.057500000	.060000000	.065000000	.070000000	.075000000	.080000000	365

APPENDIX F

AVERAGE DAILY BALANCE SYSTEM

In the ruled portion of the worksheet:

1. Enter the dates and amounts of all deposits and withdrawals made during the period, but DO NOT enter the date or amount of earnings for the period. Enter the beginning balance of the account as a deposit.

2. Using the Julian calendar, find Julian numbers corresponding to each posted date and enter them in the JULIAN column.

In the upper portion of the worksheet:

1. Enter the APR and PPR. APR is the annual percentage rate; PPR is the periodic percentage rate; PPR may be unknown.

2. Enter the compounding frequency. Earnings may be compounded 1, 2, 4, 12, or 365 times per year, or continuously.

3. Enter the beginning and closing dates for the earnings period and the date earnings are payable or credited. The crediting date may differ from the closing date of the period. Find the length of the period by subtracting the Julian number of the first day of the period from the Julian number corresponding to the first day of the next period. For example, a quarter whose beginning date is January 1 and closing date is March 31 would be 90 days long. (91 [April 1] – 1 [January 1] = 90.)

4. Enter the bookkeeping method used: DIDO, LIFO, FIFO-first deposits, or FIFo-beginning balance.

5. Enter the number of grace days, if any. Deposit grace days may be 10 days per month or period. Deposits made during this time earn as if deposited on the first of the month or period. Withdrawal grace days may be 3 or more days at the end of the period. With- drawals made during this time will not lose earnings. Deposits made during this time may not earn until the first day of the next period.

6. Enter the amount of penalties or charges, if any. Excessive with- drawals during the period may result in penalties.

7. Enter any other conditions that influenced the amount of earnings paid.

8. Enter the interest factors used in calculating earnings for the period. If earnings are compounded daily, find the interest factor in the Table of Compound Interest Factors that corresponds to the

number of days in the interest period. If earnings are compounded quarterly, semi-annually, or annually, use the Table of Simple Interest Factors.

9. Enter the amount of posted earnings for the period.

In the ruled portion of the worksheet:

1. Posted dates have been entered in the DATE column except for the date earnings were posted to the account.

2. Julian numbers were assigned to each date. If the account has grace days, adjust the Julian number so it reflects the number of the date the deposit actually started to earn interest.

3. All transaction amounts have been entered. The beginning balance should be shown as a deposit. Amount of earnings should not be shown in the TRANSACTION columns.

4. Enter the Julian number of the first day of the next period in the space above the DAYS TO END column. If the date is January 1st, enter 366. Subtract each Julian number from that Julian number and enter the amounts in the DIDO column. Go on to step 5 if the DIDO bookkeeping method is used for determining earnings. For other methods, follow these steps:

    LIFO - (withdrawals are subtracted from latest deposits)

    In the LIFO column, adjust for withdrawals by substituting the number from the DIDO column that corresponds to the latest deposit made before the withdrawal. If the withdrawal is larger than the deposit, use the number corresponding to the next earliest deposit.

    FIFO - (withdrawals are subtracted from first deposits)

    In the FIFO column, adjust for withdrawals by substituting the number from the DIDO column that corresponds to the first deposit made during the period. If the withdrawal is larger than the deposit, use the number corresponding to the following deposit.

    FIFO - (withdrawals are subtracted from the beginning balance)

    In the FIFO column, adjust for withdrawals by substituting the number from the DIDO column that corresponds to the beginning balance for the period.

5. In the DOLLAR DAYS column, enter the product of the transaction amounts and Days to End numbers. For example, a deposit of $1000 × 90 days to the end of the period will equal +$90,000.00 Enter a plus (+) for deposit dollar days, and a minus (−) for withdrawal dollar days. Find TOTAL DOLLAR DAYS.

6. Divide TOTAL DOLLAR DAYS by the total number of days in the period to find the AVERAGE DAILY BALANCE.

7. Multiply the AVERAGE DAILY BALANCE by the INTEREST FACTOR. The result should agree with posted earnings after adjustments are made for penalties.

AVERAGE DAILY BALANCE SYSTEM

1. APR _____ % PPR _____ %

2. Compounding frequency is _____ times per year.

3. Earnings are figured for the _____ day period from _____

   through _____ and are payable or credited on _____.

4. Bookkeeping method _____.

5. Deposit grace days _____ Withdrawal grace days _____.

6. Penalties _____.

7. Other _____.

8. INTEREST FACTORS: SIMPLE _____ COMPOUND _____
                            (from table)   (from table)

9. EARNINGS: $_____ $_____ $_____
             (ADB × simple fac) (ADB × cmpd. fac)   (posted earnings)

DATE	JULIAN	TRANSACTIONS		DAYS TO END			DOLLAR DAYS	
		Deposits	Withdrawals	DIDO	LIFO	FIFO	±	
							Total	

$$\text{AVERAGE DAILY BALANCE} = \frac{\text{Total Dollar Days}}{\text{Total Days in Period}}$$

EARNINGS = ADB × Interest Factor

APPENDIX G

ACCRUED EARNINGS POTENTIAL SYSTEM

In the ruled portion of the worksheet:

1. Enter the dates and amounts of all deposits and withdrawals made
   during the period, but DO NOT enter the date or amount of earnings
   for the period. Enter the beginning balance of the account as a
   deposit.

2. Using the Julian calendar, find Julian numbers corresponding to
   each posted date and enter them in the JULIAN column.

In the upper portion of the worksheet:

1. Enter the APR and PPR. APR is the annual percentage rate; PPR is
   the periodic percentage rate; PPR may be unknown.

2. Enter the compounding frequency. Earnings may be compounded 1, 2,
   4, 12, or 365 times per year, or continuously.

3. Enter the beginning and closing dates for the earnings period and
   the date earnings are payable or credited. The crediting date may
   differ from the closing date of the period. Find the length of the
   period by subtracting the Julian number of the first day of the
   period from the Julian number corresponding to the first day of the
   next period. For example, a quarter whose beginning date is
   January 1 and closing date is March 31 would be 90 days long.
   (91 [April 1] - 1 [January 1] = 90.)

4. Enter the bookkeeping method used: DIDO, LIFO, FIFO-first deposits,
   or FIFO-beginning balance.

5. Enter the number of grace days, if any. Deposit grace days may be
   10 days per month or period. Deposits made during this time earn as
   if deposited on the first of the month or period. Withdrawal grace
   days may be 3 or more days at the end of the period. Withdrawals
   made during this time will not lose earnings. Deposits made during
   this time may not earn until the first day of the next period.

6. Enter the amount of penalties or charges, if any. Excessive with-
   drawals during the period may result in penalties.

7. Enter any other conditions that influenced the amount of earnings
   paid.

8. Enter the amount of posted earnings for the period.

In the ruled portion of the worksheet:

1. Posted dates have been entered in the DATE column except for the date earnings were posted to the account.

2. Julian numbers were assigned to each date. If the account has grace days, adjust the Julian number so it reflects the number of the date the deposit actually started to earn interest.

3. All transaction amounts have been entered. The beginning balance should be shown as a deposit. Amount of earnings should not be shown in the TRANSACTION columns.

4. Enter the Julian number of the first day of the next period in the space above the DAYS TO END column. If the date is January 1st, enter 366. Subtract each Julian number from that Julian number and enter the amounts in the DIDO column. Go on to step 5 if the DIDO bookkeeping method is used for determining earnings. For other methods, follow these steps:

   LIFO – (withdrawals are subtracted from latest deposits)

   In the LIFO column, adjust for withdrawals by substituting the number from the DIDO column that corresponds to the latest deposit made before the withdrawal. If the withdrawal is larger than the deposit, use the number corresponding to the next earliest deposit.

   FIFO – (withdrawals are subtracted from first deposits)

   In the FIFO column, adjust for withdrawals by substituting the number from the DIDO column that corresponds to the first deposit made during the period. If the withdrawal is larger than the deposit, use the number corresponding to the following deposit.

   FIFO – (withdrawals are subtracted from the beginning balance)

   In the FIFO column, adjust for withdrawals by substituting the number from the DIDO column that corresponds to the beginning balance for the period.

5. Earnings Calculations

   Note: All directions for earnings calculations are given for the Hewlett-Packard Model 80 calculator.

   For earnings compounded daily:

   1 – Divide APR by 365 ($\frac{APR}{365}$) and press STO.

   2 – Enter number of DAYS TO END for beginning balance and press n.

3 - Press RCL and i.

4 - Enter amount of beginning balance and press PV.

5 - Press FV.

6 - Enter amount of beginning balance again and press -.

7 - Figure displayed represents the earnings potential of the beginning balance for the full period.

8 - For each subsequent transaction, follow steps 2, 3, 4, 5, and 6. In the Earnings Potential column indicate the earnings potential of deposits with a +, and the negative earnings potential of withdrawals with a -.

9 - The sum of the EARNINGS POTENTIAL column should coincide with the amount of earnings posted after adjustments are made for penalties.

For earnings compounded quarterly or semi-annually:

1 - Divide APR by 365 (APR/365) and press STO.

2 - Enter 1 and press n.

3 - Press RCL, enter number of DAYS TO END for the beginning balance, press X and press i.

4 - Enter amount of beginning balance and press PV.

5 - Press FV.

6 - Enter amount of beginning balance again and press -.

7 - Figure displayed represents the earnings potential of the beginning balance for the full period.

8 - For each subsequent transaction, follow steps 2, 3, 4, 5, and 6. In the Earnings Potential column, indicate the earnings potential of deposits with a +, and the earnings potential of withdrawals with a -.

9 - The sum of the EARNINGS POTENTIAL column should coincide with the amount of earnings posted after adjustments are made for penalties.

ACCRUED EARNINGS POTENTIAL SYSTEM

1. APR _____% PPR _____%

2. Compounding frequency is _____ times per year.

3. Earnings are figured for the _____ day period from _____

    through _____ and are payable or credited on _____.

4. Bookkeeping method _____.

5. Deposit grace days _____ Withdrawal grace days _____.

6. Penalties _____.

7. Other _____.

8. EARNINGS: $_____ $_____
                 (calculated earnings)   (posted earnings)

DATE	JULIAN	TRANSACTIONS		DAYS TO END				EARNINGS POTENTIAL	
		Deposits	Withdrawals	DIDO	LIFO	FIFO	±		
								Total	

APPENDIX H

LOW BALANCE SYSTEM

Enter all account data as they appear in the savings passbook or statement in the ruled portion of the worksheet.

In the upper portion of the worksheet:

1. Enter the APR and PPR. APR is the annual percentage rate; PPR is the periodic percentage rate; PPR may be unknown.

2. Enter the compounding frequency. Earnings may be compounded 1, 2, 4, 12, or 365 times per year, or continuously.

3. Enter the beginning and closing dates for the earnings period and the date earnings are payable or credited. The crediting date may differ from the closing date of the period. Using the Julian calendar, find Julian numbers that correspond to the beginning and closing dates for the period. Find the length of the period by subtracting the Julian number of the first day of the period from the Julian number corresponding to the first day of the next period. For example, a quarter whose beginning date is January 1 and closing date is March 31 would be 90 days long. (91 [April 1] − [January 1] = 90.)

4. The bookkeeping method used is the low balance method.

5. Enter the number of grace days, if any. Deposit grace days may be 10 days per month or period. Deposits made during this time earn as if deposited on the first of the month or period. Withdrawal grace days may be 3 or more days at the end of the period. Withdrawals made during this time will not lose earnings. Deposits made during this time may not earn until the first day of the next period.

6. Enter the amount of penalties or charges, if any. Excessive withdrawals during the period may result in penalties.

7. Enter any other conditions that influenced the amount of earnings paid.

8. Enter the interest factors used in calculating earnings for the period. If earnings are compounded daily, find the interest factor in the Table of Compound Interest Factors that corresponds to the number of days in the interest period. If earnings are compounded quarterly, semi-annually, or annually, use the Table of Simple Interest Factors.

9. Enter the amount of posted earnings for the period.

Identify the lowest balance for the period and multiply it by the interest factor. The result should agree with posted earnings after adjustments are made for penalties.

LOW BALANCE SYSTEM

1. APR _____% PPR _____%

2. Compounding frequency is _____ times per year.

3. Earnings are figured for the _____ day period from _____

   through _____ and are payable or credited on _____.

4. Bookkeeping method ___LOW BALANCE_____.

5. Deposit grace days _____ Withdrawal grace days _____.

6. Penalties _____.

7. Other conditions _____.

8. INTEREST FACTORS: Simple _____ Compound _____
                            (from table)   (from table)

9. EARNINGS: $_____ $_____
              (calculated earnings)   (posted earnings)

DATE	DEPOSIT	WITHDRAWAL	EARNINGS	BALANCE

EARNINGS = lowest balance x interest factor

APPENDIX I

JULIAN DAY NUMBERS

(non-leap year)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
1	1	32	60	91	121	152	182	213	244	274	305	335	1
2	2	33	61	92	122	153	183	214	245	275	306	336	2
3	3	34	62	93	123	154	184	215	246	276	307	337	3
4	4	35	63	94	124	155	185	216	247	277	308	338	4
5	5	36	64	95	125	156	186	217	248	278	309	339	5
6	6	37	65	96	126	157	187	218	249	279	310	340	6
7	7	38	66	97	127	158	188	219	250	280	311	341	7
8	8	39	67	98	128	159	189	220	251	281	312	342	8
9	9	40	68	99	129	160	190	221	252	282	313	343	9
10	10	41	69	100	130	161	191	222	253	283	314	344	10
11	11	42	70	101	131	162	192	223	254	284	315	345	11
12	12	43	71	102	132	163	193	224	255	285	316	346	12
13	13	44	72	103	133	164	194	225	256	286	317	347	13
14	14	45	73	104	134	165	195	226	257	287	318	348	14
15	15	46	74	105	135	166	196	227	258	288	319	349	15
16	16	47	75	106	136	167	197	228	259	289	320	350	16
17	17	48	76	107	137	168	198	229	260	290	321	351	17
18	18	49	77	108	138	169	199	230	261	291	322	352	18
19	19	50	78	109	139	170	200	231	262	292	323	353	19
20	20	51	79	110	140	171	201	232	263	293	324	354	20
21	21	52	80	111	141	172	202	233	264	294	325	355	21
22	22	53	81	112	142	173	203	234	265	295	326	356	22
23	23	54	82	113	143	174	204	235	266	296	327	357	23
24	24	55	83	114	144	175	205	236	267	297	328	358	24
25	25	56	84	115	145	176	206	237	268	298	329	359	25
26	26	57	85	116	146	177	207	238	269	299	330	360	26
27	27	58	86	117	147	178	208	239	270	300	331	361	27
28	28	59	87	118	148	179	209	240	271	301	332	362	28
29	29		88	119	149	180	210	241	272	302	333	363	29
30	30		89	120	150	181	211	242	273	303	334	364	30
31	31		90		151		212	243		304		365	31

APPENDIX J

Hypothetical Savings Model
Source: Commercial National Bank

Date	Deposit	Withdrawal	Earnings	Balance
1/1				500.00
1/2	50.00			550.00
1/11	100.00			650.00
3/12	150.00			800.00
5/24	60.00			860.00
6/14		200.00		

Balance Accumulator Technique[1]

Accumulator Number	Activity Period
6	Jan 1 - Jan 10
5	Jan 1 - Feb 10
4	Feb 11 - Mar 10
3	Mar 11 - Apr 10
2	Apr 11 - May 10
1	May 11 - Jun 10
0	Jun 11 - Jun 30

[1]This technique is described in full in the Commercial National Bank letter in Appendix A. The technique is used for determining earnings for FIFO and LIFO accounts.

MONTHLY AVERAGE DAILY BALANCE SYSTEM

1. APR __5__ % PPR __2.5__ %
2. Compounding frequency is __2__ times per year.
3. Earnings are figured for the __6__ month/day period from __Jan 1__ through __Jun 30__ and are payable or credited on __Jun 30__.
4. Bookkeeping method __LIFO__
5. Deposit grace days ____ Withdrawal grace days ____
6. Penalties ____
7. Other ____
8. INTEREST FACTORS: SIMPLE ____ (from table)   COMPOUND ____ (from table)
9. EARNINGS: $ __15.96__ / (ADB × simple fac) PPR $ ____ /(ADB × cmpd. fac) $ __15.96__ (posted earnings)

DATE	JULIAN MONTH NUMBER	TRANSACTIONS Deposits	TRANSACTIONS Withdrawals	MONTHS/DAYS TO END DIDO	MONTHS/DAYS TO END LIFO	MONTHS/DAYS TO END FIFO	±	DOLLAR DAYS MONTHS
Jan 1	6	500 00					=	3000 00
Jan 2	6	50 00				6	+	300 00
Jan 11	5	100 00				5	+	500 00
Mar 12	3	150 00				3	+	450 00
May 24	1	60 00				1	+	60 00
Jun 14	0		200 00			1	-	1×60=60.00 / 3×10=...
							Total	3830 00

AVERAGE DAILY BALANCE = Total Dollar Days / Total Days in Period = Months / Months = 3830.00 / 6 = 638.33

EARNINGS = AMB × PPR × Interest Factor   638.33 × .025 = 15.96

MONTHLY AVERAGE DAILY BALANCE SYSTEM

1. APR __5__ % PPR __2.5__ %
2. Compounding frequency is __2__ times per year.
3. Earnings are figured for the __6__ month/day period from __Jan 1__ through __Jun 30__ and are payable or credited on __Jun 30__.
4. Bookkeeping method __FIFO (beginning balance)__
5. Deposit grace days ____ Withdrawal grace days ____
6. Penalties ____
7. Other ____
8. INTEREST FACTORS: SIMPLE ____ (from table)   COMPOUND ____ (from table)
9. EARNINGS: $ __12.96__ / (ADB × simple fac) PPR $ ____ /(ADB × cmpd. fac) $ __12.96__ (posted earnings)

DATE	JULIAN MONTH NUMBER	TRANSACTIONS Deposits	TRANSACTIONS Withdrawals	MONTHS/DAYS TO END DIDO	MONTHS/DAYS TO END LIFO	MONTHS/DAYS TO END FIFO	±	DOLLAR DAYS MONTHS
Jan 1	6	500 00						3000 00
Jan 2	6	50 00				6	+	300 00
Jan 11	5	100 00				5	+	500 00
Mar 12	3	150 00				3	+	450 00
May 24	1	60 00				1	+	60 00
Jun 14	0		200 00			6	-	1200 00
							Total	3110 00

AVERAGE DAILY BALANCE = Total Dollar Days / Total Days in Period = Months / Months = 3110.00 / 6 = 518.33

EARNINGS = ADB × PPR × Interest Factor   518.33 × .025 = 12.96

ACCRUED EARNINGS POTENTIAL SYSTEM

1. APR 5 % PPR quoted none %

2. Compounding frequency is 2 times per year.

3. Earnings are figured for the 181 day period from Jan 1 through Jun 30 and are payable or credited on Jan 1

4. Bookkeeping method DIDO

5. Deposit grace days -----   Withdrawal grace days -----

6. Penalties -----

7. Other -----

8. EARNINGS: $ .18.09 (calculated earnings) $ 18.10 (posted earnings)

DATE	JULIAN	TRANSACTIONS Deposits	Withdrawals	DAYS TO END DIDO	LIFO	FIFO	±	EARNINGS POTENTIAL
Jan 1	1	500 00		181			+	12 40
Jan 2	2	50 00		160			+	1 23
Jan 11	11	100 00		171			+	2 34
Mar 12	71	150 00		111			+	2 28
May 24	144	60 00		38			+	31
Jun 14	165		200 00	17			-	47
							Total	18.09

AVERAGE DAILY BALANCE SYSTEM

1. APR 5 % PPR quoted none %

2. Compounding frequency is 2 times per year.

3. Earnings are figured for the 181 day period from Jan 1 through Jun 30 and are payable or credited on Jun 30

4. Bookkeeping method DIDO

5. Deposit grace days -----   Withdrawal grace days -----

6. Penalties -----

7. Other -----

8. INTEREST FACTORS: SIMPLE .024794521 (from table)   COMPOUND ----- (from table)

9. EARNINGS: $ 18.10 (ADB × simple fac) $ ----- (ADB × cmpd. fac) $ 18.10 (posted earnings)

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DATE	JULIAN	TRANSACTIONS Deposits	Withdrawals	DAYS TO END DIDO	LIFO	FIFO	±	DOLLAR DAYS
Jan 1	1	500 00		181			+	90,500 00
Jan 2	2	50 00		180			+	9,000 00
Jan 11	11	100 00		171			+	17,100 00
Mar 12	71	150 00		111			+	16,650 00
May 24	144	60 00		38			+	2,280 00
Jun 14	165		200 00	17			-	3,400 00
							Total	132,130 00

$$\text{AVERAGE DAILY BALANCE} = \frac{\text{Total Dollar Days}}{\text{Total Days in Period}} = \frac{132,130.00}{181} = 730.00$$

EARNINGS = ADB × Interest Factor   730.00 × .024794521 = 18.10

ACCRUED EARNINGS POTENTIAL SYSTEM

1. APR 5 % PPR none quoted %

2. Compounding frequency is 365 times per year.

3. Earnings are figured for the 181 day period from Jan 1 through Jun 30 and are payable or credited on Jun 30 .

4. Bookkeeping method DIDO

5. Deposit grace days ——— Withdrawal grace days ———

6. Penalties ———

7. Other ———

8. EARNINGS: $ 18.31 (calculated earnings) $ 18.32 (posted earnings)

DATE	JULIAN	TRANSACTIONS		DAYS TO END			±	EARNINGS POTENTIAL
		Deposits	Withdrawals	DIDO	LIFO	FIFO		
Jan 1	1	500 00		181			+	12 55
Jan 2	2	50 00		180			+	1 25
Jan 11	11	100 00		171			+	2 37
Mar 12	71	150 00		111			+	2 33
May 24	144	60 00		38			+	31
Jun 14	165		200 00	17			-	47
				182				
							Total	18 31

AVERAGE DAILY BALANCE SYSTEM

1. APR 5 % PPR none quoted %

2. Compounding frequency is 365 times per year.

3. Earnings are figured for the 181 day period from Jan 1 through Jun 30 and are payable or credited on Jun 30 .

4. Bookkeeping method DIDO

5. Deposit grace days ——— Withdrawal grace days ———

6. Penalties ———

7. Other ———

8. INTEREST FACTORS: SIMPLE ——— (from table)   COMPOUND .025102661 (from table)

9. EARNINGS: $ ——— (ADB × simple fac) $ 18.32 (ADB × cmpd. fac) $ 18.32 (posted earnings)

DATE	JULIAN	TRANSACTIONS		DAYS TO END			±	DOLLAR DAYS
		Deposits	Withdrawals	DIDO	LIFO	FIFO		
Jan 1	1	500 00		181			+	90,500 00
Jan 2	2	50 00		180			+	9,000 00
Jan 11	11	100 00		171			+	17,100 00
Mar 12	71	150 00		111			+	16,650 00
May 24	144	60 00		38			+	2,280 00
Jun 14	165		200 00	17			-	3,400 00
							Total	132,130 00

$$\text{AVERAGE DAILY BALANCE} = \frac{\text{Total Dollar Days}}{\text{Total Days in Period}} \qquad \frac{132{,}130.00}{180} = 730.00$$

EARNINGS = ADB × Interest Factor   730.00 × .025102661 = 18.32

APPENDIX K

Hypothetical Savings Model

Source: <u>Teacher's Journal</u>, <u>Changing Times</u>, December 1973

How they figure interest on savings

Some bookkeeping methods earn more than others. Compare these four savings accounts, each paying 5% interest, compounded semiannually.

FIFO— First In, First Out

	Deposits	With—drawals	Balance	Accrued Interest
Jan. 1	$1,000		$1,000	$24.79
Apr. 1	$1,000		$2,000	$37.26 (+12.47)
May 15	$1,000		$3,000	$43.70 (+6.44)
May 20		$1,000	$2,000	$18.91 (−24.79)
July 1			$2,018.91	

Low Balance

	Deposits	With—drawals	Balance	Accrued Interest
Jan. 1	$1,000		$1,000	
Apr. 1	$1,000		$2,000	
May 15	$1,000		$3,000	
May 20		$1,000	$2,000	
July 1			$2,024.79	

LIFO— Last In, First Out

	Deposits	With—drawals	Balance	Accrued Interest
Jan. 1	$1,000		$1,000	$24.79
Apr. 1	$1,000		$2,000	$37.26 (+12.47)
May 15	$1,000		$3,000	$43.70 (+6.44)
May 20		$1,000	$2,000	$37.26 (−6.44)
July 1			$2,037.26	

DD/DW— Day of Deposit to Day of Withdrawal

	Deposits	With—drawals	Balance	Accrued Interest
Jan. 1	$1,000		$1,000	$24.79
Apr. 1	$1,000		$2,000	$37.26 (+12.47)
May 15	$1,000		$3,000	$43.70 (+6.44)
May 20		$1,000	$2,000	$37.95 (−5.75)
July 1			$2,037.95	

Date	Deposit	Withdrawal	Earnings	Balance
1/1	1000			1000
4/1	1000			2000
5/15	1000			3000
5/20		1000		

LOW BALANCE SYSTEM

1. APR ___5___ % PPR _quoted_ % _{none}

2. Compounding frequency is ___2___ times per year.

3. Earnings are figured for the ___181___ day period from _____Jan 1_____

   through _____Jun 30_____ and are payable or credited on __Jul 1__ .

4. Bookkeeping method __LOW BALANCE_____ .

5. Deposit grace days ___----___ Withdrawal grace days ___----___ .

6. Penalties ___----_____ .

7. Other conditions ___----_____ .

8. INTEREST FACTORS: Simple _.024794521_ Compound ___----___
                              (from table)   (from table)

9. EARNINGS: $ ___----___ $ ___24.79___
             (calculated earnings)   (posted earnings)

DATE	DEPOSIT	WITHDRAWAL	EARNINGS	BALANCE
Jan 1	1000			1000
Apr 1	1000			2000
May 15	1000			3000
May 20		1000		

EARNINGS = lowest balance x interest factor   1000 × .024794521 = 24.79

ACCRUED EARNINGS POTENTIAL SYSTEM

1. APR __5__ % PPR quoted % __none__

2. Compounding frequency is __2__ times per year.

3. Earnings are figured for the __181__ day period from __Jan 1__ through __Jun 30__ and are payable or credited on __Jul 1__.

4. Bookkeeping method __FIFO – beginning balance__

5. Deposit grace days __----__ Withdrawal grace days __----__

6. Penalties __----__

7. Other _____

8. EARNINGS: $ __18.91__ (calculated earnings) $ __18.90__ (posted earnings)

DATE	JULIAN	TRANSACTIONS Deposits	Withdrawals	DAYS TO END DIDO	LIFO	FIFO	±	EARNINGS POTENTIAL	
Jan 1	1	1000 00		161			+	24	79
Apr 1	91	1000 00		91	.		+	12	47
May 15	135	1000 00		47			+	6	44
May 20	140		1000 00	42		181	-	24	79
							Total	18	91

AVERAGE DAILY BALANCE SYSTEM

1. APR __5__ % PPR quoted % __none__

2. Compounding frequency is __2__ times per year.

3. Earnings are figured for the __181__ day period from __Jan 1__ through __Jun 30__ and are payable or credited on __Jul 1__.

4. Bookkeeping method __FIFO – beginning balance__

5. Deposit grace days __----__ Withdrawal grace days __----__

6. Penalties __----__

7. Other _____

8. INTEREST FACTORS: SIMPLE __.024794521__ (from table)   COMPOUND __----__ (from table)

9. EARNINGS: $ __18.90__ (ADB x simple fac) $ __----__ (ADB x cmpd. fac) $ __18.90__ (posted earnings)

DATE	JULIAN	TRANSACTIONS Deposits	Withdrawals	DAYS TO END DIDO	LIFO	FIFO	±	DOLLAR DAYS	
Jan 1	1	1000 00		181			+	181,000	00
Apr 1	91	1000 00		91			+	91,000	00
May 15	135	1000 00		47			+	47,000	00
May 20	140		1000 00	42		181	-	181,000	00
							Total	138,000	00

AVERAGE DAILY BALANCE = $\frac{\text{Total Dollar Days}}{\text{Total Days in Period}}$ = $\frac{138,000.00}{181}$ = 762.43

EARNINGS = ADB x Interest Factor   762.43 x .024794521 = 18.90

ACCRUED EARNINGS POTENTIAL SYSTEM

1. APR 5 % PPR quoted none %.
2. Compounding frequency is 2 times per year.
3. Earnings are figured for the 181 day period from Jan 1 through Jun 30 and are payable or credited on Jul 1 .
4. Bookkeeping method LIFO
5. Deposit grace days ---- Withdrawal grace days ----
6. Penalties ----
7. Other ----
8. EARNINGS: $ 37.26 (calculated earnings) $ 37.26 (posted earnings)

| DATE | JULIAN | TRANSACTIONS | | DAYS TO END | | | ± | EARNINGS POTENTIAL |
		Deposits	Withdrawals	DIDO	LIFO	FIFO		
Jan 1	1	1000 00		181			+	24 79
Apr 1	91	1000 00		91			+	12 47
May 15	135	1000 00		47			+	6 44
May 20	140		1000 00	42	47		-	6 44
							Total	37 26

AVERAGE DAILY BALANCE SYSTEM

1. APR 5 % PPR quoted none %.
2. Compounding frequency is 2 times per year.
3. Earnings are figured for the 181 day period from Jan 1 through Jun 30 and are payable or credited on Jul 1 .
4. Bookkeeping method LIFO
5. Deposit grace days ---- Withdrawal grace days ----
6. Penalties ----
7. Other ----
8. INTEREST FACTORS: SIMPLE .02479521 (from table)   COMPOUND ---- (from table)
9. EARNINGS: $ 37.26 (ADB × simple fac) $ ---- (ADB × cmpd. fac) $ 37.26 (posted earnings)

| DATE | JULIAN | TRANSACTIONS | | DAYS TO END | | | ± | DOLLAR DAYS |
		Deposits	Withdrawals	DIDO	LIFO	FIFO		
Jan 1	1	1000 00		181			+	181,000 00
Apr 1	91	1000 00		91			+	91,000 00
May 15	135	1000 00		47			+	47,000 00
May 20	140		1000 00	42	47		-	47,000 00
							Total	272,000 00

AVERAGE DAILY BALANCE = $\frac{\text{Total Dollar Days}}{\text{Total Days in Period}}$ $\frac{272,000.00}{181}$ = 1502.76

EARNINGS = ADB × Interest Factor   1502.76 × .02479521 = 37.26

ACCRUED EARNINGS POTENTIAL SYSTEM

1. APR __5__ % PPRquoted __none__ %

2. Compounding frequency is __2__ times per year.

3. Earnings are figured for the __181__ day period from __Jan 1__ through __Jun 30__ and are payable or credited on __Jul 1__ .

4. Bookkeeping method __DIDO__ .

5. Deposit grace days ____ Withdrawal grace days ____ .

6. Penalties ____ .

7. Other ____ .

8. EARNINGS: $ __37.95__ (calculated earnings) $ __37.95__ (posted earnings)

DATE	JULIAN	TRANSACTIONS		DAYS TO END			±	EARNINGS POTENTIAL	
		Deposits	Withdrawals	DIDO	LIFO	FIFO			
Jan 1	1	1000 00		181			-	24	79
Apr 1	91	1000 00		91			+	12	47
May 15	135	1000 00		47			+	6	44
May 20	140		1000 00	42			-	5	75
							Total	37	95

AVERAGE DAILY BALANCE SYSTEM

1. APR __5__ % PPR quoted __none__ %

2. Compounding frequency is __2__ times per year.

3. Earnings are figured for the __181__ day period from __Jan 1__ through __Jun 30__ and are payable or credited on __Jul 1__ .

4. Bookkeeping method __DIDO__ .

5. Deposit grace days ____ Withdrawal grace days ____ .

6. Penalties ____ .

7. Other ____ .

8. INTEREST FACTORS: SIMPLE __.024794521__ (from table) COMPOUND ____ (from table)

9. EARNINGS: $ __37.95__ (ADB × simple fac) $ ____ (ADB × cmpd. fac) $ __37.95__ (posted earnings)

DATE	JULIAN	TRANSACTIONS		DAYS TO END			±	DOLLAR DAYS	
		Deposits	Withdrawals	DIDO	LIFO	FIFO			
Jan 1	1	1000 00		181			+	181,000	00
Apr 1	91	1000 00		91			+	91,000	00
May 15	135	1000 00		47			+	47,000	00
May 20	140		1000 00	42			-	42,000	00
							Total	277,000	00

AVERAGE DAILY BALANCE = $\dfrac{\text{Total Dollar Days}}{\text{Total Days in Period}}$ = $\dfrac{277,000.00}{181}$ = 1530.39

EARNINGS = ADB × Interest Factor   1530.39 × .024794521 = 37.95

APPENDIX L Case _____

VERIFICATION --- PINSON EXAMPLE

_____ 1. compounded daily   _____LOW BALANCE
_____ 2. compounded quarterly
_____ 3. compounded semi-annually   _____FIFO (begin. bal.)

_____ 4. length of period--first day <u>to</u> last day   _____FIFO (1st deposit)
_____ 5. length of period--first day <u>through</u> last day
                                                        _____LIFO
_____ 6. length of year = 365 days
_____ 7. length of year = 360 days   _____DIDO

_____ 8. no grace days
_____ 9. 10 deposit grace days/period
_____10. 10 deposit grace days/month
_____11. 3 WD grace days/period

_____12. no penalties for excessive WD
_____13. 50¢/WD over 2/month

DATE	JULIAN	DAYS TO END	DEPOSIT	WITHDRAWAL	BALANCE	EARNINGS
1-1-70	1				1,000	
1-10-70	10		2,000		3,000	
2-6-70	37		1,000		4,000	
3-5-70	64			1,000	3,000	
3-20-70	79			500	2,500	
3-30-70	89			500	2,000	
4-1-70	91				2,000	
7-1-70	182				2,000	

TOTAL EARNINGS _____

Results of earnings calculated using specified variant combinations,
the Pinson standard activity pattern, and the
Accrued Earnings Potential System.

Combination of Variants	Bookkeeping Method				
	Low balance	FIFO beg. bal.	FIFO 1st deposit	LIFO	DIDO
1-5-6-8-12	45.26	52.81	54.33	58.88	75.85
1-5-6-9-12	60.40	55.85	57.37	61.92	78.89
1-5-6-10-12	60.40	56.68	58.21	62.75	79.73
1-5-6-9-11-12	67.93	62.65	64.18	68.72	79.06
2-5-6-8-12*	44.93	52.44	53.93	58.44	75.30
2-5-6-9-12*	59.95	55.44	56.94	61.44	78.30
2-5-6-10-12* **	59.95	56.28	57.77	62.27	79.13
2-5-6-9-11-12*	67.46	62.20	63.70	68.20	78.46
3-5-6-8-12	29.75	52.11	53.59	58.02	74.63
3-5-6-9-12	59.51	55.07	56.55	60.98	77.59
3-5-6-10-12	59.51	55.89	57.37	61.81	78.31
3-5-6-9-11-12	59.51	55.07	56.55	60.98	77.59
1-5-7-8-12					76.91
1-5-7-9-12					80.00
1-5-7-10-12					80.84
1-5-7-9-11-12					80.17
2-5-7-8-12					76.35
2-5-7-9-12					79.40
2-5-7-10-12					80.24
2-5-7-9-11-12					79.57

Key to Variants

1. compounded daily
2. compounded quarterly
3. compounded semi-annually

4. length of period--first day to last
5. length of period--first through last

6. length of year = 365 days
7. length of year = 360 days

8. no grace days
9. 10 deposit grace days/period
10. 10 deposit grace days/month
11. 3 withdrawal grace days/period

12. no penalties for excessive withdrawals
13. 50¢/withdrawal over two per month

*Variant combinations were identical to those used by Pinson; all 20 cases were correctly verified using the Accrued Earnings Potential System. All other variant combinations differed from those used by Pinson; earnings were calculated using the Accrued Earnings Potential System.

**Illustrations of verification procedure are included in this Appendix.

APPENDIX L   Case _____7_____

VERIFICATION --- PINSON EXAMPLE

_____	1. compounded daily	__√__ LOW BALANCE
__√__	2. compounded quarterly	
_____	3. compounded semi-annually	_____ FIFO (begin. bal.)
_____	4. length of period--first day <u>to</u> last day	_____ FIFO (1st deposit)
__√__	5. length of period--first day <u>through</u> last day	
		_____ LIFO
_____	6. length of year = 365 days	
_____	7. length of year = 360 days	_____ DIDO
_____	8. no grace days	
_____	9. 10 deposit grace days/period	
__√__	10. 10 deposit grace days/month	
_____	11. 3 WD grace days/period	
__√__	12. no penalties for excessive WD	
_____	13. 50¢/WD over 2/month	

DATE	JULIAN	DAYS TO END	DEPOSIT	WITHDRAWAL	BALANCE	EARNINGS
1-1-70	1				1,000	
1-10-70	10		2,000		3,000	
2-6-70	37		1,000		4,000	
3-5-70	64			1,000	3,000	
3-20-70	79			500	2,500	
3-30-70	89			500	2,000	
4-1-70	91				2,000	
7-1-70	182				2,000	

2000 · .06 · .90/365 = 29.59   TOTAL EARNINGS ___59.95___

2029.59 · .06 · .91/365 = 30.36

First quarter: $2000.00 \times \frac{.06}{365} \times 90$ days $= 29.59$

Second quarter: $2029.59 \times \frac{.06}{365} \times 91$ days $= 30.36$

Case ___7___

VERIFICATION --- PINSON EXAMPLE

_____ 1. compounded daily
__√__ 2. compounded quarterly
_____ 3. compounded semi-annually

_____ 4. length of period--first day <u>to</u> last day
__√__ 5. length of period--first day <u>through</u> last day

__√__ 6. length of year = 365 days
_____ 7. length of year = 360 days

_____ 8. no grace days
_____ 9. 10 deposit grace days/period
__√_10. 10 deposit grace days/month
____11. 3 WD grace days/period

__√_12. no penalties for excessive WD
____13. 50¢/WD over 2/month

_____ LOW BALANCE

__√__ FIFO (begin. bal.)

_____ FIFO (1st deposit)

_____ LIFO

_____ DIDO

DATE	JULIAN	DAYS TO END		DEPOSIT	WITHDRAWAL	BALANCE	EARNINGS
1-1-70	1	90	91			1,000	14.79
1-10-70	10	8̶1̶	90	2,000		3,000	29.59
2-6-70	37	5̶4̶	59	1,000		4,000	9.70
3-5-70	64	2̶7̶	90		1,000	3,000	-14.79
3-20-70	79	1̶2̶	81		500	2,500	- 6.66
3-30-70	89	2̶	81		500	2,000	- 6.66
4-1-70	91	91	182			2,0̶0̶0̶ 25.97	30.31
7-1-70	182					2,000	

TOTAL EARNINGS ___56.28___

Case _____ 7 _____

VERIFICATION --- PINSON EXAMPLE

_____ 1. compounded daily   _____ LOW BALANCE
__√__ 2. compounded quarterly
_____ 3. compounded semi-annually   _____ FIFO (begin. bal.)

_____ 4. length of period--first day <u>to</u> last day   __√__ FIFO (1st deposit)
__√__ 5. length of period--first day <u>through</u> last day
                                                               _____ LIFO
__√__ 6. length of year = 365 days
_____ 7. length of year = 360 days   _____ DIDO

_____ 8. no grace days
_____ 9. 10 deposit grace days/period
__√__ 10. 10 deposit grace days/month
_____ 11. 3 WD grace days/period

__√__ 12. no penalties for excessive WD
_____ 13. 50¢/WD over 2/month

DATE	JULIAN	DAYS TO END	DEPOSIT	WITHDRAWAL	BALANCE	EARNINGS
1-1-70	1	90 91			1,000	14.79
1-10-70	10	~~81~~ 90	2,000		3,000	29.59
2-6-70	37	~~54~~ 59	1,000		4,000	9.70
3-5-70	64	~~27~~ 81		1,000	3,000	-13.32
3-20-70	79	~~12~~ 81		500	2,500	- 6.66
3-30-70	89	~~2~~ 81		500	2,000	- 6.66
4-1-70	91	91 182			27.44 ~~2,000~~	30.33
7-1-70	182				2,000	

TOTAL EARNINGS _____ 57.77 _____

Case _____ 7 _____

VERIFICATION --- PINSON EXAMPLE

_____ 1. compounded daily
__√__ 2. compounded quarterly
_____ 3. compounded semi-annually

_____ 4. length of period--first day to last day
__√__ 5. length of period--first day through last day

__√__ 6. length of year = 365 days
_____ 7. length of year = 360 days

_____ 8. no grace days
_____ 9. 10 deposit grace days/period
__√__10. 10 deposit grace days/month
_____11. 3 WD grace days/period

__√__12. no penalties for excessive WD
_____13. 50¢/WD over 2/month

_____LOW BALANCE

_____FIFO (begin. bal.)

_____FIFO (1st deposit)

__√__LIFO

_____DIDO

DATE	JULIAN	DAYS TO END		DEPOSIT	WITHDRAWAL	BALANCE	EARNINGS
1-1-70	1	90	91			1,000	14.79
1-10-70	10	8̶1̶	90	2,000		3,000	29.59
2-6-70	37	5̶4̶	59	1,000		4,000	9.70
3-5-70	64	2̶7̶	54		1,000	3,000	-8.88
3-20-70	79	1̶2̶	81		500	2,500	-6.66
3-30-70	89	2̶	81		500	2,000	-6.66
4-1-70	91	91	182			2,0̶0̶0̶ 31.88	30.39
7-1-70	182					2,000	

TOTAL EARNINGS _____ 62.27

Case _____7_____

VERIFICATION --- PINSON EXAMPLE

```
_____ 1. compounded daily                        _____LOW BALANCE
___√___ 2. compounded quarterly
_____ 3. compounded semi-annually                _____FIFO (begin. bal.)

_____ 4. length of period--first day to last day _____FIFO (1st deposit)
___√___ 5. length of period--first day through last day
                                                    _____LIFO
___√___ 6. length of year = 365 days
_____ 7. length of year = 360 days               __√__ DIDO

_____ 8. no grace days
_____ 9. 10 deposit grace days/period
___√__10. 10 deposit grace days/month
_____11. 3 WD grace days/period

__√__12. no penalties for excessive WD
_____13. 50¢/WD over 2/month
```

DATE	JULIAN	DAYS TO END		DEPOSIT	WITHDRAWAL	BALANCE	EARNINGS
1-1-70	1	90	91			1,000	14.79
1-10-70	10	8̶1̶	90	2,000		3,000	29.59
2-6-70	37	5̶4̶	59	1,000		4,000	9.70
3-5-70	64	27			1,000	3,000	-4.44
3-20-70	79	12			500	2,500	- .99
3-30-70	89	2			500	2,000	- .16
4-1-70	91	91	182			2,0̶0̶0̶ 48.49	30.64
7-1-70	182					2,000	

TOTAL EARNINGS _____79.13_____

APPENDIX M

Verification of an Actual Savings Account

Source: Researcher's Personal Collection

	Date	Deposit	Withdrawal	Earnings	Balance
1st period	4/1				528.64
	4/2	170.00			698.64
	4/20	25.30			723.94
	5/3	72.00			795.94
	5/21		293.00		502.94
	6/30			7.92	510.86
2nd period	7/1				510.86
	7/3	108.00			618.86
	8/27		150.00		468.86
	9/30			7.44	476.30
3rd period	10/1				476.30
	10/1	64.87			541.17
	10/5	118.00			659.17
	10/29		15.00		644.17
	11/2	168.00			812.17
	12/7	150.00			962.17
	12/26			10.50	972.67
4th period	1/1				972.67
	1/1	212.00			1184.67
	1/14		184.00		1000.67
	1/28		45		955.67
	2/1	363.41			1319.08
	2/19		75.00		1244.08
	2/25		45.00		1199.08
	3/1	388.71			1587.79
	3/28			17.08	1604.87

AVERAGE DAILY BALANCE SYSTEM

1. APR __5__ % PPR quoted __none__ %
2. Compounding frequency is __365__ times per year.
3. Earnings are figured for the __91__ day period from __Apr 1__ through __Jun 30__ and are payable or credited on __Jun 30__.
4. Bookkeeping method __DIDO__
5. Deposit grace days ____ Withdrawal grace days ____
6. Penalties ____
7. Other ____
8. INTEREST FACTORS: SIMPLE _____ COMPOUND __.012542881__
   (from table)   (from table)
9. EARNINGS: $ _____ $ 7.92 $ 7.92
   (ADB × simple fac) (ADB × cmpd. fac) (posted earnings)

DATE	JULIAN	Deposits	Withdrawals	182 DAYS TO END DIDO	LIFO	FIFO	±	DOLLAR DAYS
Apr 1	91	528 64		91			+	48,106 24
Apr 2	92	170 00		90			+	15,300 00
Apr 20	110	25 30		72			+	1,821 60
May 3	123	72 00		59			+	4,248 00
May 21	141		293 00	41			-	12,013 00
							Total	57,462 84

AVERAGE DAILY BALANCE = Total Dollar Days / Total Days in Period 57,462.84 / 91 = 631.46

EARNINGS = ADB × Interest Factor   631.46 × .012542881 = $7.92

ACCRUED EARNINGS POTENTIAL SYSTEM

1. APR __5__ % PPR quoted __none__ %
2. Compounding frequency is __365__ times per year.
3. Earnings are figured for the __91__ day period from __Apr 1__ through __Jun 30__ and are payable or credited on __Jun 30__.
4. Bookkeeping method __DIDO__
5. Deposit grace days ____ Withdrawal grace days ____
6. Penalties ____
7. Other ____
8. EARNINGS: $ 7.92 $ 7.92
   (calculated earnings) (posted earnings)

DATE	JULIAN	Deposits	Withdrawals	192 DAYS TO END DIDO	LIFO	FIFO	±	EARNINGS POTENTIAL
Apr 1	91	528 64		91			+	6 63
Apr 2	92	170 00		90			+	2 11
Apr 20	110	25 30		72			+	23
May 3	123	72 00		59			+	58
May 21	141		293 00	41			-	1 65
							Total	7 92

ACCRUED EARNINGS POTENTIAL SYSTEM

1. APR 5 1/4 % PPR quoted % (none)
2. Compounding frequency is 365 times per year.
3. Earnings are figured for the 92 day period from Jul 1 through Sep 30 and are payable or credited on Sep 30 .
4. Bookkeeping method DIDO
5. Deposit grace days ---- Withdrawal grace days ----
6. Penalties ----
7. Other ----
8. EARNINGS: $ 7.45 (calculated earnings) $ 7.44 (posted earnings)

DATE	JULIAN	TRANSACTIONS Deposits	TRANSACTIONS Withdrawals	DAYS TO END DIDO	DAYS TO END LIFO	DAYS TO END FIFO	±	EARNINGS POTENTIAL
Jul 1	182	510 86		92			+	6 50
Jul 3	184	108 00		90			+	1 21
Aug 27	239		150 00	35			-	76
							Total	7 45

AVERAGE DAILY BALANCE SYSTEM

1. APR 5 1/4 % PPR quoted % (none)
2. Compounding frequency is 365 times per year.
3. Earnings are figured for the 92 day period from Jul 1 through Sep 30 and are payable or credited on Sep 30 .
4. Bookkeeping method DIDO
5. Deposit grace days ---- Withdrawal grace days ----
6. Penalties ----
7. Other ----
8. INTEREST FACTORS: SIMPLE ---- (from table)   COMPOUND .013319801 (from table)
9. EARNINGS: $ ---- (ADB × simple fac) $ 7.45 (ADB × cmpd. fac) $ 7.44 (posted earnings)

DATE	JULIAN	TRANSACTIONS Deposits	TRANSACTIONS Withdrawals	27 DAYS TO END DIDO	DAYS TO END LIFO	DAYS TO END FIFO	±	DOLLAR DAYS
Jul 1	182	510 86		92			+	46,999 12
Jul 3	184	108 00		90			+	9,720 00
Aug 27	239		150 00	35			-	5,250 00
							Total	51,469 12

AVERAGE DAILY BALANCE = $\frac{\text{Total Dollar Days}}{\text{Total Days in Period}}$ $\frac{51,469.12}{92}$ = 559.45

EARNINGS = ADB × Interest Factor   559.45 × .013319801 = 7.45

ACCRUED EARNINGS POTENTIAL SYSTEM

1. APR 5 1/4 % PPR quoted %   none
2. Compounding frequency is 365 times per year.
3. Earnings are figured for the 92 day period from Oct 1 through Dec 31 and are payable or credited on Dec 26.
4. Bookkeeping method DIDO
5. Deposit grace days ___ Withdrawal grace days ___
6. Penalties ___
7. Other ___
8. EARNINGS: $ 10.57 (calculated earnings) $ 10.50 (posted earnings)

DATE	JULIAN	TRANSACTIONS Deposits	Withdrawals	DIDO	LIFO	FIFO	±	EARNINGS POTENTIAL	
Oct 1	274	541 17		92			+	7	21
Oct 5	278	118 00		88			+	1	55
Oct 29	302		15 00	64			-		14
Nov 2	306	168 00		60			+	1	46
Dec 7	391	150 00		25			+		54
								Total 10	57

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AVERAGE DAILY BALANCE SYSTEM

1. APR 5 1/4 % PPR quoted %   none
2. Compounding frequency is 365 times per year.
3. Earnings are figured for the 92 day period from Oct 1 through Dec 31 and are payable or credited on Dec 26.
4. Bookkeeping method DIDO
5. Deposit grace days ___ Withdrawal grace days ___
6. Penalties ___
7. Other ___
8. INTEREST FACTORS: SIMPLE ___ (from table)   COMPOUND .013319801 (from table)
9. EARNINGS: $ ___ (ADB x simple fac) $ 10.58 (ADB x cmpd. fac) $ 10.50 (posted earnings)

DATE	JULIAN	TRANSACTIONS Deposits	Withdrawals	DIDO	LIFO	FIFO	±	DOLLAR DAYS	
Oct 1	274	541 17		92			+	49,787	64
Oct 5	278	118 00		88			+	10,384	00
Oct 29	302		15 00	64			-	960	00
Nov 2	306	168 00		60			+	10,080	00
Dec 7	341	150 00		25			+	3,750	00
								Total 73,041	64

AVERAGE DAILY BALANCE = $\frac{\text{Total Dollar Days}}{\text{Total Days in Period}}$ $\frac{73,041.64}{92} = 793.93$

EARNINGS = ADB x Interest Factor   793.93 x .013319801 = 10.58

ACCRUED EARNINGS POTENTIAL SYSTEM

1. APR 5.25 % PPR quoted none %
2. Compounding frequency is 365 times per year.
3. Earnings are figured for the 90 day period from Jan 1 through Mar 31 and are payable or credited on Mar 28 .
4. Bookkeeping method DIDO
5. Deposit grace days ---- Withdrawal grace days ----
6. Penalties ----
7. Other -
8. EARNINGS: $ 17.14 (calculated earnings) $ 17.08 (posted earnings)

DATE	JULIAN	TRANSACTIONS		DAYS TO END			±	EARNINGS POTENTIAL
		Deposits	Withdrawals	DIDO	LIFO	FIFO		
Jan 1	1	1184 67		90			+	15 43
Jan 14	14		184 00	77			-	2 05
Jan 28	28		45 00	63			-	41
Feb 1	32	363 41		59			+	3 10
Feb 19	50		75 00	41			-	22
Feb 25	56		45 00	35			-	23
Mar 1	60	388 71		31			+	1 74
						Total		17 14

AVERAGE DAILY BALANCE SYSTEM

1. APR 5.25 % PPR quoted none %
2. Compounding frequency is 365 times per year.
3. Earnings are figured for the 90 day period from Jan 1 through Mar 31 and are payable or credited on Mar 28 .
4. Bookkeeping method DIDO
5. Deposit grace days ---- Withdrawal grace days ----
6. Penalties ----
7. Other
8. INTEREST FACTORS: SIMPLE ---- (from table)   COMPOUND .013028362 (from table)
9. EARNINGS: $ 17.15 (ADB × simple fac) $ 17.08 (ADB × cmpd. fac) (posted earnings)

DATE	JULIAN	TRANSACTIONS		DAYS TO END			±	DOLLAR DAYS
		Deposits	Withdrawals	DIDO	LIFO	FIFO		
Jan 1	1	1184 67		90			+	106,620 30
Jan 14	14		184 00	77			-	14,168 00
Jan 28	28		45 00	63			-	2,835 00
Feb 1	32	363 41		59			+	21,441 19
Feb 19	50		75 00	41			-	3,075 00
Feb 25	56		45 00	35			-	1,575 00
Mar 1	60	388 71		31			+	12,050 01
							Total	118,458 50

$$\text{AVERAGE DAILY BALANCE} = \frac{\text{Total Dollar Days}}{\text{Total Days in Period}} = \frac{118,458.50}{90} = 1316.21$$

EARNINGS = ADB × Interest Factor   1316.21 × .013028362 = 17.15

APPENDIX N

October 1973

Dear Student,

A study is being conducted to develop procedures to help con-
sumers check the earnings paid on their savings accounts. To develop a
procedure that is adaptable to the variety of systems in use, we need
passbooks or statements which show actual dates, deposits, withdrawals,
earnings, and balances for at least two interest-paying periods.

We need either the passbook itself or the data from it:

• <u>Actual passbook or statement</u>

    - We will make a duplicate copy (Xerox) deleting your name and
      account number and will then return your passbook to you, or

    - You may make your own copy and turn it in, eliminating our
      need for your passbook.

<div align="center">or</div>

• <u>Data transfer</u>

    - You will transfer all data appearing in your passbook or
      statement since March 1st, or for two interest paying periods,
      to the DATA TRANSFER SHEET.

In addition to your passbook, we need a description of your account to
understand how the financial institution figured the earnings. For this
reason, we ask that you complete and attach an ACCOUNT DESCRIPTION to each
account submitted.

Your cooperation will help us to develop ways for interested
consumers to verify their savings account earnings.

Mrs. Nancy Granovsky
Instructor
Department of Family Economics

ACCOUNT DESCRIPTION

Name of institution_____

Address_____

City_____ State_____

1. What is the earnings (interest) rate? _____ % per year.

2. How often is interest compounded? (check one)

   _____ daily
   _____ quarterly
   _____ semi-annually
   _____ annually

3. On what <u>exact dates</u> is interest payable? (This may differ from the date posted in your passbook.)

   _____

   _____

4. Which method is used to determine the balance to be used as a basis for interest computation? (You may need to consult your savings institution.)

   _____ low balance
   _____ FIFO (First In First Out) on beginning balance
   _____ FIFO on first deposits
   _____ LIFO (Last in First Out)
   _____ DIDO (Day of Deposit to Day of Withdrawal, also called Daily Average Balance)
   _____ other (specify) _____
   _____ don't know

5. Does this account have grace days? _____ yes _____ no

   Explain _____

   _____

6. How many withdrawals are permitted without a charge? _____

   What charge is made for excessive withdrawals? _____

7. Does the account have any other features which would either decrease or increase the amount of earnings paid?

   _____

   _____

ATTACH THIS TO YOUR ACCOUNT.

Please transfer all data carefully.

DATE	DEPOSIT	WITHDRAWAL	EARNINGS	BALANCE

Department of Family Economics, KSU

APPENDIX O

Case _____

VERIFICATION OF EARNINGS

| Posted_____ | Verified_____ | ± Difference_____ | %Difference_____ |
| | Potential_____ | ± Difference_____ | %Difference_____ |

ASSUMED ACCOUNT DESCRIPTION

1. APR _____

2. PPR _____

3. Compounding frequency: _____ times per year.

4. Earnings are figured for the _____ day period from _____

   through _____ and are payable or credited on _____.

5. Bookkeeping method _____.

6. Deposit grace days _____ Withdrawal grace days _____.

7. Penalties _____.

8. Other conditions _____.

ADDITIONAL INFORMATION
Institution
_____National Bank
_____State Bank
_____Savings & Loan
_____Credit Union
_____Other
Activity
_____+ only
_____- only
_____± both
_____no activity

Case _____

HP-80 VERIFICATION

Assumed method – Verified earnings

DATE	JULIAN	DAYS TO END	DEPOSIT	WITHDRAWAL	BALANCE	EARNINGS

Total Earnings _____

Standard DIDO – Potential earnings

DATE	JULIAN	DAYS TO END	DEPOSIT	WITHDRAWAL	BALANCE	EARNINGS

Total Earnings _____

CONSUMER PASSBOOK SAVINGS VERIFICATION

by

NANCY LAMMI GRANOVSKY

B. S., University of Minnesota, 1968

AN ABSTRACT OF A MASTER'S THESIS

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Numerous variables affect the computation of earnings on consumer passbook savings accounts. Earnings may be computed in more than 100 different ways, depending on the combination of variables used. Consumers have the responsibility for monitoring the accuracy of earnings paid to their accounts, but the information they need to verify earnings is not routinely disclosed.

The objectives of the study were: (1) to determine whether a need exists for consumers to verify their own passbook savings earnings, as measured by the frequency of agreement of posted earnings with verified earnings and the magnitude of the discrepancy; (2) to examine whether need varies by type of institution, level of account activity, system used to compute earnings, and size of account; (3) to measure the magnitude of difference between earnings computed by the DIDO (day of deposit to day of withdrawal) method and earnings computed by the various methods employed by savings institutions; and (4) to assess the communications gap between savings institutions and consumers regarding the terms and conditions of their savings contracts.

Three earnings verification systems were developed and tested, using hypothetical savings models. No difficulties were encountered because all variables affecting earnings computation were known. An attempt to verify an actual account revealed the problems to be confronted in verifying consumers' accounts and dealing with savings institutions.

A form was developed for transcribing records from consumer passbook savings accounts and tabulating terms and conditions essential for computing earnings. Accounts were solicited using this form. Of the 156 accounts verified, 85% failed to be correctly verified. If a two penny

tolerance was permitted, 38% qualified. Accounts from savings and loan associations, those compounded daily, those whose earnings were determined by the DIDO method, and inactive accounts were correctly verified more often than other accounts.

Half of the accounts were underpaid, that is, posted earnings were less than earnings calculated according to known account conditions. Reasons for discrepancies were not evident from the data, but were believed to be a result of institutional error, student error, ineffective communications between institution and student, incorrect transaction dates, rounding differences, or differences in factors used to compute earnings.

Potential earnings for all accounts were determined using the DIDO method and daily compounding. These earnings were greater than actual earnings for two-thirds of all accounts. For the non-DIDO accounts, 85% would have generated more earnings under the DIDO method.

Consumers cannot expect to verify their passbook earnings correctly unless all conditions which influenced earnings computation during the accounting period have been fully disclosed.

As a result of the study, the following recommendations were made: (1) assess consumers' ability to interpret and use the three earnings verification systems developed; (2) examine the feasibility of savings institutions providing consumers with worksheets for verifying earnings; (3) consider the DIDO method for computing earnings if a uniform method is to be adopted by all savings institutions; (4) assess the cost potential to consumers resulting from incomplete account information for verifying earnings; (5) eliminate barriers to effective communications between savings institutions and consumers by: (a) standardizing the terminology

essential for describing the terms and conditions of savings accounts;
(b) adopting full disclosure measures as in S. 1052, Truth in Savings; and
(c) standardizing the factor tables and other instruments for facilitating
earnings computations; and (6) design educational materials for classroom
and home use to develop greater familiarity for verifying and monitoring
passbook savings accounts.