1974

BANSIM.ORG: A computer-aided game

Catherine Marie Banaugh
The University of Montana

BANSIM.ORG - A COMPUTER-AIDED GAME

By

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BANSIM.ORG - A Computer-Aided Game (173 pp.)

Director: Richard K. Smith

The purpose of this paper is to acquaint business students with the use and capability of a digital computer as a decision making instrument. This is accomplished by simulating a banking community and allowing students or groups of students to manage the banks. The computerized banking model is very elementary to permit easy modifications and additions. As the students use the model, insight gained by them may be reinserted into the model; thus improving it. Hence, there is a positive feedback to the students' learning.

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PREFACE

The purpose of this thesis is twofold. The primary purpose is to make the introduction of some basic business concepts interesting to the student. The idea of a "game" excites interest in most students, whether they are business majors or otherwise. The simulation of an economic community and the idea of making "money" or a profit is far more interesting to the average student than studying textbooks. An added incentive is present to master the game and accumulate profits.

The second purpose is far more subtle. The game itself is fairly simple, being aimed at beginning business students, but the extensions of the game are almost limitless. There is very little that cannot be added onto the program to make the simulation more and more like real life. In several sections that explain the game, I state my reasons for doing some economic action in a particular way, but there is no reason why the players of the game themselves cannot amend the game. Hopefully, when the players have mastered the game, they will begin to look closer at the program. They will want to take it apart and rebuild it the way they would like to see the game played. To do so they must first learn something of business and its concepts and computers and its programming.

Many will probably wonder why the banking industry was chosen to illustrate business concepts. The world of banks and high finance at first does not seem to have a lot in common with other industries that consume natural resources and produce finished products. At first, I thought so too. In fact, the primary reason the banking industry was chosen for the simulation was the fact that I knew nothing at all about banks and banking. Writing a computer game about banking is one sure way to learn something about the industry. If one merely thinks of the bank's deposits as its "natural resources" and its loans and stock portfolio as its "finished products", there is no problem at all.

The main difference between the banking industry and other industries, is the object of their advertising campaigns. Most industries, for example the car industry, shop around for the cheapest source of steel or other needed resources. The suppliers of the industry-needed resources advertise their products to the purchasing industry. The industry in turn consumes the resources and then advertises its finished products. The banking industry is slightly different. Banks advertise heavily for their needed resources (deposits) and soft-pedal the advertising on their "finished products": loans and stock portfolio.

Aside from the advertising difference, the banking industry operates pretty much the way most other industries operate. The banks "purchase" resources at a stated

price - the account interest rate paid the depositor. The banks "sell" their finished product at a hopefully higher price - the interest rate earned on stocks, bonds, and loans. The easiest way to think of the banking industry as any other industry handling personnel, resources, finished products, etc., is to think of money deposited as funds. The bank is merely a clearinghouse to reallocate unused money from depositors, who have an excess of it; to borrowers, who have a shortage of it. The difference in the interest rate paid to the one and the interest rate charged the other is the bank's profit. The bank becomes no different than the average retail or wholesale store.

It is hoped that the players of the game learn from the simulation as much as I did when I developed it. I also hope the players have as much fun playing with the computer and the simulation as I did. The game is really very simple to play and enjoyable.

CHAPTER I

TECHNICAL APPROACH

The computer language used in this bank management simulation is FORTRAN IV. Although FORTRAN IV is not as easy for the person unfamiliar with computers to understand as BASIC, FORTRAN IV has several advantages over BASIC for the purpose of this simulation. These advantages make the use of FORTRAN IV more logical. The main advantage of FORTRAN IV over BASIC, is the fact that it permits variable names up to six (6) digits in length. BASIC permits only one alphabetic character followed by any numeric character. For example: to codify the variables "Total Town Deposits - Demand" and "Total Town Deposits - Time", in BASIC these would be identified as the variables "D1" and "D2"; in FORTRAN IV, the two could be identified as "TTDEPD" and "TTDEPT", obviously much easier to understand. To code variables in BASIC and then to write and debug the program, would require a coding book to be on hand at all times and be very difficult for the onlooker to the program to understand. Using FORTRAN IV is handy and easy to understand.

A second, relatively minor advantage of FORTRAN IV over either BASIC or any other computer language, is the ease in

formatting input and output. Other than these advantages, the program could have been written in almost any language. The simulation could have been programmed in COBOL or BASIC or any other language. For the above reasons and for the familiarity between the language and the programmer, FORTRAN IV was the chosen language.

The program language, in itself, appears fairly complicated but is actually easy for most people to understand after a few explanations. The arithmetic operators that everyone is familiar with retain the same meanings and operations that they normally do. Addition (+), Subtraction (-), Multiplication (*), Division (/), and Equals (=), all mean the same operations and are used so. Thus,

$$\begin{array}{r} 2 \\ +\ 2 \\ \hline 4 \end{array}$$

is translated as: 4 = 2 + 2.

Parentheses ((,)) indicate that that which is within them is to be accomplished first, before moving to the next set of parenthesis or equals sign. The only other thing that may baffle a few people is the computer operation "RAN(X)". This is merely the creation of a random number between 0 and +1. It is one of two unfamiliar operators used in the program. The other is "INT( )" which causes the dropping of digits to the right of the decimal point, numbers become integer or "whole".

A "canned" program of Regression Analysis was used to derive some of the relationships used in the program. These equations are documented in the Exhibit section of this paper and explained in the section on the program. Several other relationships for which no documentation could be found, or derived through regression, are set forth. These relationships seem to be logical although they cannot be backed up by "hard figures". The best example of this is bank marketing. Advertising has some effect upon the bank's drawing power for customers but it was not possible to document with actual figures. No printed material reveals how much banks spend in advertising, nor to what effect. Banks interviewed in Missoula, Montana, also showed the same reluctance to disclose their marketing expenditures. No figures are available, but obviously money is to be spent on advertising and it does have an effect.

It is because of the above case of undocumented and assumed relationships, that one final point must be made. The actual numbers used, whether "guesstimations" or the result of regression analysis, are really unimportant. Rather the important considerations are the relationships between one individual bank and the other banks in town and the relationships within the bank itself. The numbers are not definitive. They can and may be changed by anyone who has a better set of figures or even a better relationship between ideas or values. The "beauty" of the language and program is that it can easily be changed to reflect other relationships and values.

CHAPTER II

RESULTS

STATEMENT OF CONDITION AND INCOME OF BANK: 1

STATEMENT OF CONDITION:

ASSETS

CASH, BALANCES WITH OTHER BANKS, AND CASH COLLECTION ITEMS - TOTAL	$	4369001.00
CASH AND CURRENCY	$	50000.00
RESERVE WITH F.R. BANK	$	2363947.41
DEMAND BALANCES WITH OTHER BANKS IN U.S.	$	0.00
OTHER BALANCES WITH BANKS IN U.S.	$	0.00
CASH ITEMS IN PROCESS OF COLLECTION	$	1955053.61
SECURITIES - TOTAL	$	3570000.00
U.S. GOVERNMENT OBLIGATIONS	$	1000000.00
OBLIGATIONS OF STATE AND SUBDIVISIONS	$	2000000.00
CORPORATE STOCKS	$	50000.00
CORPORATE BONDS	$	500000.00
OTHER NOTES, BONDS, AND DEBENTURES	$	20000.00
LOAN - TOTAL	$	5990350.75
REAL ESTATE LOAN	$	0.00
LOAN TO COMMERCIAL AND FOREIGN BANKS	$	0.00
LOAN TO OTHER FINANCIAL INSTITUTIONS	$	0.00
LOAN TO BROKERS AND DEALERS IN SECURITIES	$	5000.00
LOAN TO FARMERS	$	0.00
OTHER LOAN FOR CARRYING SECURITIES	$	0.00
COMMERCIAL AND INDUSTRIAL LOAN	$	5000000.00
OTHER LOAN TO INDIVIDUALS	$	0.00
ALL OTHER LOAN	$	985350.73
UNUSED LOAN MONEY	$	5014649.25
EXCESS FUNDS SUPPLIED TO THE FEDERAL RESERVE	$	11206156.00
MISCELLANEOUS ASSETS - TOTAL	$	504639.21
BANK PREMISES OWNED	$	75000.00
BANK FIXTURES OWNED	$	15000.00
BANK FURNITURE OWNED	$	20000.00
OTHER REAL ESTATE - DIRECT AND INDIRECT	$	0.00
ALL OTHER MISCELLANEOUS ASSETS	$	394639.21
TOTAL ASSETS:	$	25640147.00
BUSINESS AND PERSONAL DEPOSITS - TOTAL	$	20138091.00

INDIVIDUALS, PARTNERSHIPS, AND CORPORATIONS DEMAND	$	9425940.75
INDIVIDUALS, PARTNERSHIPS, AND CORPORATIONS TIME	$	10578177.90
CERTIFIED AND OFFICIERS CHECKS, LETTERS OF CREDIT AND TRAVELERS CHECKS, ETC.	$	133972.22
GOVERNMENT DEPOSITS - TOTAL	$	2803791.22
U.S. GOVERNMENT - DEMAND	$	821328.72
U.S. GOVERNMENT - TIME	$	46865.10
STATES AND MUNICIPLES - DEMAND	$	841133.20
STATES AND MUNICIPLES - TIME	$	1094464.19
DOMESTIC INTERBANK DEPOSITS - TOTAL	$	831564.15
COMMERCIAL BANKS - DEMAND	$	783034.06
COMMERCIAL BANKS - TIME	$	48530.09
TOTAL TIME DEPOSITS	$	11768037.40
TOTAL DEMAND DEPOSITS	$	11871436.90
TOTAL DEPOSITS	$	23773446.50
MISCELLANEOUS LIABILITIES - TOTAL	$	1005616.78
REDISCOUNTS AND OTHER BORROWED MONEY	$	0.00
OTHER MISCELLANEOUS LIABILITIES	$	1005616.78
CAPITAL ACCOUNTS - TOTAL	$	861083.70
CAPITAL	$	750000.00
CONTRIBUTED CAPITAL	$	75000.00
UNDIVIDED PROFITS	$	222451.67
LOAN AND SECURITY RESERVE	$	36083.70
RESERVE FOR CONTINGENCIES	$	0.00
COMMON STOCK IN TREASURY	$	0.00
TOTAL LIABILITIES	$	24779063.30
TOTAL LIABILITIES AND CAPITAL ACCOUNTS	$	25640147.00

PROFIT AND LOSS STATEMENT

INCOME

LOAN INTEREST	$	539081.56
SECURITIES INTEREST	$	208469.86
EARNED FROM FEDERAL FUNDS SUPPLIED	$	1498521.36
OTHER REAL ESTATE RENT	$	0.00
TOTAL INCOME	$	2246072.78

EXPENSES

DEPRECIATION	$	2200.00
STAFF	$	234000.00
MARKETING EXPENDITURES	$	50000.00
EXTRA SERVICES OFFERED	$	0.00
INTEREST PAID ON ACCOUNTS	$	588401.87
BROKERS FEE	$	35700.00
INTEREST PAID ON BORROWED MONEY	$	0.00
GENERAL INSURANCE	$	180465.37
PERSONNEL INSURANCE	$	93600.00
MAINTENANCE	$	157200.00
RESERVE SHORTAGES	$	227121.48
MISCELLANEOUS EXPENSES	$	529602.20
TOTAL EXPENSES	$	1821169.44
NET INCOME	$	424903.34
ADDITION TO FEDERAL INCOME TAX FUND	$	212451.67
PROFIT(+)/LOSS(-)	$	212451.67
DIVIDENDS PAID	$	0.00
ADDITION TO OWNERS EQUITY	$	212451.67
COMMON STOCK OUTSTANDING	$	1000.00
EPS - COMMON	$	0.000
TREASURY STOCK	$	0.00
MARKET PRICE OF STOCK	$	5.14

AVERAGE STOCK QUOTATION $ 9.72

ECONOMIC INDICATOR IS 97
TOWN TIME DEPOSITS GREW -.030 LAST PERIOD, YOUR TIME DEPOSITS WERE .099 OF THO
TOWN DEMAND DEPOSITS GREW -.026 LAST PERIOD, YOUR DEMAND DEPOSITS WERE .088 OF

TOWN DEMAND FOR LOANS WAS (1-9): 48535073.00 19963.38 34871.82
58.00 4908442.06 985350.73
YIELD ON SECURITIES WAS (1-5): .060 .054 .028 .077 .064

THE BANKS EQUITY WAS LOW, PROFITS ARE RETAINED.

STATEMENT OF CONDITION AND INCOME OF BANK: 2

STATEMENT OF CONDITION:

ASSETS

CASH, BALANCES WITH OTHER BANKS, AND CASH COLLECTION ITEMS - TOTAL	$	9445607.88
CASH AND CURRENCY	$	100000.00
RESERVE WITH F.R. BANK	$	5108566.50
DEMAND BALANCES WITH OTHER BANKS IN U.S.	$	0.00
OTHER BALANCES WITH BANKS IN U.S.	$	0.00
CASH ITEMS IN PROCESS OF COLLECTION	$	4237041.38
SECURITIES - TOTAL	$	7000000.00
U.S. GOVERNMENT OBLIGATIONS	$	1000000.00
OBLIGATIONS OF STATE AND SUBDIVISIONS	$	3000000.00
CORPORATE STOCKS	$	0.00
CORPORATE BONDS	$	1000000.00
OTHER NOTES, BONDS, AND DEBENTURES	$	2000000.00
LOAN - TOTAL	$	17030000.00
REAL ESTATE LOAN	$	0.00
LOAN TO COMMERCIAL AND FOREIGN BANKS	$	0.00
LOAN TO OTHER FINANCIAL INSTITUTIONS	$	0.00
LOAN TO BROKERS AND DEALERS IN SECURITIES	$	0.00
LOAN TO FARMERS	$	10000000.00
OTHER LOAN FOR CARRYING SECURITIES	$	30000.00
COMMERCIAL AND INDUSTRIAL LOAN	$	5000000.00
OTHER LOAN TO INDIVIDUALS	$	2000000.00
ALL OTHER LOAN	$	0.00
UNUSED LOAN MONEY	$	1010000.00
EXCESS FUNDS SUPPLIED TO THE FEDERAL RESERVE	$	22330217.00
MISCELLANEOUS ASSETS - TOTAL	$	987751.97
BANK PREMISES OWNED	$	100000.00
BANK FIXTURES OWNED	$	20000.00
BANK FURNITURE OWNED	$	15000.00
OTHER REAL ESTATE - DIRECT AND INDIRECT	$	0.00
ALL OTHER MISCELLANEOUS ASSETS	$	852751.97
TOTAL ASSETS:	$	56793577.00
BUSINESS AND PERSONAL DEPOSITS - TOTAL	$	44175537.00

INDIVIDUALS, PARTNERSHIPS, AND CORPORATIONS DEMAND	$	20681251.50
INDIVIDUALS, PARTNERSHIPS, AND CORPORATIONS TIME	$	23209350.30
CERTIFIED AND OFFICIERS CHECKS, LETTERS OF CREDIT AND TRAVELERS CHECKS, ETC.	$	284934.80
GOVERNMENT DEPOSITS - TOTAL	$	5374599.00
U.S. GOVERNMENT - DEMAND	$	1777185.64
U.S. GOVERNMENT - TIME	$	101406.40
STATES AND MUNICIPLES - DEMAND	$	1519224.78
STATES AND MUNICIPLES - TIME	$	1976782.17
DOMESTIC INTERBANK DEPOSITS - TOTAL	$	1820464.55
COMMERCIAL BANKS - DEMAND	$	1714222.23
COMMERCIAL BANKS - TIME	$	106242.31
TOTAL TIME DEPOSITS	$	25393781.30
TOTAL DEMAND DEPOSITS	$	25691884.30
TOTAL DEPOSITS	$	51370600.50
MISCELLANEOUS LIABILITIES - TOTAL	$	2172976.41
REDISCOUNTS AND OTHER BORROWED MONEY	$	0.00
OTHER MISCELLANEOUS LIABILITIES	$	2172976.41
CAPITAL ACCOUNTS - TOTAL	$	3250000.00
CAPITAL	$	3000000.00
CONTRIBUTED CAPITAL	$	250000.00
UNDIVIDED PROFITS	$	595227.89
LOAN AND SECURITY RESERVE	$	0.00
RESERVE FOR CONTINGENCIES	$	0.00
COMMON STOCK IN TREASURY	$	0.00
TOTAL LIABILITIES	$	53543577.00
TOTAL LIABILITIES AND CAPITAL ACCOUNTS	$	56793577.00

PROFIT AND LOSS STATEMENT

INCOME

LOAN INTEREST	$	1603000.00
SECURITIES INTEREST	$	425360.18
EARNED FROM FEDERAL FUNDS SUPPLIED	$	2986064.72
OTHER REAL ESTATE RENT	$	0.00
TOTAL INCOME	$	5014424.94

EXPENSES

DEPRECIATION	$	2700.00
STAFF	$	315466.67
MARKETING EXPENDITURES	$	52827.23
EXTRA SERVICES OFFERED	$	1500.00
INTEREST PAID ON ACCOUNTS	$	1269689.06
BROKERS FEE	$	70000.00
INTEREST PAID ON BORROWED MONEY	$	0.00
GENERAL INSURANCE	$	529337.88
PERSONNEL INSURANCE	$	126186.67
MAINTENANCE	$	170200.00
RESERVE SHORTAGES	$	737819.16
MISCELLANEOUS EXPENSES	$	996903.65
TOTAL EXPENSES	$	3480483.94
NET INCOME	$	1533941.00
ADDITION TO FEDERAL INCOME TAX FUND	$	766970.50
PROFIT(+)/LOSS(-)	$	766970.50
DIVIDENDS PAID	$	191742.63
ADDITION TO OWNERS EQUITY	$	575227.88
COMMON STOCK OUTSTANDING	$	3000.00
EPS - COMMON	$	63.914
TREASURY STOCK	$	0.00
MARKET PRICE OF STOCK	$	519.31

AVERAGE STOCK QUOTATION $ 9.72

ECONOMIC INDICATOR IS 97
TOWN TIME DEPOSITS GREW -.030 LAST PERIOD, YOUR TIME DEPOSITS WERE .217 OF THO
TOWN DEMAND DEPOSITS GREW -.026 LAST PERIOD, YOUR DEMAND DEPOSITS WERE .193 OF

TOWN DEMAND FOR LOANS WAS (1-9): 48535073.00 19963.38 34871.82
58.00 4908442.06 985350.73
YIELD ON SECURITIES WAS (1-5): .060 .054 .028 .077 .064

STATEMENT OF CONDITION AND INCOME OF BANK: 3

STATEMENT OF CONDITION:

ASSETS

CASH, BALANCES WITH OTHER BANKS, AND CASH COLLECTION ITEMS - TOTAL	$	9799245.75
CASH AND CURRENCY	$	90000.00
RESERVE WITH F.R. BANK	$	5313325.00
DEMAND BALANCES WITH OTHER BANKS IN U.S.	$	2500.00
OTHER BALANCES WITH BANKS IN U.S.	$	0.00
CASH ITEMS IN PROCESS OF COLLECTION	$	4393420.69
SECURITIES - TOTAL	$	5500000.00
U.S. GOVERNMENT OBLIGATIONS	$	1000000.00
OBLIGATIONS OF STATE AND SUBDIVISIONS	$	2000000.00
CORPORATE STOCKS	$	1000000.00
CORPORATE BONDS	$	500000.00
OTHER NOTES, BONDS, AND DEBENTURES	$	1000000.00
LOAN - TOTAL	$	20000000.00
REAL ESTATE LOAN	$	0.00
LOAN TO COMMERCIAL AND FOREIGN BANKS	$	0.00
LOAN TO OTHER FINANCIAL INSTITUTIONS	$	0.00
LOAN TO BROKERS AND DEALERS IN SECURITIES	$	0.00
LOAN TO FARMERS	$	15000000.00
OTHER LOAN FOR CARRYING SECURITIES	$	0.00
COMMERCIAL AND INDUSTRIAL LOAN	$	5000000.00
OTHER LOAN TO INDIVIDUALS	$	0.00
ALL OTHER LOAN	$	0.00
UNUSED LOAN MONEY	$	1000000.00
EXCESS FUNDS SUPPLIED TO THE FEDERAL RESERVE	$	24306752.00
MISCELLANEOUS ASSETS - TOTAL	$	1086984.07
BANK PREMISES OWNED	$	90000.00
BANK FIXTURES OWNED	$	15000.00
BANK FURNITURE OWNED	$	20000.00
OTHER REAL ESTATE - DIRECT AND INDIRECT	$	75000.00
ALL OTHER MISCELLANEOUS ASSETS	$	886984.07
TOTAL ASSETS:	$	60692982.00
BUSINESS AND PERSONAL DEPOSITS - TOTAL	$	46498700.50

INDIVIDUALS, PARTNERSHIPS, AND CORPORATIONS DEMAND	$	21769051.50
INDIVIDUALS, PARTNERSHIPS, AND CORPORATIONS TIME	$	24430124.00
CERTIFIED AND OFFICIERS CHECKS, LETTERS OF CREDIT AND TRAVELERS CHECKS, ETC.	$	299524.98
GOVERNMENT DEPOSITS - TOTAL	$	5017273.50
U.S. GOVERNMENT - DEMAND	$	1869567.02
U.S. GOVERNMENT - TIME	$	106677.69
STATES AND MUNICIPLES - DEMAND	$	1321509.45
STATES AND MUNICIPLES - TIME	$	1719519.31
DOMESTIC INTERBANK DEPOSITS - TOTAL	$	1916801.23
COMMERCIAL BANKS - DEMAND	$	1804936.70
COMMERCIAL BANKS - TIME	$	111864.53
TOTAL TIME DEPOSITS	$	26368185.50
TOTAL DEMAND DEPOSITS	$	26765064.80
TOTAL DEPOSITS	$	53432775.50
MISCELLANEOUS LIABILITIES - TOTAL	$	2260206.41
REDISCOUNTS AND OTHER BORROWED MONEY	$	0.00
OTHER MISCELLANEOUS LIABILITIES	$	2260206.41
CAPITAL ACCOUNTS - TOTAL	$	5000000.00
CAPITAL	$	4500000.00
CONTRIBUTED CAPITAL	$	500000.00
UNDIVIDED PROFITS	$	597501.28
LOAN AND SECURITY RESERVE	$	0.00
RESERVE FOR CONTINGENCIES	$	0.00
COMMON STOCK IN TREASURY	$	500.00
TOTAL LIABILITIES	$	55692982.00
TOTAL LIABILITIES AND CAPITAL ACCOUNTS	$	60692982.00

PROFIT AND LOSS STATEMENT

INCOME

LOAN INTEREST	$	1850000.00
SECURITIES INTEREST	$	297338.30
EARNED FROM FEDERAL FUNDS SUPPLIED	$	3250373.03
OTHER REAL ESTATE RENT	$	6265.57
TOTAL INCOME	$	5403976.63

EXPENSES

DEPRECIATION	$	4000.00
STAFF	$	411840.00
MARKETING EXPENDITURES	$	76851.69
EXTRA SERVICES OFFERED	$	3000.00
INTEREST PAID ON ACCOUNTS	$	1450250.20
BROKERS FEE	$	55000.00
INTEREST PAID ON BORROWED MONEY	$	0.00
GENERAL INSURANCE	$	518752.25
PERSONNEL INSURANCE	$	164736.00
MAINTENANCE	$	204000.00
RESERVE SHORTAGES	$	769549.62
MISCELLANEOUS EXPENSES	$	1055394.73
TOTAL EXPENSES	$	3863973.22
NET INCOME	$	1540003.41
ADDITION TO FEDERAL INCOME TAX FUND	$	770001.70
PROFIT(+)/LOSS(-)	$	770001.70
DIVIDENDS PAID	$	192500.42
ADDITION TO OWNERS EQUITY	$	577501.28
COMMON STOCK OUTSTANDING	$	5000.00
EPS - COMMON	$	38.500
TREASURY STOCK	$	50.00
MARKET PRICE OF STOCK	$	395.00

AVERAGE STOCK QUOTATION $ 9.72

ECONOMIC INDICATOR IS 97
TOWN TIME DEPOSITS GREW -.030 LAST PERIOD, YOUR TIME DEPOSITS WERE .229 OF THO
TOWN DEMAND DEPOSITS GREW -.026 LAST PERICD, YOUR DEMAND DEPOSITS WERE .203 OF

TOWN DEMAND FOR LOANS WAS (1-9): 48535073.00 19963.38 34871.82
58.00 4908442.06 985350.73
YIELD ON SECURITIES WAS (1-5): .060 .054 .028 .077 .064

STATEMENT OF CONDITION AND INCOME OF BANK: 4

STATEMENT OF CONDITION:

ASSETS

CASH, BALANCES WITH OTHER BANKS, AND CASH COLLECTION ITEMS - TOTAL	$	21898916.00
CASH AND CURRENCY	$	20000.00
RESERVE WITH F.R. BANK	$	11925227.62
DEMAND BALANCES WITH OTHER BANKS IN U.S.	$	30000.00
OTHER BALANCES WITH BANKS IN U.S.	$	50000.00
CASH ITEMS IN PROCESS OF COLLECTION	$	9873688.38
SECURITIES - TOTAL	$	11000000.00
U.S. GOVERNMENT OBLIGATIONS	$	3000000.00
OBLIGATIONS OF STATE AND SUBDIVISIONS	$	4000000.00
CORPORATE STOCKS	$	1000000.00
CORPORATE BONDS	$	1000000.00
OTHER NOTES, BONDS, AND DEBENTURES	$	2000000.00
LOAN - TOTAL	$	41361847.50
REAL ESTATE LOAN	$	0.00
LOAN TO COMMERCIAL AND FOREIGN BANKS	$	0.00
LOAN TO OTHER FINANCIAL INSTITUTIONS	$	0.00
LOAN TO BROKERS AND DEALERS IN SECURITIES	$	9890.13
LOAN TO FARMERS	$	33351957.00
OTHER LOAN FOR CARRYING SECURITIES	$	0.00
COMMERCIAL AND INDUSTRIAL LOAN	$	7000000.00
OTHER LOAN TO INDIVIDUALS	$	1000000.00
ALL OTHER LOAN	$	0.00
UNUSED LOAN MONEY	$	8838152.50
EXCESS FUNDS SUPPLIED TO THE FEDERAL RESERVE	$	64850216.50
MISCELLANEOUS ASSETS - TOTAL	$	2435609.56
BANK PREMISES OWNED	$	250000.00
BANK FIXTURES OWNED	$	50000.00
BANK FURNITURE OWNED	$	45000.00
OTHER REAL ESTATE - DIRECT AND INDIRECT	$	100000.00
ALL OTHER MISCELLANEOUS ASSETS	$	1990609.56
TOTAL ASSETS:	$	141546590.00
BUSINESS AND PERSONAL DEPOSITS - TOTAL	$	104527240.00

INDIVIDUALS, PARTNERSHIPS, AND CORPORATIONS DEMAND	$	48940376.50
INDIVIDUALS, PARTNERSHIPS, AND CORPORATIONS TIME	$	54922901.00
CERTIFIED AND OFFICIERS CHECKS, LETTERS OF CREDIT AND TRAVELERS CHECKS, ETC.	$	663962.10
GOVERNMENT DEPOSITS - TOTAL	$	11061290.30
U.S. GOVERNMENT - DEMAND	$	4240095.94
U.S. GOVERNMENT - TIME	$	241940.32
STATES AND MUNICIPLES - DEMAND	$	2859080.56
STATES AND MUNICIPLES - TIME	$	3720173.34
DOMESTIC INTERBANK DEPOSITS - TOTAL	$	4327709.31
COMMERCIAL BANKS - DEMAND	$	4075144.19
COMMERCIAL BANKS - TIME	$	252565.11
TOTAL TIME DEPOSITS	$	59137580.00
TOTAL DEMAND DEPOSITS	$	60114697.00
TOTAL DEPOSITS	$	119916239.00
MISCELLANEOUS LIABILITIES - TOTAL	$	5072456.88
REDISCOUNTS AND OTHER BORROWED MONEY	$	0.00
OTHER MISCELLANEOUS LIABILITIES	$	5072456.88
CAPITAL ACCOUNTS - TOTAL	$	16557894.30
CAPITAL	$	15000000.00
CONTRIBUTED CAPITAL	$	1500000.00
UNDIVIDED PROFITS	$	2785433.56
LOAN AND SECURITY RESERVE	$	57894.29
RESERVE FOR CONTINGENCIES	$	0.00
COMMON STOCK IN TREASURY	$	10000.00
TOTAL LIABILITIES	$	124988696.00
TOTAL LIABILITIES AND CAPITAL ACCOUNTS	$	141546590.00

PROFIT AND LOSS STATEMENT

INCOME

LOAN INTEREST	$	3722566.25
SECURITIES INTEREST	$	626427.63
EARNED FROM FEDERAL FUNDS SUPPLIED	$	8671968.75
OTHER REAL ESTATE RENT	$	9274.23
TOTAL INCOME	$	13030236.90

EXPENSES

DEPRECIATION	$	8900.00
STAFF	$	982800.00
MARKETING EXPENDITURES	$	282096.50
EXTRA SERVICES OFFERED	$	4500.00
INTEREST PAID ON ACCOUNTS	$	3548254.81
BROKERS FEE	$	110000.00
INTEREST PAID ON BORROWED MONEY	$	0.00
GENERAL INSURANCE	$	1293073.64
PERSONNEL INSURANCE	$	393120.00
MAINTENANCE	$	331400.00
RESERVE SHORTAGES	$	1370094.55
MISCELLANEOUS EXPENSES	$	2268198.84
TOTAL EXPENSES	$	8935747.38
NET INCOME	$	4094489.50
ADDITION TO FEDERAL INCOME TAX FUND	$	2047244.75
PROFIT(+)/LOSS(-)	$	2047244.75
DIVIDENDS PAID	$	511811.19
ADDITION TO OWNERS EQUITY	$	1535433.56
COMMON STOCK OUTSTANDING	$	100000.00
EPS - COMMON	$	5.118
TREASURY STOCK	$	1000.00
MARKET PRICE OF STOCK	$	91.77

AVERAGE STOCK QUOTATION $ 9.72

ECONOMIC INDICATOR IS 97
TOWN TIME DEPOSITS GREW -.030 LAST PERIOD, YOUR TIME DEPOSITS WERE .514 OF THO
TOWN DEMAND DEPOSITS GREW -.026 LAST PERIOD, YOUR DEMAND DEPOSITS WERE .457 OF

TOWN DEMAND FOR LOANS WAS (1-9): 48535073.00 19963.38 34871.82
58.00 4908442.06 985350.73
YIELD ON SECURITIES WAS (1-5): .060 .054 .028 .077 .064

CHAPTER III

EXPLANATION OF PROGRAM

For the convenience of the person reading this or trying to play the game, the explanation of the game and the flow-charts of the program have been divided into five groups. They are:

1. General Set-Up of Program in Computer,
2. Loop 1: Environment,
3. Loop 2: Banks' Conditions,
4. Loop 3: Profit/Loss, and
5. Loop 4: Print Out.

General Set-Up of the Program in the Computer

This is just a brief section in which the mechanics of the actual running of the simulation are set up. There are several things done:

1. Dimension,
2. Integerize and Real,
3. Data, and
4. Index for the Economy.

Dimension

All variables that are common to each bank are dimensioned to a limit of ten (10). This puts a limit on the actual number of banks that can participate in the simulation. This limit can be extended although it would involve changing all dimension statements containing a ten (10). There are also several variables that are dimensioned to the second degree. These (i.e., SEC(I,J)) put a limit on the number of variations of a variable per bank. Each bank has this general type of variable and also many variations of this variable. The two things in particular that each bank has variations on are: the types of securities the bank may invest in, and the types of loans the bank can release money in. There are nine types of loans and five types of securities that the banks have to consider, as explained later in the paper.

Integerize and Real

This is merely a technical portion of the program to ensure that certain variables are in the proper "mode" before being used. "The normal mode for a variable or function name beginning with letters A thru H or O thru Z is floating point or 'real'. Likewise, the normal mode is integer if the name begins with the letters I thru N." (Organick, 1966, p. 159). In these sections new mode declarations are made. Certain variable names that are normally in one mode are changed to another. This is for convenience in naming a variable. It

is easier to remember that the time period value is held in the memory space named "PERIOD" than to try to think of something that will immediately suggest the time period and also begin with the letters I thru N.

For those that are hazy as to the difference between real and integer, integer variables do not have decimal places; real numbers retain the information that is to the right of the decimal. Because of limitations placed upon any program by the computer, certain variables must be in one mode or the other. These sections merely ensure that this is so.

Data

For the convenience of the person overseeing the running of the game, the type of data that must be supplied to the simulation has been divided into four sections. Each section has an independent file associated with it and this file can be amended or recreated at the whim of the person mediating the game. The four files contain specifics about the town in which the banks will operate, the loan and deposits potential of the town, the average town wage and stock market conditions, and finally the individual bank's decisions regarding the current operating period.

The first set of information, the file concerned with the specifics or conditions of the town in which all the banks must operate, is found on the first file (FOR21.DAT - an

explanation of the file system is found in Appendix B of the paper). The information that must be included on this file is:

1. TNOBK - the total number of banks that will be participating in the game;
2. XN - a trend indicator, it normally initializes at .5 but this can be changed - this is examined later in the section on the Economic Indicator;
3. TTDEPD(I) - the total demand deposits of the town in which the banks will operate;
4. TTDEPT(I) - the total time deposits in the same town;
5. DEPGRT(J) (J=1 to 2) - the maximum variation (rise and fall) of the deposits in the town for any one period - there is an independent growth rate for each type of deposit, subscripted thus:
    1. demand, and
    2. time.
6. MLOAN(I) (I=1 to 9) - the maximum amount of money that can be absorbed by the nine types of loans in the town (the nine loan types are explained later in the section on generating maximum loans);
7. LOAGRT(I) (I=1 to 9) - the maximum variations from one period to the next on the nine different types of loans - the subscripts correspond to those on MLOAN(I); and

8. PERIOD - the time period in which the game will be played.

The second set of information required concerns the history of the individual banks. This is in file FOR22.DAT. Each bank that is playing in the game must have on record for the computer to access several pieces of information about its past that the computer cannot derive from looking at the bank's current decisions. This information is:

1. CONCAP(I) - the amount of bank equity from contributed capital on its stock issuances;
2. CCSLD(I) - the amount of common stock that the bank has issued to date;
3. STKPRI(I) - the market quote on the bank's stock at the end of the previous period;
4. TCSTK(I) - the amount of common stock that was repurchased by the bank or that was issued but not sold - the treasury stock;
5. UNDPRO(I) - the total of the undivided profit of the bank;
6. RPC(I) - this figure is the "running profit counter" - a number that reveals for how many more past periods the individual bank has had a profit than a loss;
7. OBPDEP(I) - a weighted average of the bank's previous Business and Personal Deposits; and
8. CSITR(I) - the value of the treasury stock held by the bank.

The third set of data, found in file FOR23.DAT, is the set of values for various exogenous variables that cannot be affected by anything that the bank does. They are:

1. AVEWGE - the average wage in the town;
2. AVEMSK - the average stock quotation on the market exchange;
3. RRAT - the last period's Federal Reserve Requirement for reserves deposited with them against the bank's demand and time deposits; and
4. SINT(J) (J=1 to 5) - the previous period's yields for securities in the market that the bank may purchase as part of its portfolio - the subscripts will be explained later.

The fourth and final file, FOR24.DAT, holds information regarding the individual bank's decisions for the next period, the period for which the game will now be played. Each bank makes decisions regarding:

1. CAC(I) - the amount of cash and currency the bank elects to hold in its vaults;
2. TDDB(I) - the amount of money that the bank will deposit in other banks - in particular these are demand balances to be held in other banks;
3. TOTOB(I) - the amount the bank wishes to deposit as other types of balances in other banks;
4. SEC(I,J) (J=1,5) - the amount the bank wishes to spend purchasing different types of securities to

hold in its portfolio, in particular the bank can invest in five different types of securities:

1. U. S. Government bonds,
2. State and Municipal bonds,
3. Corporate stocks,
4. Corporate bonds, and
5. Other notes and debentures.

5. LOAN(I,J) (J=1 to 9) - the amount of funds that the bank desires to release into various types of loans that are demanded by the town. The types of loans are:

   1. Real estate loans,
   2. Loans to commercial and foreign banks,
   3. Loans to other financial institutions,
   4. Loans to brokers and dealers in securities,
   5. Loans to farmers,
   6. Other loans for carrying securities,
   7. Commercial and industrial loans,
   8. Other loans to individuals, and
   9. All other miscellaneous loans.

6. LOAINT(I,J) (J=1 to 9) - the interest rates that the bank will charge for the various loans it wishes to attract - the subscripts match those for LOAN(I,J);

7. BNPFF(I,J) (J=1 to 3) - the amount the bank wishes to expend for its physical features - subscripted thus:

1. the bank's premises,
2. the bank's fixtures, and
3. the bank's furniture.

8. VORE(I) - the amount of other real estate that the bank wishes to own - this does not include the bank's physical premises;
9. CSTKI(I) - the amount of common stock that the bank wishes to issue during this time period - the bank does not have to issue stock, this is optional;
10. CSTKPV(I) - the par value of the common stock that the bank desires to issue;
11. LSRES(I) - each bank may choose to keep some of its assets under the option of loan and security reserves - these are reserves against the failures of securities or loans;
12. RESCON(I) - the contingency reserve that banks usually maintain against unforeseen events that may occur to the bank;
13. SEROFF(I,J) (J=1 to 3) - three optional features that the bank may offer to keep its present customers and to entice customers away from other banks. They are three unspecified different types of extra services and they each have an associated cost. For example, they could be:
    1. all night depository,
    2. drive up window, or

3. 24-hour check cashing capabilities.

14. STAFF(I) - the number of employees that the bank desires to employ;
15. STASAL(I) - the amount of wages that is paid to the bank's employees, this is the total figure;
16. MARMON(I) - the money the bank spends in advertising; and
17. BPAC(I) - the percentage that the bank pays on its savings accounts.

Index for the Economy

In this section is generated the economic index for the period in which the game is played. This index will determine the movement of the yield rates of securities that the bank may purchase and the town's deposits, etc., as seen later on in the different sections. What is done is simply to generate a random number (Y) between 0 and 1. This number is then compared to the trend indicator (XN) that has been read into the program. If this value Y is smaller than the trend indicator, a dummy argument X is set at -1. This indicates that the economic conditions in general are falling. If the value Y is greater than the trend indicator, the argument X is set at +1.0, indicating that the economy in general is rising. Next, to finish generating the economic indicator, a variable called DUM is created that is the result of the current trend ($\pm$1.0) times a random number.

This is further amended to limit the economic indicator to within a range of 95 to 105, 100 being a "normal" economy, neither rising nor falling. Finally, the economic indicator (ECOIND) this is used in the program is set equal to the dummy variable (DUM) and the general economic index (ECOINX) is created which is released to the game's players at the end of the run.

After Y has been compared to the trend indicator, the trend indicator (XN) is changed to reflect the current period's general economic movement. Thus, if the current period's movement has been up, the indicator is increased by .05 so that the next time a Y is generated it becomes harder for the Y to be greater than the trend indicator and it becomes more difficult for the economy to rise again in the next period. To simplify: assuming that the original trend indicator is at .5, and that the Y generated is greater than .5, and thus, the economy is rising, by changing the trend indicator correspondingly (by .05) the next period's Y must be .55 or greater in order for the economy to rise again. This has a long-run effect of keeping the economy stable and the economic index around 100.

CHAPTER IV

EXTERNAL VARIABLES

Loop: Environment

In this first loop, the external rates that are common to all banks in the town are generated for the period. The seven external rates or conditions are:

1. Securities Market Interest Rates,
2. Town's Total Deposits,
3. Town's Average Wage,
4. Average Stock Price,
5. Town and Surrounding Area's Maximum Loan Potential,
6. Check on the Reserve Requirement, and
7. Borrowed Money and Funds Supplied Rate.

Securities Market Interest Rates

There are five different kinds of securities that the bank may purchase for its portfolio. Each of these securities has its own yield. The five types of securities are:

1. U. S. Government securities,
2. State and Municipal securities,
3. Corporate stock securities,
4. Corporate bond securities, and
5. Other notes and debentures securities.

For convenience in the program, the five market securities' rates are all numbered variations of the same variable name, SINT. This variable is subscripted five times and the subscripts correspond to the above five securities. In particular, SINT(1) is the yield in bank-held U. S. Government securities; SINT(2) is the yield in bank-held State and Municipal securities; and so forth. The securities' yields are common for all banks and the amount of securities held and the size of the holding bank have no effect upon the yield of the various securities to the banks.

These rates or securities' yields were computed from various data published in Moody's Common Bonds (see Exhibit IX). These computations are different for the two different types of time periods; the first time period and those following. It is simpler to change old yields using the current economic index than to find a starting point. To find the starting point for each of the securities, the average yield was

computed from Moody's information (see Exhibit IX). This becomes a basic, or average rate around which the particular security's yield will move. This is similar to the moving of the economic index around an average of 100. Thus, for example: SINT(4) or the yield on corporate bonds, will average in the long run, 7.79%. Another way to look at this average is that when the economic index is at 100, the yield on corporate bonds will be 7.79%, or very close, allowing that the economic index is integer, while the economic indicator, which is used to generate the yield, is in floating point and thus retains its digits to the right of the decimal.

To amend this average in each period, including the original period, the maximum variation is multiplied by the economic indicator. Since the economic indicator varies between -.5 and +.5, this means that the most a security can move, increasing or decreasing, is one-half of its maximum variation. One should note here that this "maximum variation" is the greatest difference between the average yield and the actual yield. For example, the average yield may be 7.00% but the high and low yields are 5.50% and 8.00%. Then the maximum difference is 1.50 percentage points. It is this 1.5 that is affected by the economic indicator. Some portion of this amount is added or subtracted to the average to get the current period's yield.

An example will perhaps best illustrate this generation of securities market interest rates. The average yield for corporate bonds, as has been stated, is 7.79%. For any period, if the economic indicator is +.211, it is multiplied by the maximum variation, thus:

average: 7.79%

maximum variation: 0.3%

economic indicator: +.211

Then: .3 x .211 = .0633

And adding to the average: 7.79 + .0633 = 7.85%

Therefore, the yield on corporate bonds for this period is 7.85%. Using this as a starting point for the next period, the economic indicator again is multiplied by the maximum variation and added to the last period's yield rate, so:

new economic indicator: -.400

maximum variation: 0.3%

Then: -.400 x .3 = -.120

Adding: 7.85 + (-.120) = 7.73%

Thus, for the second period the rate is down when compared to the first period. The yield is still above the average as the movement down was not as severe as the first period's movement was up.

In this method, all five different securities' yields are generated at the beginning of each period. Before leaving this section, checks are made to ensure that there are no negative securities' yields. If any occur, they are set equal to 0.

Generate Town Deposits

In this section, the two different types of the town's business and personal deposits are computed. The types of deposits are time and demand. This is the total amount of these types of deposits and all banks share it. This section places a maximum on the resources (cash deposits) available to the banks.

The first step before the total deposits of the period are generated, is to record the last period's deposits under the variable names, OTTTD (old total town time deposits) and OTTDD (old total town demand deposits). This is to save this information for later when computing periodic percentage changes. The deposits are then changed.

The change is easily done by multiplying the growth rate (read in from the files at the beginning of the program) by the economic index. This allows for a rise and fall in deposits compatible with the general rise and fall in the economy.

One note should be added here to the effect that the moderator may move the growth of the deposits at his discretion

at the beginning of the program by changing the proper data file to reflect his choice or decision.

Generate Average Wage

Each period an average wage for the town is generated. This figure is the result of watching the general market and economic indicator. If the index is depressed or inflated to the extent of being ±.15 off the medium (.50), the average wage is increased or decreased correspondingly. This increase or decrease is the amount of the economic index at that period. This time lag, until the trend indicator (XN) is .15 off the medium, is an attempt to simulate the natural lag of wages. Wages are slow to follow the economic trend of the country, by building in this lag, wages do indeed lag behind the general economic conditions of the rest of the economic community.

Average Stock Market Price

The average stock market price for the current period is dependent upon the last period's market price of stock and yield and this period's yield. The current market price of stock is equal to last period's plus the weighted difference in yields between the two. Thus,

old market price = $10.00
old market yield = 10%
if: new market yield = 5%

the stock will fall (all stock prices are based solely upon yield rates not expectations):

$$\text{new stock price} = 10.00 + 10.00 \times (5\% - 10\%)$$
$$= \$9.50$$

Generate Maximum Loan Potential

Just as the total time and demand deposits are generated by multiplying the deposit growth rate by the economic indicator of the period, so too, the maximum loan potential is derived. The loan growth rate (LOAGRT) is multiplied by the economic index of the period and added to the loan amount of the previous period to arrive at the current period's demand for loans. The nine different types of loans that the bank may choose to release funds as loans in are:

1. real estate loans,
2. loans to commercial and foreign banks,
3. loans to other financial institutions,
4. loans to brokers and dealers in securities,
5. farm loans,
6. loans for carrying securities,
7. commercial and industrial loans,
8. other loans to individuals, and
9. all other miscellaneous loans.

The loan growth rates are subscripted the above way in order to simplify computations whenever any of these variables are involved.

Again like the deposits, all banks in the town compete with one another to gain a share of this loan market.

Check on Reserve Requirement

In the same way that XN is scrutinized in the average wage section to see if the town's average wage should be raised or lowered, XN is again scrutinized here to determine if the Reserve Requirement needs to be changed. If the trend indicator is more than .15 off of center (.50), that is in the range 0-.35 or .65-1.00, the Reserve Requirement is changed ±1%. The Reserve Requirement is read into the program from a data file and should the XN indicate that this should be amended, the Reserve Requirement is then increased or decreased. The money supply is tightened if XN is .65 or higher; indicating a period of inflation. Similarly, the money supply is increased if XN is .35 or less, indicating deflation or recession.

Generate Borrowed Money, etc.

Since the banks participating in the game may have surplus funds or, conversely, be short of funds, the simulation allows the banks to supply funds to or borrow funds from the Federal Reserve System. The rates paid to the bank or paid by the bank,

are tied to the Federal Reserve Requirement. The borrowing rate is computed to be an arbitrary .45 of the reserve ratio, and the receiving rate to be an arbitrary .40 of the reserve ratio. This is assuming a Reserve Requirement of around 20% - if less, this should be correspondingly lowered. This way, the rate is tied in with the manipulations of the Federal Reserve System. Two other things are considered by this method of computing these rates. The rates will be relatively stable over the long run. More importantly, by setting the loaning rate higher than the rate paid for funds supplied to the Reserve System, a bank will be trapped if it decides to try to funnel all its deposits into the Federal Reserve and then borrow them back at a lower rate than the funds are supplied at. This is not inconceivable, but it is not profitable in this simulation.

CHAPTER V

BANKS' CONDITIONS

Loop: Banks' Conditions

The second loop generates the conditions of the banks. The banks' individual balance sheet is generated. The routines to accomplish this are:

1. Evaluation of Services Offered,
2. Personnel,
3. Business and Personal Deposits,
4. Certified and Officers Checks,
5. State and Municipal Deposits,
6. U. S. Government Deposits,
7. Domestic Interbank Deposits,
8. Federal Reserve Requirements,
9. Cash Items in the Process of Collection,
10. Loss on the Process of Collection,
11. Deciding on Loans,
12. Bad Loan Losses,
13. Bad Security Losses,
14. Sufficiency of Cash and Currency,
15. Check on Loan and Security Reserves,
16. Check on Reserve for Contingencies,
17. Capital Accounts,
18. Balance Sheet Totals, and
19. Borrowed Money and Funds Supplied to Federal Reserve System.

Services Offered Evaluated

Every bank has the option of offering extra services to its customers (see discussion of Bank's Decisions). It can offer any, all, or none of the three extra services. What they actually are is immaterial. They could be free parking, 24-hour teller, all-night depository or whatever. What is important is the fact that the bank can offer them and this may or may not improve their marketability among the banks. The extra services have an individual associated cost of $1,500 per period for the bank and are considered part of the marketing of the bank to the public. The three optional services are considered equal in marketing effectiveness, thus 1 service is better than 0, 2 services are twice as effective as 1, and so forth. The total number of the optional three services is used in computing the total Business and Personal Deposits. The cost is retained to be included in the Profit and Loss statement.

Personnel

Each bank has to staff itself and to pay the salaries of the staff. When the individual bank makes its decisions, it must choose the number of employees it wishes to have and the total salary bill for these employees. This section evaluates both of these choices of the bank. Previously in the program, an average wage of the town was generated. Arbitrarily, bank employees are considered, on the average, to earn 40% more than the average wage of the town. If the bank meets this average, the normal attrition rate takes its

toll of the employees. Normal attrition in this simulation is considered 10% per period, but may be anything the moderator of the game wants it to be. Should the bank pay more than the required average, the attrition rate remains the same and the bank is not receiving any extra benefits for the extra money.

If the bank pays less than the required amount to minimize its attrition to 10%, the attrition rate will rise. This has serious consequences later on in determining the bank's business and personal deposits. If the attrition rate rises, it rises from its normal 10% mark. The amount of rise is the difference between 1 and the fraction defined as the bank's actual average wage divided by the town's average wage. For example:

If: bank's average wage = $80.
and the town's average wage = $100.
then: added attrition = 1 - 80/100
= 20%
the new attrition rate = .10 + .20
= 30% per period

Another example:

If: bank's average wage = $50.
and the town's average wage = $100.
then: added attrition = 1 - 50/100
= 50%

the new attrition rate = .10 + .50

= 60% per period.

Business and Personal Deposits

This section is the heart of the game. To generate the amount of business and personal deposits each bank is to receive is the crux of the simulation. Since there was nothing concrete to use in the way of research or studies, it is theoretical. Hence, this section was created at the discretion of the designer of the game and has no firm foundation. It can be rebuilt or amended at the discretion of the person moderating or even playing the game.

Four choices or values of each bank were evaluated. These were chosen as the most pertinent to the amount of funds the bank will draw from the community. These things are: the bank's physical features, the bank's staff, the money spent on marketing the bank, and the historical trend of the bank's business and personal deposits. A regression analysis was run on the first two things considered, physical aspects of the bank and bank staff, from the FDIC Annual Report for 1972 (Exhibit VI) and the 1973 Annual Reports for BankAmerica Corp. and Wells Fargo and Co. (Exhibit X). These two equations were then used to set up an effectiveness rating for bank staff and premises. The two equations computed what the bank's business and personal deposits should be if each was the only consideration.

Next, marketing expenditures were taken into consideration. Each bank's marketing money was compared to the total amount of marketing money spent by all banks. The individual bank was rated against this and an effectiveness equation set up to generate how much in deposits the bank would receive if it was to receive deposits solely from its marketing efforts.

Finally, all these things are considered along with the bank's weighted average amount of deposits. Each of the four things that are considered are weighted so:

1. 10% - bank premises
2. 5% - bank staff
3. 15% - bank marketing
4. 70% - previous deposits

These things are all considered to get a predicted amount of business and personal deposits for each bank. This is done for each individual bank.

Since this method does not take into consideration the maximum limit placed upon the available amount of deposits earlier, one more thing must be done. All of the individually generated deposit's totals are added up and a percentage of the total for each bank is computed. It is this percentage of the total for each bank that is then applied to the total for the town. This figure is the individual bank's share of the town's business and personal deposits.

Finally, the amount of total deposits that are time and are demand is computed. An average percentage was taken from

the FDIC Annual Report (Exhibit XI) and applied to each bank's deposits. Then the weighted average of deposits was computed for the next period. The old weighted average receives a weight of .67 while the new deposit receives .33, both figures are arbitrary.

Other Deposits

There are four other types of deposits that the banks compete for:

1. U. S. Government deposits,
2. State and Municipal deposits,
3. Commercial Bank deposits, and
4. Officers, Travelers Checks, etc.

To determine each individual bank's amount of these deposits, the bank's total business and personal deposits are moved into a regression equation. Multiple regression was used on U. S. Government deposits (Exhibit II). State and Municipal deposits (Exhibit III), and Commercial Bank deposits (Exhibit IV). Single regression was used for Officers, Travelers Checks, etc. (Exhibit V). These computations will leave only a total figure without regard for type (time or demand). A five-year average for time and demand was taken from the FDIC Annual Report (Exhibit I) and these percentages applied to the total figures.

Federal Reserve Requirements

This section merely applies the Federal Reserve Ratio generated earlier to the individual bank's deposits and

stores it under the name FRR. Since all deposits, both time and demand, have some form of reserve ratio placed upon them, a single reserve ratio is placed upon the total of the bank's deposits rather than splitting them up. This should be remembered by the moderator of the game when he creates the data file that includes this reserve ratio.

Cash Items in the Process of Collection

Cash items in the process of collection are items that are commonly called "float" monies. These are checks on demand accounts, etc. Since the individual banks have little or no control over this amount, the simulation itself takes care of it. This float money is a percentage of the total deposits of the bank. Total deposits defined as Total Business and Personal time and demand, U. S. Government time and demand, State and Municipal time and demand, and Commercial Bank time and demand deposits. From Exhibit VIII, one can see that the percentage cash items in the process of collection are of total deposits, is fairly stable over the five years of the FDIC report: 7.30-9.5%. After computing the five individual year's percentage, an average of the five years is arrived at: 8.25%. This is the figure that is applied to the total deposits to determine the bank's cash items in the process of collection.

Loss on Cash Items in the Process of Collection

According to several bankers in the City of Missoula, Montana, loss in cash items in the process of collection are "less than 1/2% a year". With this in mind, a random figure, up to .5% is generated. This figure is then applied to the cash items in the process of collection to arrive at the bank's loss on such items. The amount is stored for later use. At the same time, this sum is subtracted from the previously computed cash items in the process of collection to arrive at a true amount of such items at the end of the simulated period.

Deciding Loans

The amount that the bank is able to loan is determined solely by the rate of interest that is charged by the bank. The reputation of the bank has nothing to do with the amount loaned. The size of the bank limits the bank in the amount of money it desires to release in any particular type of loan. The amount set aside for marketing and for personnel have no effect, unlike in determining how much the bank receives in deposits. This is done because it is the simplest method and is easy for the player to understand. It also makes the game more competitive. Therefore, everything depends upon the rate charged by the bank for each individual type of loan.

This is the easiest method of determining where the loans will go also. The bank with the lowest interest rate will be able to loan all of its funds, up its own limit, or to the limit established in the section on the maximum demand for that type of loan. Once the lowest rate is filled, the bank with the next lowest rate is able to release funds in that type of loan. An illustration will perhaps demonstrate best:

Assume: Five banks

Type of loan: real estate

Maximum demand (MLOAN(I)) = $2,000,000

Rates and amounts desired for the individual banks:

Number	Rate	Amount
1	.06	$ 200,000
2	.07	400,000
3	.05	600,000
4	.05	700,000
5	.08	200,000

Then as Banks Number 3 and Number 4 are the lowest, they loan their amounts first (in case of tie, first numbered bank first).

Then: Bank Number 3 loans $600,000 @ 5%

Bank Number 4 loans $700,000 @ 5%

Now the maximum to be loaned is amended:

$2,000,000 - (600,000 + 700,000)

Remaining town demand for real estate loans:

$700,000

Then going to the next lowest rate and loaning that amount:

Bank Number 1 loans $200,000 @ 6%

New town demand = $500,000

Going to the next lowest rate:

Bank Number 2 loans $400,000 @ 7%

New town demand = $100,000

Finally, Bank Number 5 loans only $100,000 and has $100,000 in loanable monies undemanded by real estate loans in the town. This money cannot be switched over to another type of loan.

Note that all banks can loan all their funds and still have the demand for loans unfilled; demanded loans can equal loanable money; or loanable money can surpass the demand.

Bad Loan Losses

Since most banks do lose a small amount on loans that default, a simple way was devised to allow this to happen. This is to stress the fact that loans are not risk-free.

One immediately obvious accounting for the risks inherent in releasing loan monies is the amount of interest charged on the loan. High-risk loans, such as individuals and some businesses, have high interest rates attached to them. At the same time, loans with little risk attached, such as some industrial and personal loans, are associated with lower interest rates. With this in mind, a simple system was devised to generate these loan losses.

The system was to generate a random number up to .1. This number is then multiplied by the interest rate of the loan type and then multiplied by the amount of the loans. Adding these nine figures, for the nine different types of loans, yields the total loan loss. For example:

Loan interest: .09

Random number: .7

Changed: .7 x .1 = .07

Multiplying the two: .07 x .09 = .0063

Loan loss % = .63%

Total amount of that type of loan: $150,000

Total loan loss: $150,000 x .63% = $945.00

Doing this for all nine types of loans will result in the total loan loss for the bank.

Bad Security Losses

Losses on bad security purchases are generated the same way as loan losses. A random number up to .1 is multiplied by the interest rate and in turn multiplied by the yield on the security type purchased by the bank. Summing up these individual losses results in the total loss due to bad securities. This method allows greater loss upon a high market yield, indicating risky investments; and this method allows little loss upon a depressed market, indicating little speculation and risk.

Sufficiency of Cash and Currency

Each bank indicates the amount of cash and currency it wants to keep in the till. This is the cash used for cash withdrawals, etc. that the bank must supply its customers. Since this amount is voluntary and arbitrary, the bank may not put in enough or else may put in too much. Either way the bank loses, shortages cost as do unused funds. A minimum acceptable amount is computed for each bank. This amount can be exceeded but must at least be met. In order to chose this "minimum acceptable" amount, figures on the FDIC report for 1972 were analyzed (Exhibit VIII). These figures showed that for the national total of commercial banks, banks held from 1.43% to 1.73% of their assets as cash and currency. Taking a five-year average, revealed that the banks held 1.56% of their assets this way. This is what is considered the "minimum acceptable" cash and currency for each bank.

If the bank's chosen amount of cash and currency is below its "minimum acceptable" for the bank, a shortage occurs and this shortage figure is kept and used later on. If the bank has more in cash and currency than it should, it merely foregoes the use of some possible funds that could have been invested in securities or released in loans. The income that could have been made off this surplus is lost.

Check on Loan and Security Reserves

Each bank should keep some of its funds in a special reserve against possible loan and security losses. In this section, that reserve is checked in order to be sure that the amount can indeed cover such losses. The previously computed loan and security losses are subtracted from this reserve. If the reserve amount is sufficient to cover these losses, the computer moves on to the next set of computations. Should the reserve be insufficient, the amount the reserve does not cover is subtracted from the contingency reserves all banks maintain. The loan and security reserve is then set equal to 0, as all funds have been removed from it.

Check on Reserve for Contingencies

The contingency reserve is taken care of in much the same way as the loan and security reserve. The reserve contingency that actually exists at the end of the simulated period is the contingency reserve, as desired by the bank

and possibly changed by any loan and security reserve shortages. It can further be decreased by the amount that cash and currency was short and the amount lost on cash items in the process of collection.

Should these amounts be too heavy for this reserve to bear, notice is taken of the amount the contingency reserve is short and the amount is saved. This amount is taken into consideration later. The contingency reserve is then set to 0.

Capital Accounts

If the bank has decided to issue new stock, the amount flowing into the bank's equity accounts must be calculated. Three things can occur when the new stock is issued: the par value of the new stock can be equal to or less than the current market price, or the par value can be greater than the market price. In each case something different occurs, but in all cases an expense entitled, "broker's fees" is accumulated. This must be paid and it is computed to be an arbitrary value of 2.5% of the value of the stock to be issued.

In the event that the bank issues new stock with a par value less than or equal to the current market price of the bank's stocks, all the newly issued stock is sold. The new stock is computed to be sold at the market price on the stock, not the par value. In the case that the par value is

equal to the market price, the contributed capital of the bank remains the same. If the par value is less than the market price, the bank's contributed capital is increased by the difference between the two times the number of shares of newly issued stock.

If the par value of the newly issued stock is greater than the current market price of the bank's stock, not all of the new stock will be sold. In this case, "par value" is interpreted as the "asking price" of the new stock. Since the "asking price" of the stock is greater than the market price of the stock, the past performance of the bank will determine the amount of new stock that is purchased by the public. The running profit count (RPC) will show this. If the running profit count is 0.0, this indicates that the number of periods that the bank has had a profit is exactly equal to the number of periods in which the bank has had a loss. A positive value indicates the number of profitable periods over loss period. A negative number indicates the converse.

First off a dummy variable, PERC, is set equal to .5. Next, the amount of the running profit count is divided by 10 and added to this. Finally, a random 80 to 100% of this amount is multiplied by the desired amount of the issue to see how much of the new stock will be purchased by the public. An example will illustrate this best to facilitate better understanding of this process:

If RPC = 2.0

Then PERC = .50 + (2.0 / 10)

If the random number is .9

Then (.90 x .70) = .63

and .63 is the amount of newly issued stock that is purchased by the public. The rest of the newly issued stock is retained as treasury stock.

Balance Sheet Totals

There are three categories of items that will be totaled for the bank's balance sheet: Liabilities, Assets, and Capital Accounts. Liabilities include:

1. all business and personal deposits,
2. all governmental deposits,
3. a subtotal of all time deposits,
4. a subtotal of all demand deposits,
5. a grand total of all bank deposits,
6. miscellaneous liabilities - computed to be 4.23% of all deposits for a five-year average as found in the FDIC Annual Report of 1972 (Exhibit VIII), and
7. a grand total of miscellaneous liabilities to include borrowed money and other miscellaneous liabilities (Number 6).

Assets include:

1. cash, cash balances, etc.,
2. total bank physical features,
3. other miscellaneous assets - computed to be 1.66% of all deposits as described in Exhibit VII,
4. a grand total of miscellaneous assets including bank's physical features, other real estate, and miscellaneous assets,
5. all securities and funds supplied to the Federal Reserve System, and
6. a grand total of all the above assets.

Finally, Capital Accounts include:

1. total capital accounts consisting of capital, contributed capital, and all reserves,
2. total liabilities,
3. total of all liabilities and capital accounts, and
4. total of treasury stock.

Borrowed Money and Funds Supplied to the Federal Reserve System

If the total liabilities of the bank surpass the total assets of the bank, the bank must borrow money to cover this shortage. The money is borrowed from the Federal Reserve System at the rate generated in the beginning of the program.

Should the bank need to borrow money, it borrows an amount sufficient to cover its shortage, no more. The balance sheet totals are recomputed with this new addition and these figures are recalled when computing the bank's income statement.

If the total assets of the bank are greater than the total liabilities of the bank, the bank has a surplus. These excess funds are supplied to the Federal Reserve System. They earn the rate generated at the beginning of the program. Again in this case, too, new balance sheet totals are computed and this use of funds is remembered in computing the bank's income statement.

CHAPTER VI

BANKS' PROFIT/LOSS

Loop: Profit/Loss

In the third loop, the income statement is generated. Routines include:

1. Expenses,
2. Income,
3. Profit/Loss,
4. Taxes,
5. Check on Equity,
6. Dividends,
7. Owners' Equity,
8. Stock Quote on Bank Stock, and
9. % and Changes in the Market.

Expenses

Each bank has nine expenses:

1. staff salary - the salary earned by employees of the bank;
2. depreciation - arbitrarily computed to be 1% of the value of the bank's total premises and other real estate;
3. general insurance - insurance that the bank holds on itself, this is a random amount between 1 and 5% of the size of the bank as indicated by the total savings deposits;
4. maintenance - maintenance is paid for both other real estate and the bank's own premises, this is set at .5% of the value of both of these;
5. interest paid upon savings deposits - the bank must pay the rate it has decided to pay on all funds held in savings deposits;
6. broker's fees - of two types, one from issuing its own new stock as previously explained and a general broker's fee for handling the bank's security division transactions, the second computed to be 1% of the face value of the securities;
7. interest on borrowed money - if the bank has borrowed money because it is overextended, the bank must pay the Federal Reserve System interest on the money it uses;

8. insurance on personnel - general insurance and such for the staff of the bank, computed to be 10% of the staff's salary; and
9. miscellaneous expenses - these expenses are unclassified and are arbitrarily decided to be a set $45,000 and .8% of the bank's total assets.

The sum of all these is the total expense figure of the bank.

Income

There are only four sources of income for the bank:

1. the interest paid on borrowed money by the individuals and businesses that borrowed the money;
2. the money earned from the bank's portfolio;
3. the income generated from the "other real estate" that the bank holds - arbitrarily computed to be 11.5% of the value of this "other real estate"; and
4. the money earned from funds that were supplied to the Federal Reserve System, if these funds existed.

The sum of these is the total income that the bank has earned in this period.

Profit/Loss

In this section the bank's total expenses are subtracted from the bank's total income. If the resulting

figure (Gross Income) is greater than 0, the bank operated in the time period at a profit; and the bank continues on through the regular order of the program. If the bank operated at a loss, with income equalling or surpassing expenses, the bank skips the next several sections, dealing with taxes, dividends, and owners' equity and moves to find the market's quote on the bank stock.

Taxes

Taxes are simply computed to be 50% of gross income. The bank's profit is the figure resulting when taxes are subtracted from the bank's gross income. If there remains enough to be a profit, 1.0 is added to the bank's running profit counter (RPC). This figure will be used later on in computing the bank's dividends.

Check on Equity

Each bank in the town must maintain, at the very minimum, a ratio of $1 of equity for every $20 of deposits. If this ratio is not met or exceeded, all profits that the bank may earn are moved into the undivided profits section. Dividends may not be declared and the computer proceeds straight to the section on figuring bank stock price.

Dividends

Two conditions must be met if the bank is to pay dividends to its stock holders. First, the running profit counter

(RPC) of the bank must be greater than or equal to 0.0. This indicates that the bank has had at least as many profitable periods as loss periods in its past. Secondly, the amount of profit earned in the period must be greater than 3% of the total value of all capital accounts. If both these conditions are met, the bank must pay dividends. It has no alternate to this action. If one or both of the conditions are not met, dividends may not be paid and all profits are added to the owners' equity. Should dividends be in order, they are set at an arbitrary 75% of the profit and the remaining 25% of the profit goes into equity.

Owners' Equity

If there is any profit remaining after dividends have been declared and paid by the bank, it becomes an addition to owners' equity. This is shown on the bank's income statement under "Undivided Profits" on the bank's balance sheet.

Stock Quote on Bank Stock

Three things can happen to the bank in the period: it can break even, show a profit, or sustain a loss. If the bank breaks even or pays no dividends, the stock price rises or falls an amount equal to the yield on general market corporate stock securities. For example:

Old bank stock price = $10.00

Corporate Stock Yield (SINT(3)) = 5%

Then the stock's price will be: $10.00 - .05 x (10.00)

New stock price = $9.50

If the bank earns a profit, the bank's stock rises. The rise is equal to the percentage of the stock dividend. Thus:

Old stock price = $10.00

Stock EPS % = .10

Then the new stock price is: $10.00 + .10 x (10.00)

New stock price = $11.00

This action is independent of the market's movements.

If the bank shows a loss, the bank's stock falls the amount of the loss per share plus the amount that other corporate stocks are paying. Assuming:

Old stock price = $10.00

Bank loss = $150,000

Bank's treasury stock = 10,000

Bank's common stock = 90,000

Then the total stock = 100,000

Loss per share = $1.50

Corporate stock yield = 5%

Then the new bank stock price, without considering what other stocks are doing, is:

$$10.00 - (150{,}000 / 100{,}000)$$
$$= 8.50$$

and considering the normal corporate stock yield, the new price of the bank's stock is:

$$\text{New stock price} = 8.50 - .05\,(8.50)$$
$$= \$8.075$$

Percentage and Changes in the Market

There are two sets of figures that are computed in this section. They both consist of two pieces of information. The first set is:

1. the percentage gain (+) or loss (-) of this period's time deposits over the previous period's time deposits; and
2. the percentage gain (+) or loss (-) of this period's demand deposits over the previous period's demand deposits.

The second set of information regards the individual banks and the general market:

1. the percentage of time deposits in the town the bank holds; and

2. the percentage of <u>demand</u> deposits in the town the bank holds.

Both these sets of information will be given later to the players of the game.

CHAPTER VII

PRINT OUT FILES

Loop: Print Out

In this fourth and final loop, the results of each bank's actions are given to the players of the game. Released to the banks are their individual:

1. Balance sheet, and
2. Income statement.

Before terminating this loop, and the program, some of the data files are rewritten to reflect the current period's actions. When this is accomplished, the run is complete and the program is ready for the next period's choices by the banks.

Balance Sheet Print Out

For each individual bank, five copies of the bank's balance sheet will be printed. The format of this information is:

STATEMENT OF CONDITION AND INCOME OF BANK:

STATEMENT OF CONDITION:

ASSETS

CASH, BALANCES WITH OTHER BANKS, AND CASH COLLECTION ITEMS - TOTAL	$
CASH AND CURRENCY	$
RESERVE WITH F.B. BANK	$
DEMAND BALANCES WITH OTHER BANKS IN U.S.	$
OTHER BALANCES WITH BANKS IN U.S.	$
CASH ITEMS IN PROCESS OF COLLECTION	$
SECURITIES - TOTAL	
U.S. GOVERNMENT OBLIGATIONS	$
OBLIGATIONS OF STATE AND SUBDIVISIONS	$
CORPORATE STOCKS	$
CORPORATE BONDS	$
OTHER NOTES, BONDS, AND DEBENTURES	$
LOAN - TOTAL	
REAL ESTATE LOAN	$
LOAN TO COMMERCIAL AND FOREIGN BANKS	$
LOAN TO OTHER FINANCIAL INSTITUTIONS	$
LOAN TO BROKERS AND DEALERS IN SECURITIES	$
LOAN TO FARMERS	$
OTHER LOAN FOR CARRYING SECURITIES	$
COMMERCIAL AND INDUSTRIAL LOAN	$
OTHER LOAN TO INDIVIDUALS	$
ALL OTHER LOAN	$
UNUSED LOAN MONEY	$
EXCESS FUNDS SUPPLIED TO THE FEDERAL RESERVE	$
MISCELLANEOUS ASSETS - TOTAL	
BANK PREMISES OWNED	$
BANK FIXTURES OWNED	$
BANK FURNITURE OWNED	$
OTHER REAL ESTATE - DIRECT AND INDIRECT	$
ALL OTHER MISCELLANEOUS ASSETS	$

TOTAL ASSETS:

BUSINESS AND PERSONAL DEPOSITS - TOTAL

INDIVIDUALS, PARTNERSHIPS, AND CORPORATIONS
DEMAND $
INDIVIDUALS, PARTNERSHIPS, AND CORPORATIONS
TIME $
CERTIFIED AND OFFICERS CHECKS,
LETTERS OF CREDIT AND TRAVELERS CHECKS, ETC. $

GOVERNMENT DEPOSITS - TOTAL
U.S. GOVERNMENT - DEMAND $
U.S. GOVERNMENT - TIME $
STATES AND MUNICIPALS - DEMAND $
STATES AND MUNICIPALS - TIME $

DOMESTIC INTERBANK DEPOSITS - TOTAL
COMMERCIAL BANKS - DEMAND $
COMMERCIAL BANKS - TIME $

TOTAL TIME DEPOSITS $
TOTAL DEMAND DEPOSITS $
TOTAL DEPOSITS $

MISCELLANEOUS LIABILITIES - TOTAL
REDISCOUNTS AND OTHER BORROWED MONEY $
OTHER MISCELLANEOUS LIABILITIES $

CAPITAL ACCOUNTS - TOTAL

CAPITAL $
CONTRIBUTED CAPITAL $
UNDIVIDED PROFITS $
LOAN AND SECURITY RESERVE $
RESERVE FOR CONTINGENCIES $

COMMON STOCK IN TREASURY $
TOTAL LIABILITIES $
TOTAL LIABILITIES AND CAPITAL ACCOUNTS $

Income Statement Print Out

Again, for each individual bank, five copies of the bank's income statement will be printed. The form of this information is as follows:

PROFIT AND LOSS STATEMENT

INCOME

LOAN INTEREST	$
SECURITIES INTEREST	$
EARNED FROM FEDERAL FUNDS SUPPLIED	$
OTHER REAL ESTATE RENT	$
TOTAL INCOME	$

EXPENSES

DEPRECIATION	$
STAFF	$
MARKETING EXPENDITURES	$
EXTRA SERVICES OFFERED	$
INTEREST PAID ON ACCOUNTS	$
BROKERS FEE	$
INTEREST PAID ON BORROWED MONEY	$
GENERAL INSURANCE	$
PERSONNEL INSURANCE	$
MAINTENANCE	$
RESERVE SHORTAGES	$
MISCELLANEOUS EXPENSES	$
TOTAL EXPENSES	$

NET INCOME	$
ADDITION TO FEDERAL INCOME TAX FUND	$

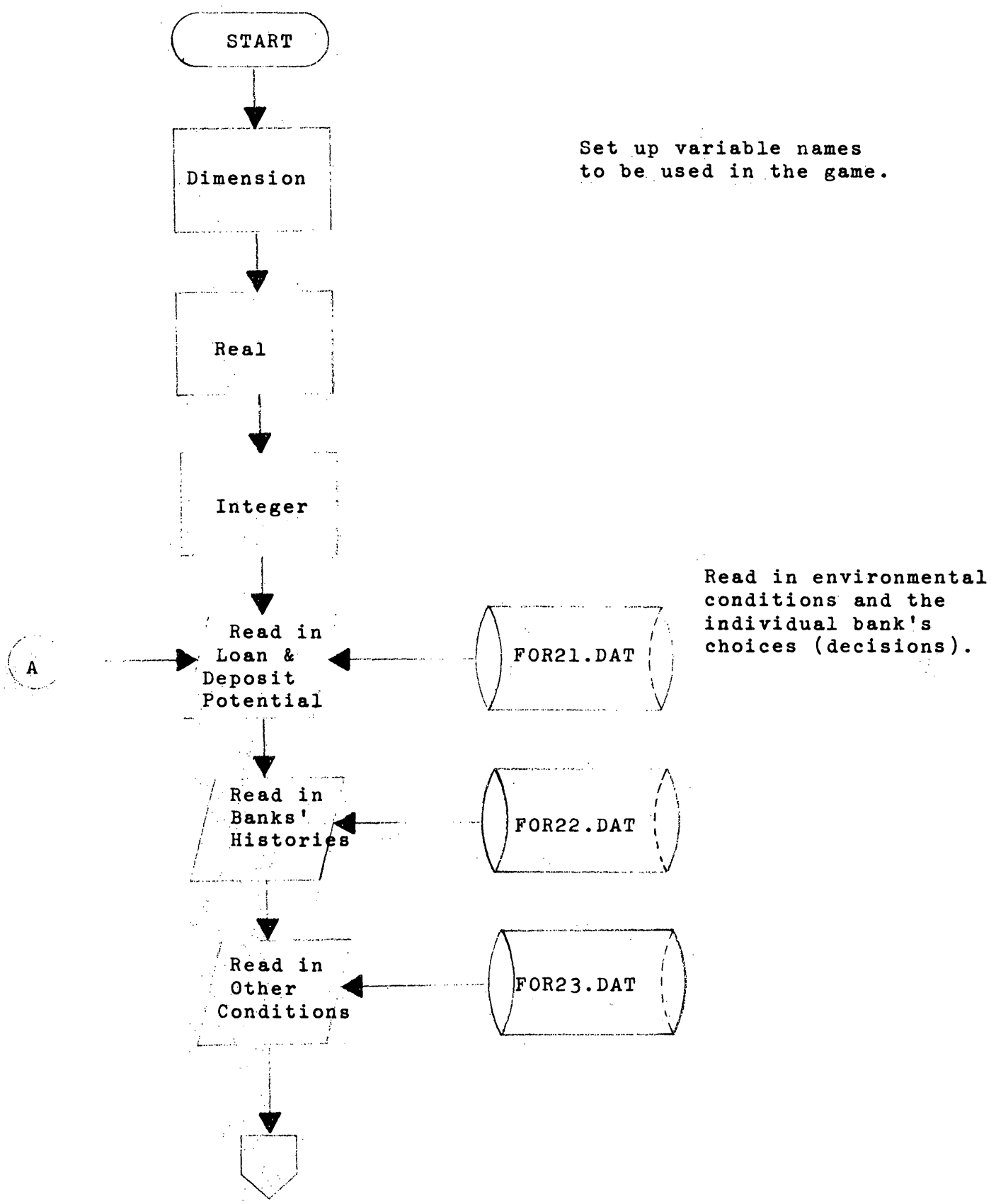
PROFIT(+)/LOSS(-) $
DIVIDENDS PAID $
ADDITION TO OWNERS' EQUITY $

COMMON STOCK OUTSTANDING $
EPS - COMMON $
TREASURY STOCK $
MARKET PRICE OF STOCK $
AVERAGE STOCK QUOTATION $

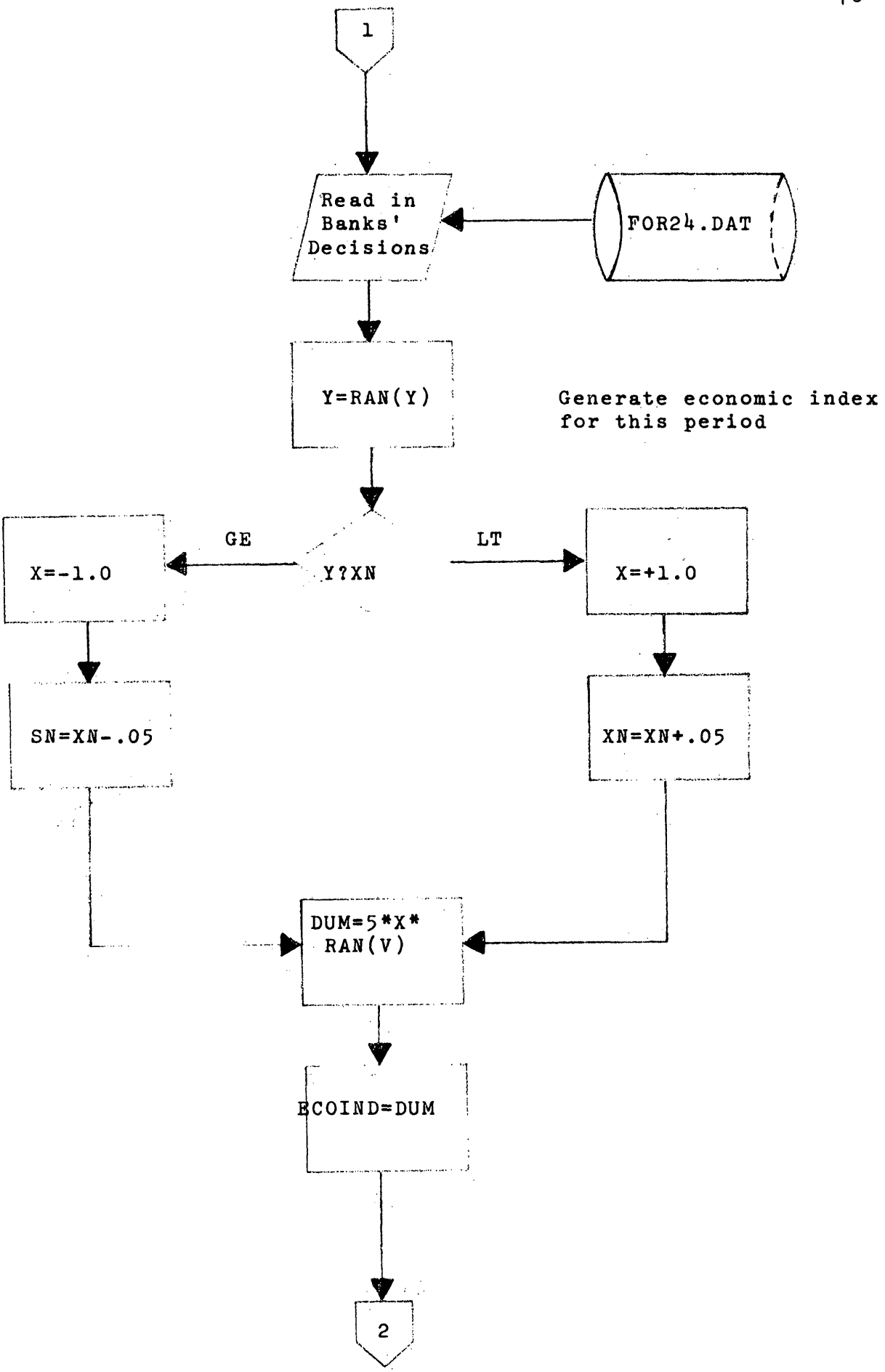
ECONOMIC INDICATOR IS _____
TOWN TIME DEPOSITS GREW _____ LAST PERIOD, YOUR TIME DEPOSITS GREW _____
TOWN DEMAND DEPOSITS GREW _____ LAST PERIOD, YOUR DEMAND DEPOSITS GREW _____
THE BANKS EQUITY WAS LOW, PROFITS ARE RETAINED.

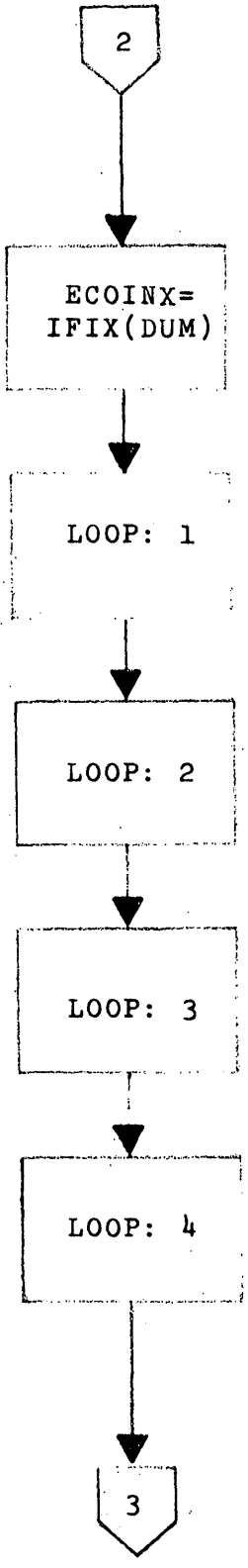
CHAPTER VIII

FLOWCHART OF BANSIM.ORG



Set up variable names to be used in the game.


1
Read in Banks' Decisions
FOR24.DAT
Y=RAN(Y)
Generate economic index for this period
GE
LT
X=-1.0
Y?XN
X=+1.0
SN=XN-.05
XN=XN+.05
DUM=5*X* RAN(V)
ECOIND=DUM
2

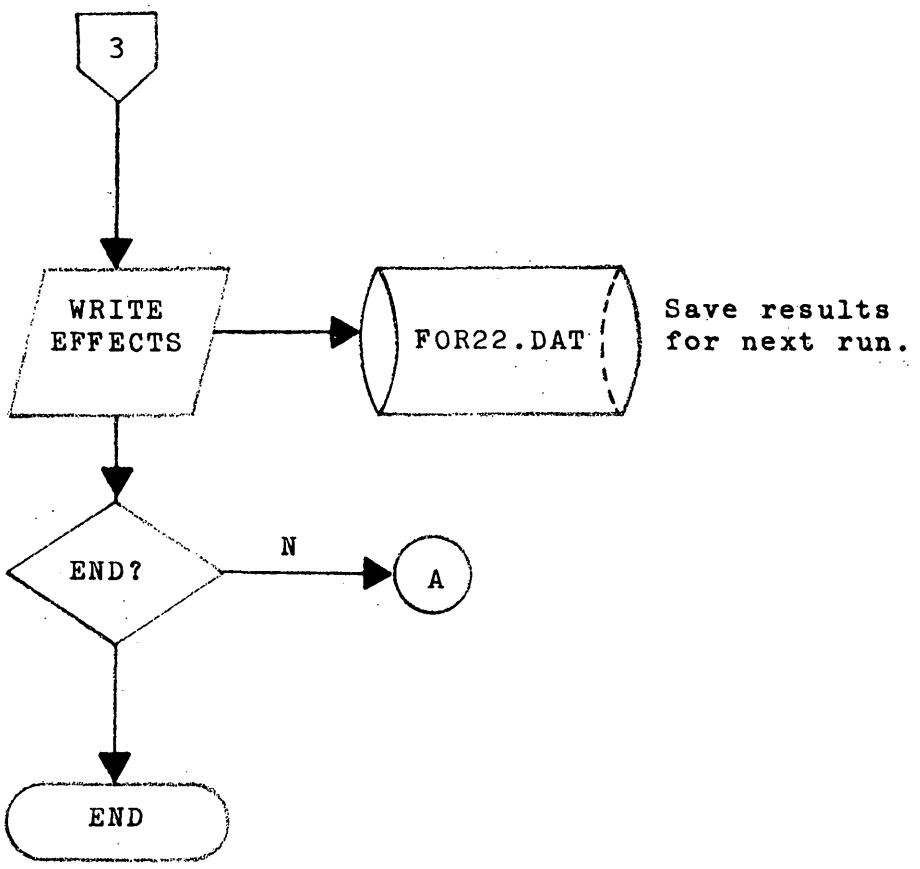


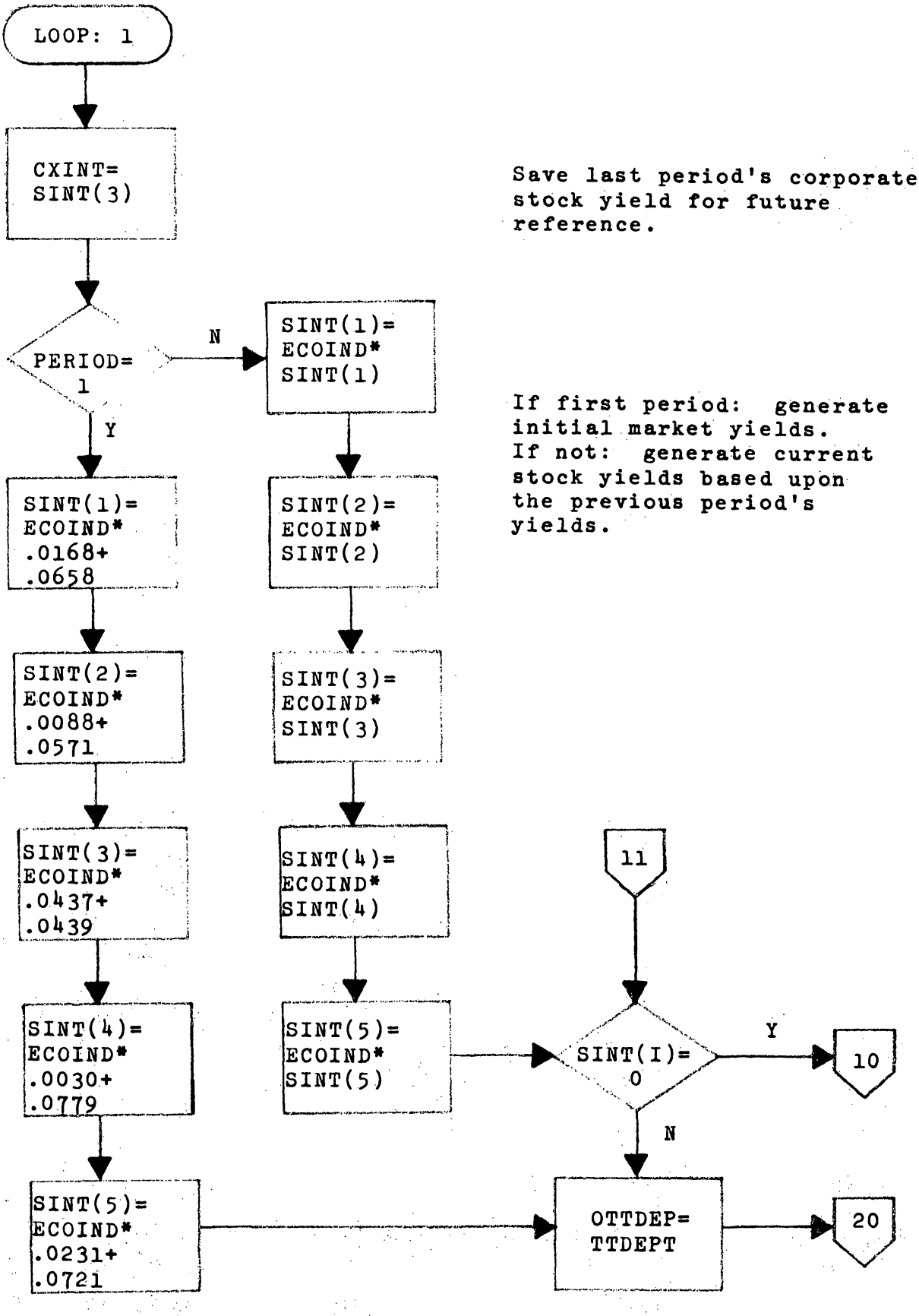
External Variables

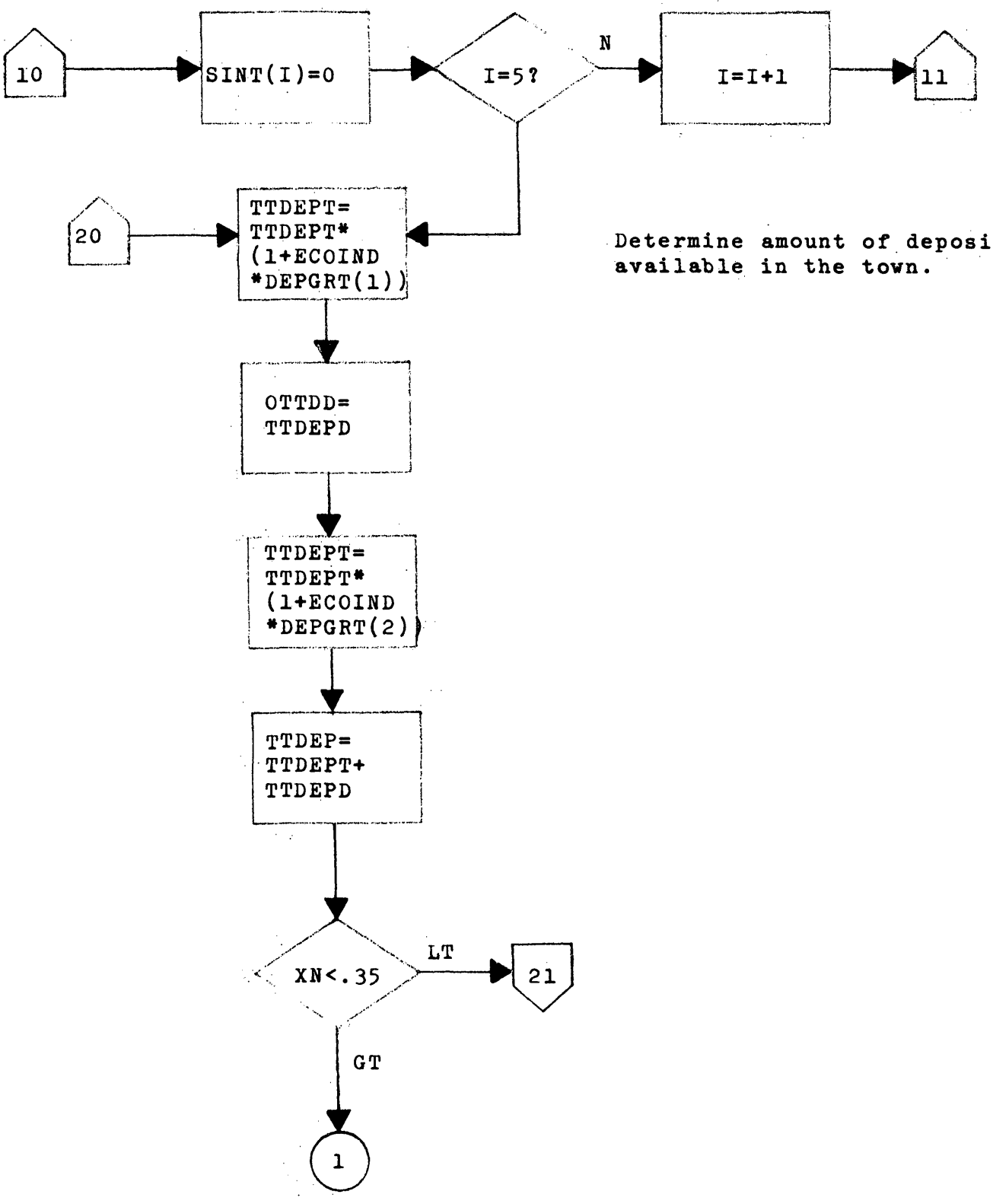
Banks' Conditions

Banks' Profit/Loss

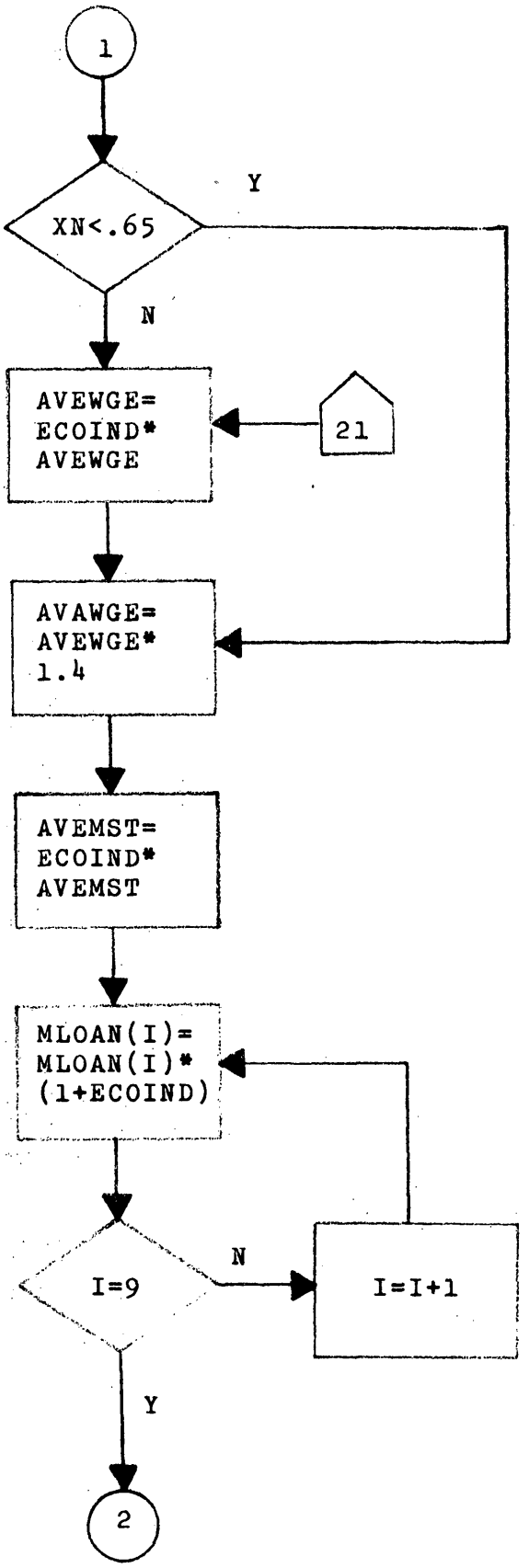
Print out the results


3
WRITE EFFECTS
FOR22.DAT
Save results for next run.
END?
N
A
END


LOOP: 1
CXINT= SINT(3)
PERIOD= 1
N
Y
SINT(1)= ECOINDX SINT(1)
SINT(1)= ECOINDX .0168+ .0658
SINT(2)= ECOINDX SINT(2)
SINT(2)= ECOINDX .0088+ .0571
SINT(3)= ECOINDX SINT(3)
SINT(3)= ECOINDX .0437+ .0439
SINT(4)= ECOINDX SINT(4)
SINT(4)= ECOINDX .0030+ .0779
SINT(5)= ECOINDX SINT(5)
SINT(5)= ECOINDX .0231+ .0721
11
SINT(I)= 0
Y
10
N
OTTDEP= TTDEPT
20
Save last period's corporate stock yield for future reference.
If first period: generate initial market yields.
If not: generate current stock yields based upon the previous period's yields.

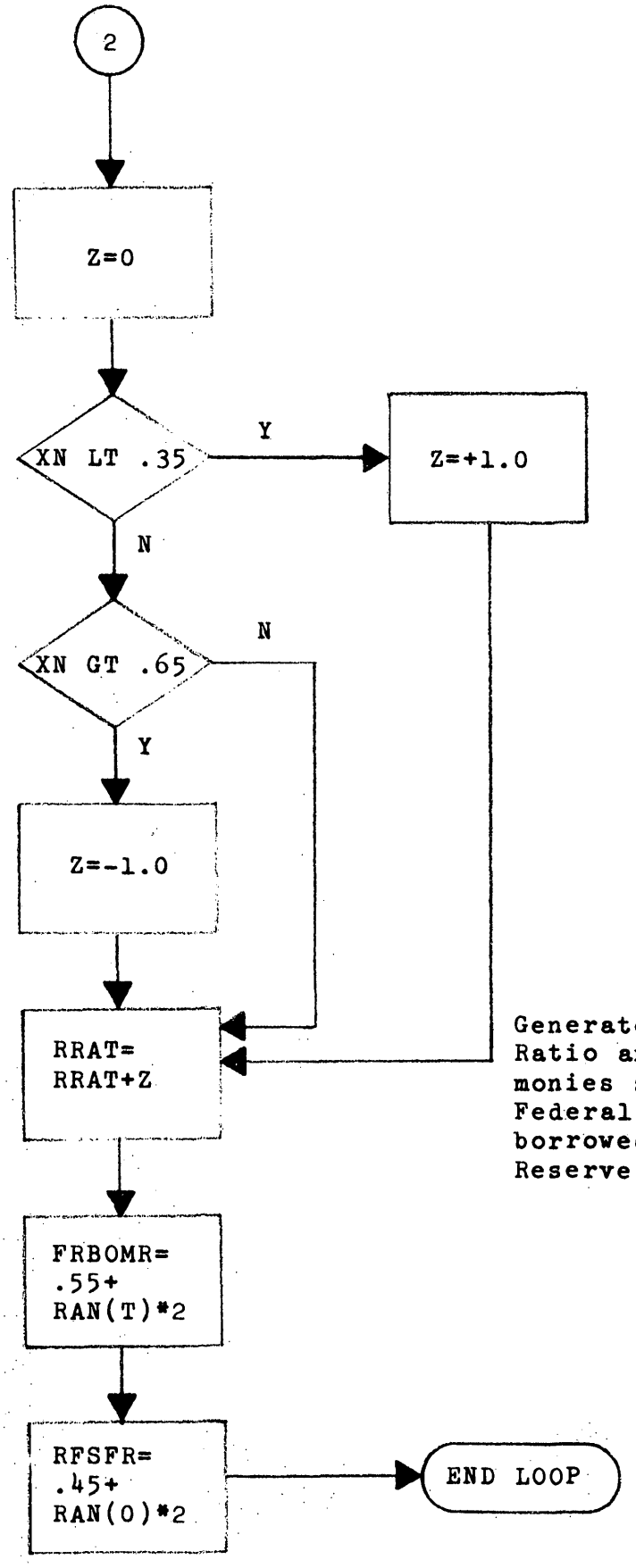


Determine amount of deposits available in the town.

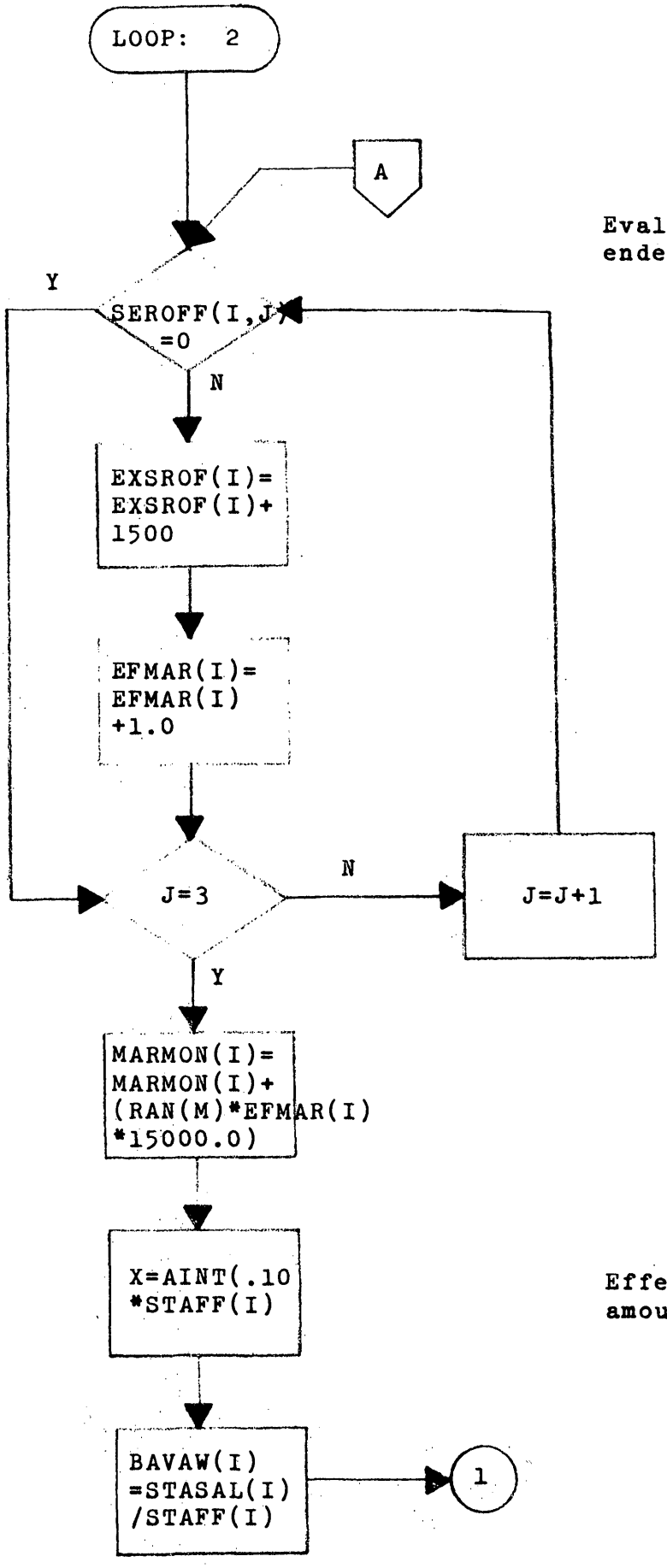


Generate average town wages and average market stock price.

Generate town's maximum loan potential

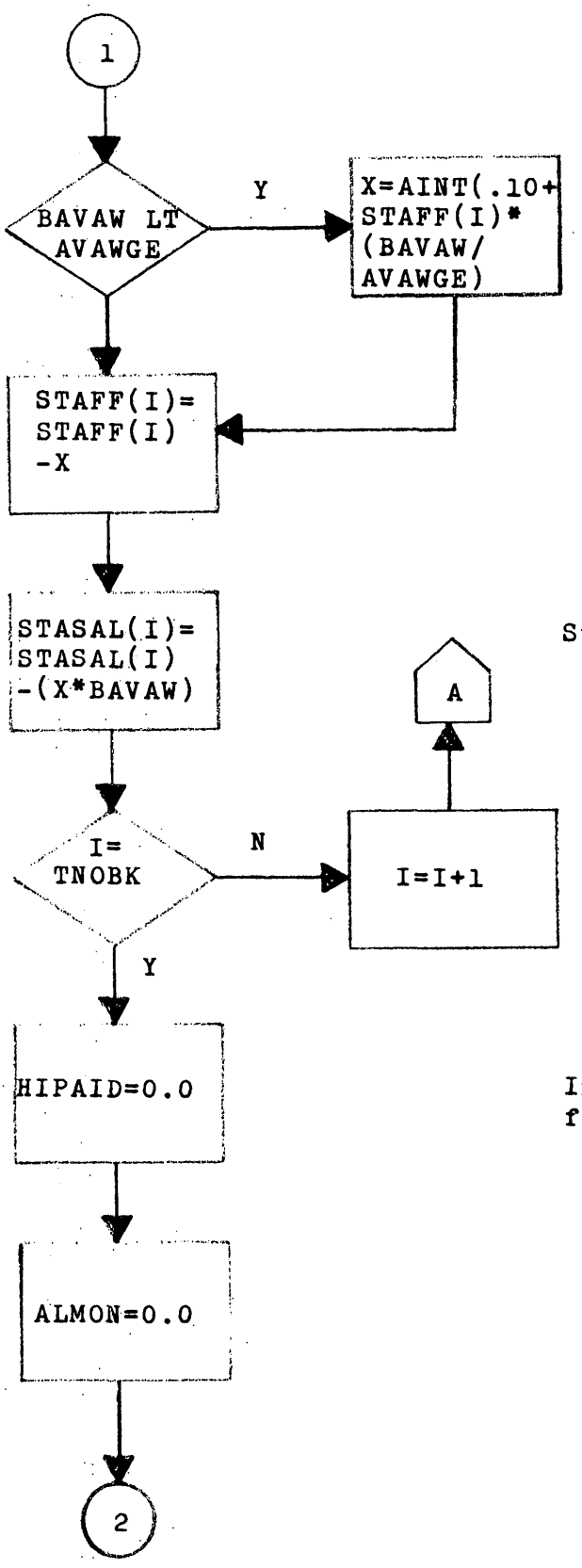


Generate Federal Reserve Ratio and rates paid for monies supplied to the Federal Reserve and borrowed from the Federal Reserve.



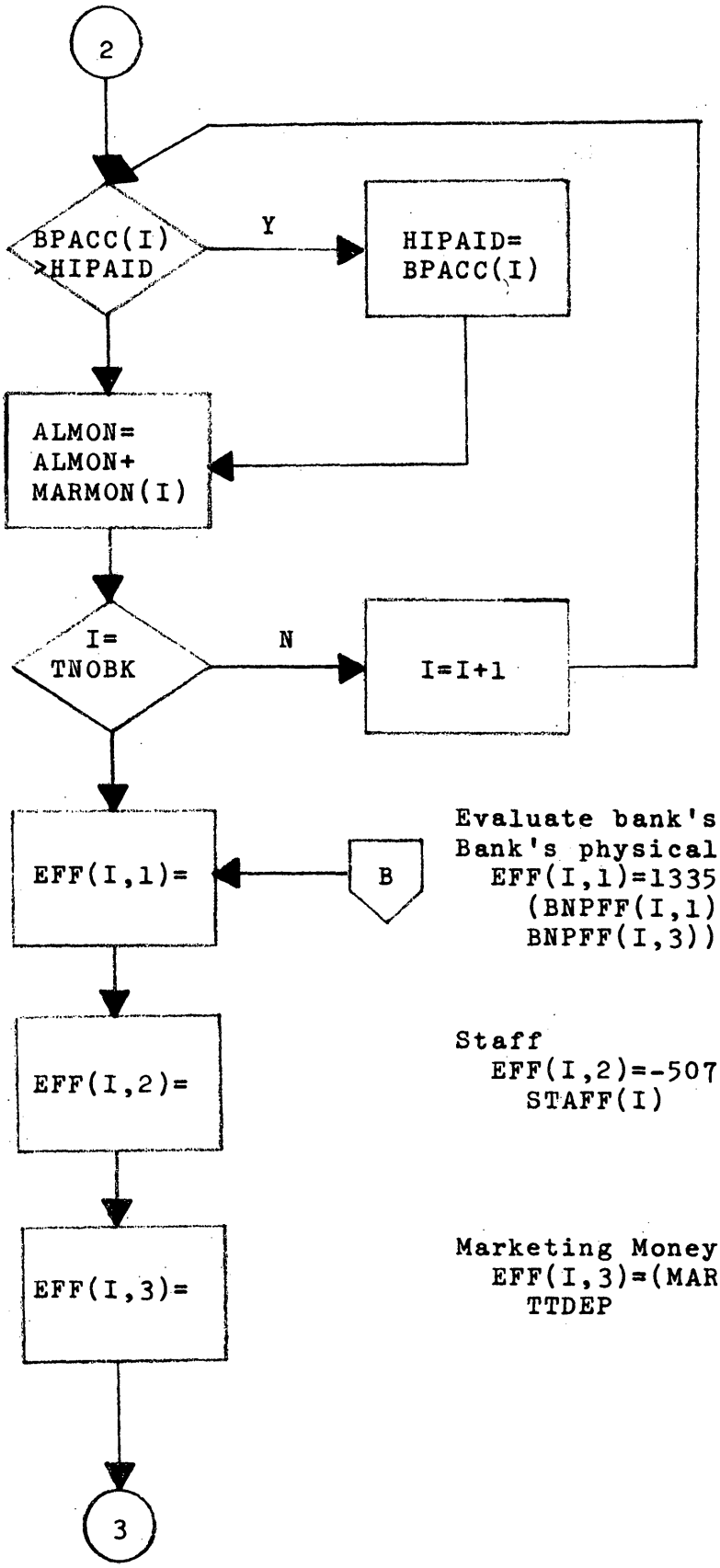
Evaluate bank's marketing endeavors.

Effect of wage paid on amount of bank staff.



Staff Salary

Initialize variables for later use.



Evaluate bank's marketing
Bank's physical features.

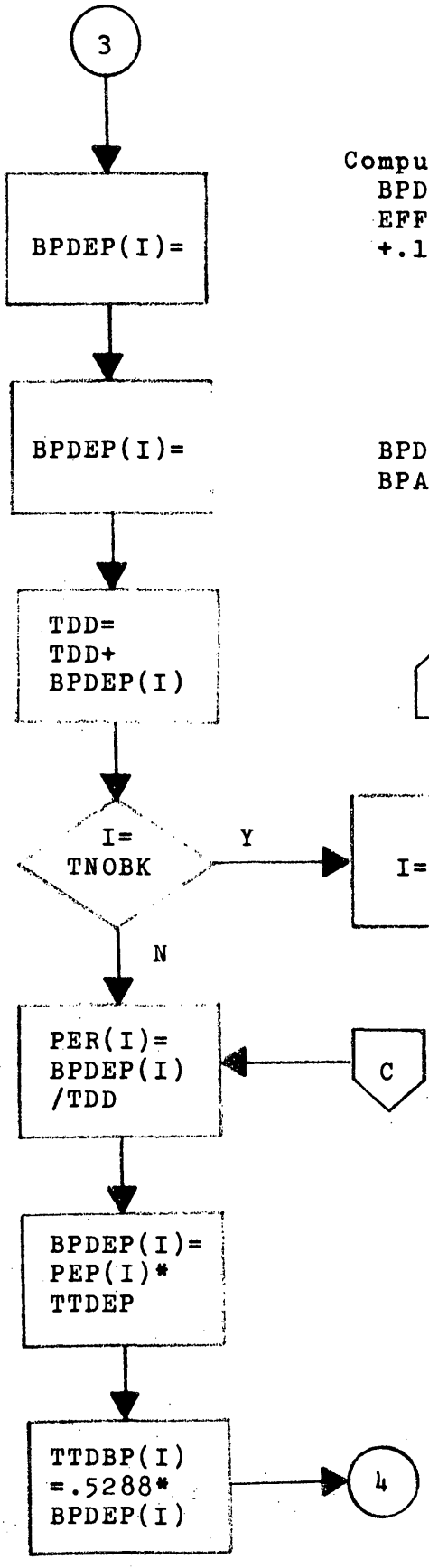
```
EFF(I,1)=133532.0+29.5291*
  (BNPFF(I,1)+BNPFF(I,2)+
  BNPFF(I,3))
```

Staff

```
EFF(I,2)=-507.405+.4764*
  STAFF(I)
```

Marketing Money

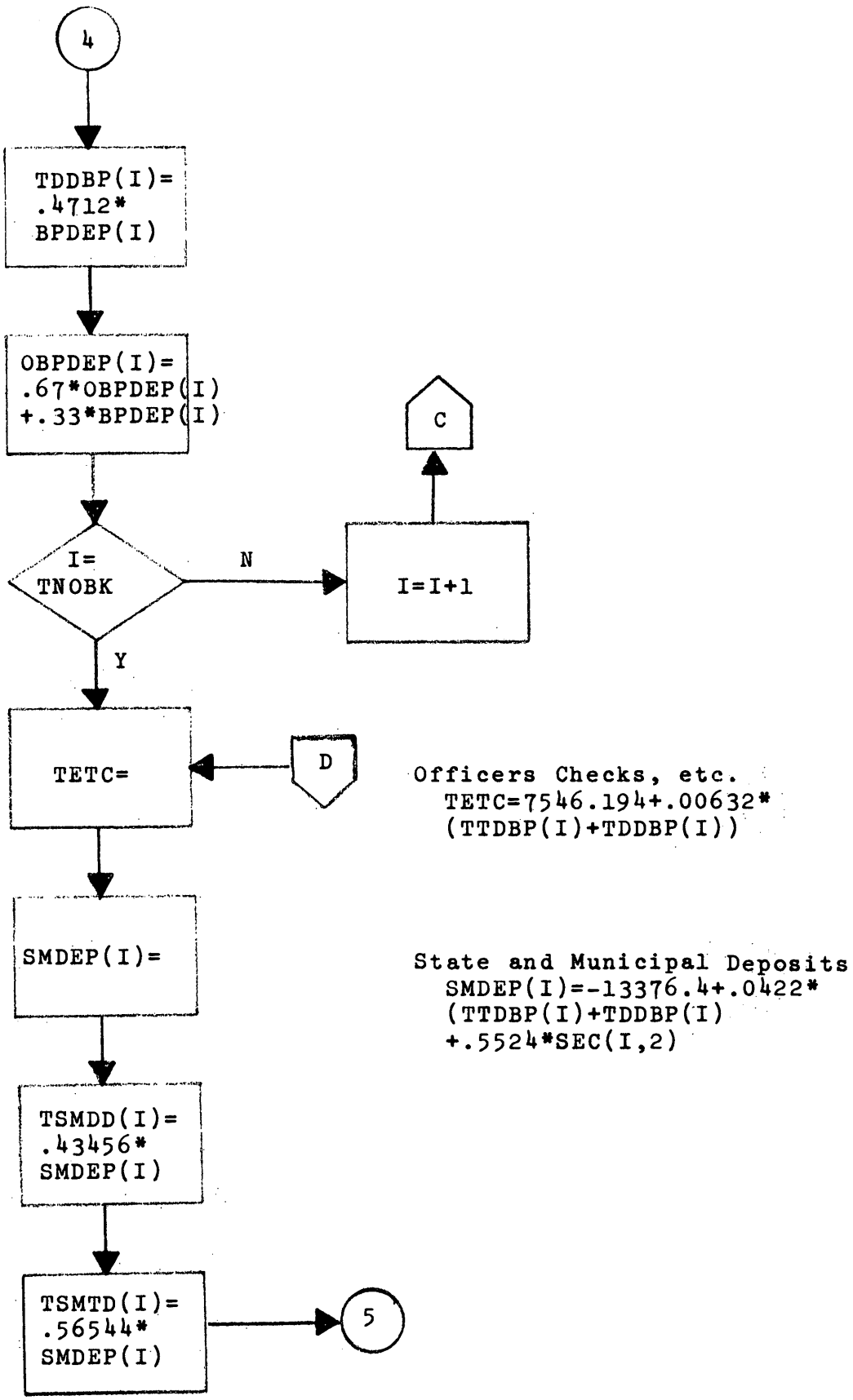
```
EFF(I,3)=(MARMON(I)/ALMON)*
  TTDEP
```

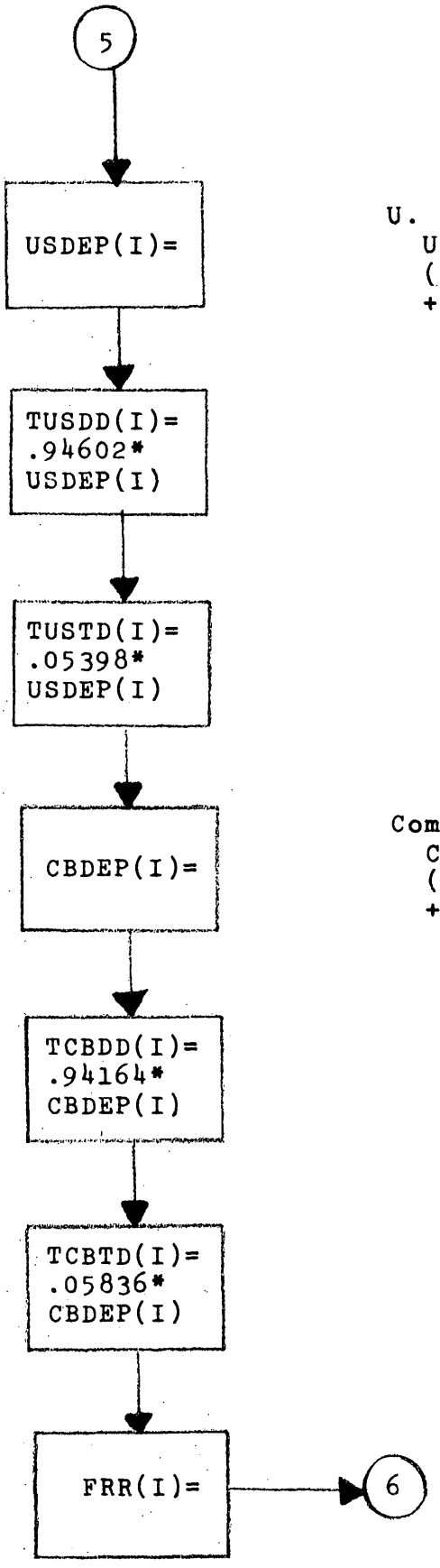


Compute bank's deposits.
BPDEP(I)=.70*OBPDEP(I)+.10*
EFF(I,1)+.05*EFF(I,2)
+.15*EFF(I,3)

BPDEP(I)=BPDEP(I)-((HIPAID-
BPACC(I))*2.0)*BPDEP(I)

Business and Personal


4
TDDBP(I)=
.4712*
BPDEP(I)
OBPDEP(I)=
.67*OBPDEP(I)
+.33*BPDEP(I)
C
I=
TNOBK
N
I=I+1
Y
TETC=
D
Officers Checks, etc.
TETC=7546.194+.00632*
(TTDBP(I)+TDDBP(I))
SMDEP(I)=
State and Municipal Deposits
SMDEP(I)=-13376.4+.0422*
(TTDBP(I)+TDDBP(I)
+.5524*SEC(I,2)
TSMDD(I)=
.43456*
SMDEP(I)
TSMTD(I)=
.56544*
SMDEP(I)
5



U. S. Government Deposits

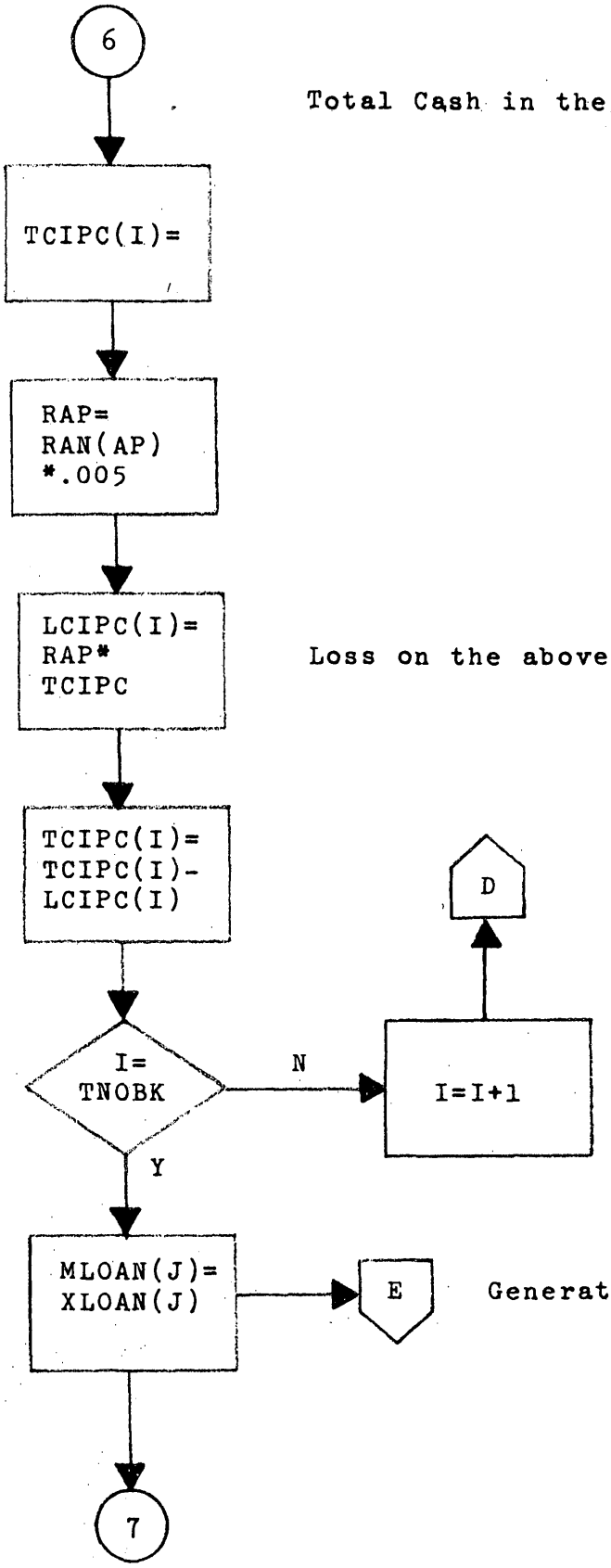
```
USDEP(I)=-11280.4+.0423*
(TTDBP(I)+TDDBP(I))
+.0333*SEC(I,1)
```

Commercial Bank Deposits

```
CBDEP(I)=3393.63+.0414*
(TTDBP(I)+TDDBP(I))
+.3047*(TDDB(I)+TOTOB(I))
```

Compute Federal Reserve Requirement

```
FRR(I)=RRAT*(TTDBP(I)+
TDDBP(I)+USDEP(I)+
SMDEP(I)+CBDEP(I))
```

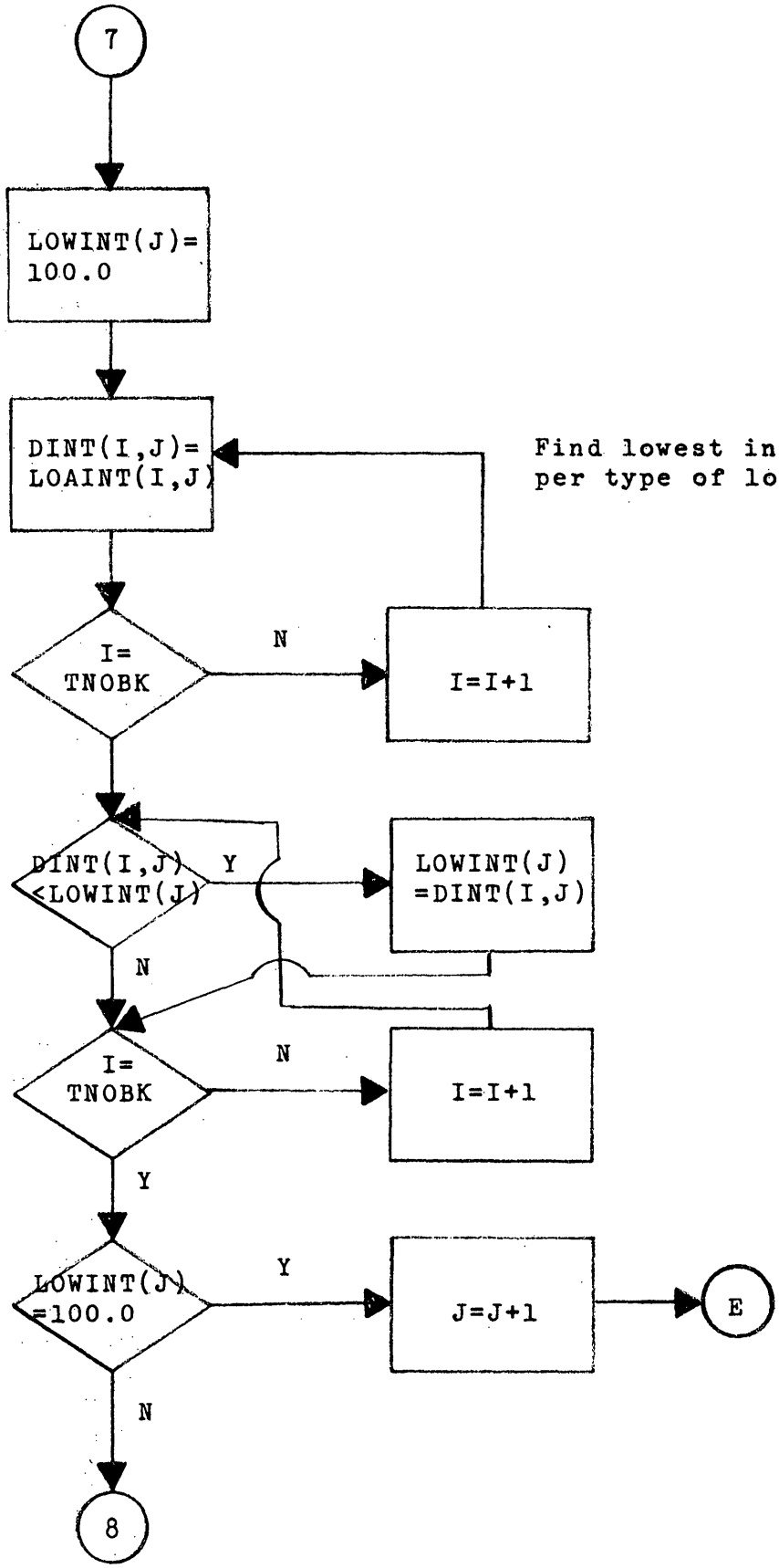


Total Cash in the Process of Collection.

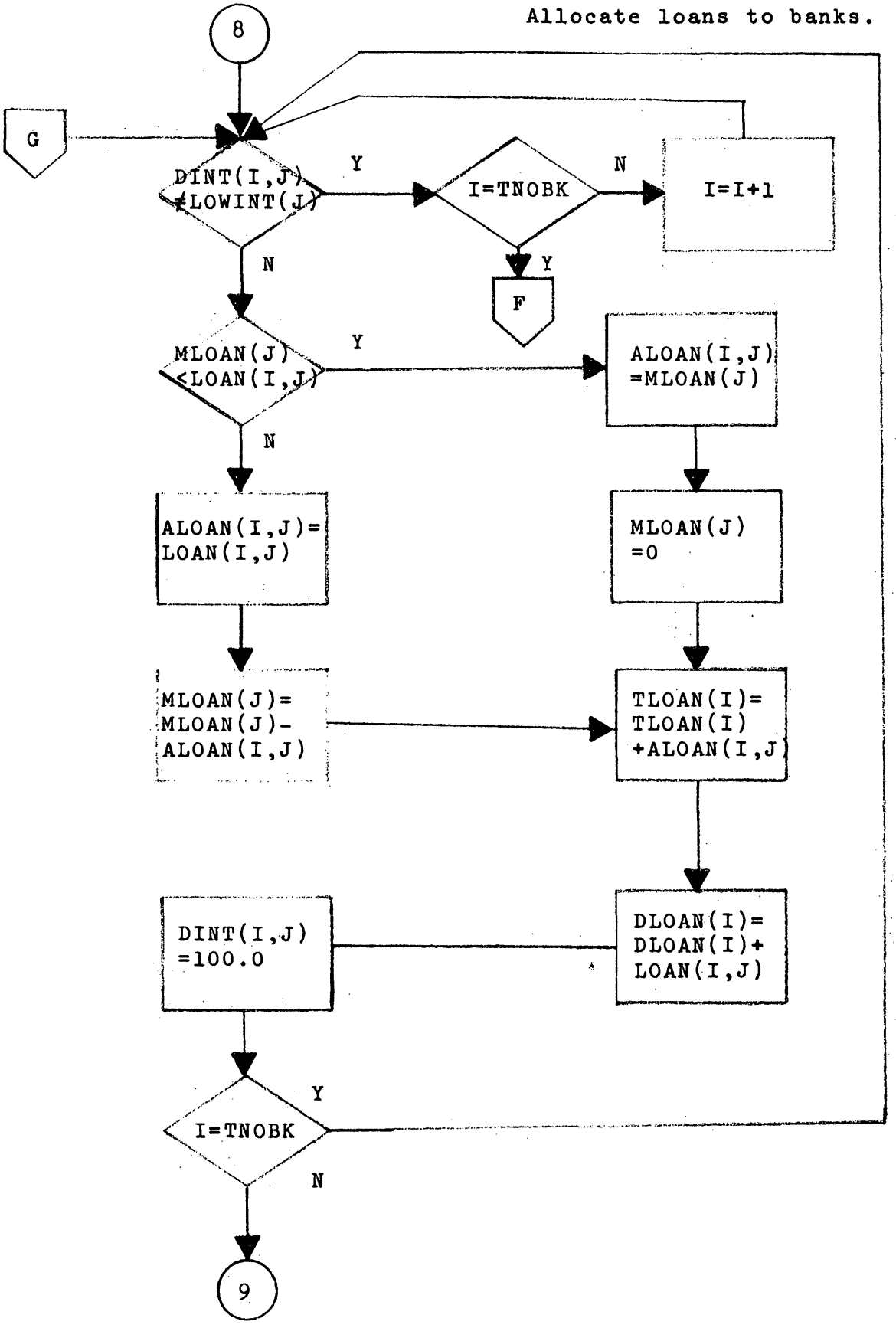
Loss on the above cash.

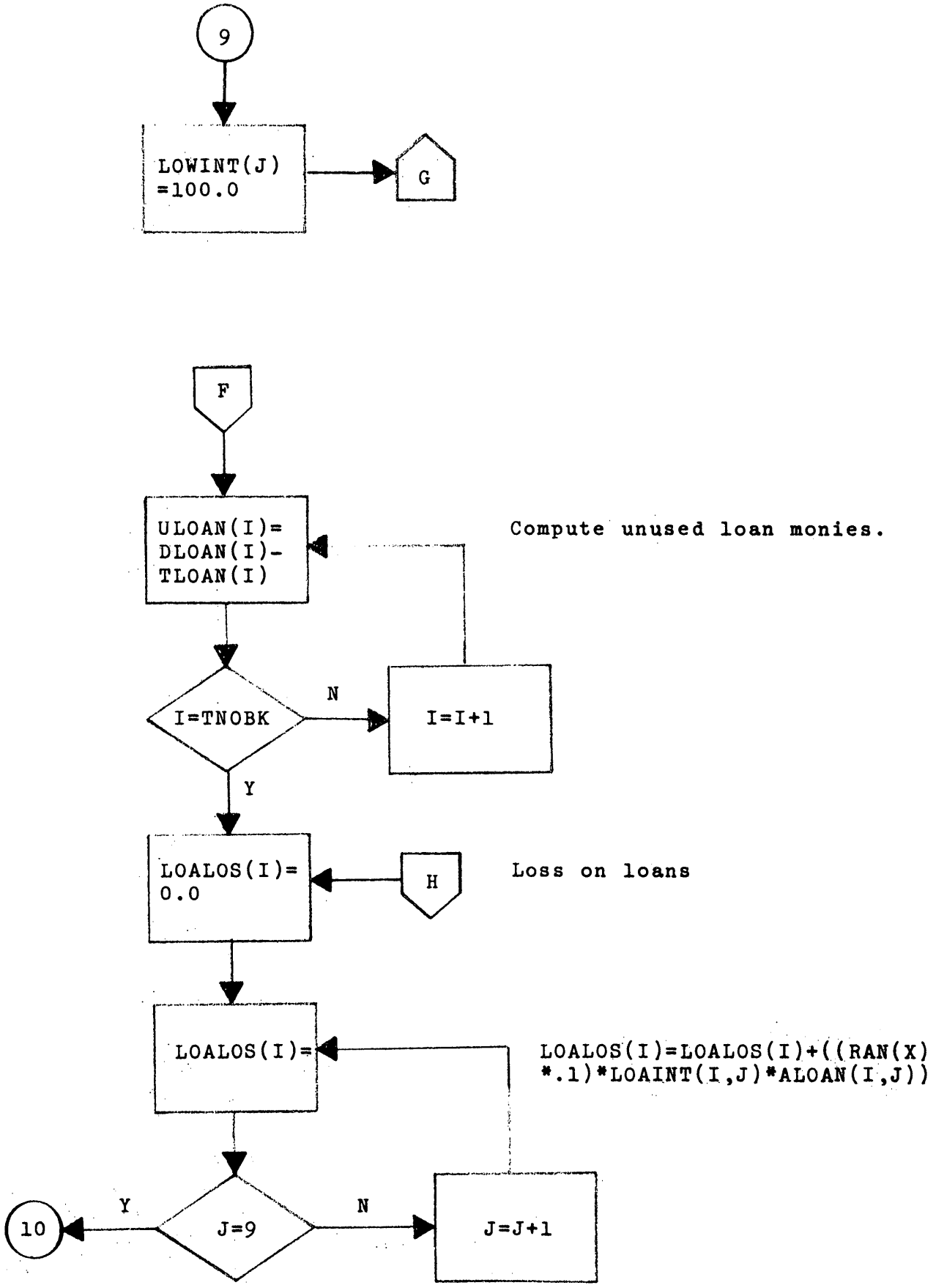
Repeat Loop for next bank.

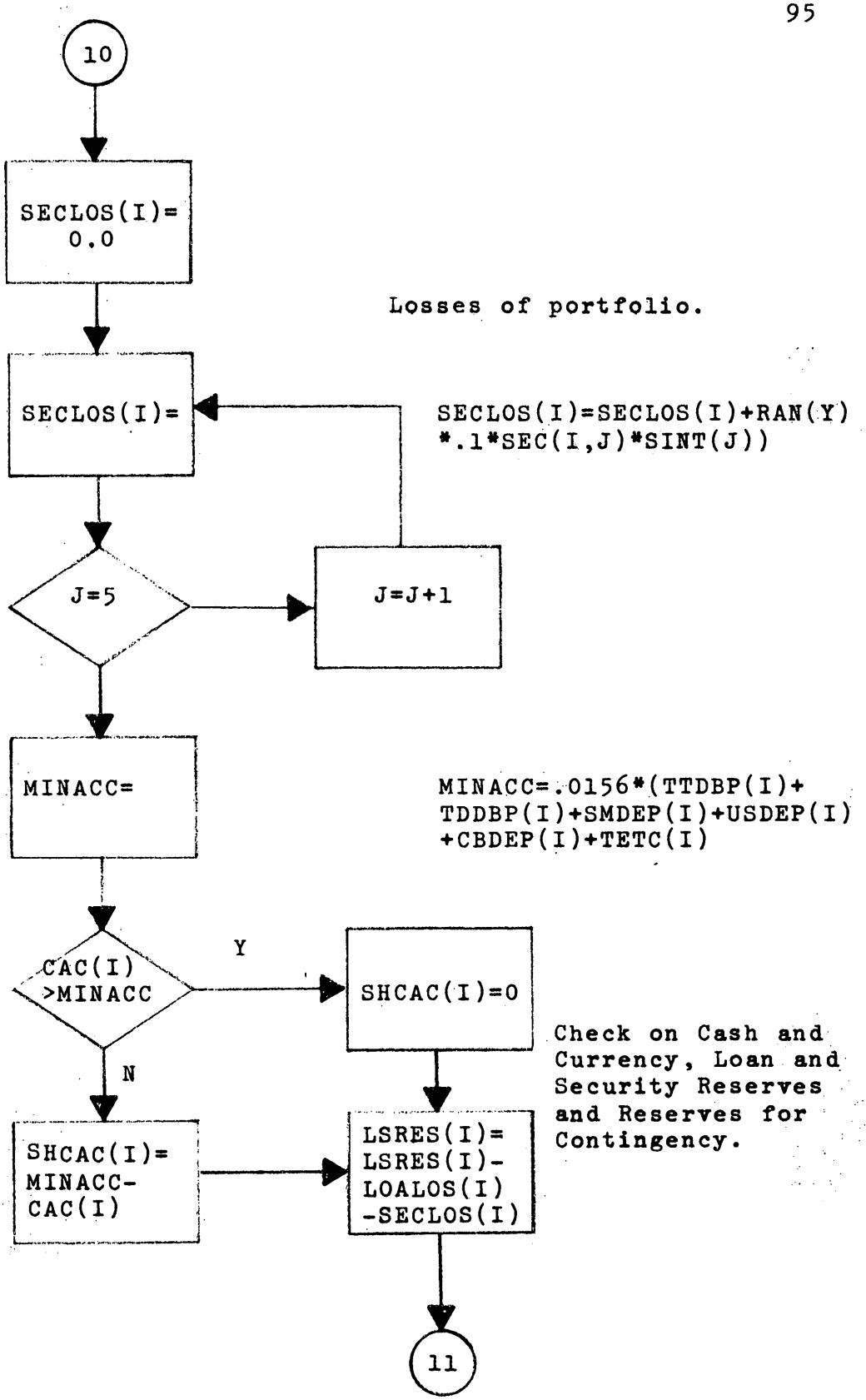
Generate loans for each bank.

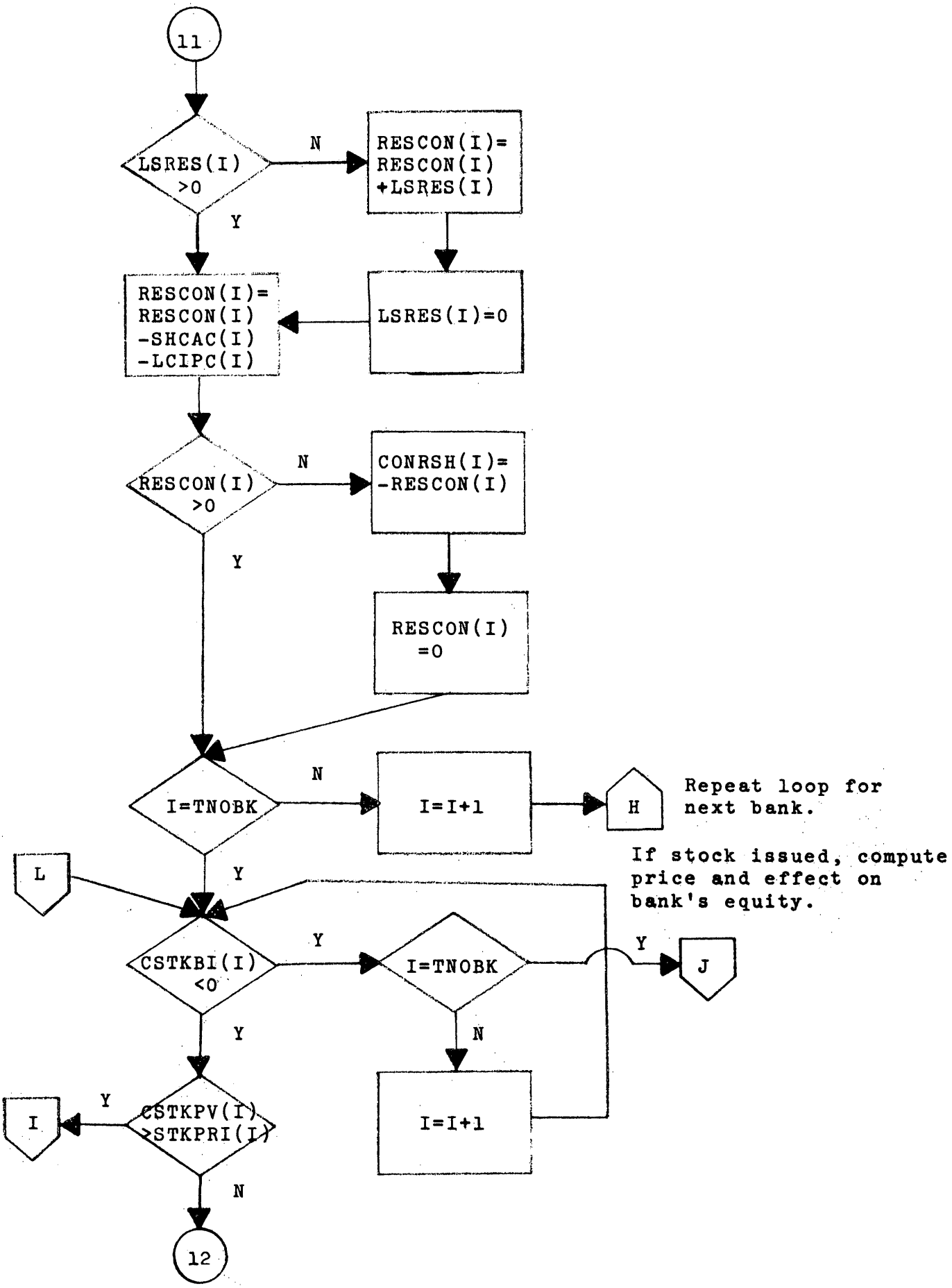

7
LOWINT(J)=
100.0
DINT(I,J)=
LOAINT(I,J)
Find lowest interest rate
per type of loan.
I=
TNOBK
N
I=I+1
DINT(I,J)
<LOWINT(J)
Y
LOWINT(J)
=DINT(I,J)
N
I=
TNOBK
N
I=I+1
Y
LOWINT(J)
=100.0
Y
J=J+1
E
N
8

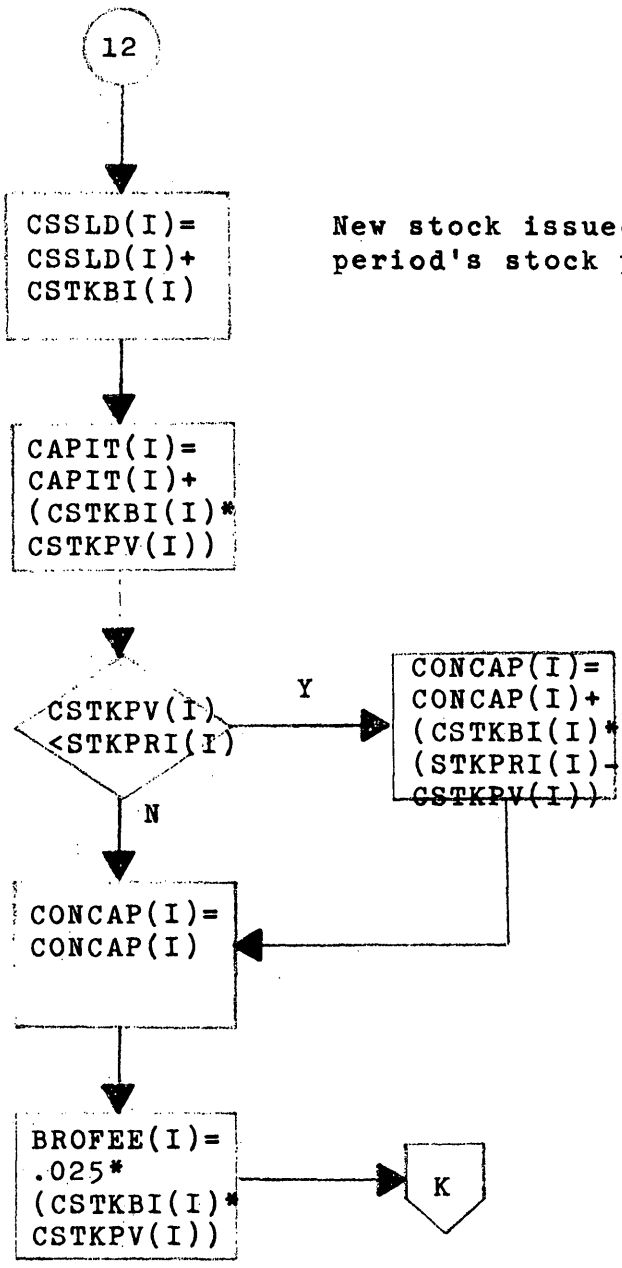
Allocate loans to banks.



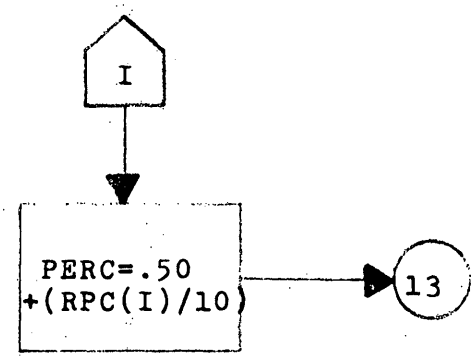

9
LOWINT(J)
=100.0
G
F
ULOAN(I)=
DLOAN(I)-
TLOAN(I)
Compute unused loan monies.
I=TNOBK
N
I=I+1
Y
LOALOS(I)=
0.0
H
Loss on loans
LOALOS(I)=
LOALOS(I)=LOALOS(I)+((RAN(X)
*.1)*LOAINT(I,J)*ALOAN(I,J))
Y
J=9
N
J=J+1
10


10
SECLOS(I)=
0.0
Losses of portfolio.
SECLOS(I)=
SECLOS(I)=SECLOS(I)+RAN(Y)
*.1*SEC(I,J)*SINT(J))
J=5
J=J+1
MINACC=
MINACC=.0156*(TTDBP(I)+
TDDBP(I)+SMDEP(I)+USDEP(I)
+CBDEP(I)+TETC(I)
CAC(I)
>MINACC
Y
SHCAC(I)=0
N
SHCAC(I)=
MINACC-
CAC(I)
LSRES(I)=
LSRES(I)-
LOALOS(I)
-SECLOS(I)
Check on Cash and
Currency, Loan and
Security Reserves
and Reserves for
Contingency.
11

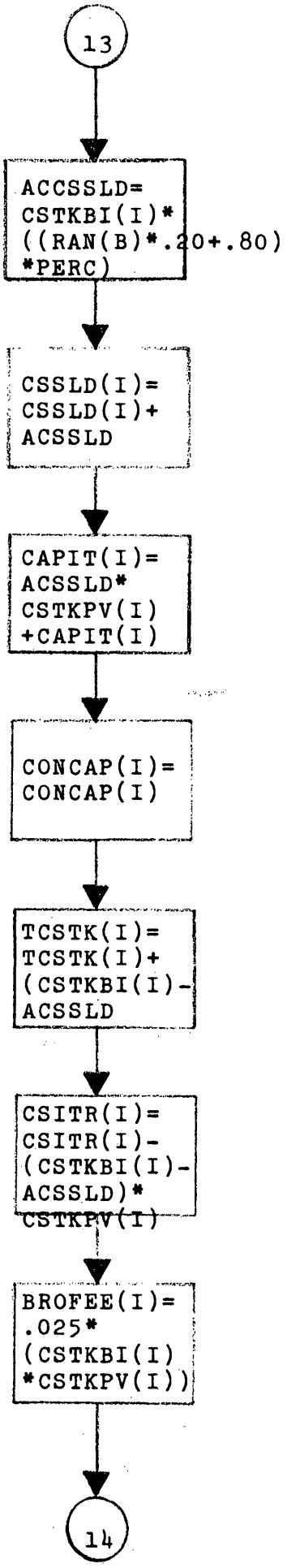

11
LSRES(I) >0
N
RESCON(I)= RESCON(I) +LSRES(I)
Y
RESCON(I)= RESCON(I) -SHCAC(I) -LCIPC(I)
LSRES(I)=0
RESCON(I) >0
N
CONRSH(I)= -RESCON(I)
Y
RESCON(I) =0
I=TNOBK
N
I=I+1
H
Repeat loop for next bank.
If stock issued, compute price and effect on bank's equity.
L
Y
CSTKBI(I) <0
Y
I=TNOBK
Y
J
Y
N
I
Y
CSTKPV(I) >STKPRI(I)
I=I+1
N
12

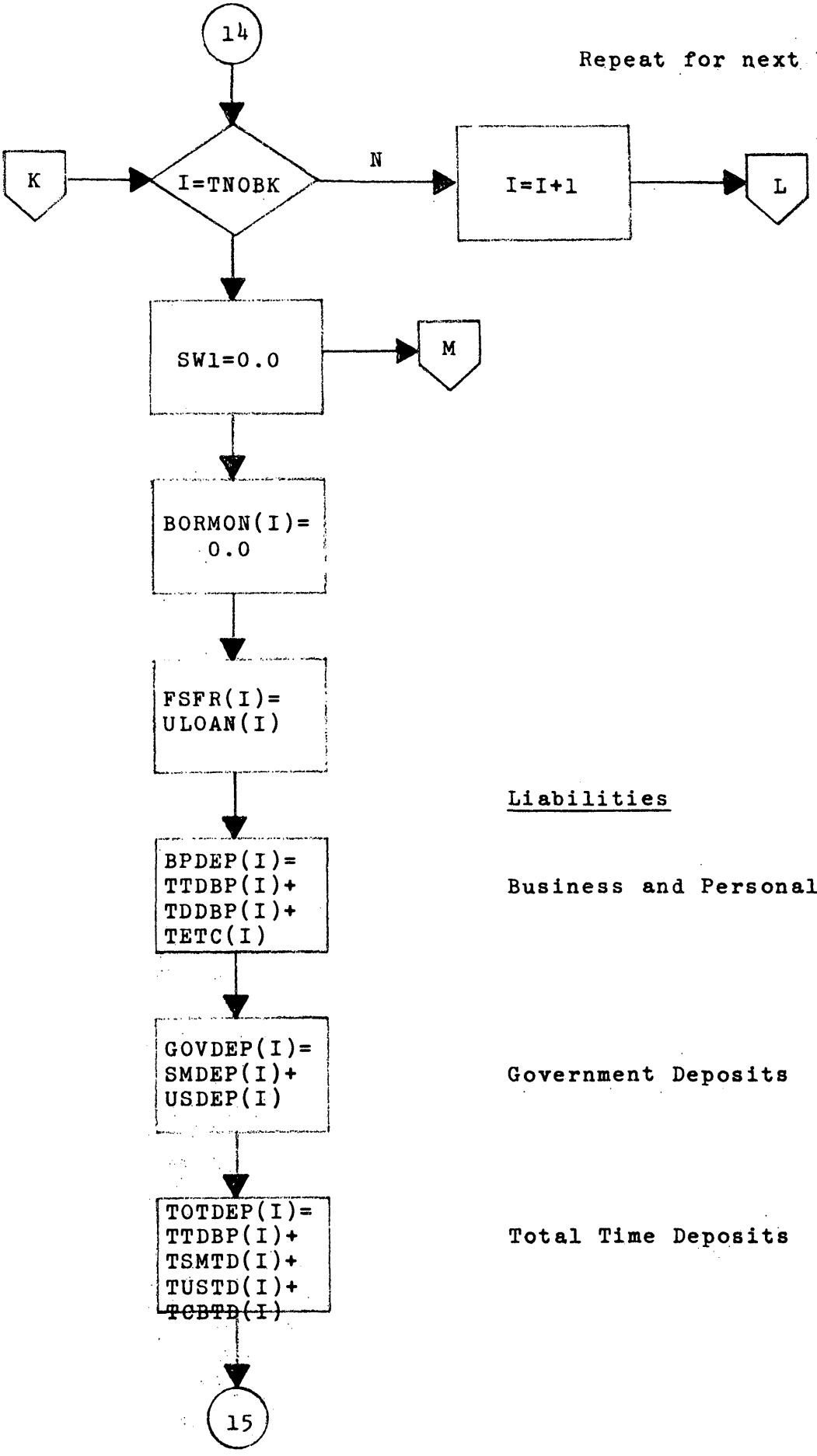


New stock issued at or below last period's stock price.



New stock issued at greater price than last period's stock price.


13
ACCSSLD=
CSTKBI(I)*
((RAN(B)*.20+.80)
*PERC)
CSSLD(I)=
CSSLD(I)+
ACSSLD
CAPIT(I)=
ACSSLD*
CSTKPV(I)
+CAPIT(I)
CONCAP(I)=
CONCAP(I)
TCSTK(I)=
TCSTK(I)+
(CSTKBI(I)-
ACSSLD
CSITR(I)=
CSITR(I)-
(CSTKBI(I)-
ACSSLD)*
CSTKPV(I)
BROFEE(I)=
.025*
(CSTKBI(I)
*CSTKPV(I))
14



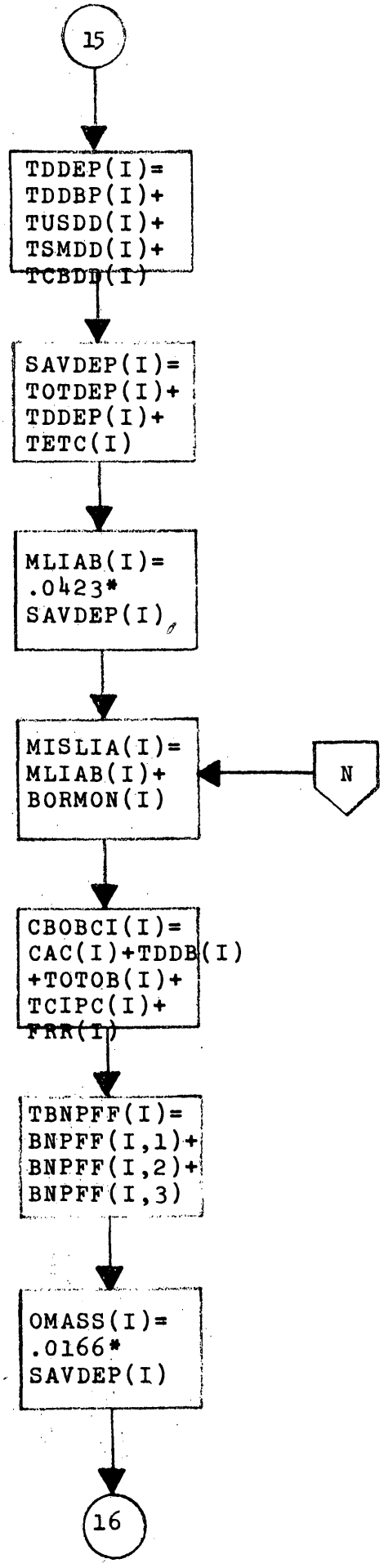
Repeat for next bank.

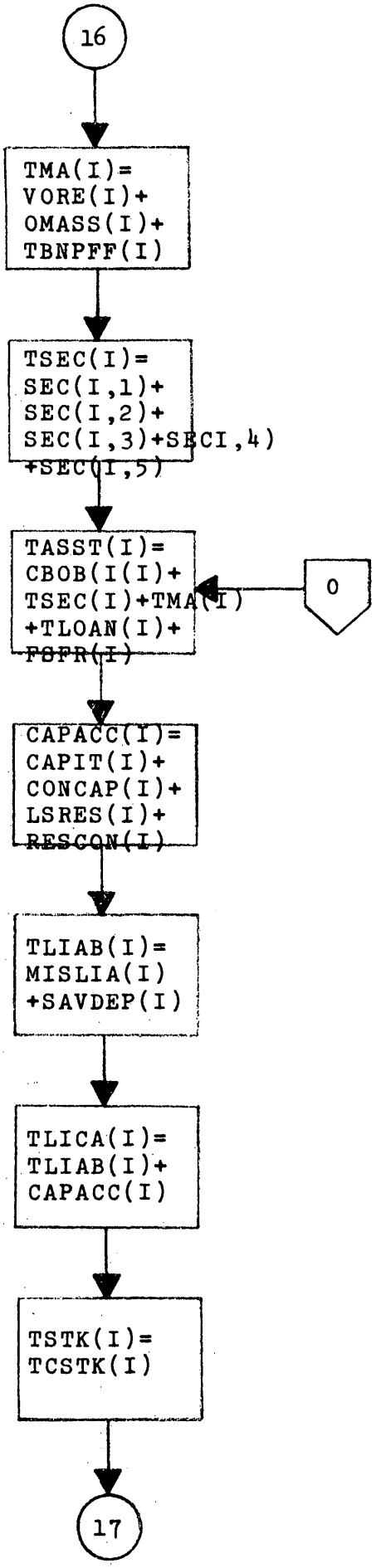
Liabilities

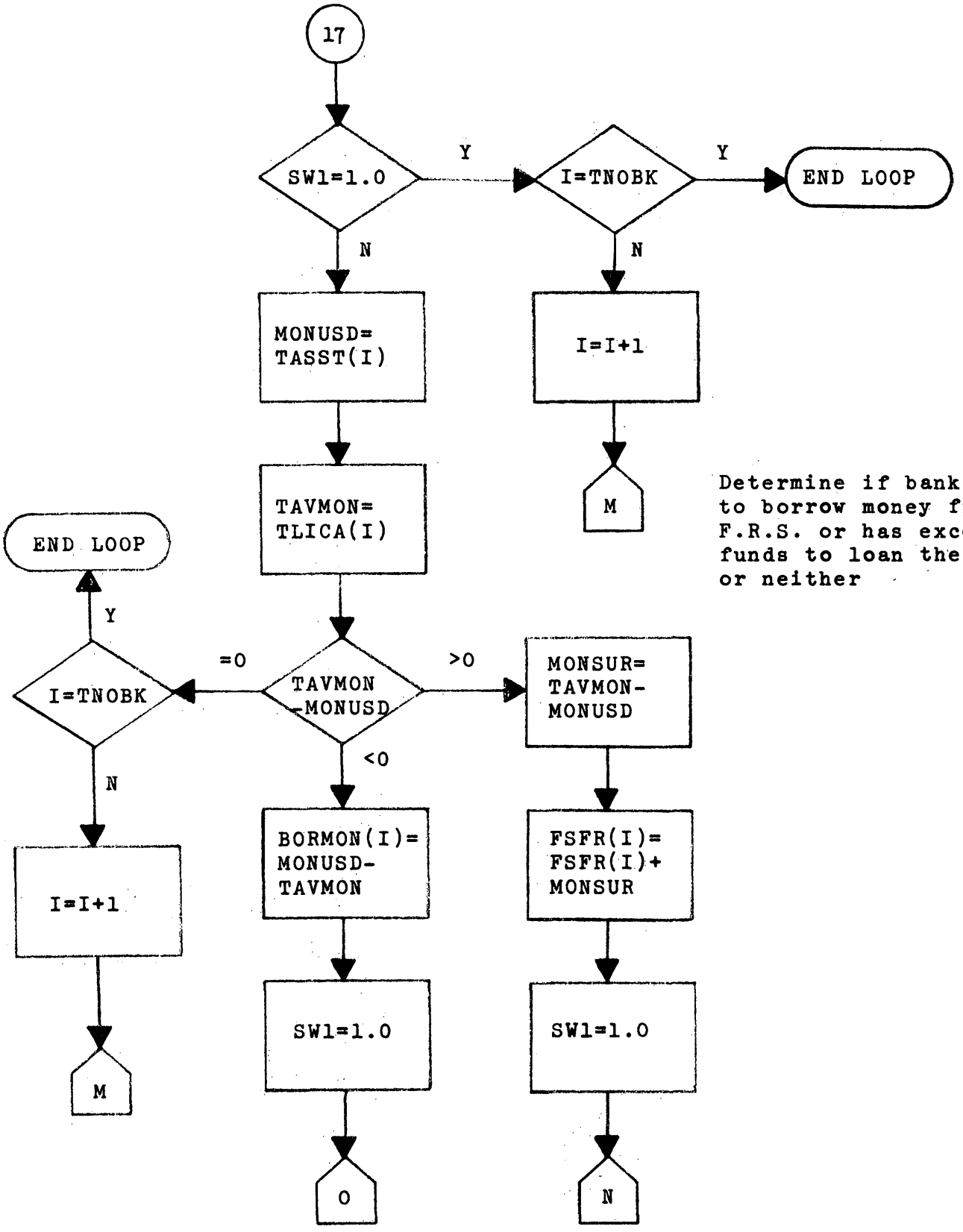
Business and Personal Deposits

Government Deposits

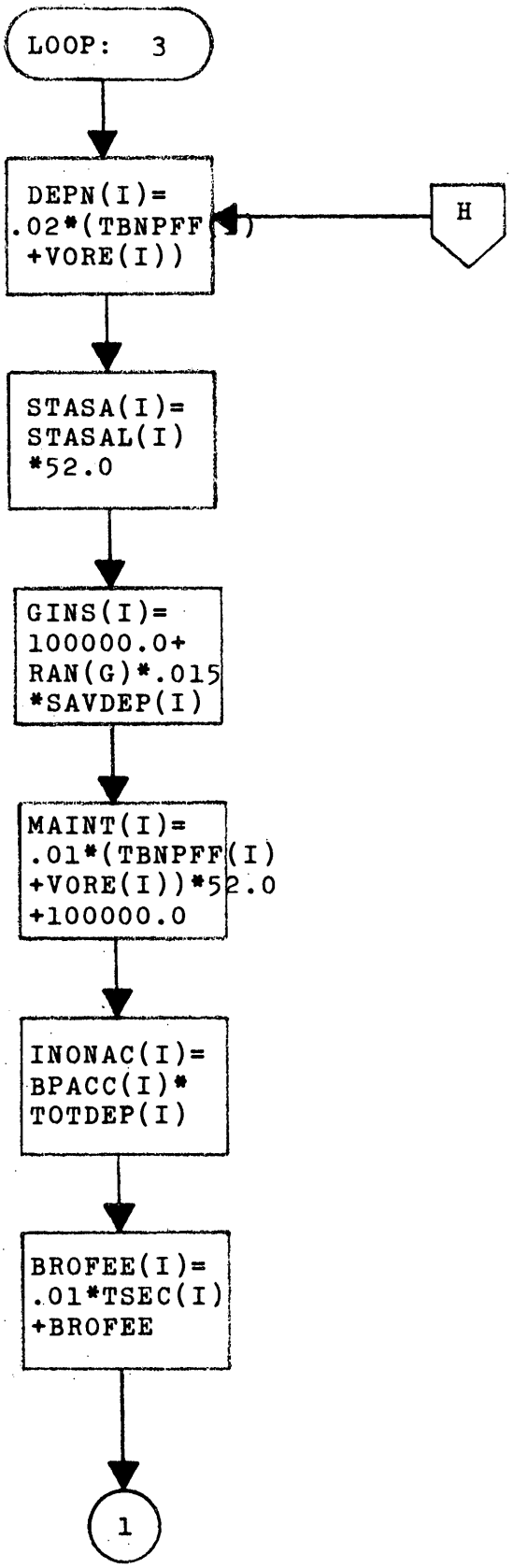
Total Time Deposits


15
TDDEP(I)=
TDDBP(I)+
TUSDD(I)+
TSMDD(I)+
TCBDD(I)
Total Demand Deposits
SAVDEP(I)=
TOTDEP(I)+
TDDEP(I)+
TETC(I)
Total Deposits
MLIAB(I)=
.0423*
SAVDEP(I)
Miscellaneous Liabilities
MISLIA(I)=
MLIAB(I)+
BORMON(I)
N
Assets
CBOBCI(I)=
CAC(I)+TDDB(I)
+TOTOB(I)+
TCIPC(I)+
FRR(I)
Cash
TBNPFF(I)=
BNPFF(I,1)+
BNPFF(I,2)+
BNPFF(I,3)
Physical Features
OMASS(I)=
.0166*
SAVDEP(I)
Miscellaneous Assets
16


16
TMA(I)=
VORE(I)+
OMASS(I)+
TBNPFF(I)
Total Miscellaneous Assets
TSEC(I)=
SEC(I,1)+
SEC(I,2)+
SEC(I,3)+SECI,4)
+SEC(I,5)
Total Securities
TASST(I)=
CBOB(I(I)+
TSEC(I)+TMA(I)
+TLOAN(I)+
FSFR(I)
0
Total Assets
CAPACC(I)=
CAPIT(I)+
CONCAP(I)+
LSRES(I)+
RESCON(I)
Capital Accounts
Total Capital Accounts
TLIAB(I)=
MISLIA(I)
+SAVDEP(I)
Total Liabilities
TLICA(I)=
TLIAB(I)+
CAPACC(I)
Total Liabilities and
Capital Accounts
TSTK(I)=
TCSTK(I)
Treasury Stock
17



Determine if bank needs to borrow money from F.R.S. or has excess funds to loan the F.R.S. or neither



Compute the individual bank's expenses:

Depreciation

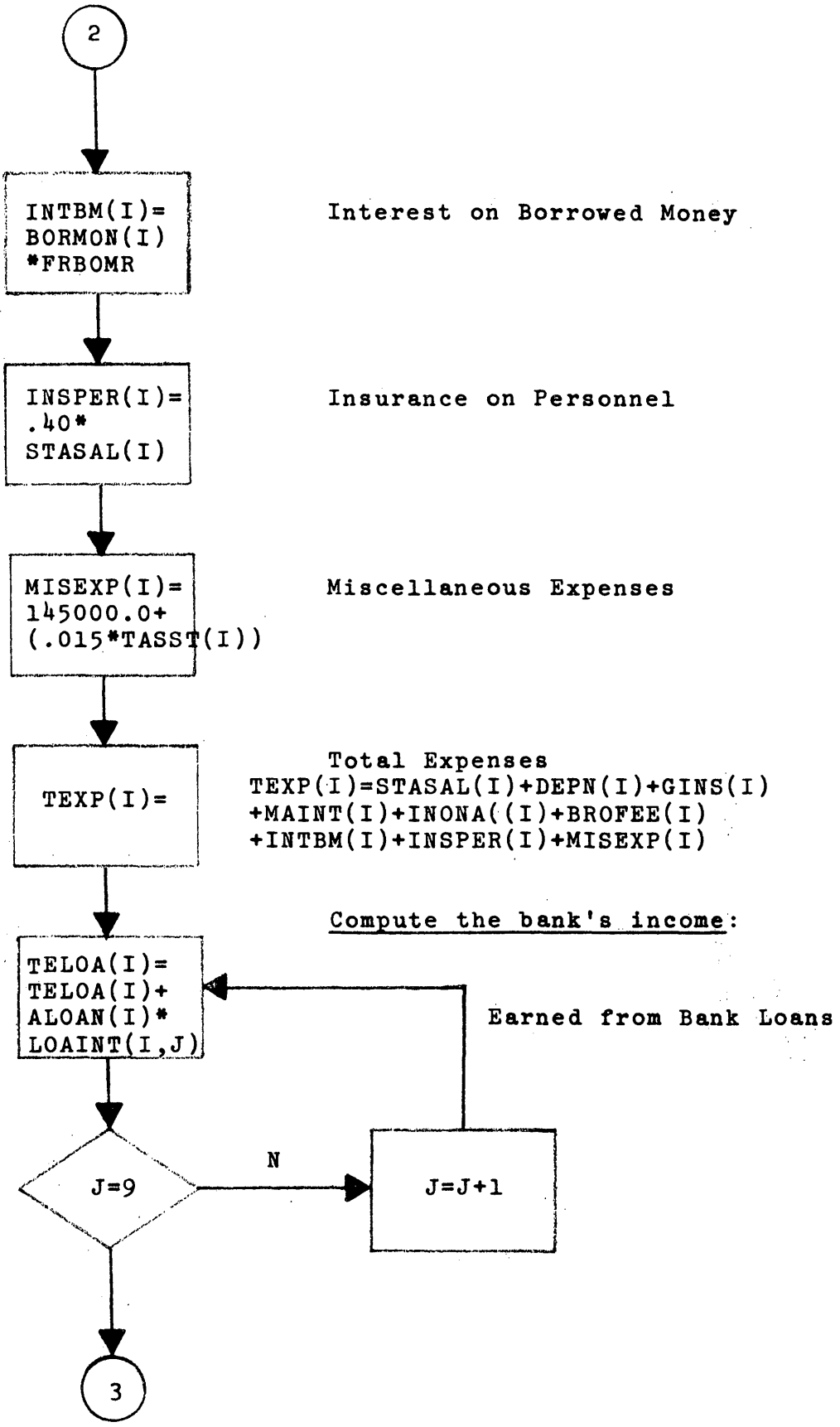
Salaries

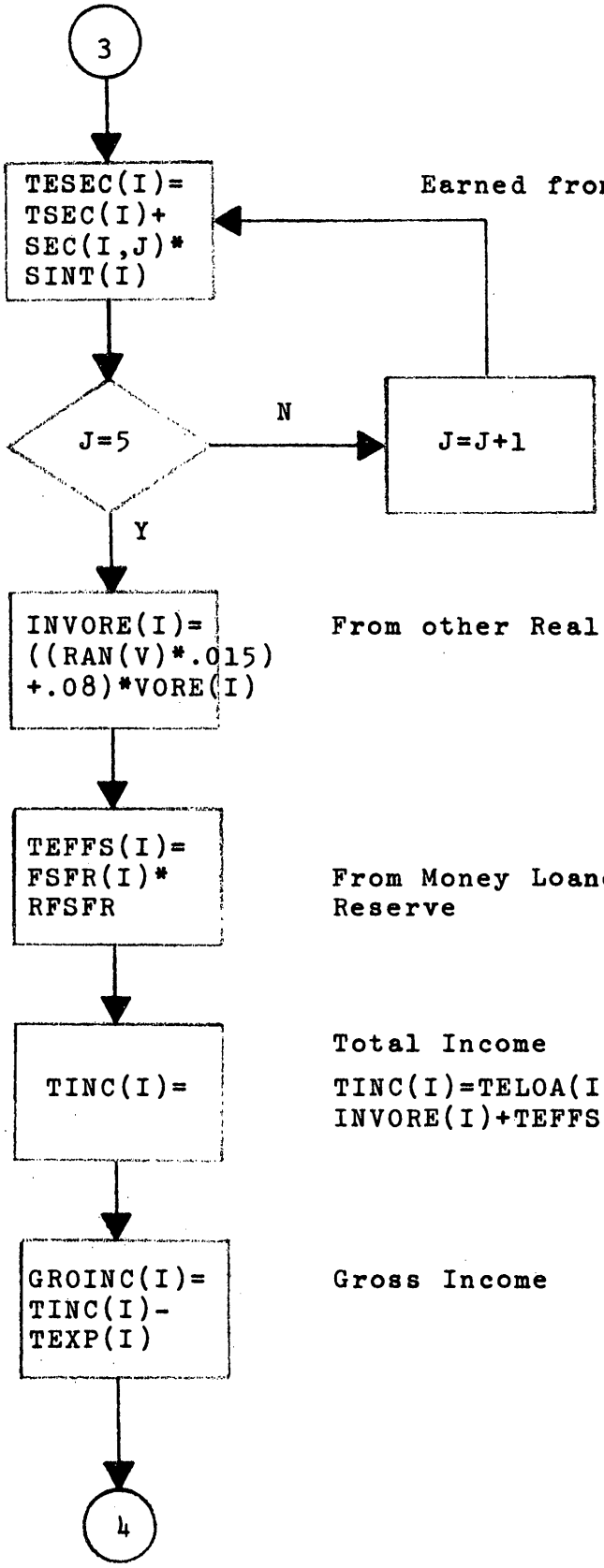
General Insurance

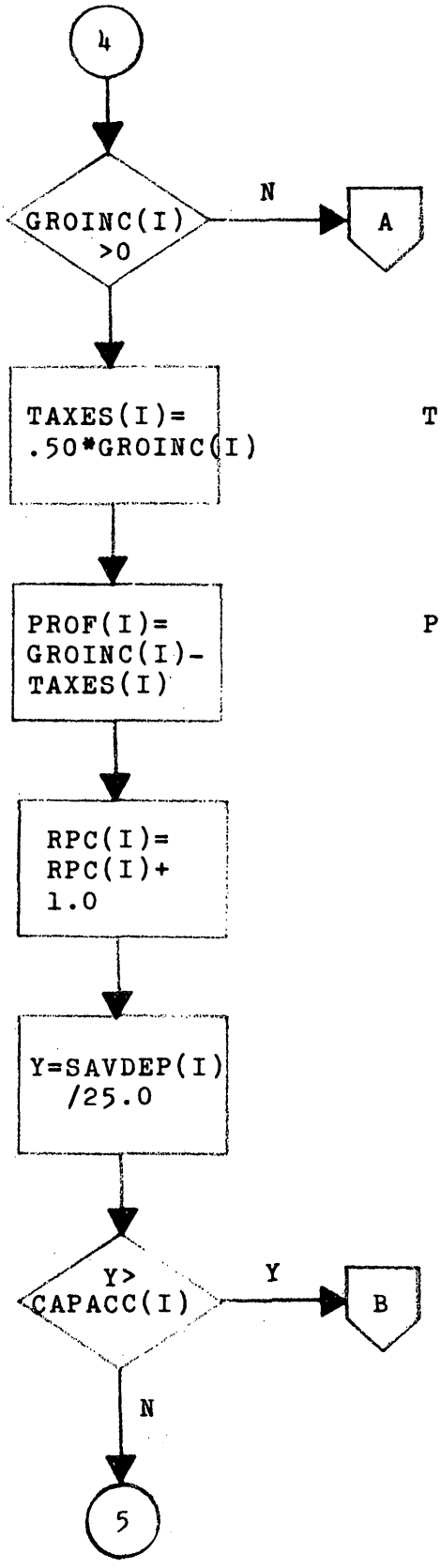
Maintenance

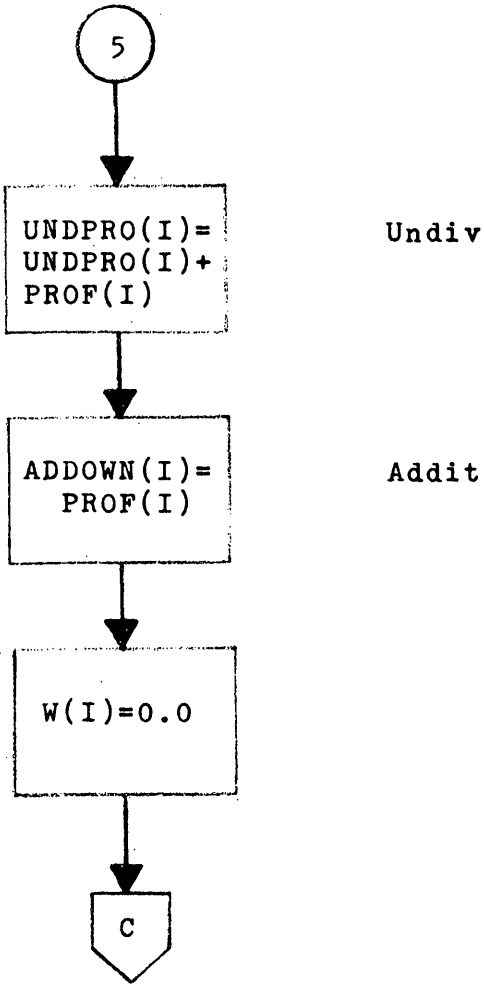
Interest paid on accounts

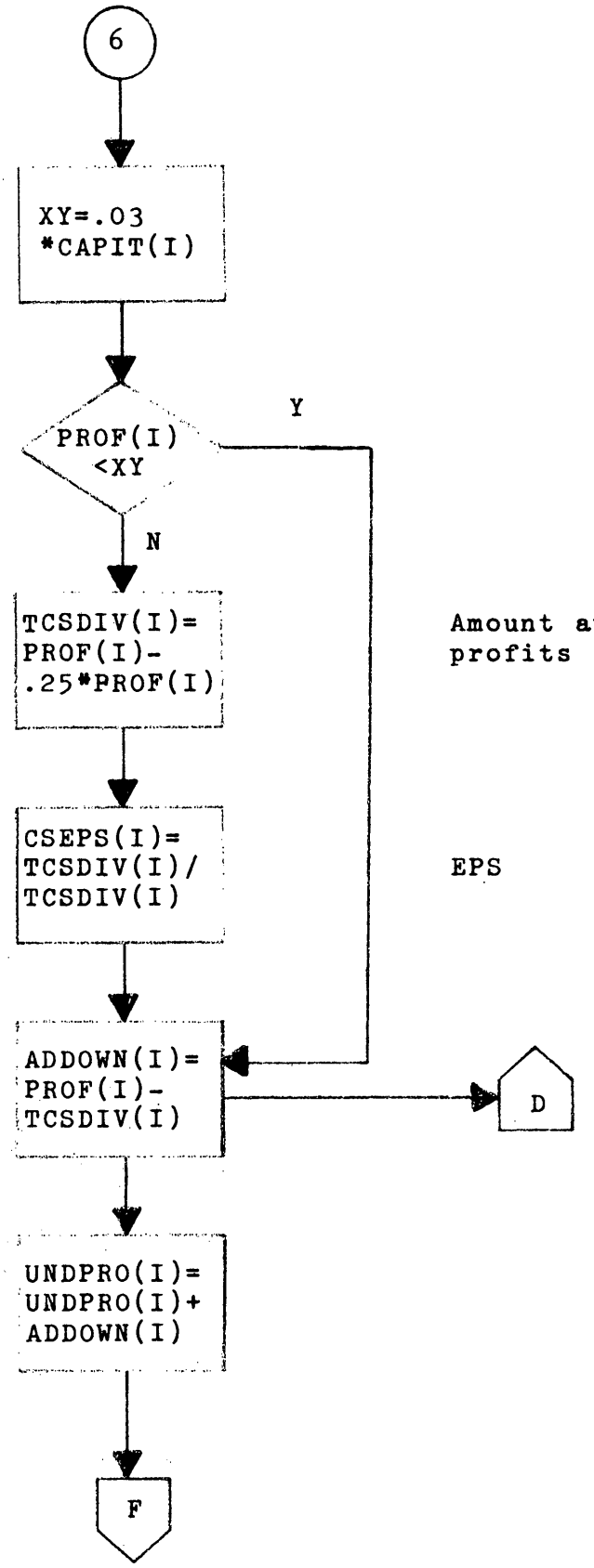
Brokers' Fees

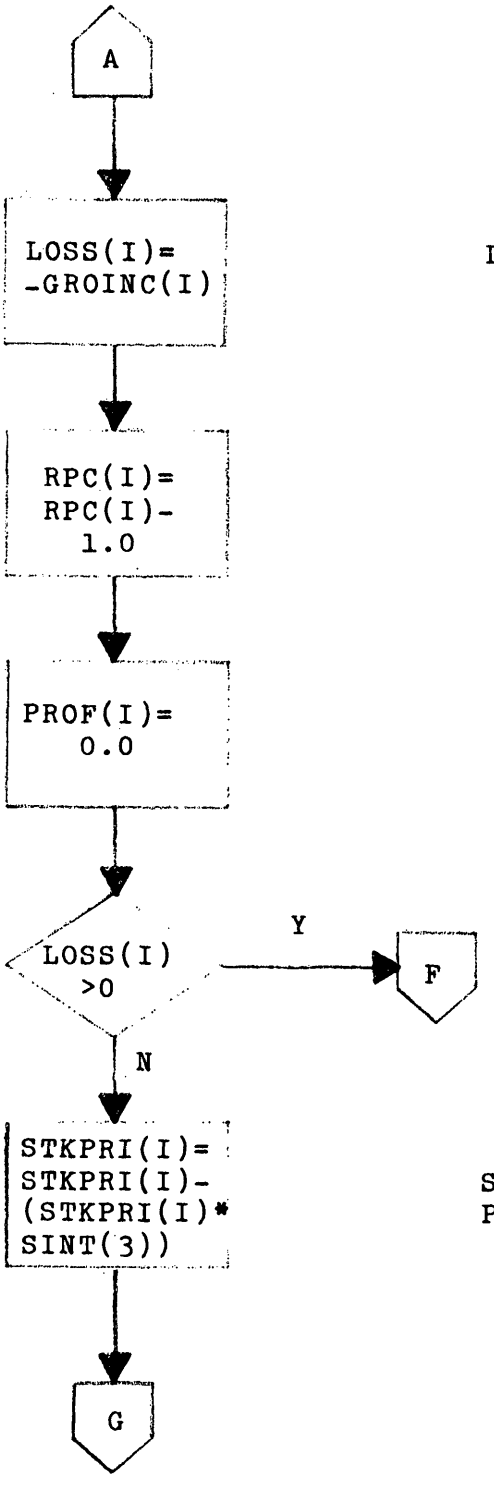

2
INTBM(I)= BORMON(I) *FRBOMR
Interest on Borrowed Money
INSPER(I)= .40* STASAL(I)
Insurance on Personnel
MISEXP(I)= 145000.0+ (.015*TASST(I))
Miscellaneous Expenses
TEXP(I)=
Total Expenses
TEXP(I)=STASAL(I)+DEPN(I)+GINS(I)
+MAINT(I)+INONA((I)+BROFEE(I)
+INTBM(I)+INSPER(I)+MISEXP(I)
Compute the bank's income:
TELOA(I)= TELOA(I)+ ALOAN(I)* LOAINT(I,J)
Earned from Bank Loans
J=9
N
J=J+1
3


3
TESEC(I)=
TSEC(I)+
SEC(I,J)*
SINT(I)
Earned from Bank's Portfolio
J=5
N
J=J+1
Y
INVORE(I)=
((RAN(V)*.015)
+.08)*VORE(I)
From other Real Estate held
TEFFS(I)=
FSFR(I)*
RFSFR
From Money Loaned the Federal Reserve
TINC(I)=
Total Income
TINC(I)=TELOA(I)+TESEC(I)+
INVORE(I)+TEFFS(I)
GROINC(I)=
TINC(I)-
TEXP(I)
Gross Income
4


4
GROINC(I) >0
N
A
TAXES(I)= .50*GROINC(I)
Taxes
PROF(I)= GROINC(I)- TAXES(I)
Profit
RPC(I)= RPC(I)+ 1.0
Y=SAVDEP(I) /25.0
Y> CAPACC(I)
Y
B
Determine if bank can declare and pay dividends.
N
5

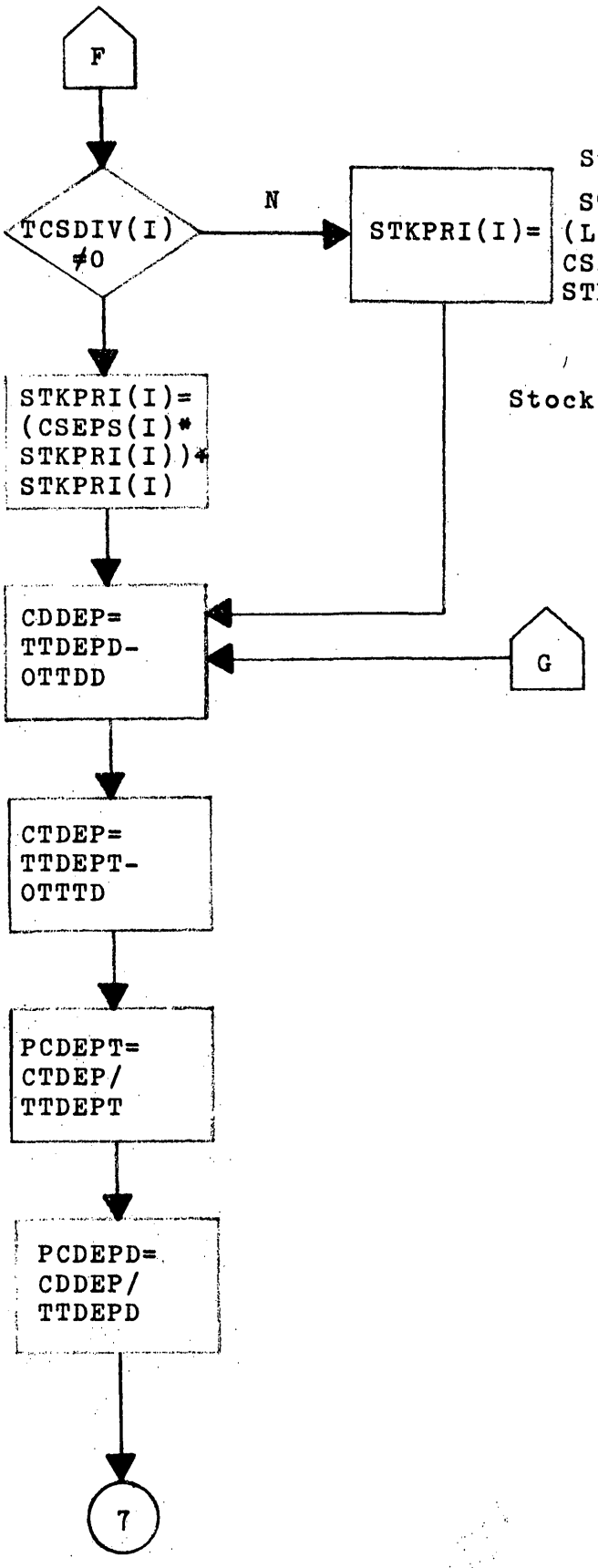

5
UNDPRO(I)=
UNDPRO(I)+
PROF(I)
Undivided Profit
ADDOWN(I)=
PROF(I)
Addition to Owners' Equity
W(I)=0.0
C
B
TCSDIV(I)=
0.0
RPC(I)
<0.0
D
6

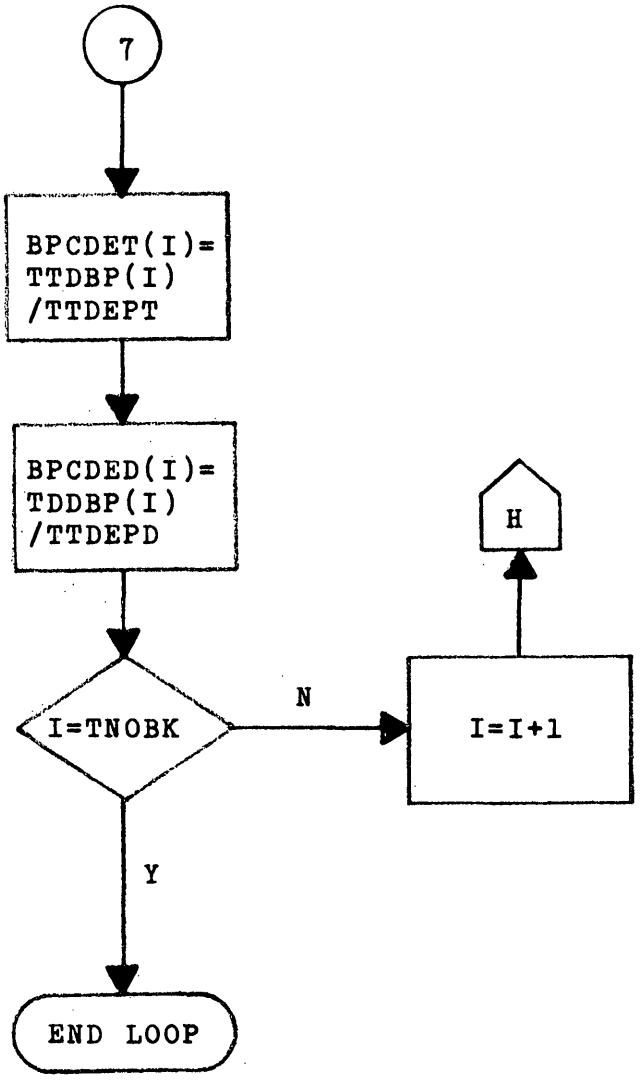

6
XY=.03
*CAPIT(I)
PROF(I)
<XY
Y
N
TCSDIV(I)=
PROF(I)-
.25*PROF(I)
Amount available from
profits for dividends.
CSEPS(I)=
TCSDIV(I)/
TCSDIV(I)
EPS
ADDOWN(I)=
PROF(I)-
TCSDIV(I)
D
UNDPRO(I)=
UNDPRO(I)+
ADDOWN(I)
F



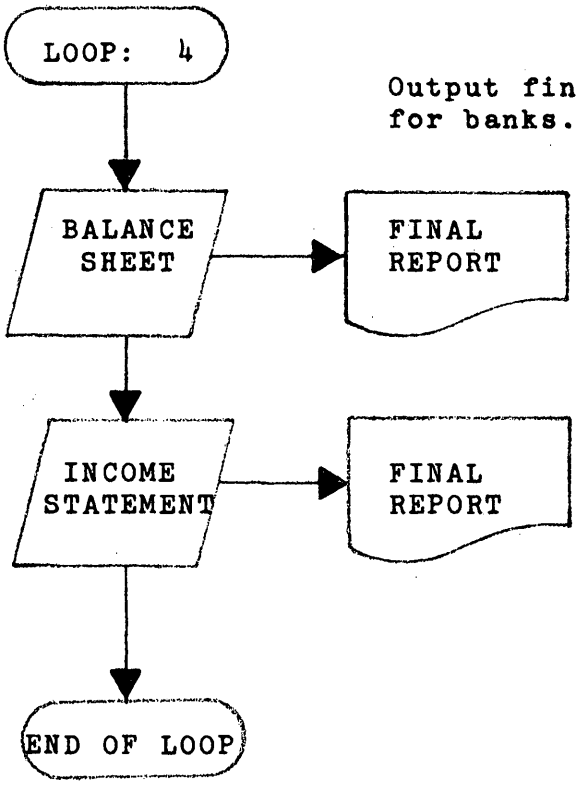
Loss

Stock Price if neither Profit nor Loss.


F
TCSDIV(I) ≠0
N
STKPRI(I)=
Stock price if Loss
STKPRI(I)=(STKPRI(I)-(LOSS(I)/TCSTK(I)+CSSLD(I))-SINT(3)*STKPRI(I)))
STKPRI(I)=(CSEPS(I)*STKPRI(I))+STKPRI(I)
Stock price if Profit
CDDEP=TTDEPD-OTTDD
G
Compute percentage changes in market.
CTDEP=TTDEPT-OTTTD
PCDEPT=CTDEP/TTDEPT
PCDEPD=CDDEP/TTDEPD
7



If not done for all banks, repeat for next one.


LOOP: 4
Output final results for banks.
BALANCE SHEET
FINAL REPORT
INCOME STATEMENT
FINAL REPORT
END OF LOOP

CHAPTER IX

PROGRAM

```
C
C       MUTI-PERSON BANK GAME
C
C
C       CATHY BANAUGH
C
C
C       M.S. 1974
C
C
C
      DIMENSION TTDBP(10),OBPDEP(10),DEPGRT(5),MLOAN(9),LOAGRT(9),
     1CONCAP(10),CSSLD(10),STKPRI(10),TCSTK(10),ADDOWN(10),RPC(10),
     2SINT(5),CAC(10),TDDB(10),TOTOB(10),SEC(10,5),LOAN(10,9),LOAINT
     3(10,9),BNPFF(10,3),VORE(10),CSTKBI(10),CSTKPV(10),LSRES(10),
     3RESCON(10),SEROFF(10,3),STAFF(10),STASAL(10),MARMON(10),BPACC(10),
     4EXSROF(10),EFMAR(10),EFF(10,3),TETC(10),SMDEP(10),TSMDEP(10),
     5TSMDD(10),TSMTD(10),USDEP(10),TUSDD(10),TUSTD(10),CBDEP(10),
     6TCBDD(10),TCBTD(10),FRR(10),TCIPC(10),LCIPC(10),LOALOS(10),
     7SHCAC(10),PER(10),CAPIT(10),CONRSH(10),BROFEE(10),
     8FSFR(10),BORMON(10),ULOAN(10),BPDEP(10),GOVDEP(10),TOTDEP(10),
     9TDDEP(10),SAVDEP(10),MLIAB(10),MISLIA(10),CBOBCI(10),TBNPFF(10),
     AOMASS(10),TSEC(10),TASST(10),CAPACC(10),TLIAB(10),TSTK(10),TLICA
     B(10),DEPN(10),GINS(10),MAINT(10),INONAC(10),DINT(10,9),LOWINT(9),
     CINTBM(10),INSPER(10),MISEXP(10),TEXP(10),TELOA(10),TESEC(10),
     DINVORE(10),TEFFS(10),TINC(10),GROINC(10),TAXES(10),PROF(10),
     ETCSDIV(10),CSEPS(10),LOSS(10),SECLOS(10),TMA(10),TDDBP(10),
     FBPCDET(10),BPCDED(10),ALOAN(10,9),TLOAN(10),DLOAN(10),W(10),
     GUNDPRO(10),CSITR(10),XLOAN(9)
      REAL MLOAN,LOAGRT,LOAINT,LOAN,LSRES,MARMON,HIPAID,LCIPC,LOSS,
     1LOWINT,LOALOS,MINACC,MONUSD,MONSUR,MAINT,INONAC,INTBM,INSPER,
     2MISEXP,INVORE,MLIAB,MISLIA
      INTEGER TNOBK,PERIOD,ECOINX
C       READ IN LOAN AND DEPOSIT POTENTIAL FOR TOWN
      READ (21, 1000) TNOBK,XN,TTDEPD,TTDEPT,(DEPGRT(I),I=1,2),
     1  (XLOAN(I),I=1,9),(LOAGRT(I),I=1,9),PERIOD
1000  FORMAT (I,23F,I)
C       READ IN HISTORY OF BANKS
      DO 200 I=1,TNOBK
      READ (22,1001) CONCAP(I),CSSLD(I),STKPRI(I),TCSTK(I),
     1  UNDPRO(I),RPC(I),OBPDEP(I),CSITR(I),CAPIT(I)
1001  FORMAT (9F)
200   CONTINUE
C       OTHER ENVIRONMENTAL CONDITIONS
      READ (23,1002) AVEWGE,AVEMST,RRAT,(SINT(J),J=1,5)
1002  FORMAT (8F)
C       BANKS DECISIONS
      DO 201 I=1,TNOBK
      READ (24,1003) CAC(I),TDDB(I),TOTOB(I),(SEC(I,J),J=1,5),
     1  (LOAN(I,J),J=1,9),(LOAINT(I,J),J=1,9),
     2  VORE(I),CSTKBI(I),CSTKPV(I),LSRES(I),RESCON(I),(SEROFF(I,J),
     3  J=1,3),STAFF(I),STASAL(I),MARMON(I),BPACC(I),(BNPFF(I,J),J=1,3)
1003  FORMAT (41F)
201   CONTINUE
C
C       INDEX FOR THE ECONOMY
C
      Y=RAN(Y)
      IF (Y.LT.XN) GO TO 7000
```

```
      X=1.
      XN=XN+.35
      GO TO 7001
7000  X=-1.
      XN=XN-.05
7001  DUM=(X*RAN(V)*.5)
      ECOIND=DUM
      ECOINX=IFIX(ECOIND*10)+100
C
C
C     LOOP: ENVIRONMENT
C
C     SECURITIES MARKET INTEREST RATES
      CXINT=SINT(3)
      IF (PERIOD.GT.1) GO TO 7500
      SINT(1)=ECOIND*.0168+.0658
      SINT(2)=ECOIND*.0088+.0571
      SINT(3)=ECOIND*.0437+.0439
      SINT(4)=ECOIND*.003+.0779
      SINT(5)=ECOIND*.0231+.0721
      GO TO 7501
7500  SINT(1)=SINT(1)+ECOIND*.007
      SINT(2)=SINT(2)+ECOIND*.019
      SINT(3)=SINT(3)+ECOIND*.036
      SINT(4)=SINT(4)+ECOIND*.003
      SINT(5)=SINT(5)+ECOIND*.0216
      DO 5000 J=1,5
      IF (SINT(J).LT.0.0) SINT(J)=0.0
5000  CONTINUE
C     GENERATE TOWN DEPOSITS
7501  OTTD=TTDEPT
      TTDEPT=TTDEPT*(ECOIND*DEPGRT(1)+1.0)
      OTTDD=TTDEPD
      TTDEPD=TTDEPD*(ECOIND*DEPGRT(2)+1.0)
      TTDEP=TTDEPT+TTDEPD
C     GENERATE AVERAGE WAGE
      IF (XN.LT..35) AVEWGE=AVEWGE*(1.0+ECOIND)
      IF (XN.GT..65) AVEWGE=AVEWGE*(1.0+ECOIND)
      GO TO 7301
7300  AVEWGE=AVEWGE*ECONIND
7301  AVAWGE=AVEWGE*1.4
C     GENERATE AVERAGE STOCK PRICE
      AVEMST=AVEMST+AVEMST*(CXINT-SINT(3))
C     GENERATE MAXIMUM LOAN POTENTIAL
      DO 7190 I=1,9
      XLOAN(I)=XLOAN(I)*(1.0+ECOIND*LOAGRT(I))
7190  CONTINUE
C     CHECK ON RESERVE REQUIREMENT
      Z=0.0
      IF (XN.LT..35) Z=+1.0
      IF (XN.GT..65) Z=-1.0
      RRAT=RRAT+Z
C     GENERATE FEDERAL RESERVE BORROWED MONEY RATE AND RATE FOR
C     FUNDS SUPPLIED TO THE FEDERAL RESERVE
      FRBOMR=.65+RAN(I)*2.0*ECOIND
      RFSFR=.37+RAN(J)*2.0*ECOIND
C
C
C     LOOP: BANKS CONDITIONS
C
```

```
C       SERVICES OFFERED EVALUATED
7601    DO 1500 I=1,TNOBK
        DO 1100 J=1,3
        IF (SEROFF(I,J).EQ.0.0) GO TO 1100
        EXSROF(I)=EXSROF(I)+1500.0
        EFMAR(I)=EFMAR(I)+1.0
1100    CONTINUE
        MARMON(I)=MARMON(I)+(RAN(M)*EFMAR(I)*15000.0)
C       PERSONNEL
        X=AINT(.10*STAFF(I))
        BAVAW=STASAL(I)/STAFF(I)
        IF (BAVAW.LT.AVAWGE) X=AINT(.10+((BAVAW/AVAWGE)*STAFF(I)))
        STAFF(I)=STAFF(I)-X
        STASAL(I)=STASAL(I)-(X*BAVAW)
1500    CONTINUE
C       INDIVIDUALS, PARTNERSHIPS, AND BUSINESS DEPOSITS
        HIPAID=0.0
        ALMON=0.0
        DO 6401 I=1,TNOBK
        IF (BPACC(I).GT.HIPAID) HIPAID=BPACC(I)
        ALMON=ALMON+MARMON(I)
6401    CONTINUE
        DO 6403 I=1,TNOBK
        EFF(I,1)=133532.0+29.5291*(BNPFF(I,1)+BNPFF(I,2)+BNPFF(I,3))
        EFF(I,2)=-507.405+.4764*STAFF(I)
        EFF(I,3)=(MARMON(I)/ALMON)*TTDEP
        BPDEP(I)=.70*OBPDEP(I)+.10*EFF(I,1)+.05*EFF(I,2)+.15*EFF(I,3)
        BPDEP(I)=BPDEP(I)-((HIPAID-BPACC(I))*2.0)*BPDEP(I)
        TDD=TDD+BPDEP(I)
6403    CONTINUE
        DO 6402 I=1,TNOBK
        PER(I)=BPDEP(I)/TDD
        BPDEP(I)=PER(I)*TTDEP
        TTDBP(I)=.5288*BPDEP(I)
        TDDBP(I)=.4712*BPDEP(I)
        OBPDEP(I)=.67*OBPDEP(I)+.33*BPDEP(I)
6402    CONTINUE
C       OTHER DEPOSITS
        DO 8500 I=1,TNOBK
C       CERTIFIED AND OFFICIERS CHECKS
        TETC(I)=7546.19+.00632*(TTDBP(I)+TDDBP(I))
C       STATE AND MUNICIPLE DEPOSITS
        SMDEP(I)=-13376.4+.0422*(TTDBP(I)+TDDBP(I))+.5524*SEC(I,2)
        TSMDD(I)=.43456*SMDEP(I)
        TSMTD(I)=.56544*SMDEP(I)
C       U.S. GOVERNMENT DEPOSITS
        USDEP(I)=-11280.4+.0423*(TTDBP(I)+TDDBP(I))+.0333*SEC(I,1)
        TUSDD(I)=.94602*USDEP(I)
        TUSTD(I)=.05398*USDEP(I)
C       DOMESTIC INTERBANK DEPOSITS
        CBDEP(I)=3393.63+.0414*(TTDBP(I)+TDDBP(I))+.3047*(TDDB(I)
     1  +TOTDB(I))
        TCBDD(I)=.94164*CBDEP(I)
        TCBTD(I)=.05836*CBDEP(I)
C       FEDERAL RESERVE REQUIREMENTS
        FRR(I)=RRAT*(TTDBP(I)+TDDBP(I)+USDEP(I)+SMDEP(I)+CBDEP(I))
C       CASH IN THE PROCESS OF COLLECTION
        TCIPC(I)=.0825*(TETC(I)+TTDBP(I)+TDDBP(I)+SMDEP(I)+USDEP(I)
     1  +CBDEP(I))
C       LOSS ON CASH IN THE PROCESS OF COLLECTION
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      RAP=RAN(AP)*.005
      LCIPC(I)=RAP*TCIPC(I)
      TCIPC(I)=TCIPC(I)-LCIPC(I)
8500  CONTINUE
C     DECIDING LOANS
      DO 6302 J=I,9
      MLOAN(J)=XLOAN(J)
      LOWINT(J)=100.0
      DO 6301 I=1,TNOBK
      DINT(I,J)=LOAINT(I,J)
6301  CONTINUE
6310  DO 6303 I=1,TNOBK
      IF (DINT(I,J).LT.LOWINT(J)) LOWINT(J)=DINT(I,J)
6303  CONTINUE
      IF (LOWINT(J).EQ.100.0) GO TO 6302
      DO 6304 I=1, TNOBK
      IF (DINT(I,J).NE.LOWINT(J)) GO TO 6304
      IF (MLOAN(J).LT.LOAN(I,J)) GO TO 6305
      ALOAN(I,J)=LOAN(I,J)
      MLOAN(J)=MLOAN(J)-ALOAN(I,J)
      GO TO 6306
6305  ALOAN(I,J)=MLOAN(J)
      MLOAN(J)=0.0
6306  TLOAN(I)=TLOAN(I)+ALOAN(I,J)
      DLOAN(I)=DLOAN(I)+LOAN(I,J)
      DINT(I,J)=100.0
6304  CONTINUE
      LOWINT(J)=100.0
      GO TO 6310
6302  CONTINUE
6309  ULOAN(I)=DLOAN(I)-TLOAN(I)
      DO 6300 I=1,TNOBK
      ULOAN(I)=DLOAN(I)-TLOAN(I)
6300  CONTINUE
      DO 8501 I=1,TNOBK
C     BAD LOAN LOSSES
      LOALOS(I)=0.0
      DO 8100 J=1,9
      LOALOS(I)=LOALOS(I)+((RAN(X)*.1)*LOAINT(I,J)*ALOAN(I,J))
8100  CONTINUE
C     BAD SECURITY LOSSES
      SECLOS(I)=0.0
      DO 8101 J=1,5
      SECLOS(I)=SECLOS(I)+(RAN(Y)*.1*SEC(I,J)*SINT(J))
8101  CONTINUE
C     SUFFICENCY OF CASH AND CURRENCY
      MINACC=.0156*(TTDBP(I)+TDDBP(I)+SMDEP(I)+USDEP(I)+CRDEP(I)+
     1  TETC(I))
      IF (CAC(I).GT.MINACC) GO TO 8200
      SHCAC(I)=MINACC-CAC(I)
      GO TO 8201
8200  SHCAC(I)=0.0
C     CHECK ON LOAN AND SECURITY RESERVES
8201  LSRES(I)=LSRES(I)-LOALOS(I)-SECLOS(I)
      IF (LSRES(I).GT.0.0) GO TO 8300
      RESCON(I)=RESCON(I)+LSRES(I)
      LSRES(I)=0.0
C     CHECK ON RESERVE FOR CONTINGENCIES
8300  RESCON(I)=RESCON(I)-SHCAC(I)-LCIPC(I)
      IF (RESCON(I).GT.0.0) GO TO 8501
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      CONRSH(I)=-RESCON(I)
      RESCON(I)=0.0
8501  CONTINUE
C     CAPITAL ACCOUNTS
      DO 8540 I=1,TNOBK
      IF (CSTKBI(I).LE.0.0) GO TO 8540
      IF (CSTKPV(I).GT.STKPRI(I)) GO TO 8551
      CSSLD(I)=CSSLD(I)+CSTKBI(I)
      CAPIT(I)=CAPIT(I)+(CSTKBI(I)*CSTKPV(I))
      IF (CSTKPV(I).LT.STKPRI(I)) CONCAP(I)=CONCAP(I)+(CSTKBI(I)*
     1 (STKPRI(I)-CSTKPV(I)))
      CONCAP(I)=CONCAP(I)
      BROFEE(I)=.025*(CSTKBI(I)*CSTKPV(I))
      GO TO 8540
8551  PERC=.50+(RPC(I)/10)
      ACSSLD=CSTKBI(I)*((RAN(B)*.20+.80)*PERC)
      CSSLD(I)=CSSLD(I)+ACSSLD
      CAPIT(I)=ACSSLD*CSTKPV(I)+CAPIT(I)
      CONCAP(I)=CONCAP(I)
      TCSTK(I)=TCSTK(I)+(CSTKBI(I)-ACSSLD)
      CSITR(I)=CSITR(I)-(CSTKBI(I)-ACSSLD)*CSTKPV(I)
      BROFEE(I)=(CSTKBI(I)*CSTKPV(I))*.025
8540  CONTINUE
C     BALANCE SHEET TOTALS
8550  DO 8800 I=1,TNOBK
      SW1=0.0
      BORMON(I)=0.0
      FSFR(I)=ULOAN(I)
C     LIABILITIES
      BPDEP(I)=TTDBP(I)+TDDBP(I)+TETC(I)
      GOVDEP(I)=SMDEP(I)+USDEP(I)
      TOTDEP(I)=TTDBP(I)+TSMTD(I)+TUSTD(I)+TCBTD(I)
      TDDEP(I)=TDDBP(I)+TUSDD(I)+TSMDD(I)+TCBDD(I)
      SAVDEP(I)=TOTDEP(I)+TDDEP(I)+TETC(I)
      MLIAB(I)=.0423*SAVDEP(I)
9401  MISLIA(I)=MLIAB(I)+BORMON(I)
C     ASSETS
      CBOBCI(I)=CAC(I)+TDDB(I)+TOTOB(I)+TCIPC(I)+FRR(I)
      TBNPFF(I)=BNPFF(I,1)+BNPFF(I,2)+BNPFF(I,3)
      OMASS(I)=.0166*SAVDEP(I)
      TMA(I)=VORE(I)+OMASS(I)+TBNPFF(I)
      TSEC(I)=SEC(I,1)+SEC(I,2)+SEC(I,3)+SEC(I,4)+SEC(I,5)
9101  TASST(I)=CBOBCI(I)+TSEC(I)+TMA(I)+TLOAN(I)+FSFR(I)
C     CAPITAL ACCOUNTS
      CAPACC(I)=CAPIT(I)+CONCAP(I)+LSRES(I)+RESCON(I)
      TLIAB(I)=MISLIA(I)+SAVDEP(I)
      TLICA(I)=TLIAB(I)+CAPACC(I)
      TSTK(I)=TCSTK(I)
      IF (SW1.EQ.1.0) GO TO 8800
C     BORROWED MONEY AND MONEY SUPPLIED TO F.R.S. RATES
      MONUSD=TASST(I)
      TAVMON=TLICA(I)
      IF (TAVMON-MONUSD) 8802,8800,8801
8802  BORMON(I)=MONUSD-TAVMON
      SW1=1.0
      GO TO 9401
8801  MONSUR=TAVMON-MONUSD
      FSFR(I)=FSFR(I)+MONSUR
      SW1=1.0
      GO TO 9401
```

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8800    CONTINUE
C
C
C       LOOP: PROFIT/LOSS
C
        DO 8804 I=1,TNOBK
C       EXPENSES
9102    DEPN(I)=.02*(TBNPFF(I)+VORE(I))
        STASAL(I)=STASAL(I)*52.0
        GINS(I)=(RAN(G)*.015)*SAVDEP(I)+100000.0
        MAINT(I)=.01*(TBNPFF(I)+VORE(I))*52.0+100000.0
        INONAC(I)=BPACC(I)*TOTDEP(I)
        BROFEE(I)=.01*TSEC(I)+BROFEE(I)
        INTBM(I)=BORMON(I)*FRBOMR
        INSPER(I)=.40*STASAL(I)
        MISEXP(I)=145000.0+(.015*TASST(I))
        TEXP(I)=STASAL(I)+DEPN(I)+GINS(I)+MAINT(I)+INONAC(I)+BROFEE(I)+
     1  INTBM(I)+INSPER(I)+MISEXP(I)
C       INCOME
        DO 7100 J=1,9
        TELOA(I)=TELOA(I)+ALOAN(I,J)*LOAINT(I,J)
7100    CONTINUE
        DO 7101 J=1,5
        TESEC(I)=TESEC(I)+SEC(I,J)*SINT(J)
7101    CONTINUE
        INVORE(I)=((RAN(V)*.015)+.080)*VORE(I)
        TEFFS(I)=FSFR(I)*RFSFR
        TINC(I)=TELOA(I)+TESEC(I)+INVORE(I)+TEFFS(I)
C       PROFIT/LOSS(GO TO STOCK QUOTE)
        GROINC(I)=TINC(I)-TEXP(I)
        IF (GROINC(I).LE.0.0) GO TO 7005
C       TAXES
        TAXES(I)=(.50*GROINC(I))
        PROF(I)=GROINC(I)-TAXES(I)
        RPC(I)=RPC(I)+1.0
C       CHECK ON EQUITY
        Y=SAVDEP(I)/25.0
        IF (Y.GT.CAPACC(I)) GO TO 3200
        UNDPRO(I)=UNDPRO(I)+PROF(I)
        ADDOWN(I)=PROF(I)
        W(I)=1.0
        GO TO 7007
C       DIVIDENDS
3200    TCSDIV(I)=0.0
        IF (RPC(I).LE.0.0) GO TO 8600
        XY=.03*CAPIT(I)
        IF (PROF(I).LE.XY) GO TO 8600
        TCSDIV(I)=PROF(I)-(.25*PROF(I))
        CSEPS(I)=TCSDIV(I)/CSSLD(I)
C       OWNERS EQUITY
8600    ADDOWN(I)=(PROF(I)-TCSDIV(I))
        UNDPRO(I)=UNDPRO(I)+ADDOWN(I)
        GO TO 7007
C       STOCK QUOTE ON BANK STOCK
7005    LOSS(I)=-GROINC(I)
        RPC(I)=RPC(I)-1.0
        PROF(I)=0.0
        IF (LOSS(I).GT.0.0) GO TO 7007
        STKPRI(I)=STKPRI(I)-(SINT(3)*STKPRI(I))
        GO TO 2200
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7007     IF (TCSPIV(I).NE.0.0) GO TO 7006
         STKPRI(I)=(STKPRI(I)-(LCSS(I)/(TCSTK(I)+CSSLD(I))-SINT(3)
     1   *STKPRI(I)))
         GO TO 2200
7006     STKPRI(I)=(CSEPS(I)*STKPRI(I))+STKPRI(I)
C        % AND CHANGES IN MARKET
2200     CODEP=TTDEPD-OTTDD
         CTDEP=TTDEPT-OTTTD
         PCDEPT=CTDEP/TTDEPT
         PCDEPD=CODEP/TTDEPD
         BPCDEP(I)=TTDBP(I)/TTDEPT
         BPCDED(I)=TDDBP(I)/TTDEPD
8804     CONTINUE
C
C
C        LOOP: PRINT OUTS
C
C        BALANCE SHEET PRINT OUT
         DO 9999 K=1,15
         DO 9900 I=1,TNOBK
         WRITE (5, 9010) I
9010     FORMAT (///'1STATEMENT OF CONDITION AND INCOME OF BANK:',I2,//)
         WRITE (5, 90115)
90115    FORMAT (' STATEMENT OF CONDITION:'///)
         WRITE (5, 91025)
91025    FORMAT (' ASSETS'//)
         WRITE (5, 9103) CBOBCI(I)
9103     FORMAT (' CASH, BALANCES WITH OTHER BANKS, AND CASH'/' COLL
     1ECTION ITEMS - TOTAL',29X,' $',F15.2)
         WRITE (5, 9104) CAC(I)
9104     FORMAT (' CASH AND CURRENCY',36X,' $',F15.2)
         WRITE (5, 9105) FRR(I)
9105     FORMAT (' RESERVE WITH F.R. BANK',31X,' $',F15.2)
         WRITE (5, 9106) TDDB(I)
9106     FORMAT (' DEMAND BALANCES WITH OTHER BANKS IN U.S.',13X,' $',F15
     1.2)
         WRITE (5, 9107) TOTOB(I)
 9107    FORMAT (' OTHER BALANCES WITH BANKS IN U.S.',20X,' $',F15.2)
         WRITE (5, 9109) TCIPC(I)
 9109    FORMAT (' CASH ITEMS IN PROCESS OF COLLECTION',18X,' $',F15.2)
         WRITE (5, 9110) TSEC(I)
 9110    FORMAT (//' SECURITIES - TOTAL',35X,' $',F15.2/)
         WRITE (5, 9111) SEC(I,1)
 9111    FORMAT (' U.S. GOVERNMENT OBLIGATIONS',26X,' $',F15.2)
         WRITE (5, 9112) SEC(I,2)
 9112    FORMAT (' OBLIGATIONS OF STATE AND SUBDIVISIONS',16X,' $',F15.2)
         WRITE (5, 9114) SEC(I,3)
9114     FORMAT (' CORPORATE STOCKS',37X,' $',F15.2)
         WRITE (5, 91145) SEC(I,4)
91145    FORMAT (' CORPORATE BONDS',38X,' $',F15.2)
         WRITE (5, 9113) SEC(I,5)
 9113    FORMAT (' OTHER NOTES, BONDS, AND DEBENTURES',19X,' $',F15.2)
         WRITE (5, 9115) TLOAN(I)
 9115    FORMAT(//' LOAN - TOTAL',41X,' $',F15.2/)
         WRITE (5, 9116) ALOAN(I,1)
 9116    FORMAT (' REAL ESTATE LOAN',36X,' $',F15.2)
         WRITE (5, 91165) ALOAN(I,2)
91165    FORMAT (' LOAN TO COMMERCIAL AND FOREIGN BANKS',16X,' $',F15.2)
         WRITE (5, 9117) ALOAN(I,3)
 9117    FORMAT (' LOAN TO OTHER FINANCIAL INSTITUTIONS',16X,' $',F15.2)
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      WRITE (5, 9118) ALOAN(I,4)
 9118 FORMAT (' LOAN TO BROKERS AND DEALERS IN SECURITIES'11X,' $',F
     1 15.2)
      WRITE (5, 91195) ALOAN(I,5)
91195 FORMAT (' LOAN TO FARMERS',37X,' $',F15.2)
      WRITE (5, 9119) ALOAN(I,6)
 9119 FORMAT (' OTHER LOAN FOR CARRYING SECURITIES',18X,' $',F15.2)
      WRITE (5, 9120) ALOAN(I,7)
 9120 FORMAT (' COMMERCIAL AND INDUSTRIAL LOAN',22X,' $',F15.2)
 9011 WRITE (5, 9121) ALOAN(I,8)
 9121 FORMAT ('  OTHER LOAN TO INDIVIDUALS',26X,' $',F15.2)
      WRITE (5, 9122) ALOAN(I,9)
 9122 FORMAT (' ALL OTHER LOAN ',37X,' $',F15.2)
      WRITE (5, 9530) ULOAN(I)
 9530 FORMAT (' UNUSED LOAN MONEY',35X,' $',F15.2)
      WRITE (5, 9012) FSFR(I)
 9012 FORMAT (' EXCESS FUNDS SUPPLIED TO THE FEDERAL RESERVE',8X,
     1' $',F15.2)
      WRITE (5, 9123) TMA(I)
 9123 FORMAT (//' MISCELLANEOUS ASSETS - TOTAL',25X,' $',F15.2/)
      WRITE (5, 9124) BNPFF(I,1)
 9124 FORMAT (' BANK PREMISES OWNED',34X,' $',F15.2)
      WRITE (5, 9125) BNPFF(I,2)
 9125 FORMAT (' BANK FIXTURES OWNED',34X,' $',F15.2)
      WRITE (5, 9126) BNPFF(I,3)
 9126 FORMAT (' BANK FURNITURE OWNED',33X,' $',F15.2)
      WRITE (5, 9127) VORE(I)
 9127 FORMAT (' OTHER REAL ESTATE - DIRECT AND INDIRECT',14X,' $',F15
     1 .2)
      WRITE (5, 9128) OMASS(I)
 9128 FORMAT (' ALL OTHER MISCELLANEOUS ASSETS',23X,' $',F15.2)
 9013 WRITE (5, 9129) TASST(I)
 9129 FORMAT (///' TOTAL ASSETS:',40X,' $',F15.2)
C     LIABILITIES AND CAPITAL ACCOUNTS
      WRITE (5, 9130) BPDEP(I)
 9130 FORMAT (////' BUSINESS AND PERSONAL DEPOSITS - TOTAL',15X,' $',
     1 F15.2//)
      WRITE (5, 9131) TDDBP(I)
 9131 FORMAT (' INDIVIDUALS, PARTNERSHIPS, AND CORPORATIONS'/' DEMAND'
     1 ,47X,' $',F15.2)
      WRITE (5, 9132) TTDBP(I)
 9132 FORMAT (' INDIVIDUALS, PARTNERSHIPS, AND CORPORATIONS'/' TIME'
     1 ,49X,' $',F15.2)
      WRITE (5, 9133) TETC(I)
 9133 FORMAT (' CERTIFIED AND OFFICIERS CHECKS,'/'  LETTERS OF CREDIT
     1 AND TRAVELERS CHECKS, ETC.'7X,' $',F15.2)
      WRITE (5, 9134) GOVDEP(I)
 9134 FORMAT (//' GOVERNMENT DEPOSITS - TOTAL',26X,' $',F15.2)
      WRITE (5, 9135) TUSDD(I)
 9135 FORMAT (/' U.S. GOVERNMENT - DEMAND',29X,' $',F15.2)
      WRITE (5, 9136) TUSTD(I)
 9136 FORMAT (' U.S. GOVERNMENT - TIME',31X,' $',F15.2)
      WRITE (5, 9137) TSMDD(I)
 9137 FORMAT (' STATES AND MUNICIPLES - DEMAND',23X,' $',F15.2)
      WRITE (5, 9138) TSMTD(I)
 9138 FORMAT (' STATES AND MUNICIPLES - TIME',25X,' $',F15.2)
      WRITE (5, 9139) CBDEP(I)
 9139 FORMAT (//' DOMESTIC INTERBANK DEPOSITS - TOTAL',19X,' $',F15.2)
      WRITE (5, 9140) TCBDD(I)
 9140 FORMAT (/' COMMERCIAL BANKS - DEMAND',28X,' $',F15.2)
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      WRITE (5, 9141) TCRTD(I)
 9141 FORMAT (' COMMERCIAL BANKS - TIME',30X,' $',F15.2)
      WRITE (5, 9142) TOTDEP(I)
 9142 FORMAT (///' TOTAL TIME DEPOSITS',34X,' $',F15.2)
      WRITE (5, 9143) TDDEP(I)
 9143 FORMAT (' TOTAL DEMAND DEPOSITS',32X,' $',F15.2)
      WRITE (5, 9144) SAVDEP(I)
 9144 FORMAT (/' TOTAL DEPOSITS',39X,' $',F15.2///)
      WRITE (5, 9145) MISLIA(I)
 9145 FORMAT (' MISCELLANEOUS LIABILITIES - TOTAL',20X,' $',F15.2/)
      WRITE (5, 9146) BORMON(I)
 9146 FORMAT (' REDISCOUNTS AND OTHER BORROWED MONEY',17X,' $',F15.2)
      WRITE (5, 9147) MLIAB(I)
 9147 FORMAT (' OTHER MISCELLANEOUS LIABILITIES',22X,' $',F15.2//)
      WRITE (5, 9148) CAPACC(I)
 9148 FORMAT (' CAPITAL ACCOUNTS - TOTAL',29X,' $',F15.2//)
      WRITE (5, 9149) CAPIT(I)
 9149 FORMAT (' CAPITAL',46X,' $',F15.2)
      WRITE (5, 9150) CONCAP(I)
 9150 FORMAT (' CONTRIBUTED CAPITAL',34X,' $',F15.2)
      WRITE (5, 91505) UNDPRO(I)
91505 FORMAT (' UNDIVIDED PROFITS',36X,' $',F15.2)
      WRITE (5, 9152) LSRES(I)
 9152 FORMAT (' LOAN AND SECURITY RESERVE',28X,' $',F15.2)
      WRITE (5, 9153) RESCON(I)
 9153 FORMAT (' RESERVE FOR CONTINGENCIES',28X,' $',F15.2///)
      WRITE (5, 91535) CSITR(I)
91535 FORMAT (' COMMON STOCK IN TREASURY',29X,' $',F15.2)
      WRITE (5, 9154) TLIAB(I)
 9154 FORMAT (' TOTAL LIABILITIES',36X,' $',F15.2)
      WRITE (5, 9155) TLICA(I)
 9155 FORMAT (/' TOTAL LIABILITIES AND CAPITAL ACCOUNTS',15X,' $',F15
     1 .2//////)
      IF (W(I).NE.1.0) GO TO 9300
C
C     INCOME STATEMENT PRINT OUT
C
C     INCOME
9300  WRITE (5, 9201)
9201  FORMAT ('1PROFIT AND LOSS STATEMENT',////)
      WRITE (5, 9202)
9202  FORMAT (' INCOME')
      WRITE (5, 9203) TELOA(I)
9203  FORMAT (//,' LOAN INTEREST',40X,' $',F15.2)
      WRITE (5, 9204) TESEC(I)
9204  FORMAT (' SECURITIES INTEREST',34X,' $',F15.2)
      WRITE (5, 9246) TEFFS(I)
9246  FORMAT (' EARNED FROM FEDERAL FUNDS SUPPLIED',19X,' $',F15.2)
      WRITE (5, 9206) INVORE(I)
9206  FORMAT (' OTHER REAL ESTATE RENT',31X,' $',F15.2)
      WRITE (5, 9207) TINC(I)
9207  FORMAT (//,' TOTAL INCOME',41X,' $',F15.2)
C     EXPENSES
      WRITE (5, 9208)
9208  FORMAT (///,' EXPENSES')
      WRITE (5, 9209) DEPN(I)
9209  FORMAT (//,' DEPRECIATION',41X,' $',F15.2)
      WRITE (5, 9215) STASAL(I)
9215  FORMAT (' STAFF',48X,' $',F15.2)
      WRITE (5, 9216) MARMON(I)
```

```
9216    FORMAT (' MARKETING EXPENDITURES',31X,' $',F15.2)
        WRITE (5, 9217) EXSROF(I)
9217    FORMAT (' EXTRA SERVICES OFFERED',31X,' $',F15.2)
        WRITE (5, 9218) INOMAC(I)
9218    FORMAT (' INTEREST PAID ON ACCOUNTS',28X,' $',F15.2)
        WRITE (5, 9219) BROFEE(I)
9219    FORMAT (' BROKERS FEE',42X,' $',F15.2)
        WRITE (5, 9220) INTBM(I)
9220    FORMAT (' INTEREST PAID ON BORROWED MONEY',22X,' $',F15.2)
        WRITE (5, 9221) GINS(I)
9221    FORMAT (' GENERAL INSURANCE',36X,' $',F15.2)
        WRITE (5, 9222) INSPER(I)
9222    FORMAT (' PERSONNEL INSURANCE',34X,' $',F15.2)
        WRITE (5, 9223) MAINT(I)
9223    FORMAT (' MAINTENANCE',42X,' $',F15.2)
        WRITE (5, 9224) CONRSH(I)
9224    FORMAT (' RESERVE SHORTAGES',36X,' $',F15.2)
        WRITE (5, 9265) MISEXP(I)
9265    FORMAT (' MISCELLANEOUS EXPENSES',31X,' $',F15.2)
        WRITE (5, 9226) TEXP(I)
9226    FORMAT (//,' TOTAL EXPENSES',39X,' $',F15.2)
        WRITE (5, 9227) GROINC(I)
9227    FORMAT (///,' NET INCOME',43X,' $',F15.2)
        WRITE (5, 9228) TAXES(I)
9228    FORMAT (/////,' ADDITION TO FEDERAL INCOME TAX FUND',18X,' $',F
     1  15.2)
        IF (PROF(I).GE.0.0) XROP=PROF(I)
        IF (LOSS(I).GT.0.0) XROP=-LOSS(I)
        WRITE (5, 9229) XROP
9229    FORMAT (//,' PROFIT(+)/LOSS(-)',36X,' $',F15.2)
        WRITE (5, 9230) TCSDIV(I)
9230    FORMAT (/,' DIVIDENDS PAID',39X,' $',F15.2)
        WRITE (5, 9237) ADDOWN(I)
9237    FORMAT (' ADDITION TO OWNERS EQUITY',28X,' $',F15.2)
        WRITE (5, 9231) CSSLD(I)
9231    FORMAT (//,' COMMON STOCK OUTSTANDING',29X,' $',F15.2)
        WRITE (5,9232) CSEPS(I)
9232    FORMAT (' EPS - COMMON',41X,' $',F15.3)
        WRITE (5, 9238) TCSTK(I)
9238    FORMAT (' TREASURY STOCK',39X,' $',F15.2)
        WRITE (5, 9235) STKPRI(I)
9235    FORMAT (/,' MARKET PRICE OF STOCK',32X,' $',F15.2)
        WRITE (5, 9236) AVEMST
9236    FORMAT (/,' AVERAGE STOCK QUOTATION',30X,' $',F15.2////////)
        WRITE (5, 9245) ECOTNX
9245    FORMAT (' ECONOMIC INDICATOR IS ',I3)
        WRITE (5, 92465) PCDEPT,BPCDET(I)
92465   FORMAT (' TOWN TIME DEPOSITS GREW ',F5.3,' LAST PERIOD, YOUR
     1TIME DEPOSITS WERE ',F5.3,' OF THOSE.')
        WRITE (5, 9247) PCDEPD,BPCDED(I)
9247    FORMAT (' TOWN DEMAND DEPOSITS GREW ',F5.3,' LAST PERIOD,
     1YOUR DEMAND DEPOSITS WERE ',F5.3,' OF THOSE.')
        WRITE (5, 92476) (XLOAN(J),J=1,9),(SINT(J),J=1,5)
92476   FORMAT (////' TOWN DEMAND FOR LOANS WAS (1-9):',9F15.2,/
     1' YIELD ON SECURITIES WAS (1-5):',5F5.3,//)
        IF (W(I).EQ.1.0) WRITE (5, 92475)
92475   FORMAT (' THE BANKS EQUITY WAS LOW, PROFITS ARE RETAINED.'////)
9900    CONTINUE
9999    CONTINUE
C
```

```
C       LOOP: SAVE RECORDS
C
C       WRITE ON FILES
        PERIOD=PERIOD+1.0
        GO TO 291
        WRITE (21, 1000) TNOBK,XN,TTDEPD,TTDEPT,(DEPGRT(I),I=1,2),
     1  (XLOAN(I),I=1,9),(LOAGRT(I),I=1,9),PERIOD
        DO 290 I=1,TNOBK
        WRITE (22,1001) CONCAP(I),CSSLD(I),STKPRI(I),TCSTK(I),
     1  UNDPRO(I),RPC(I),OBPDEP(I),CSITR
290     CONTINUE
        WRITE (23,1002) AVEWAG,AVESTK,RRAT,(SINT(J),J=1,5)
291     CALL EXIT
        END
```

Note: Corrections made to this text reflect corrections made before previously seen results were received.

CHAPTER X

DATA FILES

Size of Banks Used

Bank 1: small - $20,000,000

Bank 2: medium - $50,000,000

Bank 3: medium - $50,000,000

Bank 4: large - $100,000,000

File FOR21.DAT: Loan and Deposit Potential of Town

Total number of banks - 4

Trend Indicator - .50

Total Town Demand Deposits - $110,000,000

Total Town Time Deposits - $110,000,000

Growth rate of Demand Deposits - .08

Growth rate of Time Deposits - .07

Period - 1

		Loan Potential	Growth Rate
1.	real estate	$ 50,000,000	.08
2.	commercial and foreign banks	20,000	.005
3.	other financial institutions	35,000	.01
4.	brokers and dealers in securities	15,000	.02
5.	farm	60,000,000	.075
6.	carrying securities	100,000	.01
7.	commercial and industrial	40,000,000	.08
8.	individuals	5,000,000	.05
9.	all other	1,000,000	.04

File FOR22.DAT: Original Condition of Banks*

	1	2	3	4
Contributed Capital	$ 75,000	$ 250,000	$ 500,000	$ 1,500,000
Common Stock Sold (held by public)	1,000	3,000	5,000	100,000
Stock Price (on market)	5.00	8.00	10.00	15.00
Treasury Stock	0	0	50	1,000
Undivided Profits	10,000	20,000	20,000	1,250,000
Running Profit Count	0	0	0	0
Last Period's Business and Personal Deposits	20,000,000	50,000,000	50,000,000	100,000,000
Value of Common Stock in Treasury	0	0	500	10,000

* round figures used because it is easier to see differences and changes

File FOR23.DAT: Other Environmental Conditions

Average wage in town - $50.00 / period

Average stock price on market - $10.00

Federal Reserve Ratio - 10%

Original U. S. Government bond yield - 0.0

Original State and Municipal bond yield - 0.0

Original Corporate Stock bond yield - 0.0

Original Corporate Bond bond yield - 0.0

Original Other Notes and Debentures bond yield - 0.0

File FOR24.DAT: Bank's Decisions

	1	2	3	4
Cash & Currency	$ 50,000	$ 100,000	$ 90,000	$ 200,000
Demand Bal. in Other Banks	0	0	2,500	30,000
Other Bal. in Other Banks	0	0	0	50,000
Securities:				
U. S. Gov't Bonds	1,000,000	1,000,000	1,000,000	3,000,000
State & Mun. Bonds	2,000,000	3,000,000	2,000,000	4,000,000
Corp. Stocks	50,000	0	1,000,000	1,000,000
Corp. Bonds	500,000	1,000,000	500,000	1,000,000
Other Notes & Debentures	20,000	2,000,000	1,000,000	2,000,000
Loans:				
Real Estate	5,000,000	10,000,000	15,000,000	40,000,000
Com. & For. Bks	0	100,000	0	1,000,000
Other Fin. Institutions	0	0	0	500,000
Bnks & Dlrs in Sec.	5,000	10,000	0	200,000
Farm	5,000,000	10,000,000	15,000,000	40,000,000
Car Sec.	0	30,000	0	0
Com. & Ind.	5,000,000	5,000,000	5,000,000	7,000,000
Indivi.	0	2,000,000	0	1,000,000
All Other	1,000,000	1,000,000	1,000,000	2,000,000
Loan interest to be charged:				
Real Estate	7%	7%	7%	6%
Com. & For. Bks	0	6%	0	7%
Other Fin. Institutions	0	0	0	8%
Bnks & Dlrs in Sec.	8%	10%	0	9%
Farm	10%	9%	9%	9%
Car Sec.	0	10%	0	0
Com. & Ind.	9%	10%	10%	9%

	1	2	3	4
Indivi.	0	10%	0	9%
All Other	9%	10%	10%	10%
Other Real Estate	$ 0	$ 0	$ 7,500	$ 100,000
Com. Stk	0	0	0	0
Com. Stk P. V.	0	0	0	0
Loan & Sec. Res.	50,000	50,000	75,000	250,000
Contingency Res.	100,000	50,000	75,000	500,000
Extra Serv. Offered:				
1	0	1	1	1
2	0	0	1	1
3	0	0	0	1
# Staff	10	15	20	50
Wages	1,000	1,800	2,500	4,000
Marketing Money	50,000	50,000	75,000	250,000
To Pay on Sav. Dep.	5%	5%	5.5%	6%
Bank Premises:				
Premises	75,000	100,000	90,000	250,000
Fixture	15,000	20,000	15,000	50,000
Furniture	20,000	15,000	20,000	45,000

APPENDIXES

APPENDIX A

Variables Used in BANSIM.ORG

I. Undimensioned

ACSSLD- the actual common stock sold during a time period

ALMON - total of all bank's marketing monies

AVESTK - average stock market price of a share of stock

AVAWGE - average bank wage in town

AVEWGE - average town wage

BAVAW - average wage per employee in an individual bank

C - counter in routine for alloting loans

CDDEP - change in an individual bank's amount of demand deposits from one period to the next

CTDEP - change in an individual bank's amount of time deposits from one period to the next

CXINT - storage place for previous period's corporate stock yield

DUM - dummy variable used to compute economic index

ECOIND - economic index in floating point mode

ECOINX - economic index in integer mode

FRBOMR - Federal Reserve System's borrowed money rate

HIPAID - highest interest paid on savings accounts by any bank in town

MINACC - minimum acceptable cash and currency requirement per individual bank

MONSUR - money surplus after computing bank's assets and liabilities

MONUSD - total amount of money used by the bank (total liabilities)

OTTDD - previous period's total town demand deposits

OTTTD - previous period's total town time deposits

PCDEPD - percent change in town's total demand deposits from one period to the next

PCDEPT - percent change in town's total time deposits from one period to the next

PERC - dummy variable used in computing amount of bank stock sold when sold over market quote on stock

PERIOD - time period in which the game is played

RAP - dummy variable

RFSFR - rate at which funds are borrowed from the Federal Reserve System

RRAT - reserve requirement for banks

SW1 - dummy switch

TAVMON - total available money of individual bank - total assets

TDD - dummy variable of total deposits - used to compute business and personal deposits per bank

TNOBK - number of banks in town - also number of banks playing the game

TTDEPD - total town demand deposits

TTDEPT - total town time deposits

X - dummy variable

XN - trend record

XY - dummy variable

II. 1-dimensional*

ADDOWN(I) - amount of profit added to owner's equity after taxes and dividends

BORMON(I) - funds borrowed from Federal Reserve System to cover bank's shortages

BPACC(I) - rate bank pays on saving accounts of depositors

BPCDED(I) - percentage of town's demand deposits that bank holds

BPCDET(I) - percentage of town's time deposits that bank holds

BPDEP(I) - total business and personal deposits

BROFEE(I) - broker's fees

CAC(I) - cash and currency

CAPACC(I) - total capital accounts

CAPIT(I) - capital

CBDEP(I) - total commercial bank deposits

CBOBI(I) - total cash and currency, balances in other banks, and amount on deposits with Federal Reserve

CONCAP(I) - contributed capital

CONRSH(I) - contingency reserve shortage

CSEPS(I) - common stock's earnings per share

CSITR(I) - dollar value of common stock in treasury

* (I) indicates "per individual bank" unless otherwise specified

CSSLD(I) - common stock sold

CSTKBI(I) - common stock being issued

CSTKPV(I) - par value of common stock being issued

DEPGRT(I) - town deposit growth rate

1. demand
2. time

DEPN(I) - depreciation

DLOAN(I) - desired loan level

EFMAR(I) - sum of extra services offered

EXSROF(I) - cost of extra services offered

FRR(I) - amount on deposit with Federal Reserve System against deposits in bank

FSFR(I) - funds supplied to Federal Reserve System

GINS(I) - general insurance

GOVDEP(I) - U. S. Government deposits

GROINC(I) - gross income

INONAC(I) - interest paid on savings accounts

INSPER(I) - insurance, etc. on bank's personnel

INTBM(I) - interest paid on borrowed money

INVORE(I) - income earned on other real estate

LCIPC(I) - loss on cash items in process of collections

LOAGRT(I) - growth rate of deposits in town

1. demand
2. time

LOALOS(I) - total loss on loans

LOSS(I) - period's loss

LOWINT(I) - lowest interest available to public on loans

1. Real estate loans
2. Loans to commercial and foreign banks
3. Loans to other financial institutions
4. Loans to brokers and dealers in securities
5. Loans to farmers
6. Other loans for carrying securities
7. Commercial and industrial loans
8. Other loans to individuals
9. All other miscellaneous loans

LSRES(I) - loan and security reserves

MAINT(I) - maintainance

MARMON(I) - marketing money

MISEXP(I) - miscellaneous expenses

MISLIA(I) - miscellaneous liabilities

MLIAB(I) - total of miscellaneous liabilities and borrowed money

MLOAN(I) - maximum demand for loan in town

1. Real estate loans
2. Loans to commercial and foreign banks
3. Loans to other financial institutions
4. Loans to brokers and dealers in securities
5. Loans to farmers
6. Other loans for carrying securities
7. Commercial and industrial loans
8. Other loans to individuals
9. All other miscellaneous loans

OBPDEP(I) - last period's business and personal deposits

OMASS(I) - other miscellaneous assets

PER(I) - percent of theoretical market

PROF(I) - period's profit

RESCON(I) - reserve for contingencies

RPC(I) - running profit count

SAVDEP(I) - total deposits

SECLOS(I) - total security loss

SHCAC(I) - shortage in cash and currency

SINT(I) - securities yield

1. U. S. government securities
2. State and Municipal securities
3. Corporate stock
4. Corporate bonds
5. Other notes and debentures

SMDEP(I) - state and municipal deposits

STAFF(I) - number of employees

STASAL(I) - total amount of staff salary

STKPRI(I) - bank's stock price

TASST(I) - total assets

TAXES(I) - taxes

TBNPFF(I) - total of bank's physical features

TCBDD(I) - total commercial bank demand deposits

TCBTD(I) - total commercial bank time deposits

TCIPC(I) - total cash items in the process of collection

TCSDIV(I) - total common stock dividends

TCSTK(I) - common stock in treasury

TDDB(I) - demand deposits in other banks

TDDBP(I) - total business and personal demand deposits

TDDEP(I) - total demand deposits

TELOA(I) - total earned from loans

TESEC(I) - total earned from portfolio

TETC(I) - all other deposits

TEXP(I) - total operating expenses

TINC(I) - total operating income

TLIAB(I) - total liabilities

TLICA(I) - total liabilities and capital accounts

TLOAN(I) - total loans sold

TMA(I) - total miscellaneous assets

TOTDEP(I) - total time deposits

TOTOB(I) - total other deposits in other banks

TSEC(I) - total dollar amount in portfolio

TSMDD(I) - total state and municipal demand deposits

TSMDEP(I) - total state and municipal deposits

TSMTD(I) - total state and municipal time deposits

TSTK(I) - total treasury stock

TTDBP(I) - total business and personal time deposits

TUSDD(I) - total U. S. government demand deposits

TUSTD(I) - total U. S. government time deposits

ULOAN(I) - unused loan money

UNDPRO(I) - undivided profit

USDEP(I) - U. S. government deposits

VORE(I) - value of other real estate

XLOAN(I) - input/output form of town's loans

1. Real estate loans
2. Loans to commercial and foreign banks
3. Loans to other financial institutions
4. Loans to brokers and dealers in securities
5. Loans to farmers
6. Other loans for carrying securities
7. Commercial and industrial loans
8. Other loans to individuals
9. All other miscellaneous loans

III. 2-dimensional*

ALOAN(I,J) - actual amount loaned in categories

1. Real estate loans
2. Loans to commercial and foreign banks
3. Loans to other financial institutions
4. Loans to brokers and dealers in securities
5. Loans to farmers
6. Other loans for carrying securities
7. Commercial and industrial loans
8. Other loans to individuals
9. All other miscellaneous loans

BNPFF(I,J) - physical features of bank

1. premises

* (I,J) I denotes "per individual bank" and J denotes variations of variable (J will be specified)

2. fixtures

3. furniture

DINT(I,J) - dummy holder of LOAINT(I,J)

1. Real estate loans

2. Loans to commercial and foreign banks

3. Loans to other financial institutions

4. Loans to brokers and dealers in securities

5. Loans to farmers

6. Other loans for carrying securities

7. Commercial and industrial loans

8. Other loans to individuals

9. All other miscellaneous loans

EFF(I,J) - effectiveness

1. bank's physical features

2. staff

3. marketing money

LOAN(I,J) - amount to be available for loans

1. Real estate loans

2. Loans to commercial and foreign banks

3. Loans to other financial institutions

4. Loans to brokers and dealers in securities

5. Loans to farmers

6. Other loans for carrying securities

7. Commercial and industrial loans

8. Other loans to individuals

9. All other miscellaneous loans

LOAINT(I,J) - amount charged for interest

1. Real estate loans
2. Loans to commercial and foreign banks
3. Loans to other financial institutions
4. Loans to brokers and dealers in securities
5. Loans to farmers
6. Other loans for carrying securities
7. Commercial and industrial loans
8. Other loans to individuals
9. All other miscellaneous loans

SEC(I,J) - amounts held in portfolio

1. U. S. Government bonds
2. State and Municipal bonds
3. Corporate stocks
4. Corporate bonds
5. Other notes and debentures

SEROFF(I,J) - optional services offered

3 subscript variables that can indicate any extra service

APPENDIX B

Creation and Amending of Files

As mentioned previously in this paper, there are four files from which the computer will read data to be given to the program. To review for a minute, the four files and their contents are:

1. FOR21.DAT - Loan and Deposit Potential of the Town,
2. FOR22.DAT - the Original Condition of the Banks,
3. FOR23.DAT - Other Environmental Conditions, and
4. FOR24.DAT - the Banks' Decisions.

These files have been broken up along those lines because it is easiest to manipulate them while in this condition. For example, it is easy to change the loan and deposit potential of the town without affecting any other environmental conditions. Also, it is simple to enter the current period's banks' choices without disturbing the other variable values.

The program has been set up to read the values in the files into the program in a free format. This means that the values for the variables need not be in any special column, only that they be in the proper order. The values must be separated by commas (,) though. Thus, 1.0000,01.000 will read the same as 1,1 . This is for the convenience of anyone who is unfamiliar with computers. Data can be entered in any format as long as the values are separated by commas and the data is in the proper order (the proper order can be determined by looking at the READ statements at the beginning of the program).

APPENDIX C

Additions to the Program

As mentioned in the Introduction, the main thrust of this simulated banking community is to emphasize the relationships between various interest rates. The individual banks can always show a profit by "renting" out its deposited money at a higher rate than the bank "rents" the money from its depositors. Real life banking is considerably more complex. Two factors make it so: portfolio gains and losses, and the timing of loans. Both factors can be accounted for with slight modifications to the game.

A bank's portfolio of stocks is no different from an individual's portfolio of stocks. The bank has capital gains and losses the same as an individual. A bank must consider the possibility of capital losses when investing in the market. The relative value of invested funds fluctuates from day to day, meaning the value of the bank's portfolio is unstable over many periods. A bank should consider this.

This fluctuation of the value of the bank's portfolio can be accounted for in the program. This can be accomplished very simply by letting the general economic index affect not only the interest rates of stocks and bonds; but also the selling price of these same stocks and bonds. This way the total dollar value of the bank's portfolio will follow the general activity of the market as reflected by the economic

indicator. Capital losses, of course, must be covered by the bank to ensure its survival and profitability. Capital gains are considered revenue and are applied to expenses or profit.

A second modification of the game that may be made is a provision for a time element in the loans. Unlike the bank's portfolio, which may be totally reinvested at the beginning of each period, loans are released for a specified lifetime. The bank usually cannot call the loan in before it is due. A bank loan is released for a certain amount at a stated rate for a specified amount of time. During that time, at agreed upon intervals, the holder of the loan pays the bank interest and may or may not repay part of the principle of the loan.

The demand for bank loans from the town will naturally be modified slightly also to reflect a time factor. The banks will not only be fulfilling a demand for funds at a specified rate, but also for a specific time period. The bank will no longer be able to reallocate its loaning monies fully at the beginning of each period, but have only newly deposited funds and repaid loan money available for new loans. This will cut considerably into the amount of money the game players may loan out each period. The players will now compete for the short-term, high interest loans; and the long-term, lower interest loans.

EXHIBITS

Exhibit I: Federal Deposit Insurance Corp.: Assets and Liabilities of Insured Commercial Banks: 1968-1972*

(Amounts in thousands of dollars)

Asset, liability, or capital account item	Dec. 31, 1968	Dec. 31, 1969[1]	Dec. 31, 1970	Dec. 31, 1971	Dec. 31, 1972
Total assets	505,453,732[2]	530,714,711	576,350,801	639,903,322	737,699,385
Cash, reserves, balances, and collection items-total	83,269,951	89,335,129	93,048,095	98,690,700	111,844,113
Currency and coin	7,216,003	7,346,973	7,084,430	7,591,590	8,703,008
Reserve with Federal Reserve banks(member banks)	21,230,246	21,452,826	23,325,123	27,482,817	26,074,890
Demand balances with banks in the U.S.(except American branches of foreign banks)	18,089,886	19,389,950	21,088,737	21,962,456	28,156,064
Other balances with banks in the U.S.	334,917	230,150	1,401,661	2,427,914	2,783,379
Balances with banks in foreign countries	264,433	320,921	395,356	567,033	739,928
Cash items in process of collection	36,134,466	40,594,309	39,752,788	38,658,890	45,386,844
Investment securities-total	135,242,315	122,203,185	141,554,863	163,859,514	178,632,700
U.S. Treasury securities	64,171,324	53,262,588	58,880,431	62,696,667	64,709,715
Securities of other U.S. Government agencies and corporations	10,081,641	9,239,140	12,481,059	17,071,836	21,156,678
Obligations of States and subdivisions	58,391,738	57,572,607	67,414,393	80,135,021	87,418,538
Other securities	2,597,612	2,128,850	2,778,980	3,955,990	5,347,769
Trading account securities[3]	...	3,181,756	5,664,059	5,307,564	5,128,096
Federal funds sold[4]	6,526,458	9,712,405	15,952,321	19,643,272	25,634,862
Other loans and discounts-total	264,671,395[2]	286,751,602	298,189,504	328,225,896	388,902,133
Real estate loans-total	65,332,745	70,325,953	73,053,364	82,314,290	99,086,276

Source: Federal Deposit Insurance Corp. Annual Report 1972

Exhibit I: (continued)

(Amounts in thousands of dollars)

Asset, liability, or capital account item	Dec. 31, 1968	Dec. 31, 1969	Dec. 31, 1970	Dec. 31, 1971	Dec. 31, 1972
Loans to domestic commercial and foreign banks	2,145,604	2,425,147	2,581,078	4,405,298	6,119,843
Loans to other financial institutions	13,676,953	14,938,963	15,794,299	16,908,213	23,407,695
Loans to brokers and dealers in securities	6,409,302	5,646,962	6,208,570	7,202,440	11,165,572
Other loans for purchasing or carrying securities	4,068,900	3,994,818	3,517,601	3,646,064	4,467,145
Loans to farmers (excluding loans on real estate)	9,712,410	10,323,657	11,153,583	12,506,206	14,302,106
Commercial and industrial loans (including open market paper)	98,161,381	108,393,788	112,214,990	118,401,203	132,497,555
Other loans to individuals-total	58,414,799	63,355,683	66,005,700	74,796,848	87,629,904
All other loans (including overdrafts)	6,749,301	7,346,631	7,660,319	8,045,334	10,226,037
Total loans and securities	406,440,168	421,848,948	461,360,747	517,036,246	598,297,791
Bank premises, furniture and fixtures, and other assets representing bank premises	6,656,856	8,070,059	9,143,432	10,285,384	11,524,646
Real estate owned other than bank premises	323,257	360,820	406,832	390,833	369,193
Investments in subsidiaries not consolidated[3]	...	651,095	740,897	911,550	1,077,700
Customers' liability on acceptances outstanding	2,472,778	3,308,881	3,753,246	3,914,186	3,471,203
Other assets	6,290,722	7,139,779	7,897,552	8,674,423	11,114,739
Total liabilities, reserves, and capital accounts	505,453,732	530,714,711	576,350,801	639,903,322	737,699,385

Exhibit I: (continued)

(Amounts in thousands of dollars)

Asset, liability, or capital account item	Dec. 31, 1968	Dec. 31, 1969	Dec. 31, 1970	Dec. 31, 1971	Dec. 31, 1972
Business and personal deposits-total	361,993,247	365,934,821	395,246,811	439,568,884	504,283,757
Individuals, partnerships, and corporations-demand	172,006,973	178,185,683	181,897,284	191,775,515	221,204,645
Individuals, partnerships, and corporations-time	180,506,278	176,240,900	204,962,756	237,930,791	271,826,567
Certified and officers' checks, letters of credit, travelers' checks, etc.	9,479,996	11,508,238	8,386,771	9,862,578	11,252,545
Government deposits-total	41,385,278	36,092,200	49,455,597	58,987,158	67,554,342
United States Government-demand	5,012,445	5,050,538	7,914,962	10,263,251	10,939,672
United States Government-time	376,629	222,560	465,476	530,769	614,035
States and subdivisions-demand	16,881,042	17,559,438	17,784,768	17,714,586	18,672,774
States and subdivisions-time	19,115,162	13,259,664	23,290,391	30,478,552	37,327,861
Domestic interbank deposits-total	23,221,458	24,858,037	28,968,652	31,906,847	33,677,534
Commercial banks in the United States-demand	21,424,784	23,394,428	26,290,939	28,014,732	28,569,727
Commercial banks in the United States-time	714,271	415,216	1,424,049	2,441,489	3,548,503
Mutual savings banks in the United States-demand	933,799	1,017,123	975,413	1,163,740	1,205,688
Mutual savings banks in the United States-time	148,604	31,270	278,251	286,886	353,616
Foreign government and bank deposits-total	8,051,716	10,104,607	8,842,795	8,721,173	11,391,934
Foreign governments, central banks, etc.-demand	866,885	940,239	919,683	803,364	908,731
Foreign governments, central banks, etc.-time	4,752,732	6,378,964	4,627,306	5,053,554	6,517,493

Exhibit I: (continued)

(Amounts in thousands of dollars)

Asset, liability, or capital account item	Dec. 31, 1968	Dec. 31, 1969	Dec. 31, 1970	Dec. 31, 1971	Dec. 31, 1972
Banks in foreign countries-demand	2,118,758	2,475,098	3,000,626	2,681,096	3,637,309
Banks in foreign countries-time	313,341	310,306	295,180	183,159	328,401
Total deposits	434,651,699	436,989,665	482,513,855	539,184,062	616,907,567
Demand	228,724,682	240,130,785	247,170,446	262,278,862	296,391,091
Time	205,927,017	196,858,880	235,343,409	276,905,200	320,516,476
Miscellaneous liabilities-total	28,958,217	47,966,725	44,968,169	47,367,281	61,509,222
Federal funds purchased (borrowed)[7]	7,468,200	14,684,700	16,609,041	24,179,742	33,731,069
Other liabilities for borrowed money	1,214,440	3,367,342	2,572,528	1,463,429	3,919,796
Mortgage indebtedness[3]	...	601,562	668,545	668,331	1,160,675
Acceptances outstanding	2,508,707	3,387,309	3,848,666	4,039,643	3,570,900
Other liabilities	17,766,870	25,925,812	21,269,389	17,016,136	19,126,782
Total liabilities	463,609,916	484,956,390	527,482,024	586,551,343	678,416,789
Minority interest in consolidated subsidiaries	...	3,295	3,219	3,551	5,594
Reserves on loans and securities-total	5,215,817	6,178,797	6,299,150	6,443,382	6,909,306
Reserve for bad debt losses on loans	5,215,817	5,885,873	5,998,689	6,151,274	6,623,801
Other reserves on loans[3]	...	108,824	115,601	113,427	112,167
Reserves on securities[3]	...	184,100	184,860	178,681	173,338
Capital accounts-total	36,627,999	39,576,229	42,566,408	46,905,046	52,367,696
Capital notes and debentures	2,110,137	1,998,316	2,091,879	2,956,180	4,092,820
Equity capital-total	34,517,862	37,577,913	40,474,529	43,948,866	48,274,876
Preferred stock	90,686	103,416	107,304	91,930	68,924
Common stock	9,772,605	10,529,322	11,137,824	11,811,129	12,853,653
Surplus	16,173,907	17,460,832	18,072,590	19,895,816	21,528,422
Undivided profits	7,419,669	8,426,787	10,145,848	11,135,068	13,012,232
Reserve for contingencies and other capital reserves	1,060,995	1,057,556	1,010,963	1,014,923	811,645

Exhibit I: (continued)

[1] For description of changes in 1969 in the Report of Condition, see pp.237-238 and notes to tables.

[2] Assets in 1968 and prior years include "Other loans and discounts" at gross (before deduction of valuation reserves) value, as reported in 1969-1972.

[3] Not available prior to figure shown, see note 1.

[4] Prior to December 31, 1966, "Federal funds sold (loaned)" not reported separately; most were included with loans to banks; since 1967, includes securities purchased under agreements to resell, which previously were reported with "Loans to domestic commercial and foreign banks" and "Other loans for purchasing or carrying securities".

[5] Before 1967, loans extended under credit cards and related plans were distributed among other instalment loan items.

[6] Includes postal savings deposits, $18,169 thousand.

[7] Prior to December 31, 1966, Federal funds purchased were included in "Other liabilities for borrowed money"; since 1967, includes securities sold under agreements to repurchase, which previously were reported with "Other liabilities for borrowed money".

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*Only pertinent information was used from the FDIC Annual Report. Therefore, some totals are incorrect due to missing figures.

Exhibit II: Regression Analysis of U. S. Government Deposits from FDIC Report 1968-1972 (Ex. I)

(000,000)

	1968	1969	1970	1971	1972
Total Deposits*	352,513	354,427	386,860	429,706	493,032
Total Bank-held U. S. Gov't Sec.	74,252	62,502	71,361	79,769	85,867
U. S. Deposits	5,389	5,274	8,380	10,794	11,554

Constant	B1	B2
-11280.4	4.23252E-2	3.32913E-2

Y Bar = 8278.2
Standard Error of Estimate 1403.92
Coefficient of Determination = 0.885551
Overall F Ratio = 7.73751

Variable	B Value	Std Dev
0	-11280.4	6038.12
1	4.23252E-2	2.39342E-2
2	3.32913E-2	0.160634

* Business and Personal Time and Demand Deposits

Exhibit III: Regression Analysis of State and Municipal Deposits from FDIC Report 1968-1972 (Ex. I)

(000,000)

	1968	1969	1970	1971	1972
Total Deposits*	352,513	354,427	386,860	429,706	493,032
Bank-held State and Municipal Bonds	58,392	57,573	67,414	80,135	87,419
State and Municipal Deposits	35,996	30,819	41,085	48,194	56,001

Constant	B1	B2
-13376.4	4.22182E-2	0.552353

Y Bar = 42419
Standard Error of Estimate 2566.06
Coefficient of Determination = 0.966695
Overall F Ratio = 29.0256

Variable	B Value	Std Dev
0	-13376.4	12529.4
1	4.22182E-2	0.108655
2	0.552353	0.485064

* Business and Personal Time and Demand Deposits

Exhibit IV: Regression Analysis of Domestic Interbank Deposits from FDIC Report 1968-1972 (Ex. I)

(000,000)

	1968	1969	1970	1971	1972
Total Deposits*	352,513	354,427	386,860	429,706	493,032
Bank's own deposits with other banks	18,425	19,620	22,590	24,390	30,949
Domestic Interbank Deposits	22,139	23,809	27,715	30,056	32,119

Constant	B1	B2
3393.63	4.14228E-2	0.304688

Y Bar = 27167.6
Standard Error of Estimate 1941.65
Coefficient of Determination = 0.891863
Overall F Ratio = 8.24749

Variable	B Value	Std Dev
0	3393.63	14796.3
1	4.14228E-2	0.10926
2	0.304688	1.30898

* Business and Personal Time and Demand Deposits

Exhibit V: Regression Analysis of Officers, Travelers Checks, etc. Deposits from FDIC Report 1968-1972 (Ex. I)

(000,000)

	1968	1969	1970	1971	1972
Total Deposits*	352,513	354,427	386,860	429,706	493,032
Officers, Travelers Checks, etc.	9,480	11,508	8,367	9,863	11,253

The Regression Equation is
Y = 7546.19 + 6.31778E-3 X
SY = 1299.57
RSQD = 8.26424E-2
SB = 1.21527E-2
SYX = 1437.27
R = 0.287476
T = 0.519866
Data Points = 5

* Business and Personal Time and Demand Deposits

Exhibit VI: Regression Analysis of Business and Personal Deposits from FDIC Report 1968-1972 (Ex. I)

(000,000)

	1968	1969	1970	1971	1972
Bank Premises	6,657	8,070	9,143	10,285	11,525
Total Deposits*	352,513	354,427	386,860	429,706	493,031

The Regression Equation is
Y = 133523. + 29.5291 X
SY = 59133.9
RSQD = 0.892349
SB = 5.92151
SYX = 22403.5
R = 0.944642
T = 4.98676
Data Points = 5

* Includes Business and Personal Time and Demand Deposits

Exhibit VII: Miscellaneous Assets and Liabilities as a % of Total Deposits from FDIC Report 1968-1972 (Ex. I)

(000,000)

	1968	1969	1970	1971	1972
Total Deposits*	425,516	425,835	472,415	529,010	603,954
Misc. Assets	6,290	7,139	7,897	8,674	11,114
(%)	1.47	1.68	1.67	1.64	1.84
Misc. Liabilities	17,766	25,925	21,269	17,016	19,126
(%)	4.18	6.09	4.50	3.22	3.17

Average % for Miscellaneous Assets: 1.66

Average % for Miscellaneous Liabilities: 4.23

*Includes Business and Personal, U. S. Government, State and Municipal, and Commercial Bank Deposits

Exhibit VIII: Cash and Currency and Cash Items in the Process of Collection as a % of Total Deposits from FDIC Report 1968-1972 (Ex. I)

(000,000)

	1968	1969	1970	1971	1972
Total Deposits*	425,516	425,835	472,415	529,010	603,954
Total Cash Items in the Process of Collection	36,134	40,594	39,753	38,659	45,387
(%)	8.49	9.53	8.41	7.31	7.51
Cash and Currency	7,216	7,346	7,084	7,591	8,703
(%)	1.70	1.73	1.50	1.43	1.44

Average % for Cash Items in the Process of Collection: 8.25

Average % for Cash and Currency: 1.56

*Includes Business and Personal, U. S. Government, State and Municipal and Commercial Bank Deposits

Exhibit IX: Securities Market Interest Rates

U. S. Government Treasury Bond (Aaa)

Yield to Maturity:

8.11%	6.55%	6.76%	7.21%	5.21%
7.54	6.45	6.83	7.31	
6.90	6.55	5.78	6.64	
6.66	6.77	6.38	4.80	
6.46	6.10	5.95	7.21	

Average Yield: 6.58

Maximum Variation: 1.68

Source: Moody's Bond Record (p. 59)
Municipals, Corporates, Governments, Convertibles
January 1974, Vol. 41, No. 1

Exhibit IXa: Securities Market Interest Rates

State and Municipal Bond Yields

(Pollution and Environmental Central Revenue Bonds)

Aaa	5 3/8%	5 1/4%	5 3/8%	5.40%
Aa	5 3/4	5 1/4	6	5.70
A	5 5/8	5.70	5.70	5.95
Baa	5.95	5 1/2	6 1/8	5.95
NR	5.90	5.70	6	5.90

Average Yield: 5.71

Maximum Variation: .88

Source: Moody's Bond Record (p. 59)
Municipals, Corporates, Governments, Convertibles
January 1974, Vol. 41, No. 1

Exhibit IXb: Securities Market Interest Rates

Corporate Stock Yield:

Company	1973
Akzona	3.9%
Am. Cyanamid Co.	5.2
Armstrong Rubber Co.	6.2
BankAmerica Co.	2.7
Boeing Corp.	2.2
Burlington Industries Inc.	4.4
Central and South West Corp.	5.4
Cominco Ltd.	2.6
Deere and Co.	2.5
Dow Chemical Co.	1.5
Fedders Co.	2.5
Gerber Prod. Co.	7.1
Hilton Hotel Co.	3.8
Internat'l Nichel Co. of Canada Ltd.	3.6
Loew's Corp.	4.6
Maryland Cup Corp.	2.3
Mohasco Ind. Inc.	5.7
Northern States Power Co.	7.4
Peter Paul Inc.	8.0
Public Service Electric and Gas Co.	7.8
Research-Cottrell Inc.	.2
Seven-Up Co.	1.2

Exhibit IXb: (continued)

Corporate Stock Yield:

Company	1973
Square D Co.	3.9
Taylor Wines Co.	1.1
Times-Mirror Co.	1.4
United Aircraft Co.	5.5
Western Bancorp	4.8
Woods Corp.	3.2
Zenith Radio Corp.	4.2

Average Yield: 4.39

Maximum Variation: 4.37

Source: Moody's Handbook of Common Stock (random) Fourth Quarterly 1973 Edition

Exhibit IXc: Securities Market Interest Rates

1973 Average Bond Yield for Corporations*

January	7.49%
February	7.57
March	7.62
April	7.62
May	7.62
June	7.69
July	7.80
August	8.04
September	8.06
October	7.96
November	8.01
December	8.05

Average Yield: 7.79

Maximum Variation: .34

*Rail Roads, Public Utilities, Industries

Source: Moody's Bond Record (p. 103)
Municipals, Corporates, Governments, Convertibles
January 1974, Vol. 41, No. 1

Exhibit IXd: Securities Market Interest Rates

Other Bonds, Notes, and Debentures

U. S. Treasury Notes:

Yield:	7.54%	7.27%	6.90%	6.81%	6.60%
	7.76	6.26	6.91	6.81	6.60
	4.90	6.92	6.74	6.64	6.67
	7.44	6.91	6.83	6.69	6.69

Federal Land Bank Bonds:

Yield:	8.06%	7.66%	6.89%	6.72%
	7.75	7.04	6.73	6.84
	7.36	6.65	6.81	6.83
	7.40	6.76	6.75	6.78

Federal Intermediate Credit Debentures:

Yield:	8.03%	7.59%	7.55%	6.85%
	7.87	7.59	7.42	6.91
	7.70	7.62	6.82	6.97
	7.73	7.64	6.85	

U. S. Postal Services:

Yield 7.77%

Average Yield: 7.21

Maximum Variation: 2.31

Source: Moody's Bond Records (p. 59)
Municipals, Corporates, Governments, Convertibles
January 1974, Vol. 41, No. 1

Exhibit X: Regression Analysis of Business and Personal Deposits and Number of Employees

(000,000)

	1969	1970	1971	1972	1973
BankAmerica Corp.					
Total Deposits	21,509	23,563	27,464	31,678	36,903
Amended Total Deposits*	17,293	18,945	22,081	25,469	29,670
# of Employees	43,488	46,246	49,032	51,408	56,250
Wells Fargo & Co.					
Total Deposits	4,542	4,726	5,755	6,706	8,165
Amended Total Deposits*	3,652	3,800	4,627	5,392	6,565
# of Employees	9,755	10,262	10,441	10,887	11,514

The Regression Equation is
Y = -507.405 + 0.476365 X
SY = 10030.
RSQD = 0.963535
SB = 3.27643E-2
SYX = 2031.5
R = 0.981598
Data Points = 10

*Amended by computing average % of total deposits that are Business and Personal Time and Demand Deposits from FDIC Report (Ex. I), 80.40, and applying this % to these total deposits to get an approximation of the total Business and Personal Deposits of these Banks

Sources: BankAmerica Corp. Annual Report 1973 (pp.21,22)
Wells Fargo & Co. Annual Report 1973 (p.33)

Exhibit XI: % Time and % Demand of Total Business and Personal Deposits from FDIC Annual Report 1972 (Ex. I)

(000,000)

	1968	1969	1970	1971	1972
Total Business & Personal Deposits	352,513	354,427	386,860	429,757	493,032
Time	180,506	176,241	204,963	237,931	271,827
%	51.21	49.73	52.98	55.36	55.13
Demand	172,007	178,186	181,897	191,776	221,205
%	48.79	50.27	47.02	44.64	44.87

Average Time: 52.88

Average Demand: 47.12

BIBLIOGRAPHY

1. American Bankers' Assn. - Commission on Money and Credit, The Commercial Banking Industry, (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1962).
2. Amstutz, Arnold E., Computer Simulation of Competitive Market Response, (Cambridge, Mass.: M.I.T. Press, 1967).
3. BankAmerica Corporation, "Annual Report - 1973", (San Francisco, Calif.: BankAmerica Corp, 1973).
4. Bell, Frederick and Murphy, Neil, "Costs in Commercial Banking: A Quantitative Analysis of Bank Behavior and Its Relation to Bank Regulation", Report to Federal Reserve Bank of Boston, (No. 41, 1968).
5. Childs, John F., "Profit Goals for Banks and Industry", Journal of Commercial Bank Lending, (June, 1971).
6. Cohen, Kalman J., "Risk Analysis and Branch Bank Location Decisions", Innovations in Bank Management: Selected Readings, (N. Y.: Holt, Rinehart, and Winston, 1969).
7. Derwa, Leon, "Computer Models: Aids to Management at Societe Generale de Banque", Journal of Bank Research, (Summer, 1972).
8. Enrick, Norbert Lloyd, Market and Sales Forecasting, (San Francisco, Calif.: Chandler Publishing Co., 1969).
9. Fourcans, Andre and Hindelang, Thomas J., "Multinational Capital Budgeting: A Simulation Model", 1973 Simulation Conference, (Jan., 1973).

20. Weinberg, Peter R., "Uses and Limitations of Mathematical Models for Market Planning", Mathematical Models and Methods in Marketing, (Homewood, Ill.: Richard I. Irwin, Inc., 1961).

21. Wells Fargo Company, "Annual Report-1973", (San Francisco, Calif.: Wells Fargo Company, 1973).

22. Winters, Peter R., "Forecasting Sales by Exponential Weighted Moving Averages", Mathematical Models and Methods in Marketing, (Homewood, Ill.: Richard I. Irwin, 1961).