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IRR Feasibility Analysis Program for Use on MS DOS Microcomputers

Release 2

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IRR FEASIBILITY ANALYSIS PROGRAM
FOR USE ON MS DOS MICROCOMPUTERS

RELEASE 2

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for the

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Guide to Computerized System for Feasible Agribusiness Development", is equally appropriate for microcomputer and mainframe analysis.

This program operates on any MS-DOS microcomputer with at least 164 K bytes of memory. The program was compiled with the Heath Fortran 77 Compiler without 8087 Coprocessor and with ALTMATH.LIB. It can handle a total of 120 time periods in the cash flow, up to 13 fields of data, and up to 40 "Scale Option" alternatives per run. Output is formatted for 130 columns so that a wide printer or condensed print is needed for the hard copy output. A sample BASIC program file, 17 PITCH.OKI, is included on the IRR Master diskette for converting Okidata printers to typesize of 17 characters per inch. Similar BASIC programs can be written for making this kind of conversion on other printers which are not controlled directly.

The user data input is read from the logged drive as file DATA.IRR on the same disk with the linked program file, IRR(ENG).EXE. As provided, the program disk contains two sample data files, DATA.ONE and DATA.TWO, either of which can be used as pattern in preparing your user data file. Use the DATA.ONE pattern if you have no scale options in the immediate run you intend to make. Use DATA.TWO if you are preparing one or more scale options for your up-coming run. The desired pattern file can be copied to your work disk with COPY, renamed with REName to DATA.IRR, and by editing with EDLIN, changed to the data file for your user problem. Then it can be copied to the program disk with COPY as DATA.IRR for running your problem. Alternatively, LOTUS 123 can be used to create input data files for the IRR program, as explained in Section I-E of the Manual. When you are ready to make the run, simply type x:IRR(ENG), where x is the drive containing the disk with the program and data files. The program menu then will be displayed, and you will be prompted for the information and commands for your run. Default values are provided as patterns for your entries. When the commands have been entered ready for program execution, you will be reminded to prepare for receiving the printed output, either by printer echo, <Ctrl> P, or by routing to a disk file such as > B:OUTPUT.ONE.

To make a trial run, REName one of the files, say DATA.ONE, to DATA.IRR, and then type IRR(ENG) and <return>. Follow the screen menu prompts, responding as instructed, or simply with <return> to accept the default values. After you have made the run, don't forget to rename the DATA.IRR file back to DATA.ONE. Otherwise when you copy back the data file for your own problem from the work disk to the program disk, the original will be lost as it is replaced by your DATA.IRR file. This same procedure should be followed to retain input data files for problems you have run in the past, retaining them as DATA.III, DATA.IV, etc., for example, so that DATA.IRR always is open for the current run, and no data file will be lost by over copying.

The sequential steps for the IRR program input are as follows:

1. Prepare your data file in tabular format with rows from 1 to n for the n accounting periods and columns for the period sequence, period identification, and then data columns for facilities investment, for working capital, for sales revenue and income, and for operating expenses.

SECTION I

INTRODUCTION

The Fortran computer program for Economic Feasibility Analysis contained herein represents direct adaptation of the corresponding Fortran IV program for mainframe computer previously published by the Kansas State University Food and Feed Grains Institute under predecessor agreements with the U. S. Agency for International Development. The compiled program in the microcomputer version of the Feasibility Analysis Program incorporates all features of the latest version of the mainframe program, while providing additional flexibility to the microcomputer user.

Differences between the mainframe version and the current microcomputer version include the following:

1. Input steps for command instructions and data input are modified to better suit microcomputer users, especially those familiar with popular electronic spreadsheet software such as LOTUS 1-2-3.

2. This version of the program is operated from menus which indicate instructions on the screen, and the user enters the control commands and information for his problem through the keyboard. Default values for the entries are presented on the screen to serve as pattern to the user. Those default values which are applicable for the run can be accepted by keying <return> at the appropriate point.

3. Results of computational routines can be stored in disk files for access by subsequent runs and/or programs, so that user options are enhanced.

4. The Alternative Math library used to Link the current program facilitates rapid computation with sufficient accuracy for accounting purposes better than other math libraries and can operate on all IBM-compatible hardware, whether or not a 8087 coprocessor is available.

5. The micro version is dimensioned for 120 accounting periods (e.g., 30 years by quarter) rather than the 500 periods in the mainframe version because of capacity limits of the Heath Fortran 77 DOS compiler. Rarely will the user find this limitation to be a problem, however.

6. Options for printing the output in Spanish, French or Portuguese are not available in the micro version contained herein. Instead separate manuals and diskettes of the program are available in each of these languages. Those preferring another language or desiring output capabilities in more than one language should order manuals and diskettes accordingly.

Each program in the microcomputer version of the family of computer programs for feasible agribusiness development is being published as a separate manual, replacing Volume II, Computer Programs, for mainframe computers. The manuals are available with or without the corresponding program and instructional diskettes. Volume I containing text and charts of Special Report No. 2, "User's

2. If this run includes one or more alternatives for sensitivity analysis from the same cash flow projections, include the four footnote lines plus one (or two) scaler factor lines for each alternative.

3. Name your data file DATA.IRR, be sure that it is on the same disk as your IRR(ENG) Program, and then type IRR(ENG) <return> to begin.

4. Follow the screen Menu prompts to enter the information and commands for your problem. You can follow the menu in any order, and can make changes any time up until the program execution command.

5. You will be reminded to prepare your printer or disk file to receive the program output before execution of the program. Remember that the output needs 130 columns, so plan for wide paper or small type size.

6. When the execution screen appears on your monitor and all is ready, the program is executed by keying <return>.

7. You will be given a PAUSE upon completion of the first problem. This provides opportunity to change disks or make other preparation if you have another problem to follow. If not, just key <return> and the program will return to the operating system.

SECTION II

PROGRAM INSTRUCTIONS: IRR FEASIBILITY ANALYSIS WITH OPTIONS (ENGLISH)

Outline of Program Options

1. Type of Analysis and Output Format

Internal Rate of Return	(IRR)
Direct Rate of Return	(DRR)
Associated Rate of Return	(ARR)
Social Rate of Return	(SRR)
Comparative Rate of Return	(CRR)
Financial Rate of Return	(FRR)
Economic Rate of Return	(ERR)
Comparative NPV at Given Rate	(CPV)
Actual NPV at Given Rate	(NPV)

   Note: See page 52 for a listing of formulas for the different rates of return which can be created.
2. Number of Times Discounted per Year
   (Rates of Return are computed on equivalent annual basis)
3. Provision for scaling any or all input columns to analyze alternatives and test sensitivities of project.
4. Provision to start scaling input in any period after first.
5. Optional Benefit/Cost Ratios and Discounted Present Values at up to six specified discount rates.
6. Optional Starting Period for Discounting so that sunken investments as well as future investments and incomes are computed in equivalent present values.
7. Completely Formatted Output Tables with titles and monetary unit read in with data.
8. Option to Create Data Files of combined outlay and net income schedules for use in developing proforma statements.
9. Option to Create Data File of scaled input for selected alternative.

Sequential Steps Executed by the IRR(ENG).EXE Program

1. Establish the Basic Parameters for the Run (Menu Driven)
2. Read Titles, Headers and Footnotes for Output Tables
3. Read the Input Data File for the Problem
   a. Read INO, YEAR and First Eight Columns of Data for the Problem, One Line Entry for Each Period in the Cash Flow
      FORMAT is I3, 1X, I4, 8F9.0 [1]

---

[1] In Fortran statements I represents integer fields, A represents alphanumeric fields, F represents floating point (decimal number) fields, and X is the blank space indicator. Thus, the format of I3, 1X, I4, 8F9.0 indicates starting from the left a 3-column integer field followed by one blank space, a 4-column integer field and eight floating point fields, each of which is 9 columns wide with the decimal point 0 spaces back from the right edge of each such field.

INO - Indicates Accounting Period Sequence, e.g., -2, -1, 0, 1
YEAR - Identification for Each Period, e.g., "1990" or "0188"
CASH - Cash Flow Data for the First 8 Columns of Outlay and Revenue Data for the Problem. For Negative Entries, Insert "-" before First Digit of Number. Right Justify Data, or Insert Decimal Point.

b. Read INO, YEAR, (Optional), and Last Five Columns of CASH Insert Input Data as Above; FORMAT is 8X, 5F9.0

4. Read Footnotes and Scaler Factors for Each Alternative Specified under "Nscale". Order is Alternative 1, Alternative 2, Alternative 3, ... , Alternative n. Within each, Order is:

c. Read Two-Line Entry for First Footnote.
FORMAT is 20A4, 13A4
Read Two Line Entry for Second Footnote.
FORMAT is 20A4, 13A4

d. Read First Line of Scaler Factors for Alternative
IDECK - Create Disc File of Scaled Data for the Alternative: Yes = 1, No = 0.
ISTART - Period (INO) with which to Begin Scaling Data
CONV - Scale Factors (Multipliers), Matching the First 8 Input Columns of Data to Be Scaled. Enter "1.0" for Columns which Are to Remain the Same as for the Base Case.
FORMAT is I3, 1X, I4, 8F9.0

e. If NCARDS = 2, Read Second Line of Scaler Factors
IDECK - As in Step 4, or Leave Blank
ISTART - As in Step 4, or Leave Blank
CONV - Scale Factors (Multipliers), Matching the Last 5 Input Columns of Data to Be Scaled, as in Step 4d.
FORMAT is 8X, 5F9.0

5. Scale the Data, if Ordered, and Print the Input
6. Combine the Input Columns for Analysis
7. Calculate the Rate of Return and Output Data
8. Print the Body of the Output Table
9. Compute and Print the B/C Ratios and Present Values
10. Return to the Next Scaling of this Problem or to the Next Problem

Operational Features of the Program

This program operates on any MS-DOS microcomputer with at least 164 K bytes of memory. The program was compiled with the Heath Fortran 77 Compiler without 8087 Coprocessor and with ALTMATH.LIB. It can handle a total of 120 time periods in the cash flow, up to 13 fields of data, and up to 40 "Scale Option" alternatives per run. Output is formatted for 130 columns so that a wide printer or condensed print is needed for the hard copy output. A sample BASIC program file, 17PITCH.OKI, is included on the IRR Master diskette for converting Okidata printers without self controls to 17 Pitch typesize. Similar BASIC programs can be written for making this kind of conversion on other printers which are not controlled directly.

The user data input is read from the logged drive as file DATA.IRR on the same disk with the linked program file, IRR(ENG).EXE. There are two ways to prepare your data file for input into the program, (1) select one of the two sample data

files provided on the program disk, and replace the sample data with your own, or (2) use LOTUS 123 to create your input data file. The first method is described in the following sub-section. The same method is described in the last sub-section.

When you are ready to make the run, simply type x:IRR(ENG), where x is the drive containing the disk with the program and data files. The program menu then will be displayed, and you will be prompted for the information and commands for your run. Default values are provided as patterns for your entries. When the commands have been entered ready for program execution, you will be reminded to prepare for receiving the printed output, either by printer echo, <Ctrl> P, or by routing to a disk file such as > B:OUTPUT.ONE.

To make a trial run, REName one of the files, say DATA.ONE to DATA.IRR, and then type IRR(ENG) and <return>. Follow the screen menu prompts, responding as instructed, or simply with <return> to accept the default values. After you have made the run, don't forget to rename the DATA.IRR file back to DATA.ONE. Otherwise when you copy back the data file for your own problem from the work disk to the program disk, the original will be lost as it is replaced by your DATA.IRR file. This same procedure should be followed to retain input data files for problems you have run in the past, retaining them as DATA.III, DATA.IV, etc., for example, so that DATA.IRR always is open for the current run, and no data file will be lost by over copying.

The sequential steps for the IRR(ENG) program input are as follows:

Prepare your data file for N projected periods and a total of M + 2 columns in the Format I3, 1X, A4, 8F9.0. If M is greater than 8, where M is the total number of columns of data in the projected cash flow (NFAC+NWC+NREV+NEXP), follow with the second data set for the M - 8 remaining columns in the Format I3, 1X, A4, 5F9.0.

2. If this run includes one or more alternatives for sensitivity analysis from the same cash flow projections, include the four footnote lines plus one (or two) scaler factor lines for each alternative.
3. Name your data file DATA.IRR, be sure that it is on the same disk as your IRR(ENG) Program, and then type IRR(ENG) <return> to begin.
4. Follow the screen Menu prompts to enter the information and commands for your problem. You can follow the menu in any order, and can make changes anytime up until the program execution command.
5. You will be reminded to prepare your printer or disk file to receive the program output before execution of the program. Remember that the output needs 130 columns, so plan for wide paper or small type size.
6. When the execution screen appears on your monitor and all is ready, the program is executed by keying <return>.
7. You will be given a PAUSE upon completion of the first problem. This provides opportunity to change disks or make other preparation if you have another problem to follow. If not, just key <return> and the program will come back to the operating system.

Preparing IRR(ENG) Input Files with the MS-DOS Editor Program, EDLIN

Purpose. It is easy to use the MS-DOS program, EDLIN, to prepare user data input for IRR problems. The procedure permits use of one of the text sample problems, DATA.ONE or DATA.TWO, as format template for the user problem. EDLIN is used to edit the sample problem line by line, thus converting it from the text sample problem to the user data input. Use DATA.ONE as the format template if the user problem has no scale options. Use DATA.TWO as the pattern if the user problem has scale options.

STEP 1. The first step in preparing the user input data is to print the file you will use to represent the format template, say DATA.ONE. This can be done with the PRINT command directed to the configured PRN device, e.g., PRINT DATA.ONE>PRN and key <return>. It also can be done by echoing to the printer with CTRL-P, using TYPE and <return>.

STEP 2. The second step in preparing the user data input is to assemble the data for entering to the computer with EDLIN. The step must be completed precisely, following the exact format of the DATA.XXX template. Step 2 is completed by writing the new data just above the corresponding data as printed on the sample template. Remember that both vertical and horizontal spaces are significant in the template. They should be retained as they are unless specific changes are needed to fit the user problem.

STEP 3. Use COPY to transfer the template master to your work disk, renaming the file at the same time, e.g., COPY DATA.ONE B:DATA.ARR <return>; also copy the headers file for editing, e.g., COPY HEADERS B:HEADERS.ARR and key <Return>.

STEP 4. Set up the template file for editing with EDLIN, e.g., EDLIN B:DATA.ARR <return>. The EDLIN prompt, *, should appear with flashing cursor, __, in the upper left corner of the screen. To list a reasonable number of lines for the file to appear on the screen, type 1, 20 L <return>.

STEP 5. Starting with Line 1, use EDLIN to replace template information and data, proceeding until the entire file is changed. With your DOS disk in A> and your work disk in B>, logged in A>, type EDLIN B:DATA.ARR <return>. Type 1 to recall line 1; use [F1] to copy a character to the edited line; type in corrections in the appropriate locations. Key <return> to accept changed line and move to the next line. When the process is completed, type E to accept to the file all changes made with EDLIN.

Detailed Instructions for Completing Step 5, DATA.AR2 example

1. Type 2 <return>
2. Using the F1 key to copy the numbers which don't change, make the changes on line 2, e.g., copy across to 118359 and edit to 23500, 4 spaces, 13000, 4 spaces, 47200, 4 spaces 25000 <return>.
3. Type 3 <return>, and repeat as above, except make the last number 23480, finishing with <return>. Note that the last eight columns (72-80) show as wrapped around on the monitor screen--this is normal.
4. Note that lines for years 1975 through 1991 are identical to year

1974 (except for the 72000 in 1982). This means that the following short cut procedure can be used:

a. Type 4 I[nsert] <return>
b. Type <spacebar <spacebar> 3 <spacebar> 1975 [F3] <return>
c. Type <spacebar> <spacebar> 4 <spacebar> 1976 [F3] <return>
d. Repeat as above through year 1981
e. Type <spacebar> 10 <spacebar> 1982, use [F1] to move to position to type in 72000, then use [F3] <return>
f. Type <spacebar> 11 <spacebar> 1983, use [F1] and <spacebar> to change 72000 to 0 again, and then use [F3] <return>
g. Now repeat through year 1991, as in 4c, above
h. Type <spacebar> 20 <spacebar> 1992, use [F1] to move to position to type in 72000, then use [F3] <return>
i. Type <spacebar> 21 <spacebar> 1993, use [F1] and spacebar to change 72000 to 0 again, then use [F3] <return>
j. Now repeat through year 2001, as in 4c, above
k. Type in line 31 as follows: two spaces 30 space 2002 three spaces -47800 eight spaces 0 three spaces -81600 three spaces -32700 eight spaces 0 eight spaces 0 eight spaces 0 eight spaces 0 <return>
l. At line 32, type <Ctrl> C to turn off line insert mode

5. Type 30,40 L[ist] <return> to list these lines and see how the file is coming
6. Delete the extra lines from old template by typing 32,40 D[elete] <return>
7. Repeat Step 5
8. Delete the remaining extra lines from the old template by typing 32, 39 D <return>
9. Repeat Step 5
10. Type 33 <return> and make needed changes and additions to line 33 as in Step 2, above, e.g., copy across with F1 to 14000 and type 24000 four spaces 19500 five spaces 6500 four spaces 11000 <return>
11. Type 34 <return> and make needed changes and additions to line 34 as in Step 2, above, e.g., copy across to 11000 and type four spaces 0 four spaces 19500 five spaces 6500 five spaces 8000 <return>
12. Repeat Step 11 for line 35, finishing with 4000 <return>, line 36, finishing with 1000 <return>, and line 37, finishing with 0 <return>
13. Note that the remaining changes and insertions are identical through year 2001. The short-cut steps are:
    a. Type 38 I <return>
    b. Type <spacebar> <spacebar> 6 <spacebar> 1978 [F3] <return>
    c. Repeat as in 13b for years 1979 through 2001
    d. At line 62 type <Ctrl> C to turn off line insert
14. Type 60,70 L <return> to list data
15. Type 62,70 D <return> to delete data from old template
16. Repeat Step 14
17. Type 62,68 D <return> to delete remaining data from old template
18. Repeat Step 14
19. Make needed changes to line 62 (Year 2002) as in Step 2, above, e.g., type two spaces 30 space 2002 eight spaces 0 eight spaces 0 eight spaces 0 eight spaces 0 eight spaces 0 <return>

20. Now all changes should be complete.
    Type E <return> to save the new data file, DATA.ARR.

STEP 6. Repeat Step 5 to edit the Headers file. With your DOS disk in A> and your work disk in B>, logged in A>, type EDLIN B:HEADERS.ARR <return>. Edit the file as needed for your problem, and save the edited file by typing E <return>. NOTE: This step can be omitted, and the control and header commands supplied with the keyboard in response to Menu prompts if preferred.

Detailed Instructions for Completing Step 6, DATA.AR2 example

1. Type 3 <return>
2. Use the F1 key to copy headers which don't change, then type in the changes and key <return>, e.g. copy to Product and type Employ. two spaces Training four spaces Output five spaces Input <return>
3. Type 4 <return>, type in changes and key <return>, e.g., type one space Capital three spaces Training two spaces Output five spaces Input five spaces Other <return>
4. Type 5 <return> and type changes, e.g., copy to Sales and type backspace Benefit three spaces Benefit two spaces Linkage two spaces Linkage <return>
5. Type 6 <return>, and type in changes, e.g., type two spaces Gains, copy with F1 to Deprec. and type Expense, copy with F1 to Tax and type two backspaces Invest. <return>
6. Type 1,10 L to list and check the edited file
7. When OK, type E <return> to save the edited file.

To combine EDLIN files, use COPY rather than EDLIN. For example: COPY B:FILE.ONE+A:FILE.TWO+B:FILE.SIX B:FILE.ALL <return> will copy the three files from their respective sources and make a combined file, FILE.ALL, on the B drive.

Using LOTUS 1-2-3 to Create Files for Input to IRR(ENG)

Introduction. The LOTUS systems disk contains the Software package for creating and manipulating electronic spreadsheets, or LOTUS Work-sheets. LOTUS Worksheets can be copied into a print file (LOTUS.PRN) so that they are recognized as standard ASCII files for reading as formatted data files by the IRR and other Fortran programs.

LOTUS is widely used and recognized, and has many uses in its own right, including file management and graphics as well as electronic spreadsheets. Easy to follow references and manuals have been developed by users and are readily available at local book stores. No one will regret investing the time and energy necessary to become familiar with LOTUS. Now using LOTUS to create data files for other programs adds further to the usefulness of this software.

LOTUS Worksheets are keyed by lettered columns and numbered rows like a road map. Data appearing in cells are stored as formulas, even though they appear as numbers in the displayed worksheet, making it easy to update the data files by changing a few base numbers in the formulas. Copy, move, erase, insert, change format, adjust column width, and other worksheet manipulations are

relatively easy with LOTUS, so that the user is in no way bound to the standard or default spreadsheet pattern. However, because the standard column width in LOTUS Worksheets is nine spaces, it is convenient to use this pattern as basis for input formatting to the Fortran programs like the IRR.

File Creation Using DATA.ONE Example. The following example of preparation of the input data file, DATA.ONE, for the IRR Program with LOTUS 1-2-3 is designed to give the user an introduction to this software and how to use it. The exercise provides practice in the use of Lotus menus, column-width control, entering and tabulating headings, data and formulas, filling ranges of data, copying data from existing cells, editing cell data, saving data and files, and especially in creating Lotus print files which can be used as input for Feasibility Analysis and other analytical purposes as standard ASCII files.

Bring up LOTUS 1-2-3

1. Type LOTUS <return>
2. When the LOTUS options appear in the screen window, place the cursor on 1-2-3 and Key <return>
3. Key <return> again in response to the prompt Press any Key
4. An alternative short-cut procedure is to type 1[23] and key <return> at Step 3.

Set up LOTUS Worksheet (Column A at 3 spaces wide and Column B at 5 spaces wide, leaving Columns C..J at the standard 9 spaces)

1. Put Cursor on Column A with arrow key and type / for window
2. Put Cursor on Worksheet with arrow key and key <return>
3. Put Cursor on Column-Width and key <return>
4. Put Cursor on Set and key <return>
5. Enter 3 for column width and key <return>
6. Repeat Steps 1 thru 5 for Column B, entering 5 for column width
7. Short-cut alternative for steps 1 thru 5 is / W C S 5 <return>

Enter Input data for Periods 0..24 in Column A

1. Put Cursor on A1 cell, and type /
2. Put Cursor on Data and key <return>
3. Put Cursor on Fill and key <return>
4. For fill range, type A1..A25 and key <return>
5. In response to Start prompt, type 0 and key <return>
6. In response to Step prompt, type 1 and key <return>
7. For End Cell prompt, type 24 (or any number larger than 20) and key <return>

Enter Input data for Years 1972..1996 in Column B

1. Put Cursor on B1 cell and type /
2. Put Cursor on Data and key <return>
3. Put Cursor on Fill and key <return>
4. For Start prompt, type 1972 and key <return>
5. For fill range, type B1..B25 and key <return>

6. For Step prompt, type 1 and key <return>
7. For End Cell prompt, type 1996 (or any larger number) and key <return>

Enter Input data for Period 0 on Row 1

1. Put Cursor on C1 cell, type 147000 and press right arrow key
2. Type 72000 and press right arrow key
3. Type 0 and press right arrow key
4. Type 0 and press right arrow key
5. Type 0 and press right arrow key
6. Type 0 and press right arrow key
7. Type 0 and press right arrow key
8. Type 0 and press right arrow key

Enter Input data for Period 1 on Row 2

1. Put Cursor on C2 cell, type 0 and press right arrow key
2. Type 0 and press right arrow key
3. Type 81600 and press right arrow key
4. Type 32700 and press right arrow key
5. Type 118359 and press right arrow key
6. Type 39000 and press right arrow key
7. Type 10581 and press right arrow key
8. Type 58700 and press right arrow key

Copy Row 2 data to Rows 3..25

1. Type /
2. Put Cursor on Copy and key <return>
3. At Copy from prompt, type C2..J2 and key <return>
4. For Copy to: type C3..J25 (corners of block) and key <return>

Make needed corrections to data input in Column C

1. Put Cursor on C25 cell and press edit key, F2
2. With Backspace key remove existing entry in cell of 0, and insert correct entry of -81900, then key <return>

Make needed corrections to data input in Column D

1. Put Cursor on D11 cell and press edit key, F2
2. With Backspace key remove existing entry in cell of 0, and insert correct entry of 72000, then key <return>

Make needed corrections to data input in Column E

1. Put Cursor on E3 cell and key F2
2. With Backspace key remove existing entry in cell, and insert correct entry of 0, then key <return>
3. Copy corrected entry from above cell to cells E4..E24, as follows: Type / C E3 <return> E4..E24 <return>, or

with cursor on E3 cell, type / C <return> <down arrow> <period> <down arrow until highlight extends through cell E24> <return>

4. Put Cursor on E25 cell and press edit key, F2, then press HOME key and type -, and then key <return>

Make needed corrections to data input in Column F

1. Put Cursor on F3 cell and key [F2]
2. With <Backspace> key remove existing entry in cell, and insert correct entry of 0, then key <return>
3. Copy the corrected entry from above cell to cells F4..F24, as follows: Type / C F3 <return> F4..F24 <return>, or use arrow keys and <.> as in 10c, above.
4. Put Cursor on cell F25 and type -32700 <return>

Make the remaining corrections to Row 25 by copying in a 0

1. Put Cursor on a cell containing a 0--say D20
2. Type / C <Return> for Cursor selection of source cell, then type G25..J25 as destination range and key <return>, or use arrow and <.> keys as above.

Enter Period and Year designations for remainder of input

1. Put Cursor on A26 cell and type / D F A26..A50 <return> 0 <return> 1 <return> 24 <return> (for fill sequence as in Step 9)
2. Put Cursor on B35 cell and type / D F B26..B50 <return> 1972 <return> 1 <return> 1996 <return>

Enter remaining input data for period 0

1. Put Cursor on C26 cell, type 0 and press <right arrow>
2. Type 0 and press <right arrow>
3. Type 0 and press <right arrow>
4. Type 0 and press <right arrow>
5. Type 0 and press <right arrow>

Enter remaining input data for Period 1

1. Put Cursor on C27 cell, type 18500 and press <right arrow>
2. Type 14000 and press <right arrow>
3. Type 0 and press <right arrow>
4. Type 0 and press <right arrow>
5. Type 0 and press <right arrow>

Enter remaining input data for Period 2

1. Put Cursor on C28 cell, type 18500 and press right arrow
2. Type 11000 and press <right arrow>
3. Type 0 and press <right arrow>
4. Type 0 and press <right arrow>
5. Type 0 and press <right arrow>

Copy Row 28 data to Rows 29..49

1. Type /
2. Type C[opy] C28..G28 <Return> C29..G49 <return>, or use arrow and <.> keys and <return>

Complete data entry for Period 24

1. Put Cursor on C50 cell, type 0 and press right arrow key
2. Type 0 and press right arrow key
3. Type 0 and press right arrow key
4. Type 0 and press right arrow key
5. Type 0 and press right arrow key

To save the new file, complete the following steps

1. Type /
2. Put Cursor on File and key <return>
3. Put Cursor on Save and key <return>
4. To prompt on file name type RICEMILL and key <return>
5. To prompt on Replace or Ignore type R[eplace], or put cursor on Replace and key <return>

Complete the following steps to make the print file which can be read by the IRR program as an ASCII File

1. Type / P[rint] F[ile] RICECASE <return>
2. Type O[ptions] M[argin] L[eft] 1 <return>
3. Type M[argin] T[op] 0 <return>
4. Type M[argin] R[ight] 132 <return>
5. Type O[ther] A[s Displayed] O[ther] U[nformatted]
6. Put cursor on Quit and key <return>
7. Type R[ange] A1..J50 <return>
8. Type G[o] and wait for file to be created
9. Type Q[uit] and wait for file to be copied to your disk
10. If you want to preserve the print (file) settings on your diskette with the worksheet file, you may do so by resaving the worksheet file at this point (i.e., repeat Step 19).

You should now have two new files on your disk, RICEMILL.WKS and RICECASE.PRN. The first is a Lotus worksheet which can be used with Lotus as any other such file. The second is an ASCII data file corresponding to DATA.ONE. After backing out of Lotus, this file RICECASE.PRN can be RENamed DATA.IRR to serve as input for running the Feasibility Analysis program, IRR(ENG).EXE.

Quitting LOTUS. Back out of LOTUS by successive Quit and End commands by typing first letters or by Cursor and <return>; for example

1. Type /
2. Type Q[uit]
3. Type Y[es]
4. Type E[xit]

5. Type Y[es]

The A> or B> signal at the left side of the screen indicates that you are back under DOS control.

Use Your RICECASE.PRN file as input to run the Data.One Feasibility Analysis

1. Insert disk with the IRR(ENG).EXE file in Drive A
2. Logged in Drive B copy the Ricecase.Prn file to Drive A as Data.Irr as follows: Type COPY RICECASE.PRN B:DATA.IRR and key <return>
3. Prepare your printer and make the run. Type IRR(ENG) and key <return>. The results should be comparable to those shown on pages 55-7.

SECTION III

SCREEN DISPLAYS AND MENUS OF THE PROGRAM

Preparing for and Starting a Feasibility Analysis Run

For the microcomputer run to measure the economic feasibility of a project for which the projected cash flow schedule, DATA.IRR, has been prepared, three files are needed on the feasibility analysis disk. They are

(1) the compiled execution program, IRR(ENG).EXE

(2) the file of default values for the program commands, project title, column headers and footnotes, HEADERS

(3) the file containing the projected cash flow schedule for the problem, DATA.IRR.

If any of the three files has been stored under another name it should be renamed to the above before making the run, using the DOS command REN[ame], e.g., REN B:HEADERS.ONE HEADERS <return>.

The user should be aware that the Feasibility Analysis Program will run if these three files are provided and the execution command given, but that the results displayed to the monitor screen will not be routed to the printer or to disk file automatically. The output can be routed to the printer as indicated by the prompt on the execution screen, illustrated below, by typing <Ctrl> P just before keying <return> for execution. Alternatively, the output can be routed to your printer or to a disk file using the DOS Print command, or by adding a routing command after the IRR(ENG) call, e.g., IRR(ENG) > B:OUTPUT.IRR.

The monitor screen displays and menus of the IRR(ENG) program are reproduced in sequence on the 11 pages which follow. Each of them is accompanied by a brief description of the screen and the keyboard commands needed by the user at that point.

It will be helpful to the first-time user to follow through this section of the manual screen by screen as they are brought up by the program on his computer. Later on, the section can be used to clarify a question on a particular screen menu by reference directly to the corresponding descriptions in the manual.

IRR (ENG) Master Display and Menu of Computational Instructions

Master Screen Display

To start the feasibility analysis run, first boot the computer in the usual manner, and then place the disk containing the three files [IRR(ENG).EXE, HEADERS and DATA.IRR] in the operating drive and type IRR(ENG) <return>. The first screen to appear on the monitor is the Master Screen, as shown by the reproduction shown on the following page. It is followed by the message "Pause. Please press <return> to continue." This message is inserted automatically by the FORTRAN compiler used to compile and link the IRR program. It is flagged by the program command "PAUSE" inserted in the Source Program at this point.

Menu of Computational Instructions

The next screen to appear is the MENU OF COMPUTATIONAL INSTRUCTIONS. The nine items listed on the menu can be brought up in any order by keying the corresponding number followed by <return>. As you make the entry for each of the nine items and key <return>, the program will return again to this menu. If you do not request one or more of the items by typing its number and supplying the entry, the program will use the corresponding default value. If you decide to change an entry you have already made, you can do so by calling again the number of that item and making the change in the same manner as the original entry for the item.

As indicated by the MENU OF COMPUTATIONAL INSTRUCTIONS, you proceed on to make the run after supplying the desired command entries by typing 0 <return> or only <return> while that menu is displayed.

IRR (ENG) Master Display and Menu of Computational Instructions - Monitor Output

Master Screen Display

IRR FEASIBILITY ANALYSIS WITH OPTIONS (ENGLISH)
Professor Richard Phillips
Department of Agricultural Economics
Kansas State University

* This program reads computational instructions from the screen menu and the projected cash flow data for N periods from the users disk file in LOTUS 123 print file format.

* The program computes discounted cash flows with corresponding present values, and solves for the Internal Rate of Return (IRR) for the project.

* Default options are provided for the menu instructions; they can be replaced in any order by the user any time prior to execution.

Pause.
Please press <return> to continue.

Menu of Computational Instructions

Enter selection number and key <return>

1 Monetary Unit for Cash Flow
2 Number of Accounting Periods per Year
3 Reflect Prior Years and/or Compute Benefit Costs
4 Annual Interest and Discount Rates to Use
5 Number of Years in Cash Flow
6 Organization of Data Input Columns
7 Type of Cash Flow Analysis and Presentation
8 Number of Alternatives to Be Analyzed in this Run
9 Create Data File of the Output

SELECTION: 0 (Enter <return> or 0 <return> to make the run)

Screens 1, 2 and 3: Monetary Unit, Accounting Periods and Options

Monetary Unit for the Projected Cash

As indicated by the screen, the monetary unit for the case is typed in response to the prompt, and followed by <return>. The entry can contain up to eight letter and space combinations as indicated. The entry will be inserted in the output tables. If typed in capital letters it will be printed that way; if typed in lower case, it will appear in lower case.

Number of Accounting Periods per Year

As indicated by the screen prompt, the number of accounting periods per year in the projected cash flow data is to be entered as a decimal number. Enter 1.0 if annual data, 4.0 if quarterly data, 12.0 if monthly data, etc. This value is used in the program to compute the Internal Rate of Return on the equivalent annual basis.

Options for Sunken Investment and Benefit-Costs

This screen requests commands in 0 = no, 1 = yes format for the two options. The first entry and <return> are for the option to reflect years prior to the current period in the cash flow (sunken investment problems), as reflected in the first column of the cash flow input data. The second entry and <return> are for the option to compute and print benefit-costs and present values for up to six alternative discount rates.

Screens 1, 2 and 3: Monetary Unit, Accounting Periods and Options - Monitor Output

Monetary Unit for the Projected Cash Flow

The default monetary unit of measure is DOLLARS ;
To change this designation, type the substitute in eight characters or less, e.g.. $1,000, Lempiras, etc., and key

<return>

MONETARY UNIT: DOLLARS

Dollars

Number of Accounting Periods Per Year

Enter the number of accounting periods per year in the projected cash flow for your problem (in decimal values), e.g., 4.0 for quarterly data and 12.0 for monthly data, followed by <return>.

To accept the default, enter 1.0 and <return>

NUMBER OF ACCOUNTING PERIODS PER YEAR: 1.

1.0

Options for Sunken Investment and Benefit-Costs

Enter commands to (1) reflect cash flow for prior years (sunken investment problems), and (2) compute and display optional benefit-costs and present values.

(1) ANALYSIS TO REFLECT CASH FLOW FOR PRIOR YEARS:
(Enter selection and <return>)
0 = No
1 = Yes

SELECTION: 0

(2) COMPUTE AND DISPLAY BENEFIT COSTS AND PRESENT VALUES:
(Enter selection and <return>)
0 = No
1 = Yes

SELECTION: 1

0
1

Screens 4, 5 and 6: Discount Rates, Number of Years and Columnar Organization

Annual Interest and Discount Rates

Two sets of rates are requested at this screen. The first is the annual discount rate to be used under the option of computing present values at a predetermined discount rate rather than solving for the Internal Rate of Return. This rate is entered as one four-digit decimal fraction and <return>. It is to be entered even though this option is not being used.

The second set of rates includes the alternative annual discount rates to be used in computing benefit-cost ratios and present values. Up to six alternative rates may be entered here; they will be used and printed in the order listed. Enter the values as four-digit decimal fractions, separating the entries by one blank space, with <return> at the end of the complete series.

Total Number of Years in Cash Flow

The total number of years in the projected cash flow is read at Screen 4. The value is read as a decimal number, and need not be an even integer. For example, a projected cash flow of 38 quarters would be entered as 9.5 years and one of 146 months would be entered as 12.167 years.

Columnar Organization of the Cash Flow Data for the Problem

This screen provides the place to enter data on the columnar organization of the cash flow data provided as input for the problem. The numbers of data columns are read as integer values with one blank space between entries. In the order read, the number of column entries are for facilities investment, working capital, income and revenue, and operating costs.

The program will check to see that the sum of the four entries does not exceed 13--the maximum number of columns of entry data permitted.

Screens 4, 5 and 6: Discount Rates, Number of Years and Columnar Organization - Monitor Output

Annual Interest and Discount Rates

(1) Enter the annual interest rate for use in computing net present value options (as four-digit decimal fraction), and <return>.

SELECTION: .1100

(2) Enter six alternative annual discount rates (four-digit decimal fractions) for use in computing benefit-cost ratios, and <return>; (separate rates by one blank space).

SELECTIONS: .1500 .2000 .2500 .3000 .3500 .4000

.1100
.1500 .2000 .2500 .3000 .3500 .4000

Total Number of Years in Cash Flow

Enter the number of years in the cash flow for analysis (decimal number, e.g., 25.5) and <return>.

Enter 21.0 and <return> to accept the default entry for Data.One

SELECTION: 21.0

21.0

Columnar Organization of Cash Flow Data for the Problem

Enter the number of columns of cash flow data for each of the following:

FACILITIES INVESTMENT: 2

WORKING CAPITAL: 2

INCOME AND REVENUE: 3

OPERATING COSTS: 6

Enter each of these values in sequence with one space between each number, and then <return>

2 2 3 6

Screens 7, 8 and 9: Type of Analysis, Number of Alternatives and File Options

Type of Cash Flow Analysis and Output Format

This screen lists the nine alternative types of discounted cash flow analysis and output format provided by the program, and prompts for the integer value corresponding to the user's selection. The first seven of these compute the compound annual discount rate which makes the present value of the combined outlay and income schedule equal to zero. The last two compute present values at a prescribed annual discount rate. The form of presentation and terms used in the output format vary with each selection.

Number of Scale Options Included in This Pass

This screen provides the location for entering the total number of scaler alternatives in addition to the base case which are included in the run. The number of alternatives is read as a two-digit integer. Enter 00 if only the base case is included, 05 for five alternatives, and 39 for thirty-nine alternatives in addition to the base case.

Creation of Data File of Project Output

The last screen in this series provides for entering a zero or one integer value to indicate whether a data file of the output cash flow for the problem is to be created in the run. If 1 is inserted here, the program will create on the active disk drive the data file, OUTDATA.IRR, for the project.

Screens 7, 8 and 9: Type of Analysis, Number of Alternatives and File Options - Monitor Output

Type of Cash Flow Analysis and Output Format

(Enter selection number and <return>)

1 Internal Rate of Return (IRR)
2 Direct Rate of Return (DRR)
3 Associated Rate of Return (ARR)
4 Social Rate of Return (SRR)
5 Comparative Rate of Return (CRR)
6 Financial Rate of Return (FRR)
7 Economic Rate of Return (ERR)
8 Comparative Present Value (CPV)
9 Net Present Value (NPV)

SELECTION: 1

1

Number of Scale Options Included in This Pass

Enter the number of options (two-digit number) and <return>.

SELECTION: 0

0

Creation of Data File of Project Output

(Enter selection number and <return>.

0 = No
1 = Yes

SELECTION: 0

0

Save Screen with Save Option and Headers Screen with Default Headers

Commands for Subsequent Runs

Upon completing entry of values for the nine command variables and keying 0 <return> or only <return> to the menu screen of computational instructions, the save option screen will be displayed and the user prompted for a 0 or 1 command. When 1 is entered here the program will save the commands and the titles and headers entered through the keyboard as a new headers file, HEADERS.NEW, for use as the default values in subsequent runs. This is a very convenient feature for the user who will be making several runs of the same or similar problems. When 0 is entered here, the HEADERS.NEW file will not be created and instead the existing HEADERS file will be retained for the default values.

Specification of Project Title, Headers and Footnotes

Upon keying <return> to the Save Option Screen, the Headers Screen appears with the prompt to enter 0 to bypass (use the default headers) or 1 to not bypass this step. If not bypassing the step, the program will look for ten 80-column lines of entry data with <return> at the end of each line. In the order read, the entries are:

(1) two title lines, each normally centered in 80 spaces
(2) two column-header lines for the first output line of decked headers
(3) two column-header lines for the second output line of decked headers
(4) two footnote lines for the first output line of footnotes
(5) two footnote lines for the second output line of footnotes (or blank lines if only one line of footnotes needed in printed output)

Any of these lines to be omitted in the entry for the problem should be entered as a blank line by keying <return> only at that point.

Save Screen with Save Option and Headers Screen with Default Headers - Monitor Output

Commands for Subsequent Runs

(Enter selection and <return>.

0 Use default commands for subsequent runs

1 Save these Commands, Title and Headers for subsequent runs

SELECTION:

0

Specification of Project Title, Headers and Footnotes

TO BYPASS TYPING IN TITLE, HEADERS, AND FOOTNOTES

1. Type 0 to bypass; type 1 to not bypass.

IF NOT BYPASSING THIS STEP:

2. Insert two-line title for your problem with <return> at the end of each line.
3. Insert four-line column header (printed as two-line decked headers), with <return> at the end of each line. Format is A8, 8A9 / 5A9.

SAMPLE HEADERS:

Site and Plant Average Other Product Other Service Fixed Variable Mkting Current Interest Income
Period Bldings Equip. Invntry Work Cap Sales Sales Income Expense Expense Expense Deprec. Expense Tax

4. Insert four footnote lines (to be printed on two lines) with <return> at the end of each line).

0

Execution Screen: Prepare Printer and Type <return> to Execute Program

Execution Screen

The program moves next to the Execution Screen and the prompt to enter 1 <return> to go back to the Menu of Computational Instructions, or alternatively to enter 0 <return> or only <return> to proceed to program execution.

As indicated by the screen, do not forget to type <Ctrl> P or otherwise prepare to receive printed output before keying <return> to this screen.

Execution Screen: Prepare Printer and Type <return> to Execute Program - Monitor Output

Execution Screen

PROGRAM WILL NOW READ THE CASH FLOW DATA AND SOLVE FOR THE IRR

The cash flow is read from the disk file, DATA.IRR, in format of I3, 1X, A4, 8F9.0. If total data columns (NFAC+NWC+NREV+NEXP) exceeds 8, the remaining columns of input are read next in the format of I3, 1X, A4, 5F9.0. If NSCALE is greater than 0, the data file must contain four footnote lines followed by one (or two) scaler line(s) for each alternative (NSCALE value).

Type 1 and <return> to go back to the menu.
Type <return> or 0 <return> to proceed to program execution.

NOTE: Prepare your printer or disk drive to receive the output for the run before keying <return> here.

To direct the output to the printer, type CTRL P; to direct output to a disk file type > B:OUTPUT.ONE, etc.

SELECTION:

0

SECTION IV

SOURCE PROGRAM LISTING: IRR FEASIBILITY ANALYSIS (ENGLISH)

```
C                    Professor Richard Phillips
C                Department of Agricultural Economics
C                     Kansas State University
C
C     Basic Algorithm Uses the Method of Lawrence Fisher as Presented in
C                       The Journal of Business
C                     Graduate School of Business
C                       University of Chicago
C                     Volume 39  Number 1  Part 2
C                       January 1966  Page 116
C
C     Options Include the Following:
C     (A) Type of Analysis and Output Format
C         1. Internal Rate of Return          (IRR)
C         2. Direct Rate of Return            (DRR)
C         3. Associated Rate of Return        (ARR)
C         4. Social Rate of Return            (SRR)
C         5. Comparative Rate of Return       (CRR)
C         6. Financial Rate of Return         (FRR)
C         7. Economic Rate of Return          (ERR)
C         8. Comparative NPV at Given Rate    (CPV)
C         9. Actual NPV at Given Rate         (NPV)
C     (B) Number of Times Discounted per Year
C         (Rates of Return are computed on equivalent annual basis)
C     (C) Provision for scaling any or all input columns to analyze
C         alternatives and test sensivities of project.
C     (D) Provision to Start Scaling Input in any Period after First.
C     (E) Optional Benefit/Cost Ratios and Discounted Present Values
C         at up to six specified Discount Rates.
C     (F) Optional Starting Period for Discounting so that Sunken
C         Investments as well as Future Investments and Incomes
C         are computed in equivalent present values.
C     (G) Completely Formated Output Tables with Titles and Monetary
C         Unit Read in with Data.
C     (H) Option to Create Data Files of Combined Outlay and Net Income
C         Schedules for Use in Developing Proforma Statements.
C     (I) Option to Create Data File of Scaled Alternative Input
C
      IMPLICIT REAL*8(A-H,O-Z)
      REAL*8 INTRAT,INT
      INTEGER ISCALE,NSCALE,HEAD(40),HEADI(66),HEADK(66)
      DIMENSION RATE(6),ZRATE(6),CONV(13),TOT(13),FLOW(120),INO(120),
     1YEAR(120),PVAL(6,4),CASH(120,13),HOLD(120,13),OUT(120,13)
   30 FORMAT (I3,1X,I4,7F9.2)
   37 FORMAT (2A4,4(5X,I4),F9.0)
C
C  A. ESTABLISH THE BASIC PARAMETERS FOR THE RUN
C
```

```
 33 FORMAT (' ',4X,6F10.5)
    INF = 2
    OPEN(2,FILE='HEADERS',STATUS='OLD')
    NPUNCH = 1
    NPR = 0
    NST = 1
    READ (2,4) MEASR1,MEASR2,EFAC,IOPT,IBC
  4 FORMAT (4X,2A4,2X,F4.0,2(2X,I4))
    READ (2,5) INT,(RATE(J),J=1,6)
  5 FORMAT (7F6.5)
    READ (2,6) YRS,NFAC,NWC,NREV,NEXP,IRRW,NSCALE,ICARDS
  6 FORMAT (F6.0,7(2X,I4))
 10 WRITE (0,48)
    WRITE (0,1)
  1 FORMAT (/15X,'IRR FEASIBILITY ANALYSIS WITH OPTIONS (ENGLISH)'/,
   126X,'Professor Richard Phillips'/21X, 'Department of Agricultural
   2Economics'/28X,'Kansas State University'//5X,'* This program reads
   3 computational instructions from the screen menu'/7X,'and the proj
   4ected cash flow data for N periods from the users disk'/7X, 'file
   5in LOTUS 123 print file format.'//5X,'* The program computes disco
   6unted cash flows with corresponding'/7X,'present values, and solve
   7s for the Internal Rate of Return (IRR)'/7X,'for the project.'//5X
   8, '* Default options are provided for the menu instructions; they
   9can'/7X,'be replaced in any order by the user any time prior to ex
   aecution.'//)
    PAUSE
    WRITE (0,48)
  2 FORMAT (I1)
 41 FORMAT (2A4)
 42 FORMAT (F4.0)
 43 FORMAT (F8.4)
 44 FORMAT (6F6.4)
 46 FORMAT (I2)
 47 FORMAT (I1,3(I2))
 48 FORMAT (20(/))
 39 WRITE (0,3) MENU
  3 FORMAT  (/' MENU OF COMPUTATIONAL INSTRUCTIONS:'/5X,'Enter selecti
   1on number and key <return>'//5X,'1  Monetary Unit for Cash Flow'//
   25X,'2  Number of Accounting Periods per Year'//5X,'3  Reflect Prio
   3r Years and/or Compute Benefit Costs'//5X,'4  Annual Interest and
   4Discount Rates to Use'//5X,'5  Number of Years in Cash Flow'//5X,
   5'6  Organization of Data Input Columns'//5X,'7  Type of Cash Flow
   6Analysis and Presentation'//5X,'8  Number of Alternatives to Be An
   7alyzed in this Run'//5X,'9  Create Data File of the Output'//' SEL
   8ECTION: ',I1,8X,'(Enter <return> or 0 <return> to make the run)'/)
    READ (0,2) MENU
    WRITE (0,48)
    IF (MENU.EQ.0) GOTO 49
    GOTO (11,12,13,14,15,16,17,18,19),MENU
 11 WRITE (0,21) MEASR1,MEASR2
 21 FORMAT (///2X,'The default monetary unit of measure is DOLLARS ;'/
   1/5X,'To change this designation, type the substitute one in eight'
```

```
     2//5X,'characters or less, e.g., $1,000, Lempiras, etc., and key',
     3//5X,'<return>; to accept the default, type DOLLARS and key <retur
     4n>.'//////' MONETARY UNIT: ',2A4/)
      READ (0,41) MEASR1,MEASR2
      GOTO 39
   12 WRITE (0,22) EFAC
   22 FORMAT (///2X,'Enter the number of accounting periods per year in
     1the projected'//5X, 'cash flow for your problem (in decimal values
     2), e.g., 4.0 for'//5X,'quarterly data and 12.0 for monthly data, f
     3ollowed by <return>.'//2X, 'To accept the default, enter 1.0 and <
     4return>.'//////' NUMBER OF ACCOUNTING PERIODS PER YEAR: ',F4.0/)
 READ (0,42) EFAC
      GOTO 39
   13 WRITE (0,23) IOPT,IBC
   23 FORMAT (2X,'Enter commands to (1) reflect cash flow for prior year
     1s (sunken'/5X,'investment problems), and (2) compute and display o
     2ptional'/5X,'benefit-costs and present values.'////2X,'(1) ANALYSI
     3S TO REFLECT CASH FLOW FOR PRIOR YEARS:'/7X,'(Enter selection and
     4<return>'/6X,'0  =  No'/6X,'1  =  Yes'//' SELECTION:',I4///2X,
     5'(2) COMPUTE AND DISPLAY BENEFIT COSTS AND PRESENT VALUES:'/7X,'(E
     6nter selection and <return>'/6X,'0  = No'/6X,'1  = Yes'//' SELECTI
     7ON:',I4/)
      READ (0,2) IOPT
      READ (0,2) IBC
      GOTO 39
   14 WRITE (0,24) INT,(RATE(I),I=1,6)
   24 FORMA  (/' ANNUAL INTEREST AND DISCOUNT RATES:'//2X,'(1) Enter the
     1 annual interest rate for use in computing net present'//6X, 'valu
     2e options (as four-digit decimal fraction), and <return>.'///' SEL
     3ECTION:',F8.4////2X,'(2) Enter six alternative annual discount rat
     4es (four-digit decimal'//6X,'fractions) for use in computing benef
     5it-cost ratios, and <return>;'//6X,'(separate rates by one blank s
     6pace).'///' SELECTIONS:',6F8.4/)
      READ (0,43) INT
      READ (0,44) RATE
      GOTO 39
   15 WRITE (0,25) YRS
   25 FORMAT (/' TOTAL NUMBER OF YEARS IN CASH FLOW:'//2X,'Enter the num
     1ber of years in the cash flow for analysis (as decimal'//2X,
     2'number, e.g., 25.5) and <return>.'//2X,'Enter 21.0 and <return> t
     3o accept the default entry for Data.One'////' SELECTION: ',F5.2/)
READ (0,42) YRS
      GOTO 39
   16 WRITE (0,26) NFAC,NWC,NREV,NEXP
   26 FORMAT (/' COLUMNAR ORGANIZATION OF CASH FLOW DATA FOR THE PROBLEM
     1:',      //2X,'Enter the number of columns of cash flow data for ea
     2ch of the following:'///15X,'FACILITIES INVESTMENT:',
     3,I4//15X,'WORKING CAPITAL:',I4//15X,'INCOME AND REVENUE:',
     4I4//15X,'OPERATING COSTS:',I4///2X,  'Enter each of these values i
     5n sequence with one space between each number,'/5X, 'and then <ret
     6urn>.'/)
```

```
      READ (0,47) NFAC,NWC,NREV,NEXP
      GOTO 39
   17 WRITE (0,27) IRRW
   27 FORMAT (//2X,'TYPE OF CASH FLOW ANALYSIS AND OUTPUT FORMAT'/5X,'(E
     1nter selection number and <return>)'//7X,'1  Internal Rate of Retu
     2rn (IRR)'//7X,'2  Direct Rate of Return (DRR)'//7X,
     3'3  Associated Rate of Return (ARR)'//7X,'4  Social Rate of Return
     4 (SRR)'//7X,'5  Comparative Rate of Return (CRR)'//7X,'6  Financia
     51 Rate of Return (FRR)'//7X,'7  Economic Rate of Return (ERR)',
     6//7X,'8  Comparative Present Value (CPV)'//7X,'9  Net Present Valu
     7e (NPV)'//' SELECTION:',I4/)
      READ (0,2) IRRW
      GOTO 39
   18 WRITE (0,28) NSCALE
   28 FORMAT (//2X,'NUMBER OF SCALE OPTIONS INCLUDED IN THIS PASS'//5X,
     1'Enter the number of options (two-digit number) and <return>.'////
     2//' SELECTION:',I4/)
      READ (0,46) NSCALE
      GOTO 39
   19 WRITE (0,29) ISCALE
   29 FORMAT (//2X,'CREATE DATA FILE OF PROJECT OUTPUT'//5X,'(Enter sele
     lction number and <return>).'///7X,'0  =  No'//7X,
     2'1  =  Yes'/////' SELECTION:',I4/)
      READ (0,2) ISCALE
      GOTO 39
   49 WRITE (0,51)
   51 FORMAT (/' COMMANDS FOR SUBSEQUENT RUNS: (Enter selection and <ret
     lurn>.'///10X,'0  Use default commands for subsequent runs'//10X,
     2'1  Save these Commands, Title and Headers for subsequent runs'///
     3///' SELECTION:'/)
      READ (0,2) IGO
   65 IEND = 0
      WRITE (0,48)
      IP = EFAC + .45
      NOYR = (EFAC*YRS)+.45
      JFAC1=1
      JFAC2=JFAC1+NFAC-1
      JWC1=JFAC2+1
      JWC2=JWC1+NWC-1
      IF(NFAC.EQ.0)JFAC=0
      JREV1=JWC2+1
      JREV2=JREV1+NREV-1
      JEXP1=JREV2+1
      JEXP2=JEXP1+NEXP-1
      IF (JEXP2.LE.8) NCARDS = 1
      IF (JEXP2.GT.8) NCARDS = 2
      IF (NCARDS.EQ.1) NC = 8
      IF (NCARDS.EQ.2) NC = 13
      IF (ITRIP.EQ.2.OR.IMENU.EQ.1) GOTO 90
      READ (2,100) HEAD
  100 FORMAT (20A4)
```

```
      READ (2,99) HEADI
   99 FORMAT (20A4/13A4)
      READ (2,99) HEADK
   90 IF (JEXP2.LE.13) GOTO 20
      WRITE (NPR,113) JEXP2
  113 FORMAT (' ','STOPPED.  TOTAL ENTRY COLUMNS = 13.  YOU HAVE ',I3)
 STOP
C
C   B. READ TITLES, HEADERS AND FOOTNOTES FOR OUTPUT TABLES
C
   20 WRITE (0,31)
   31 FORMAT (/' TO BYPASS TYPING IN TITLE, HEADERS, AND FOOTNOTES'//5X,
     1'1. Type 0 to bypass; type 1 to not bypass.'        //' IF NOT BYP
     2ASSING THIS STEP:'//5X,'2. Insert two-line title for your problem
     3with <return>'/8X,'at the end of each line.'//5X,'3. Insert four-l
     4ine column header (printed as two-line decked headers),'/8X,'with
     5<return> at the end of each line.  Format is A8, 8A9 / 5A9.'
     6    //' SAMPLE HEADERS:'//9X,'Site and   Plant   Average   Other
     7 Product   Other  Service    Fixed'/' Varable  Mkting  Current
     8Intrest   Income'/' Period  Bldings   Equip.  Invntry  Wrk Cap
     9Sales    Sales   Income   Expense'/' Expense  Expense  Deprec.  E
     Axpense     Tax'//5X, '4. Insert four footnote lines (to be printed
B on two lines) with'/8X,'<return> at the end of each line).'/)
      READ (0,2) IPASS
      IF (IPASS.EQ.0) GOTO 57
      READ (0,100) HEAD
      READ (0,99) HEADI
      READ (0,99) HEADK
   57 WRITE (0,48)
      IF (IGO.EQ.0) GOTO 64
      OPEN (2,FILE='HEADERS.NEW',STATUS='NEW')
      WRITE (2,4) MEASR1,MEASR2,EFAC,IOPT,IBC
      WRITE (2,5) INT,(RATE(I),I=1,6)
      WRITE (2,6) YRS,NFAC,NWC,NREV,NEXP,IRRW,NSCALE,ICARDS
      WRITE (2,62) HEAD
   62 FORMAT (' ',20A4/' ',20A4)
      WRITE (2,63) HEADI
   63 FORMAT (' ',20A4/' ',13A4/' ',20A4/' ',13A4)
      WRITE (2,63) HEADK
   64 CONTINUE
      WRITE (0,32)
   32 FORMAT (/' PROGRAM WILL NOW READ THE CASH FLOW DATA AND SOLVE FOR
     1THE IRR'//5X,'The cash flow is read from the disk file, DATA.IRR,
     2in format of'/5X,'I3, 1X, A4, 8F9.0.  If total data columns (NFAC+
     3NWC+NREV+NEXP)'/5X, 'exceeds 8, the remaining columns of input are
4 read next in the'/5X,'format of I3, 1X, A4, 5F9.0.  If NSCALE is
     5greater than 0, the'/5X,'data file must contain four footnote line
     6s followed by one (or'/5X,'two) scaler line(s) for each alternativ
     7e (NSCALE value).'//5X,' Type 1 and <return> to go back to the men
     8u.'/5X,' Type <return> or 0 <return> to proceed to program executi
     9on.'///' NOTE:  Prepare your printer or disk drive to receive the'
```

```
      A/8X,'output for the run before keying <return> here.'//8X,'To dire
      Bct the output to the printer, type CTRL P; to'/8X,'direct output t
      Co a disk file type > B:OUTPUT.ONE, etc.'//' SELECTION:'//)
       READ (0,2) IMENU
       WRITE (0,48)
       IF (IMENU.EQ.1) GOTO 39
       WRITE(NPR,110)
  110 FORMAT(' ','    LISTING OF FACTORS CONCERNING
     1 THIS RUN:'/)
       WRITE (NPR,36) MEASR1,MEASR2
   36 FORMAT (9X,'Unit of Measure for Output Is',1X,2A4/)
       WRITE (NPR,38) EFAC
   38 FORMAT(9X,'Number of Times Discounted per Year = ',F3.1/)
       IF (IOPT.NE.1) GOTO 131
       WRITE (NPR,35)
   35 FORMAT (9X, '"Sunken Investment" Option IS Being Used'/)
       GOTO 40
  131 WRITE (NPR,34)
   34 FORMAT (9X, '"Sunken Investment" Option IS NOT Being Used'/)
   40 IF(IBC.NE.1) GOTO 92
       WRITE (NPR,52)
   52 FORMAT (9X,'Benefit-Costs Computed at Annual Discount Rates of:'/)
       WRITE (NPR,33) RATE
       DO 60 L=1,6
   60 IF(RATE(L).NE.1) NDCR=L
   92 ISCALE=0
       IF (ITRIP.EQ.2) GOTO 91
       OPEN (2,FILE='DATA.IRR',STATUS='OLD')
C
C  C. READ THE INPUT DATA FOR THE PROBLEM
C   1. Read INO, YEAR and First Eight Columns of Data for the Problem,
C      One Line Entry for Each Period in the Cash Flow
C          FORMAT is I3, 1X, 14, 8F9.0
C     INO ~ Indicates Accounting Period Sequence, e.g., -2,-1, 0, 1, 2
C     YEAR ~ Identification for Each Period, e.g., "1990" or "0188"
C     CASH ~ Cash Flow Data for the First 8 Columns of Outlay and
C            Revenue Data for the Problem.  For Negative Entries,
C            Insert "-" before First Digit of Number. Right Justify
C            Data, or Insert Decimal Point.
C   2. Read INO, YEAR, (Optional), and Last Five Columns of CASH
C      Insert Input Data as Above; FORMAT is 3X, 5F9.0
C
  105 FORMAT(I3,1X,A4,8F9.0)
   66 FORMAT (8X,5F9.0)
   91 DO 67 I = 1,NOYR
   67 READ (INF,105,END=8) INO(I),YEAR(I),(CASH(I,J),J=1,8)
       IF (NCARDS.LT.2) GOTO 69
       DO 68 I = 1,NOYR
   68 READ (INF,66,END=8) (CASH(I,J),J=9,13)
   69 CONTINUE
       IF (NSCALE.LT.1) GOTO 50
```

```
      DO 70 I = 1,NOYR
      DO 70 J = 1,NC
      HOLD(I,J) = CASH(I,J)
   70 CONTINUE
      GOTO 50
C
C  D. READ FOOTNOTES AND SCALER FACTORS FOR EACH ALTERNATIVE SPECIFIED
C      UNDER "NSCALE.  ORDER IS ALTERNATIVE 1, ALTERNATIVE,
C      ALTERNATIVE 3, ... , ALTERNATIVE n.  WITHIN EACH, ORDER IS:
C   3. Read Two Line Entry for First Footnote.
C            FORMAT is 20A4, 13A4
C      Read Two Line Entry for Second Footnote.
C            FORMAT is 20A4, 13A4
C   4. Read First Line of Scaler Factors for Alternative
C       IDECK - Create Disc File of Scaled Data for the Alternative:
C                Yes = 1, No = 0.
C       ISTART - Period (INO) with which to Begin Scaling Data
C       CONV   Scale Factors (Multipliers), Matching the First 8 Input
C              Columns of Data to Be Scaled.  Enter "1.0" for Columns
C              which Are to Remain the Same as for the Base Case.
C                FORMAT is I3, 1X, I4, 8F9.0
C   5. If NCARDS = 2, Read Second Line of Scaler Factors
C       IDECK - As in Step 4, or Leave Blank
C       ISTART - As in Step 4, or Leave Blank
C       CONV - Scale Factors (Multipliers), Matching the Last 5 Input
C              Columns of Data to Be Scaled, as in Step 4.
C                FORMAT is 8X, 5F9.0 C   55 ISCALE = ISCALE + 1
C
   55 ISCALE = ISCALE + 1
      READ (INF,99) HEADK
      READ (INF,106) IDECK,ISTART,(CONV(J),J=1,8)
  106 FORMAT (I3,1X,I4,8F9.0)
      IF (NCARDS.GT.1) READ (INF,71) (CONV(J),J=9,13)
   71 FORMAT (8X,5F9.0)
      ISTNO = ISTART
C
C   E. SCALE THE DATA, IF ORDERED, AND PRINT THE INPUT
C
      IF (INO(1).EQ.0) ISTART = ISTART + 1
      IF (INO(1).EQ.-1)ISTART = ISTART + 2
      IF (INO(1).EQ.-2)ISTART = ISTART + 3
      IF (INO(1).EQ.-3)ISTART  = ISTART + 4
      IF (INO(1).EQ.-4)ISTART  = ISTART + 5
   50 CONTINUE  112 FORMAT('1 A LISTING OF THE DATA'/)
      WRITE (NPR,112)
      WRITE (NPR,72) YRS,EFAC,NFAC,NWC,NREV,NEXP,IRRW,NSCALE,NCARDS,
     1ICARDS,INT
   72 FORMAT(' ',2F5.2,8I4,2X,F8.6)
      WRITE(NPR,103) HEAD
  103 FORMAT (' ',26X,20A4/' ',26X,20A4)
      WRITE(NPR,102) HEADI
```

```
  102 FORMAT( ' ',33A4/' ',33A4/'+',2X,6('_'),13(1X,8('_'))/)
      IF (NSCALE.EQ.0) GOTO 80
      IF (ISCALE.EQ.0) GOTO 80
      WRITE(NPR,104)(CONV(J),J=1,13)
  104 FORMAT (' ','SCALERS:',13F9.4)
   74 DO 75 I = 1,NOYR
      DO 75 J = 1,NC
      IF (ISTART.GT.I) CASH(I,J) = HOLD(I,J)
      IF (ISTART.LE.I) CASH(I,J) = HOLD(I,J)*CONV(J)
   75 CONTINUE
      IF (IDECK.EQ.0) GOTO 80
      OPEN (1,FILE='NEWDATA.IRR',STATUS='NEW')
      DO 77 I = 1,NOYR
      WRITE (NPUNCH,105) INO(I),YEAR(I),(CASH(I,J),J=1,8)
   77 CONTINUE
      IF (NCARDS.LT.2) GOTO 80
      DO 73 I=1,NOYR
   73 WRITE (NPUNCH,81) INO(1),YEAR(I),(CASH(I,J),J=9,13)
  107 FORMAT (' ',I3,1X,A4,13F9.0)
   81 FORMAT (I3,1X,A4,5F9.0)
   80 CONTINUE
      DO 78 I = 1,NOYR
   78 WRITE (NPR,107) INO(I),YEAR(I),(CASH(I,J),J=1,NC)
C
C     F. COMBINE THE INPUT COLUMNS FOR ANALYSIS
C
      DO 56 I = 1,NOYR
      OUT(I,1)=0.
      IF (NFAC.EQ.0) GOTO 83
      DO 82 J=1,JFAC2
   82 OUT(I,1)=OUT(I,1)+CASH(I,J)
   83 OUT(I,2) = 0.
      IF (NWC.EQ.0) GOTO 84
      DO 85 J = JWC1,JWC2
      OUT(I,2)=OUT(I,2) + CASH(I,J)
   85 CONTINUE
      IF(IRRW.EQ.5) OUT(I,2)= OUT(I,2)*(-1.0)
      IF(IRRW.EQ.8) OUT(I,2)= OUT(I,2)*(-1.0
   84 OUT(I,5) = 0.
      IF (NEXP.EQ.0) GOTO 86
      DO 87 J = JEXP1,JEXP2
   87 OUT(I,5) = OUT(I,5) + CASH(I,J)
   86 OUT (I,4) = 0.
      IF (NREV.EQ.0) GOTO 88
      DO 89 J = JREV1,JREV2
   89 OUT(I,4) = OUT(I,4) + CASH(I,J)
   88 OUT(I,3) = OUT(I,1) + OUT(I,2)
      OUT(I,6) = OUT(I,4) - OUT(I,5)
   56 CONTINUE
      IF (NSCALE.EQ.0) GOTO 96
      IF (ISCALE.EQ.0) GOTO 96
```

```
      WRITE (NPR,95) ISTNO
   95 FORMAT('0',1X,'SCALE FACTORS APPLIED TO DATA BEGINNING IN PERIOD'
     12X,I2)
   96 CONTINUE
      IF (IRRW.GT.7) GOTO 97
C
C   G. CALCULATE THE RATE OF RETURN AND OUTPUT DATA
C
      DO 98 I=1,NOYR
   98 FLOW(I)=OUT(I,6)-OUT(I,3)
      CALL RRATE(FLOW,NOYR,R,EFAC,INO(1),IOPT)
      INTRAT=R/100.
      GOTO 149
   97 INTRAT=INT
  149 ZZ=1.+INTRAT
      IF(ZZ.EQ.0.) ZZ=0.001
      DIV = 1. / ZZ
      DO 132 I = 1,NOYR
      XI = FLOAT(I)
      IF(IOPT.EQ.1) XI=FLOAT(INO(1)+I)
      OUT(I,7)=DIV**((XI-1.)/EFAC)
      IF((DIV.LT.0.).AND.(OUT(I,7).GT.0.))OUT(I,7) = -OUT(I,7)
      OUT(I,8)=OUT(I,3)*DIV**((XI-1.)/EFAC)
      OUT(I,9)= OUT(I,6)*DIV**((XI-1.)/EFAC)
  133 IF (DIV.LT.0.AND.OUT(I,8).GT.0.) OUT(I,8) = -OUT(I,8)
      IF (DIV.LT.0.AND.OUT(I,9).GT.0) OUT(I,9) = -OUT(I,9)
  132 CONTINUE
      DO 134 I = 1,9
  134 TOT(I) = 0.
      DO 135 I = 1,NOYR
      DO 135 J = 1,9
  135 TOT(J) = TOT(J)+ OUT(I,J)
      INTRAT = INTRAT*100.
      IF (ICARDS.EQ.0) GOTO 509
      OPEN (1,FILE='OUTDATA.IRR',STATUS='NEW')
      WRITE (NST,103) HEAD
      DO 507 I = 1,NOYR
  507 WRITE (NST,508) INO(I),YEAR(I),(OUT(I,J),J=1,9)
  508 FORMAT (' ',1X,I3,A4,6F10.0,F10.4,2F10.0)
  509 CONTINUE
C
C   H. PRINT THE BODY OF THE OUTPUT TABLE
C
      WRITE(NPR,450)
  450 FORMAT ('1',35X, 'I N V E S T M E N T   F E A S I B I L I T Y   A
1N A L Y S I S')
      GOTO (451,452,453,454,455,456,457,458,459),IRRW
  451 WRITE(NPR,150)HEAD,INTRAT,MEASR1,MEASR2,MEASR1,MEASR2
  150 FORMAT( / 2(26X,20A4/) / 42X,'INTERNAL RETURN ON TOTAL CAPITAL',
     1F10.3,'  PERCENT'/'+',75X,9('_') //21X,'INVESTMENT (',2A4,')',
     215X,'    OPERATING (',2A4,')',14X,'PRESENT',6X,'PRESENT VALUE'/'+'
```

```
     3,15X,33('_'),6X,32('_'),17X,21('_')/4X,'PERIOD',20X,'WORKING',20X,
     4'TOTAL',5X,'OPERATING',6X,'NET',11X,'VALUE',5X,'TOTAL',9X,'NET'/
     5'+',12('_')/'  NO.  IDENT.   FACILITIES    CAPITAL      TOTAL
     6   REVENUE    EXPENSES**   REVENUE         FACTOR   INVESTMENT    R
7EVENUE'/'+',   5('_'),1X,6('_'),3X,10('_'),3X, 8('_'),4X, 8('_'),
     86X, 8('_'),4X, 9('_'),3X, 8('_'),8X, 6('_'),3X,10('_'),3X, 8('_'))
 GOTO 300
 452 WRITE(NPR,461)HEAD,INTRAT,MEASR1,MEASR2, MEASR1,MEASR2
 461 FORMAT(/ 2(26X,20A4/)  /42X,'DIRECT RETURN ON TOTAL CAPITAL',F10.3
     1,'  PERCENT'/'+',73X,9('_'),//21X,'INVESTMENT (',2A4,')',20X,
     2'OPERATING (',2A4,')',    13X,'PRESENT',4X,'PRESENT VALUES'/'+',
     314X,34('_'),4X,34('_'),16X,22('_')/4X,'PERIOD',20X,'WORKING',19X,
     4'DIRECT',4X,'OPERATING',7X,'NET',11X,'VALUE',5X,'TOTAL',9X,'NET'
     5  /'+',12('_')/'  NO.  IDENT.',2X,'FACILITIES',5X,'CAPITAL',6X,
     6'TOTAL',8X,'BENEFIT',3X,'EXPENSES** ',3X,'BENEFIT',8X,'FACTOR',2X,
     7'INVESTMENT',5X,'BENEFIT'
     8      /'+',5('_'),1X,5('_'),3X,10('_'),4X, 8('_'),4X, 8('_'),
     96X,8('_'),2X,10('_'),4X, 8('_'),8X, 6('_'),2X,10('_'),4X, 8('_'))
      GOTO 300
 453 WRITE(NPR,462)HEAD,INTRAT,MEASR1,MEASR2,MEASR1,MEASR2
 462 FORMAT (/ 2(26X,20A4/)  /39X,'ASSOCIATED RETURN ON TOTAL CAPITAL'
     1,F10.3,'  PERCENT'/'+',74X,9('_') //21X,'INVESTMENT (',2A4,')',
     214X,'ASSOCIATED EFFECTS (',2A4,')',22X,'PRESENT VALUES'/'+',14X,
     334('_'),4X,34('_'),16X,22('_')/          77X,'ASSOCIATED',8X,
     4 'PRESENT',14X,'ASSOCIATED'/4X,'PERIOD',19X,'WORKING',17X,'ASSOCIA
     5TED  ASSOCIATED     NET',13X,'VALUE     TOTAL',8X,'NET'/'+',12('_'
     6)/3X,'NO. IDENT.  FACILITIES    CAPITAL',6X,'TOTAL',7X,'BENEFITS',
     76X,'COSTS',5X,'BENEFITS',9X'FACTOR',2X,'INVESTMENT',4X,'BENEFITS'/
     8      '+',   5('_'),1X,5('_'),3X,10('_'),3X, 9('_'),3X, 9('_'),
     94X,10('_'),3X, 9('_'),2X,10('_'),8X, 6('_'),2X,10('_'),4X, 8('_'))
      GOTO 300
 454 WRITE(NPR,463)HEAD,INTRAT,MEASR1,MEASR2, MEASR1,MEASR2
 463 FORMAT(/2(26X,20A4/)/42X,'SOCIAL RETURN ON TOTAL CAPITAL',F10.3,'
     1 PERCENT'/'+',73X,9('_')//19X,'DIRECT INVESTMENT (',2A4,')',7X,'CO
     2MBINED TOTAL EFFECTS (',2A4,')',21X,'PRESENT VALUES'/'+',16X,32('_
     3'),5X,33('_'),18X,20('_')/30X,'PROJECT',6X,'TOTAL',7X,'COMBINED
     4 COMBINED    COMBINED',8X,'PRESENT',4X,'TOTAL',6X,'COMBINED'/'
     5PERIOD',7X,'PROJECT',6X,'WORKING    PROJECT',7X,'ANNUAL',6X,'ANNU
     6AL',8X,'NET',11X,'VALUE    PROJECT ',6X,'NET'/'+',12('_')/'   NO.
     7IDENT.  FACILITIES     CAPITAL   INVESTMENT     BENEFITS     COSTS
     8**    BENEFITS',8X,'FACTOR  INVESTMENT    BENEFITS'/'+',5('_'),1X,
     95('_'),3X,10('_'),4X,8('_'),3X,10('_'),1X,3(4X,8('_')),8X,6('_'),
     A2X,10('_'),4X,8('_'))
      GOTO 300
 455 WRITE(NPR,464)HEAD,INTRAT,MEASR1,MEASR2, MEASR1,MEASR2
 464 FORMAT(/ 2(26X,20A4/) / 38X,'COMPARATIVE RETURN ON TOTAL CAPITAL',
     1F10.3,'  PERCENT' /'+',74X,9('_') /95X,'PRESENT'/4X,'PERIOD',8X,
     2'COMPARATIVE OUTLAY (',2A4,')',9X,'COMPARATIVE COST** (',2A4,')',
     311X,'VALUE',7X,'PRESENT VALUES'/'+',11('_'),3X,34('_'),4X,34('_'),
     419X,19('_')/2X,'NO.  IDENT.  ALTERNATIVE  BASE CASE  DIFFERENCE
     5 BASE CASE  ALTERNATIVE  DIFFERENCE',8X,'FACTOR',5X,'OUTLAY',
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     65X,'SAVINGS'/
     7       '+',5('_'),1X,5('_'),3X,11('_'),2X, 9('_'),2X,10('_'),
     84X, 9('_'),2X,11('_'),2X,10('_'),8X, 6('_'),5X, 6('_'),5X, 7('_'))
      GOTO 300
  456 WRITE(NPR,465)HEAD,INTRAT,MEASR1,MEASR2, MEASR1,MEASR2
  465 FORMAT(/ 2(26X,20A4/) / 39X,'FINANCIAL RETURN ON EQUITY CAPITAL',
     1F10.3,'  PERCENT'/'+',74X,9('_') //20X,'EQUITY CAPITAL (',2A4,')',
     215X,'PROFIT AND LOSS (',2A4,')',9X,'PRESENT',5X,'PRESENT VALUES'/
     3'+',16X,30('_'),9X,31('_'),17X,20('_')/4X,'PERIOD',21X,'FROM',22X,
     4'TOTAL',5X,'OPERATING',7X,'NET',10X,'VALUE',6X,'TOTAL',8X,'NET'/'+
     5',12('_')/'   NO.  IDENT.   PAID IN     EARNINGS',6X,'TOTAL',8X,'I
     6NCOME',8X,'COST',7X,'PROFIT',8X,'FACTOR',5X,'EQUITY',6X,'PROFIT'/
     7       '+',    5('_'),2X,5('_'),4X, 7('_'),5X, 8('_'),4X, 7('_'),
     88X, 7('_'),5X, 7('_'),5X, 7('_'),7X, 7('_'),5X, 6('_'),6X, 6('_'))
      GOTO 300
  457 WRITE(NPR,466)HEAD,INTRAT,MEASR1,MEASR2, MEASR1,MEASR2
  466 FORMAT( / 2(26X,20A4/) / 42X,'ECONOMIC RETURN ON TOTAL CAPITAL',
     1F10.3, '  PERCENT'/'+',75X,9('_') //21X,'INVESTMENT (',2A4,')',
     215X,'    OPERATING (',2A4,')',14X,'PRESENT',7X,'PRESENT VALUE'/'+'
     3,16X,31('_'),8X,31('_'),18X,19('_')/4X,'PERIOD',20X,'WORKING',20X,
     4'TOTAL',5X,'OPERATING',6X,'NET',11X,'VALUE',6X,'TOTAL',9X,'NET'/
     5'+',12('_')/'  NO.  IDENT.   FACILITIES    CAPITAL      TOTAL
     6   INCOME     EXPENSES**   INCOME          FACTOR   INVESTMENT
     7INCOME'/'+',    5('_'),1X,6('_'),3X,10('_'),3X, 8('_'),4X, 8('_'),
87X, 7('_'),4X, 8('_'),5X, 7('_'),8X, 6('_'),3X,10('_'),4X, 7('_'))
      GOTO 300
  458 WRITE(NPR,467)HEAD,INTRAT,MEASR1,MEASR2,MEASR1,MEASR2
  467 FORMAT(/ 2(26X,20A4/) / 47X,'ANNUAL DISCOUNT RATE'.
     1F10.3,'  PERCENT' /'+',68X,9('_') /95X,'PRESENT'/4X,'PERIOD',8X,
     2'COMPARATIVE OUTLAY (',2A4,')',11X,'COMPARATIVE COST (',2A4,')',
     311X,'VALUE',6X,'PRESENT VALUES'/'+',11('_'),3X,34('_'),5X,32('_'),
     419X,20('_')/2X,'NO.  IDENT.  ALTERNATIVE  BASE CASE  DIFFERENCE
     5  BASE CASE ALTERNATIVE    SAVINGS',9X,'FACTOR',5X,
     6'OUTLAY',6X,'SAVINGS'/
     7       '+',    5('_'),1X,5('_'),3X,11('_'),2X, 9('_'),2X,10('_'),
     85X, 9('_'),1X,11('_'),4X, 7('_'),9X, 6('_'),5X, 6('_'),6X, 7('_'))
      GOTO 300
  459 WRITE(NPR,468)HEAD,INTRAT,MEASR1,MEASR2,MEASR1,MEASR2
  468 FORMAT(/ 2(26X,20A4/) / 47X,'ANNUAL DISCOUNT RATE',
     1F10.3,'  PERCENT'/'+',68X,9('_') //21X,'INVESTMENT (',2A4,')',
     215X,'    OPERATING (',2A4,')',14X,'PRESENT',6X,'PRESENT VALUE'/'+'
     3,16X,31('_'),8X,30('_'),19X,19('_')/4X,'PERIOD',20X,'WORKING',19X,
     4'TOTAL',6X,'OPERATING',6X,'NET',11X,'VALUE',5X,'TOTAL',9X,'NET'/
     5'+',12('_')/'  NO.  IDENT.   FACILITIES    CAPITAL      TOTAL
     6   INCOME     EXPENSES**   INCOME          FACTOR   INVESTMENT    I
     7NCOME' /'+',    5('_'),1X,6('_'),3X,10('_'),4X, 7('_'),5X, 6('_'),
     88X, 6('_'),5X, 8('_'),5X, 6('_'),9X, 6('_'),3X,10('_'),4X, 6('_'))
  300 DO 136 I=1,NOYR
      IF(IRRW.EQ.5.OR.IRRW.EQ.8) OUT(I,2) = OUT(I,2)*(-1.)
      WRITE(NPR,151)INO(I),YEAR(I),(OUT(I,J),J=1,9)
  151 FORMAT(2X,I3,3X,A4,4X,3(F9.0,3X),2X,3(F9.0,3X),F11.4, 2(3X,F9.0))
```

```
  136 IF(ICARDS.EQ 1)WRITE(NPUNCH,155)INO(I),YEAR(I),OUT(I,3),OUT(I,6)
  155 FORMAT (' ',1X,I3,4X,A4,2F12.2)
      WRITE(NPR,152)(TOT(I),I=1,6),TOT(8),TOT(
  152 FORMAT('+',15X,10('_'),2X,10('_'),2X,10('_'),4X,10('_'),2X,10('_')
     1,2X,10('_'),16X,10('_'),2X,10('_')/7X,'TOTAL',4X,3(F9.0,3X),2X,
     23(F9.0,3X),14X,2(F9.0,3X))
C
C   I. COMPUTE AND PRINT THE B/C RATIOS AND PRESENT VALUES
C
      IF (IBC.EQ.0) GOTO 120
      GOTO (471,472,473,474,475,476,477,478,479),IRRW
  471 WRITE (NPR,137) MEASR1,MEASR2
  137 FORMAT(//  ' ',20X,'INTEREST',22X,'BENEFIT/COST',21X,
     1'PRESENT VALUE IN ',2A4,/'+',83X,25('_')/' ',20X,'PER CENT',26X,
     2'RATIO',22X,'REVENUE',4X,'OUTLAY',6X,'BALANCE'/'+',20X,8('_'),26X,
     3 5('_'),22X, 7('_'),4X,6('_'),6X,7('_'))
      GOTO 329
  472 WRITE(NPR,432)MEASR1,MEASR2
  432 FORMAT(//  ' ',20X,'INTEREST',22X,'BENEFIT/COST',21X,
     1'PRESENT VALUE IN ',2A4,/'+',83X,25('_')/' ',20X,'PER CENT',26X,
     2'RATIO',22X,'BENEFIT',4X,'OUTLAY',6X,'BALANCE'/'+',20X,8('_'),26X,
     35('_'),22X,7('_'),4X,6('_'),6X,7('_'))
      GOTO 329
  473 WRITE (NPR,433)MEASR1,MEASR2
  433 FORMAT(//  ' ',20X,'INTEREST',19X,'ASSOCIATED BENEFIT',18X,
     1'PRESENT VALUE IN ',2A4,/'+',83X,25('_')/' ',20X,'PER CENT',26X,
     2'RATIO',16X,'ASSOC. BENEFITS',2X,'OUTLAY',6X,'BALANCE',/'+',20X,
     38('_'),26X, 5('_'),16X,15('_'),2X,6('_'),6X,7('_'))
      GOTO 329
  474 WRITE (NPR,434)MEASR1,MEASR2
  434 FORMAT(//  ' ',20X,'INTEREST',21X,'SOCIAL BENEFIT',21X,
     1'PRESENT VALUE IN ',2A4,/'+',84X,25('_')/' ',20X,'PER CENT',26X,
     2'RATIO',22X,'BENEFIT',4X,'OUTLAY',6X,'BALANCE'/'+',20X,8('_'),26X,
     35('_'),22X,7('_'),4X,6('_'),6X,7('_'))
      GOTO 329
  475 WRITE(NPR,435)MEASR1,MEASR2
  435 FORMAT(//  ' ',20X,'INTEREST',23X,'COMPARATIVE', 21X,
     1'PRESENT VALUE IN ',2A4,/'+',83X,25('_')/' ',20X,'PER CENT',26X,
     2'RATIO',22X,'SAVINGS',4X,'OUTLAY',5X,'DIFFERENCE'/'-',20X,8('_'),
     326X, 5('_'),22X,7('_'),4X,6('_'),5X,10('_'))
      GOTO 329
  476 WRITE(NPR,436)MEASR1,MEASR2
  436 FORMAT(//  ' ',20X,'INTEREST',22X,'PROFITABILITY',20X,
     1'PRESENT VALUE IN ',2A4,/'+',83X,25('_')/' ',20X,'PER CENT',26X,
     2'RATIO',20X,'NET PROFIT',3X,'EQUITY',6X,'BALANCE'/'+',20X,8('_'),
     326X, 5('_'),20X,10('_'),3X,6('_'),6X,7('_'))
      GOTO 329
  477 WRITE(NPR,437)MEASR1,MEASR2
  437 FORMAT(//  ' '.20X,'INTEREST',22X,'BENEFIT/COST',22X,
     1'PRESENT VALUE IN ',2A4,/'+',84X,25('_')/' ',20X,'PER CENT',26X,
     2'RATIO',22X, 'INCOME',5X,'OUTLAY',6X,'BALANCE'/'+',20X,8('_'),26X,
```

```
      35('_'),22X,6('_'),5X,6('_'),6X,7('_'))
       GOTO 329
  478 WRITE(NPR,438)MEASR1,MEASR2
  438 FORMAT(//  ' ',19X,'ALTERNATIVE',21X,'COMPARATIVE',21X,
     1'PRESENT VALUE IN ',2A4,/'+',83X,25('_')/' ',17X,'ANNUAL RATE(%)'
     2,23X,'RATIO',20X,'BASE CASE',4X,'OUTLAY',5X,'SAVINGS' /
     3 '+',17X,14('_'),23X, 5('_'),20X,9('_'),4X, 6('_'),5X,7('_'))
       GOTO 329
  479 WRITE(NPR,439)MEASR1,MEASR2
  439 FORMAT(//  ' ',19X,'ALTERNATIVE',20X,'BENEFIT/COST',21X,'PRESENT V
     1ALUE IN ',2A4,/'+',83X,25('_')/' ',17X,'ANNUAL RATE(%)',23X,
     2'RATIO',22X, 'INCOME',5X,'OUTLAY',6X,'BALANCE'/'+',17X,14('_'),
     323X,5('_'),22X,6('_'),5X,6('_'),6X,7('_'))
  329 DO 121 J=1,NDCR
       PVAL(J,2)=0.0
       PVAL(J,3)=0.0
       DIV=1./(1.+RATE(J))
       DO 122 I=1,NOYR
       XI=FLOAT(I)
       IF(IOPT.EQ.1) XI = FLOAT(INO(1)+I)
       FACTOR=DIV**((XI-1.) / EFAC)
       PVAL(J,2)=PVAL(J,2)+OUT(I,6)*FACTOR
       PVAL(J,3)=PVAL(J,3)+OUT(I,3)*FACTOR
  122 CONTINUE
       PVAL(J,1)=PVAL(J,2)/PVAL(J,3)
       PVAL(J,4)=PVAL(J,2)-PVAL(J,3)
       ZRATE(J)=RATE(J)*100.0
  121 CONTINUE
       WRITE (NPR,123) (ZRATE(J),(PVAL(J,I),I=1,4),J=1,NDCR)
  123 FORMAT(' ',20X,F7.3,25X,F7.3,19X,F10.0,2X,F9.0,2X,F10.0)
  120 WRITE (NPR,124)
  124 FORMAT (/' ',12('-'))
       IF (IRRW.EQ.3.OR.IRRW.EQ.6) GOTO 130
       WRITE (NPR,125)
  125 FORMAT(/1X,'**EXCLUDING DEPRECIATION, INTEREST, AND INCOME TAX')
  130 WRITE (NPR,126) HEADK
  126 FORMAT(/' ','ALTERNATIVE:'/' ',33A4/' ',33A4)
  140 CONTINUE
C
C   J. RETURN TO THE NEXT SCALING OF PROBLEM OR TO THE NEXT PROBLEM
C
       IF (ISCALE.NE.NSCALE) GOTO 55
       WRITE (NPR,48)
       PAUSE
    8 WRITE (NPR,127)
  127 FORMAT(////' NORMAL TERMINATION OF PROGRAM')
       STOP
       END
```

```
      SUBROUTINE RRATE (FLOW,N,R,EFAC,INO,IOPT)
      IMPLICIT REAL*8(A-H,O-Z)
      DIMENSION FLOW(1)
      OSI=.10
      DO 200 J=1,20
      SNUMER=0.
      SDENOM=0.
      DO 100 I=1,N
      II = I - 1
      IF (IOPT.EQ.1) II = INO + I - 1
      TDIF = -FLOAT(II)/EFAC
      TFACT=OSI*TDIF
      IF(TFACT.GT.174.00) GOTO 201
      IF(TFACT.LT.-180.) TFACT=-180.
      PRSNTV=FLOW(I)*DEXP(TFACT)
      SNUMER=SNUMER+PRSNT
  100 SDENOM=SDENOM+TDIF*PRSNTV
      RATIO=SNUMER/SDENOM
      SI=OSI-RATIO
      IF(DABS(SI-OSI).LE..00005) GOTO 300
      GOTO 200
  201 SI=1.0
  200 OSI=SI
  300 R=(DEXP(SI)-1.0)*100.
      RETURN
      END
```

SECTION V

VARIABLE INDEX: IRR FEASIBILITY ANALYSIS WITH OPTIONS (ENGLISH)
INDEX OF OPTIONS, COMMANDS AND VARIABLES

Analytical and Format Options (IRRW)

Code	Item and Line References [1]	Components (B:I)
ARR	Associated Rate of Return 18, 481-491, 584-589	Associated Net Benefit : Total Capital
CRR	Comparative Rate of Return 20, 506-515, 596-599	Added Net Income : Added Capital
CPV	Comparative Present Value 23, 539-548, 600-604	Added Net Income : Added Capital
DRR	Direct Rate of Return 17, 469-479, 581-585	Direct Net Benefit : Total Capital
ERR	Economic Rate of Return 22, 528-537, 611-615	Simulated Net Income : Total Capital
FRR	Financial Rate of Return 21, 517-526, 606-610	Net Profit : Equity Capital
IRR	Internal Rate of Return 16, 457-467, 575-579	Net Income : Total Capital
NPV	Net Present Value 24, 550-559, 624-628	Net Income : Total Capital
SRR	Social Rate of Return 19, 494-504, 593-598	Total Net Benefit : Total Capital

Files and Arrays of Data Input and Output

Code	Item and Line References [1]	Components (B:I)
CASH	Array of Cash Flow Input 45, 292, 296, 302, 306, 309, 365-8, 372, 376, 381, 389, 393, 400, 404	Estimated cash flow to and from project by period (row) and source/use (column).
CONV	Conversion Factor Array 44, 325, 332, 338-40, 361, 367	Decimal multipliers for converting cash flow for base case to cash flow for the given alternative.

[1] Line Numbers on Source Program Listing [Irr(Eng).For]

DATA	DATA.IRR Input File 284	Run file of input for the IRR program.
FLOW	Converted Cash Flow Array 44, 419-20, 663, 665, 677	Net + or - cash flow period by period (added across all input columns).
HEADERS	Read File of Commands and Headers 54	Read input file of commands and headers used in the operational run.
HEADERS	HEADERS.NEW Output File 236	Output file of replacement commands and headers as requested by user.
HOLD	Cash Flow Input Held in Memory 45, 310, 366-7	Original cash flow input array held in memory for later conversion.
NEW	NEWDATA.IRR Output File 370	Data file created by the program for the user specified alternative(s)
OUT	Array(s) of Intermediate Output 45, 386-406, 419, 430-35, 441, 447, 561-4, 636-7	Intermediate output arrays created for further computations and/or disk file storage.
OUTDATA	OUTDATA.IRR Output File 444	Optional disk file of program output data stored to "NST".
PVAL	Array(s) of Discounted Cash Flow 45, 629-43	Discounted cash flow arrays after applying present value factors.
TOT	Array(s) of Cumulative Totals 44, 438, 441, 566	Cumulative totals for cash flow data columns through period N.

Variables and Identifiers Included in the Program

Code	Item and Line References [2]	Components (B:I)
EFAC	Number of Times Discounted per Year 58, 109, 115, 188-9, 237, 269, 353, 420, 430-3, 635, 663, 673	Factor instructing program on the length of accounting periods and number of discounts per year.
FACTOR	Compound Discount Factor for Period N 635-637	Discounting formula for computing present value equivalents, i.e., (1./(1.+R(j)))**((XI-1.)/EFAC).
HEAD	Heading for the Problem 43, 204, 231, 240, 356, 445, 457, 469, 481, 493, 506, 517, 528, 539, 550	Alphanumeric title given this problem by the user.

[2] Line Numbers on Source Program Listing [Irr(Eng).For]

HEADI	Column Headings for Problem 43, 206, 232, 242, 358	Column headings supplied by user.
HEADK	Footnotes for the Problem 43, 208, 233, 244, 337, 650	Identification and source footnotes supplied by the user.
IBC	Command for B/C Ratios 58, 117, 127, 237, 276, 573	Command for requesting optional B/C ratios and Net Present Values.
ICARDS	Command for Disk File of Program Output 62, 239, 354, 443, 564	Command for requesting optional disk file of output for problem.
IDECK	Command for Disk File of Scaled Input 322, 330, 338, 369	Command for requesting optional disk file input data for scaled alternative.
IMENU	Screen Menu of Master Commands 203, 260, 262	Control identifier to direct program to requested next step.
INF	Logical Unit Number of Device for Reading Input 53, 302, 305, 337-8	Number corresponding to disk drive from which program input is to be read (normally 1 or 2).
IGO	Screen Indicated Order to Proceed 185, 235	Control identifier directing program to proceed with problem solution.
INO	Sequence Number of Each Period in Cash Flow 44, 287, 290, 296, 302, 346-350, 372, 376, 381, 420, 429, 447, 562-6, 663, 672	Number identifying sequence of each line entry in the cash flow input.
INT	Annual Discount Rate under NPV and CPV options 42, 129, 137, 238, 354, 423	Specified annual compound discount rate under options for which Rate of Return not to be calculated.
INTRAT	Solution Discount Rate 42, 421, 423-4, 442, 457, 469, 481, 493, 506, 517, 528, 539, 550	Per period discount rate as calculated by RRATE Subroutine or as given in the NPV and CPV options.
IOPT	Command to Begin Discounting at Period other than First 58, 117, 126, 237, 270, 420, 429, 634, 663, 672	Instruction to determine time 0 in discounting by following INO input (Sunken Investment Case).
IP	Number of Accounting Periods per Year 188	Quarters = 4, Months = 12, Six months = 2, etc.

IPASS	Screen Signal to Bypass Commands 229	Control to direct program to bypass reading commands and headers from the screen.
IRRW	Command for Kind of Analysis 62, 157, 166, 239, 414, 456, 561, 574, 647	Command for type of analysis and output format (see Section A).
ISCALE	Internal Counter Control on Scaling 43, 174, 178, 282, 361, 409, 656	Keeps track of number of scale alternatives that have been completed.
ISTART	Period to Start Scaling 324, 331, 338, 342, 346-51, 366-7	Command for which period to begin application of scale factors.
ISTNO	Control for ISTART Command 342, 410	Variable printed when ISTART is varied in the computation.
ITRIP	Counter Control for Scale Options 203, 283	Internal counter for control of program routing for scaler options.
NC	Command for Number of Columns of Data 201-202, 309, 365	Total number of columns of data for fixed assets, current assets, income and operating costs.
NCARDS	Number of Lines of Data per Period 199-202, 303, 329, 340, 353	The command is "1" if NC does not exceed 8; otherwise "2"
NDCR	Number of Different Discount Rates for B/C Ratios 281, 628, 643	Maximum number is 6; taken care of automatically by program.
NEXP	Number of Columns of Expense Data 62, 147, 155, 199, 239, 353, 398	Columns of operating expense data in cash flow input for problem.
NFAC	Number of Columns of Data for Facilities 62, 147, 155, 191, 194, 239, 353, 387	Columns of capital outlay data for facilities in input for the problem.
NPR	Logical Unit Number for Printing Output 56, 262-279, 352-362, 381, 410, 453-659	Normally 0 (for screen and parallel printer), but can be disk file if desired.
NPUNCH	Logical Unit Number for Receiving Output Data Files 55, 372, 564	Use disk drive or auxuliary device number you are using to receive NEWDATA.IRR.

NREV	Number of Columns of Income Data 62, 147, 155, 196, 239, 353, 402	Columns of income, revenue and/or benefit data in input matrix.
NSCALE	Command for Number of Scale Alternatives 43, 94, 168, 172, 239, 307, 353, 360, 409, 656	Control only: alternatives are run sequentially automatically.
NST	Logical Unit Number for Receiving Solution Output 57, 445, 447	Number for device to receive output files to be used for receiving OUTDATA.IRR.
NOYR	Number of Lines in the Matrix 189, 301, 304, 364, 371, 380, 385, 418, 420, 427, 439, 446, 560, 632	Computed internally as IP x YRS.
NWC	Number of Columns of Working Capital 62, 147, 155, 193, 353, 391	Columns of working capital data in the input matrix.
MEASR	MEASR1, MEASR2; Monetary Unit 58, 101, 107, 237, 266, 457, 467, 481, 493, 506, 517, 528, 539, 550, 575. 582, 587, 593, 599, 605, 611, 617, 623	Alphanumeric designation of the monetary unit of measure for the problem.
R	Rate of Return 420-1, 663, 686	Discount rate for the net cash flow as determined by the RRATE Subroutine.
RATE	Annual Discount Rate 44, 129, 138, 238, 279-81, 631, 641	Annual discount rate used to compute B/C Ratios and NPVs.
RRATE	RRATE SUBROUTINE for Computing Rate of Return 420, 663	Explicit subroutine patterned after Lawrence Fisher (1966).
YEAR	Projected Period Designation 45, 287, 291, 296, 302, 371, 375, 385, 447, 560	Designation of projected periods, e.g., 1990, or 0290, etc.
YRS	Total Number of Years in the Cash Flow 62, 139, 145, 189, 239, 353	Thus, IP x YRS = NOYR, the total number of periods in the matrix.
ZRATE	Discount Factors at Specified Rates 44, 643	Array of discount factors at user specified discount rates for B/C ratios and NPVs.

SECTION VI

UNDERSTANDING AND USING COMPILED FORTRAN PROGRAMS ON MICROCOMPUTER

Characteristics of FORTRAN Programs

Running FORTRAN Programs. In contrast to those written in BASIC and other languages, once FORTRAN programs have been developed, debugged, compiled and linked, they operate in the MS-DOS System without further need for any FORTRAN software. The user need only follow the instructions for the linked program he is using on microcomputer -- he needs no knowledge of FORTRAN and no FORTRAN or other special software.

User's Manual Information. However, to make effective use of any precompiled FORTRAN program, the user must understand and follow exactly the Manual accompanying that program. User's Manual materials prepared by the authors of each FORTRAN program accompany that program, either as a separate manual or as comment statements within the program, or both. The user cannot change a linked program without going back to the corresponding FORTRAN source program and then re-compiling and re-linking the changed program. To do this he would need the appropriate FORTRAN software.

User Commands in Programs. Because of this, the most useful precompiled FORTRAN programs for microcomputers contain many user-controlled options for tailoring to specific needs and specific problems. This is true of all programs in the "Computerized System for Feasible Agribusiness Development". One must follow the accompanying manuals to use the Projected Cashflow Analysis Program (IRR), the Proforma Financial Analysis Program (PROF), etc. The Information files for such programs (Feasible.Inf, Proforma.Inf, etc.) provide such user manual information.

FORTRAN.INF FILE. The present file contains general information on FORTRAN programming for microcomputers and specific information on debugging, compiling and linking programs with the Heath FORTRAN 77 package. It is assumed that the information provided herein will be supported with the Heath FORTRAN 77 Manual, the MS-DOS Manual and technical FORTRAN references to the extent needed by each user. This file is intended to serve more as a guide to getting started and as quick reference refresher to those who may develop and compile new or revised FORTRAN programs only infrequently.

FORTRAN Source Programs

What Source Programs are. FORTRAN source programs are the set of FORTRAN Read, Write, Do, Goto, If and supporting statements developed by their authors to perform designated analytical and/or data management tasks. Source programs can vary in length from a few lines to several thousand statements and in complexity from that paralleling a simple BASIC program to highly complex and powerful routines with multiple conditional statements, deeply nested loops and implicit subroutines throughout. FORTRAN programs must conform to the rigid standard rules for the FORTRAN language. Programs previously developed and applied on mainframe computers are acceptable to the 77 Compiler for MS-DOS microcomputers, and compiler error messages parallel those generated by mainframe FORTRAN compilers. Both types of compiler accept program statements only in columns 7 to 72, reserving column 6 for

continuation line designations, columns 1-5 for statement and format numbers, and columns 73 to 80 for statement sequence identification, if desired. Non-program documentary "Comment" lines must be designated by "C" in column 1. Both blank lines and blank spaces between words within lines are acceptable, and simply ignored by the compiler. These latter features are convenient for inserting page spacing and other things to enhance readability and usefulness of the FORTRAN source program files.

Transferring Programs. Once created and debugged, FORTRAN source programs are easy to transfer from computer to computer and from location to location. They can be accessed via computer networks; they can be recalled, reviewed and revised or expanded with relative ease. The KERMIT software can be used to transfer existing mainframe source listings to the microcomputer. However, the source programs must be converted to recognizable machine language (object) programs and then link-edited to form execution programs before they can be accessed by users at their commands to solve their own problems.

Creating Source Programs. FORTRAN source program statements are typed in sequence on the microcomputer just as they would be on a monitor connected to the mainframe or on a card key-punch machine. They appear on the screen as they are typed, but must be transferred to disk files in order to be retained for later reference, modification and/or compiling to object files. Recognized software programs (DBASE III, LOTUS, WORD PERFECT, WORDSTAR, etc.) can be used to create and manipulate such files, but conversion routines are needed to remove the encode system for these programs before the files can be used by MS-DOS to compile as a FORTRAN program. Such conversion is not needed when the standard DOS file management package, EDLIN, is used for building, modifying and manipulating FORTRAN source programs. Because numerical sequence is maintained and identified in all EDLIN files, they are quite easy to handle for debugging at the compilation stage when all error messages are line specific.

Naming Programs. FORTRAN source files can be designated in any manner, and renamed with RENAME to fit any convention. However, the standard convention and default system in compiling is to carry through the program name and to use the three-letter extension or second name to distinguish the kind of file; that is

FOR -- Source Programs
OBJ -- Compiled Object Programs
EXE -- Linked Run Programs.

Thus, the program for developing proforma financial statements is designated as PROFORMA.FOR, PROFORMA.OBJ, and PROFORMA.EXE. This convention may be extended to include the following:

IRR(ENG).INF for the user's guide information file
IRR(ENG).DTA for the input data file
IRR(ENG).OUT for the output data file, etc.

Each of these is a separate file serving a distinct purpose, and may or may not be kept on separate disk. The common program name, PROFORMA in this case, ties them together at a glance and avoids possible costly error due to impossible or inaccurate recall by the human mind.

Running Compiled FORTRAN Programs

Preparing Data Input Files. Because FORTRAN programs are precompiled Execution programs, they operate from keyboard commands and user-supplied data files directly under DOS. The IRR(ENG) program reads default commands, titles, headers and footnotes from a "Headers" file to serve as guide to the user in supplying comparable information for his problem run in response to query by the program. The information supplied via the keyboard may be saved as a DEFAULT.NEW file by a "YES" response to the SAVE HEADERS? Query.

The DATA.IRR input files are read in the format and order specified in this User's Manual. The user prepares the data input file for his problem prior to making the program run, either by "correcting" one of the case input files sup-plied with the program (say with EDLIN), or by creating a new DATA.IRR file in the specified format as a LOTUS print file, or a file created with DBASE III, WORD PERFECT, etc. and converted to a Standard ASCII file. Under the first of these approaches, if you have several existing data files available, choose the one most nearly like the one for your problem to use as template pattern. Then proceed as follows:

a. COPY the existing file you want to use as pattern to a formatted work disk, rename it to your problem file, and print a hard copy with PRINT or with TYPE using Echo.
b. Using the User's Manual for the program you are running and the data for your problem, pencil in the commands, titles, headers, footnotes, etc., and the data input for your own problem over those of the pattern template.
c. With a file edit program such as EDLIN, "correct" the pattern to the command instructions, information and data representing your problem (see Section I-D, above, for guidelines on doing so).
d. COPY the new edited input file to your "Run" disk containing the linked program you are using, and follow the guides of the User's Manual for the IRR(ENG) program to initiate the execution run.

If using LOTUS, DBASE III or other program to build your DATA.Run file, follow the manual procedures and menu prompts of that program. The sequence of LOTUS commands for doing so is shown in Section I-E of the manual.

Debugging Input Files. Input data files for specific problems must conform to the order and formats read by the program you are using, so that the User's Manual for this program is the "Bible" in this regard. If your problem doesn't run correctly the first time, the most probable error in your input file is an extra line of input, omission of a line of input, or an error in horizontal spacing of either integer commands or floating point data read by the program. Often you can detect such errors by the kinds of Run-Time error messages received, so that you can make the needed correction and rerun your problem. If you can't detect the needed correction in this way, then it is best to make a printed listing of your whole data input file so that it can be compared with a similar listing of the input file you used as pattern, line by line. Remember, anything you intend to be the same as the pattern must be left in and unchanged from the pattern template to your problem input file, including blank lines and blank spaces. Anything that you intended to be replaced must actually be replaced from the pattern, not just added in. Check the User's Manual very care-fully to be certain that you have provided

all needed data in the correct order, omitting none and inserting nothing extra. Once you are on the same wave length with the requests by the program, you should have no problem in discovering and correcting the final small errors in your input file for the "All OK" run.

Preparing Disk(s) and/or Printer for Output. Before typing the program name and keying RETURN to start execution of your "All OK" run, don't forget to ready your devices to receive the output as you intend. Have you directed the output to the printer and/or disk file(s) as well as to the screen? If you intend to Echo to the Printer, have you turned on Echo with the Ctrl-P toggle? If the program output is formatted for more than 80 columns in width, have you adjusted the width of paper or size of type in your printer? If the program will try to write to an existing "old" file, is that file specified, is it on the specified drive, and does it have ample empty space for the program output of your problem? A careful run through this kind of check list before starting your execution run can save time and avoid stress.

Running FORTRAN Programs. Once you have prepared and debugged your input file, and copied it to the same disk as your linked FORTRAN program, and have prepared your devices to receive the output, all you do to execute the run is to type the name of the FORTRAN program you are running and then Key <return). Then all you need do is wait for the output. No prompts will be given with the "ALL OK" run unless they have been built into the program before it was compiled. Upon satisfactory completion of the entire run, you will receive a message "Stop - Program terminated" on the screen; this will be preceded by any "Normal End" messages which have been written into the program you are running. At this point, the machine is automatically returned to the DOS operating system. Should you desire to repeat the same run or to make another, you simply repeat the process. The length of memory time required to complete a given FORTRAN program run depends upon the design and complexity of the program and the size and nature of the problem you are running. Most can be completed in two or three minutes, and rarely will one take more than 15 or 20 minutes. Often the solution has been found more quickly that the printer can deliver, and is automatically held up temporarily while the printer catches up. Where this delay is of concern, it may be advisable to direct the output to a disk file for later printing from that file as time permits.

Interpreting and Using Runtime Error Messages. Runtime error messages for programs compiled with the MS-FORTRAN 77 Compiler are identified by explanatory statement and by code number. Numbers 1000 through 1099 are Operating System status codes, and are issued in conjunction with an OS code. Examples include

1005	Filename with more than 8 characters
1218	Integer appears before + or - in Format
1233	I Format expected for integer read
1265	Attempt to put more than one record into internal unit
1285	Invalid string in list-directed input.

Errors No. 2000 through 2999 are nonfile system errors, e.g.,

2000	Stack overflow
2103	EXP argument range

2104 Square root of negative argument
2139 REAL precision loss

These messages often are very helpful in detecting problems in the input data file, and what is needed to correct the problem. Some trace to something as simple as a typo in the data input. Those that relate to capacity limitations may require a slightly different approach or handling of the analysis, and occasionally can serve as a major challenge.

Maintaining Program, Input and Output Files. For each FORTRAN program you are using, you will want to maintain a) a set of working files on your "Run" diskette, b) a set of archive files on your "Master" diskette, c) a set of input files, and for some of them d) a set of output files. Each diskette should be clearly labeled, preferably on disk name as well as on its gummed label, and a listing of its file content directory attached to the disk jacket.

Master Diskette

The Master diskette should contain the FORTRAN Source Program file, the compiled Object Program file, and the linked Execution Program file. If you maintain compiler listings of the source program and/or object program, and/or library link maps of the execution program, these should be kept on the Master diskette (or a companion one, if more space is needed) also. The diskette(s) should be write-protected and maintained in a safe place for backup purposes. The source program should be printed along with user manual information and sample problems, and maintained in document form. The object program should be copied as a semi-working file for linking with different libraries for such alternative versions of the execution program as may be needed, either now or in the future.

Run Diskette

The Run diskette of working files for each of your FORTRAN programs should contain the up-to-date linked execution program and relevant problem input files; if space permits, it also may contain corresponding output files. In addition, most users like to keep a brief summary information file of User Guide information on this file as well. You should keep 50,000 to 100,000 bytes free on each run diskette and leave it write unprotected so that it can be used as a working disk. When running problems, the Run diskette normally is used in Drive A, the logged Drive, and may need to contain space for intermediate output during the run. Keep these Run diskettes in a carrying box with other working disks or in some other convenient place readily accessible to your microcomputer.

Your input file diskette(s) for each FORTRAN program are semi-archive in nature, so that any individual data file can be edited as desired at any time, and then copied to your Run diskette for execution. Such files are valuable also as template patterns for new problem input that will be created later. Individual files on each such diskette should be named systematically so that they can be recognized by sight, even though some months may have elapsed since they were last used. The diskette name can identify the program and the fact that is represents input, but the individual file names need to identify the specific problem.

FORTRAN Program Output File Diskettes

Your FORTRAN program output file diskettes can be recreated at any time by a straight rerun if your Run and input file diskettes are properly maintained. For this reason they are less critical than those described in a-c), above, and are not maintained by all users for all programs, once the "ALL OK" run is made and the printed output obtained. Intermediate output files created by some FORTRAN programs are data files, and need to be labeled, maintained and used in the same manner as other data files. Systematic naming and labeling are particularly helpful for such files.

SECTION VII

CONCEPT OF ECONOMIC FEASIBILITY ANALYSIS

The primary objective of economic feasibility analysis is to measure the economic potential of a prototype, proposed project, modular unit or total program, normally measured as the projected Rate of Return on capital investment. Accuracy of feasibility analysis depends upon the quality of technical and economic data used in the analysis, and the precision with which these data are analyzed and evaluated. The feasibility analysis computer program provides analytical precision; the user must exercise the quality control for the basic input data supplied.

The principal measure of economic soundness used in the feasibility analysis program is the potential annual Rate of Return on investment based on the time flow of money into and out of the enterprise. The Rate of Return is calculated by solving for R in the formula:

$$I(0) + \frac{I(1)}{(1+R)} + \frac{I(2)}{(1+R)**2} + \ldots + \frac{I(N)}{(1+R)**N} =$$

$$B(0) + \frac{B(1)}{(1+R)} + \frac{B(2)}{(1+R)**2} + \ldots + \frac{B(N)}{(1+R)**N}$$

where I = net capital investment each period, B = net benefits each period, and 0, 1, 2, ... , N represent the periods starting with the present. The computer program computes R as the equivalent annual rate of return regardless of the length of the accounting periods used in the analysis.

Depending on the definitions of the projected investment cash flow, (I), and the projected net benefit cash flow, (B), specified by the user, the program computes any of the following Rates of Return:

1.	Internal Rate of Return (IRR)	I = Total Outlay	B = Net Earnings[1]
2.	Direct Rate of Return (DRR)	I = Total Outlay	B = Net Savings to Beneficiaries
3.	Associated Rate of Return (ARR)	I = Total Outlay	B = Net Associated Benefits
4.	Social Rate of Return (SRR)	I = Total Outlay	B = Total Net Benefits[1]
5.	Comparative Rate of Return (CRR)	I = Added Outlay	B = Added Savings[1]
6.	Financial Rate of Return (FRR)	I = Equity Capital	B = Net Profit
7.	Economic Rate of Return (ERR)	I = Total Outlay	B = Net Income under Free Market Conditions.[1]

The economic potential for the enterprise, project or program under study is determined by comparing the Rate of Return obtained with the relevant opportunity cost of capital. Calculated Rates of Return equal to or greater than the oppor-

---

[1] Before depreciation expense, interest charges and income tax payments.

tunity cost of capital indicate project feasibility; calculated Rates of Return lower than the opportunity cost of capital indicate that the project under study is infeasible. The greater the differential, the more conclusive the findings.

SECTION VIII

CASE ONE: BUDGETED 100,000 QUINTAL RICE MILLING OPERATION IN PANAMA

Description of the Case

DATA.ONE: 21 Periods X 10 Columns of Projected Annual Cash Flow Data for IRR

The DATA.ONE Case was selected to introduce the user to the feasibility analysis program because of its relative simplicity, and at the same time its illustration of many features which the program can address. Although hypothetical, the case is based on actual study of rice mill feasibility in Panama some years ago.

It is not the purpose in this manual to address directly the methodology for developing the estimates and projections upon which the input for feasibility analysis is based. Suffice it to say that a series of worksheets for developing engineering estimates, capital budgeting and operating plans had to be completed prior to conducting Rate of Return analysis. For our purposes here we take this information as given.

With respect to the feasibility analysis, relevant features of the case include the following:

1. Estimates are annual figures in US Dollars, with projections in real terms over an economic horizon of 20 years.

2. The mill buildings will not need to be replaced over this period; there is expected to be a remaining asset value at the end of the horizon.

3. Equipment is expected to last 10 years, so will need to be replaced once over the period.

4. Construction will take one year, with operation starting the second year and remaining at constant volume thereafter.

5. Income is to be derived from three sources, (1) sales of milled rice, (2) byproduct (bran) sales, and (3) income from storing rough rice until it is to be milled.

6. Three categories of operating cost are entered, (1) fixed expense (other than depreciation and interest on facility loans), (2) variable expense (other than interest on working capital and income taxes), and (3) marketing expense. Except for the latter, the expenses are expected to remain constant in real terms through time.

7. In addition to the Internal Rate of Return (IRR), B/C Ratios and Net Present Values (NPVs) are to be computed at alternative annual compound discount rates of 15, 20, 25, 30, 35 and 40 percent, respectively.

8. DATA.ONE represents the base case only; sensitivity analysis of alternatives is included later in DATA.TWO.

Listing of Input Information and Data File

Listing of the Headers File for the Data.One Case

```
    DOLLARS    1.0      0      1
 .1100 .1500 .2000 .2500 .3000 .3500 .4000
  21.0     2     2     3     6     1     0     0
```

Budgeted 100,000 Quintal Rice Milling Operation
A. Total Operation

```
      Site and   Plant   Average   Other   Product   Other   Service   Fixed
Variable   Mkting   Current   Interest   Income
Period   Bldings   Equip.   Invntry   Wrk Cap   Sales   Sales   Income   Expense
Expense   Expense   Deprec.   Expense   Tax
100,000 Quintal Rice Milling Operation in Panama.

Base Case.
```

Identification of Items in the Headers File

Monetary Unit	Periods/Year	Sunken Investment?	B/C Ratios?
DOLLARS	1.0	0	1

NPV Option	Annual Discount Rates					
	Benefit-Cost Ratios					
.1100	.1500	.2000	.2500	.3000	.3500	.4000

Years in Cash Flow	Number of Columns for: Cap. Invest.	Work. Cap.	Income	Op. Cost	Analysis Code	Scale Options	Output File?
21.0	2	2	3	6	1	0	0

Project Title

Budgeted 100,000 Quintal Rice Milling Operation
A. Total Operation

Column Headers (first line)

```
      Site and   Plant   Average   Other   Product   Other   Service   Fixed
Variable   Mkting   Current   Interest   Income
```

Column Headers (second line)

```
Period   Bldings   Equip.   Invntry   Wrk Cap   Sales   Sales   Income   Expense
Expense   Expense   Deprec.   Expense   Tax
```

Footnotes

```
100,000 Quintal Rice Milling Operation in Panama.
  (BLANK LINE)
Base Case.
  (BLANK LINE)
```

Listing of Data.One Input File

0	1972	147000	72000	0	0	0	0	0	0
1	1973	0	0	81600	32700	118359	39000	10581	58700
2	1974	0	0	0	0	118359	39000	10581	58700
3	1975	0	0	0	0	118359	39000	10581	58700
5	1977	0	0	0	0	118359	39000	10581	58700
6	1978	0	0	0	0	118359	39000	10581	58700
7	1979	0	0	0	0	118359	39000	10581	58700
8	1980	0	0	0	0	118359	39000	10581	58700
9	1981	0	0	0	0	118359	39000	10581	58700
10	1982	0	72000	0	0	118359	39000	10581	58700
11	1983	0	0	0	0	118359	39000	10581	58700
12	1984	0	0	0	0	118359	39000	10581	58700
13	1985	0	0	0	0	118359	39000	10581	58700
14	1986	0	0	0	0	118359	39000	10581	58700
15	1987	0	0	0	0	118359	39000	10581	58700
16	1988	0	0	0	0	118359	39000	10581	58700
17	1989	0	0	0	0	118359	39000	10581	58700
18	1990	0	0	0	0	118359	39000	10581	58700
19	1991	0	0	0	0	118359	39000	10581	58700
1	1992	-81900	0	-81600	-32700	0	0	0	0
0	1972	0	0	0	0	0			
1	1973	18500	14000	0	0	0			
2	1974	18500	14000	0	0	0			
3	1975	18500	14000	0	0	0			
4	1976	18500	14000	0	0	0			
5	1977	18500	14000	0	0	0			
6	1978	18500	14000	0	0	0			
7	1979	18500	14000	0	0	0			
8	1980	18500	14000	0	0	0			
9	1981	18500	14000	0	0	0			
10	1982	18500	14000	0	0	0			
11	1983	18500	14000	0	0	0			
12	1984	18500	14000	0	0	0			
13	1985	18500	14000	0	0	0			
14	1986	18500	14000	0	0	0			
15	1987	18500	14000	0	0	0			
16	1988	18500	14000	0	0	0			
17	1989	18500	14000	0	0	0			
18	1990	18500	14000	0	0	0			
19	1991	18500	14000	0	0	0			
20	1992	0	0	0	0	0			

LISTING OF THE PROGRAM OUTPUT FOR THE CASE

Listing of the Factors Used in the Run

LISTING OF FACTORS CONCERNING THIS RUN:

Unit of Measure for Output Is DOLLARS

Number of Times Discounted per Year = 1.0

"Sunken Investment" Option IS NOT Being Used

Benefit-Costs Computed at Annual Discount Rates of:

.15000 .20000 .25000 .30000 .35000 .40000

Listing of the Input Data for the Case

A LISTING OF THE DATA

21.00 1 2 2 3 6 1 0 2 0 .110000

Budgeted 100,000 Quintal Rice Milling Operation

A. Total Operation

Period	Site and Bldings	Plant Equip.	Average Invntry	Other Wrk Cap	Product Sales	Other Sales	Service Income	Fixed Expense	Varable Expense	Mkting Expense	Current Deprec.	Intrest Expense	Income Tax
0 1972	147000.	72000.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1 1973	0.	0.	81600.	32700.	118359.	39000.	10581.	58700.	18500.	14000.	0.	0.	0.
2 1974	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
3 1975	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
4 1976	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
5 1977	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
6 1978	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
7 1979	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
8 1980	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
9 1981	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
10 1982	0.	72000.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
11 1983	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
12 1984	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
13 1985	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
14 1986	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
15 1987	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
16 1988	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
17 1989	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
18 1990	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
19 1991	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
20 1992	-81900.	0.	-81600.	-32700.	0.	0.	0.	0.	0.	0.	0.	0.	0.

Listing of the IRR Program Output for the Case

I N V E S T M E N T F E A S I B I L I T Y A N A L Y S I S

Budgeted 100,000 Quintal Rice Milling Operation
A. Total Operation

INTERNAL RETURN ON TOTAL CAPITAL 24.642 PERCENT

PERIOD		INVESTMENT (DOLLARS)			OPERATING (DOLLARS)			PRESENT VALUE FACTOR	PRESENT VALUE	
NO.	IDENT.	FACILITIES	WORKING CAPITAL	TOTAL	TOTAL REVENUE	OPERATING EXPENSES**	NET REVENUE		TOTAL INVESTMENT	NET REVENUE
0	1972	219000.	0.	219000.	0.	0.	0.	1.0000	219000.	0.
1	1973	0.	114300.	114300.	167940.	91200.	76740.	.8023	91703.	61568.
2	1974	0.	0.	0.	167940.	88200.	79740.	.6437	0.	51327.
3	1975	0.	0.	0.	167940.	88200.	79740.	.5164	0.	41180.
4	1976	0.	0.	0.	167940.	88200.	79740.	.4143	0.	33038.
5	1977	0.	0.	0.	167940.	88200.	79740.	.3324	0.	26507.
6	1978	0.	0.	0.	167940.	88200.	79740.	.2667	0.	21266.
7	1979	0.	0.	0.	167940.	88200.	79740.	.2140	0.	17062.
8	1980	0.	0.	0.	167940.	88200.	79740.	.1717	0.	13689.
9	1981	0.	0.	0.	167940.	88200.	79740.	.1377	0.	10982.
10	1982	72000.	0.	72000.	167940.	88200.	79740.	.1105	7956.	8811.
11	1983	0.	0.	0.	167940.	88200.	79740.	.0887	0.	7069.
12	1984	0.	0.	0.	167940.	88200.	79740.	.0711	0.	5672.
13	1985	0.	0.	0.	167940.	88200.	79740.	.0571	0.	4550.
14	1986	0.	0.	0.	167940.	88200.	79740.	.0458	0.	3651.
15	1987	0.	0.	0.	167940.	88200.	79740.	.0367	0.	2929.
16	1988	0.	0.	0.	167940.	88200.	79740.	.0295	0.	2350.
17	1989	0.	0.	0.	167940.	88200.	79740.	.0236	0.	1885.
18	1990	0.	0.	0.	167940.	88200.	79740.	.0190	0.	1513.
19	1991	0.	0.	0.	167940.	88200.	79740.	.0152	0.	1214.
20	1992	-81900.	-114300.	-196200.	0.	0.	0.	.0122	-2396.	0.
	TOTAL	209100.	0.	209100.	3190860.	1678800.	1512060.		316263.	316263.

INTEREST PER CENT	BENEFIT/COST RATIO
15.000	1.516
20.000	1.196
25.000	.988
30.000	.841
35.000	.733
40.000	.650

PRESENT VALUE IN DOLLARS		
REVENUE	OUTLAY	BALANCE
491638.	324201.	167438.
383720.	320761.	62960.
311963.	315909.	-3946.
261674.	311113.	-49439.
224846.	306762.	-81917.
196874.	302898.	-106024.

**EXCLUDING DEPRECIATION, INTEREST, AND INCOME TAX

ALTERNATIVE: 100,000 Quintal Rice Milling Operation in Panama.
Base Case.

SECTION IX

CATFISH CASE: LEAN BEEF CATFISH OPERATION

Description of the Case

DATA.FSH; 44 Periods X 9 Columns of Projected Quarterly Cash Flow Data for IRR

The DATA.FSH Case is an interesting one for computerized feasibility analysis because it is based on projected quarterly cash flow, and can be carried completely through Proforma financial analysis and Financial Rate of Return calculations. It is based on an actual study of integrated production, processing and marketing of catfish on a large scale.

Because the case evaluation is based on the entire catfish operation as a division of a total integrated agribusiness enterprise including lean beef for fast food outlets, community development, and other operations, the results may not be representative of catfish only. The case serves well our purpose here, namely to become more familiar with the feasibility program in its application to a more complex case.

With respect to the feasibility analysis, relevant features of the case include the following:

1. Estimates are quarterly figures in units of $1,000, with projections in real terms over an economic horizon of 11 years (44 periods).

2. The production facilities will not need to be replaced over this period; there is expected to be a remaining asset value at the end of the horizon.

3. Equipment is expected to last 10 years, so will not need to be replaced over the horizon. Working capital is increased from time to time as operations expand.

4. Construction will take two years, with operation starting the 11th quarter and thereafter increasing each year until reaching a constant level-off volume starting with the 28th period.

5. Income is to be derived from a single source, sales of dressed frozen catfish for distribution to fast food restaurants. Note that nothing is budgeted in the Other Income column, but something might be added later.

6. Three categories of operating cost are entered, (1) raw material costs, (2) labor costs, and (3) other expense (not including depreciation, interest and income tax). Expenses increase each year as volume of output increases, reaching level-off the 28th quarter.

7. In addition to the Internal Rate of Return (IRR), B/C Ratios and Net Present Values (NPVs) are to be computed at alternative annual compound discount rates of 15, 20, 25, 30, 35 and 40 percent, respectively.

8. DATA.FSH represents the base case only; sensitivity analysis of alternatives is not included.

Listing of Input Information and Data File

Listing of the Headers File for the Data.Fsh Case[1]

```
    $1,000       4.      0      1
.12500.15000.20000.25000.30000.35000.40000
  10.0      3      1      2      3      1      0      0
```

LEAN BEEF CATFISH OPERATION
(Units of $1,000 at 1985 Price Levels)

Period	Org., Startup	Site, Bldgs.	Plant Equip.	Plant Working Capital	Product Sales	Other Income	Material Cost	Labor Costs	Other Expense
Proposed component of Lean Beef Plant and other operations in Texas									
Catfish operation only									

Listing of the Data.Fsh Input File

0	0185	0	0	0	0	0	0	0	0
1	0285	0	0	0	0	0	0	0	0
2	0385	209	0	0	0	0	0	0	0
3	0485	0	0	0	0	0	0	0	0
4	0186	0	1196	0	0	0	0	0	0
5	0286	0	1196	0	0	0	0	0	0
6	0386	0	1196	0	0	0	0	0	0
7	0486	0	358	403	0	0	0	0	0
8	0187	0	359	404	0	0	0	0	0
9	0287	0	359	404	0	0	0	0	0
10	0387	0	0	404	0	0	0	0	0
11	0487	0	0	0	200	1493	0	254	183
12	0188	0	0	0	1	1493	0	254	244
13	0288	0	0	0	188	2985	0	463	244
14	0388	0	0	0	0	2985	0	463	244
15	0488	0	0	0	0	2985	0	463	244
16	0189	0	0	0	37	3284	0	509	268
17	0289	0	0	0	0	3284	0	509	268
18	0389	0	0	0	0	3284	0	509	268
19	0489	0	0	0	0	3284	0	509	268
20	0190	0	0	0	41	3612	0	556	295
21	0290	0	0	0	0	3612	0	556	295
22	0390	0	0	0	0	3612	0	556	295
23	0490	0	0	0	0	3612	0	556	295
24	0191	0	0	0	45	3973	0	616	325
25	0291	0	0	0	0	3973	0	616	325
26	0391	0	0	0	0	3973	0	616	325
27	0491	0	0	0	0	3973	0	616	325
28	0192	0	0	0	50	4371	0	677	357
29	0292	0	0	0	0	4371	0	677	357
30	0392	0	0	0	0	4371	0	677	357
31	0492	0	0	0	0	4371	0	677	357
32	0193	0	0	0	0	4371	0	677	357
33	0293	0	0	0	0	4371	0	677	357
34	0393	0	0	0	0	4371	0	677	357
35	0493	0	0	0	0	4371	0	677	357
36	0194	0	0	0	0	4371	0	677	357
37	0294	0	0	0	0	4371	0	677	357
38	0394	0	0	0	0	4371	0	677	357
39	0494	-209	-2392	-120	-562	0	0	0	0
0		0							
1		0							
2		0							

---

[1] See page 60 for identification of items in the HEADERS file.

3	0
4	0
5	0
6	0
7	0
8	0
9	0
10	0
11	243
12	243
13	276
14	276
15	276
16	276
17	276
18	276
19	276
20	276
21	276
22	276
23	276
24	276
25	276
26	276
27	276
28	276
29	276
30	276
31	276
32	276
33	276
34	276
35	276
36	276
37	276
38	276
39	0

Listing of the Program Output for the Case

Listing of the Factors Used in the Run

LISTING OF FACTORS CONCERNING THIS RUN:

Unit of Measure for Output Is $1,000

Number of Times Discounted per Year = 4.0

"Sunken Investment" Option IS NOT Being Used

Benefit-Costs Computed at Annual Discount Rates of:

.15000 .20000 .25000 .30000 .35000 .40000

Listing of the Input Data for the Case

A LISTING OF THE DATA

10.00 4.00 3 1 2 3 1 0 2 0 .125000

LEAN BEEF CATFISH OPERATION
(Units of $1,000 at 1985 Price Levels)

Period	Org., Site, Startup	Plant Bldgs.	Plant Equip.	Working Capital	Product Sales	Other Income	Material Cost	Labor Costs	Other Expense				
0 0185	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1 0285	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2 0385	209.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3 0485	0.	0.	0.	0.	0.	0.	0.	0	0.	0.	0.	0.	0.
4 0186	0.	1196.	0.	0.	0.	0.	0.	0.	0	0	0.	0.	0.
5 0286	0.	1196.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
6 0386	0.	1196.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
7 0486	0.	358.	403.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
8 0187	0.	359.	404.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
9 0287	0.	359.	404.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
10 0387	0.	0.	404.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
11 0487	0.	0.	0.	200.	1493.	0.	254.	183.	0.	0.	0.	0.	0.
12 0188	0.	0.	0.	1.	1493.	0.	254.	244.	0.	0.	0.	0.	0.
13 0288	0.	0.	[illegible]	188.	2985.	0.	463.	244.	0.	0.	0.	0.	0.
14 0388	0.	0.	0.	0.	2985.	0.	463.	244.	0.	0.	0.	0.	0.
15 0488	0.	0.	0.	0.	2985.	0.	463.	244.	243.	0.	0.	0.	0.
16 0189	0.	0.	0.	37.	3284.	0.	509.	268.	243.	0.	0.	0.	0.
17 0289	0.	0.	0.	0.	3284.	0.	509.	268.	276.	0.	0.	0.	0.
18 0389	0.	0.	0.	0.	3284.	0.	509.	268.	276.	0.	0.	0.	0.
19 0489	0.	0.	0.	0.	3284.	0.	509.	268.	276.	0.	0.	0.	0.
20 0190	0.	0.	0.	41.	3612.	0.	556.	295.	276.	0.	0.	0.	0.
21 0290	0.	0.	0.	0.	3612.	0.	556.	295.	276.	0.	0.	0.	0.
22 0390	0.	0.	0.	0.	3612.	0.	556.	295.	276.	0.	0.	0.	0.
23 0490	0.	0.	0.	0.	3612.	0.	556.	295.	276.	0.	0.	0.	0.
24 0191	0.	0.	0.	45.	3973.	0.	616.	325.	276.	0.	0.	0.	0.
25 0291	0.	0.	0.	0.	3973.	0.	616.	325.	276.	0	0.	0.	0.
26 0391	0.	0.	0.	0.	3973.	0.	616.	325.	276.	0.	0.	0.	0.
27 0491	0.	0.	0.	0.	3973.	0.	616.	325.	276.	0.	0.	0.	0.
28 0192	0.	0.	0.	50.	4371.	0.	677.	357.	276.	0.	0.	0.	0.
29 0292	0.	0.	0.	0.	4371.	0.	677.	357.	276.	0.	0.	0.	0.
30 0392	0.	0.	0.	0.	4371.	0.	677.	357.	276.	0.	0.	0.	0.
31 0492	0.	0.	0.	0.	4371.	0.	677.	357.	276.	0.	0.	0.	0.
32 0193	0.	0.	0.	0.	4371.	0.	677.	357.	276.	0.	0.	0.	0.
33 0293	0.	0.	0.	0.	4371.	0.	677.	357.	276	0.	0.	0.	0.
34 0393	0.	0.	0.	0.	4371.	0.	677.	357.	276	0.	0.	0.	0.
35 0493	0.	0.	0.	0.	4371.	0.	677.	357.	276.	0.	0.	0.	0.
36 0194	0.	0.	0.	0.	4371.	0.	677.	357.	276.	0.	0.	0.	0.
37 0294	0.	0.	0.	0.	4371.	0.	677.	357.	276.	0.	0.	0.	0.
38 0394	0.	0.	0.	0.	4371.	0.	677.	357.	276.	0.	0.	0.	0.
39 0494	-209.	-2392.	-120.	-562.	0.	0.	0.	0.	0.	0.	0.	0.	0.

Listing of the IRR Program Output for the Case

I N V E S T M E N T F E A S I B I L I T Y A N A L Y S I S

LEAN BEEF CATFISH OPERATION
(Units of $1,000 at 1985 Price Levels)

INTERNAL RETURN ON TOTAL CAPITAL 79.621 PERCENT

PERIOD		INVESTMENT ($1,000)			OPERATING ($1,000)			PRESENT	PRESENT VALUE	
NO.	IDENT.	FACILITIES	WORKING CAPITAL	TOTAL	TOTAL REVENUE	OPERATING EXPENSES**	NET REVENUE	VALUE FACTOR	TOTAL INVESTMENT	NET REVENUE
0	0185	0.	0.	0.	0	0.	0.	1.0000	0.	0.
1	0285	0.	0.	0.	0.	0.	0.	.8638	0.	0.
2	0385	209.	0.	209.	0.	0.	0.	.7461	156.	0.
3	0485	0.	0.	0.	0.	0.	0.	.6445	0.	0.
4	0186	1196.	0.	1196.	0.	0.	0.	.5567	666.	0.
5	0286	1196.	0.	1196.	0.	0.	0.	.4809	575.	0.
6	0386	1196.	0.	1196.	0.	0.	0.	.4154	497.	0.
7	0486	761.	0.	761.	0.	0.	0.	.3588	273.	0.
8	0187	763.	0.	763.	0.	0.	0.	.3099	236.	0.
9	0287	763.	0.	763.	0.	0.	0.	.2677	204.	0.
10	0387	404.	0.	404.	0.	0.	0.	.2313	93.	0.
11	0487	0.	200.	200.	1493.	680.	813.	.1998	40.	162.
12	0188	0.	1.	1.	1493.	741.	752.	.1726	0.	130.
13	0288	0.	188.	188.	2985.	983.	2002.	.1491	28.	298.
14	0388	0.	0.	0.	2985.	983.	2002.	.1288	0.	258.
15	0488	0.	0.	0.	2985.	983.	2002.	.1112	0.	223.
16	0189	0.	37.	37.	3284.	1053.	2231.	.0961	4.	214.
17	0289	0.	0.	0.	3284.	1053.	2231.	.0830	0.	185.
18	0389	0.	0.	0.	3284.	1053.	2231.	.0717	0.	160.
19	0489	0.	0.	0.	3284.	1053.	2231.	.0619	0.	138.
20	0190	0.	41.	41.	3612.	1127.	2485.	.0535	2.	133.
21	0290	0.	0.	0.	3612.	1127.	2485.	.0462	0.	115.
22	0390	0.	0.	0.	3612.	1127.	2485.	.0399	0.	99.
23	0490	0.	0.	0.	3612.	1127.	2485.	.0345	0.	86.
24	0191	0.	45.	45.	3973.	1217.	2756.	.0298	1.	82.
25	0291	0.	0.	0.	3973.	1217.	2756.	.0257	0.	71.
26	0391	0.	0.	0.	3973.	1217.	2756.	.0222	0.	61.
27	0491	0.	0.	0.	3973.	1217.	2756.	.0192	0.	53.
28	0192	0.	50.	50.	4371.	1310.	3061.	.0166	1.	51.
29	0292	0.	0.	0.	4371.	1310.	3061.	.0143	0.	44.
30	0392	0.	0.	0.	4371.	1310.	3061.	.0124	0.	38.
31	0492	0.	0.	0.	4371.	1310.	3061.	.0107	0.	33.
32	0193	0.	0.	0.	4371.	1310.	3061.	.0092	0.	28.
33	0293	0.	0.	0.	4371.	1310.	3061.	.0080	0.	24.
34	0393	0.	0.	0.	4371.	1310.	3061.	.0069	0.	21.
35	0493	0.	0.	0.	4371.	1310.	3061.	.0059	0.	18.
36	0194	0.	0.	0.	4371.	1310.	3061.	.0051	0.	16.
37	0294	0.	0.	0.	4371.	1310.	3061.	.0044	0.	14.
38	0394	0.	0.	0.	4371.	1310.	3061.	.0038	0.	12.
39	0494	-2721.	562.	-3283.	0.	0.	0.	.0033	-11.	0.
	TOTAL	3767.	0.	3767.	103498.	32368.	71130.		2666.	2766.

INTEREST PER CENT	BENEFIT/COST RATIO
15.000	6.249
20.000	4.942
25.000	4.027
30.000	3.356
35.000	2.845
40.000	2.446

PRESENT VALUE IN $1,000		
REVENUE	OUTLAY	BALANCE
29491.	4719.	24771.
22875.	4629.	18246.
18037.	4479.	13559.
14436.	4301.	10134.
11709.	4115.	7594.
9612.	3929.	5683.

** Excluding Depreciation, Interest and Income Tax.

Alternative: Proposed component of Lean Beef and other operations in Texas Catfish operation only.

SECTION X

CONCEPT OF ECONOMIC IMPACT ANALYSIS

Both macro and micro approaches can be used for projecting the economic impacts of capital investment and development projects. The macro approach involves the use of applicable intrasector and intersector multipliers for the impact area of concern--multipliers most commonly determined from input-output models for the economic region. The micro approach involves identification and measurement of the economic linkages of the project to the total economy of the area, and computation of an Associated Rate of Return on total capital investment in the project. The micro approach is the one illustrated herein.

Economic impact analysis to measure associated benefits and costs of a proposed project is a separate step in total feasibility analysis. The internal rate of return, direct rate of return and financial rate of return measure economic feasibility in terms of benefits to those the project is designed to benefit. Impact analysis measures the "side effects" of the project upon its economic environment. These two different kinds of benefits should not be confused. A project or program which is infeasible to its owners should not be chosen for implementation by them regardless of potential favorable economic impact, because favorable side effects will not meet the payroll nor repay the banker. By contrast, the economic impact of a potential new venture is the primary concern by those in the area where the "side effects" of the associated benefits and costs will be felt. If the potential favorable economic impact is sufficiently great, the economic community or public will find it to its advantage to subsidize the venture so that in the eyes of the owners the infeasible investment becomes feasible. Likewise if the unfavorable economic impact is sufficiently great, the public will find it to its advantage to penalize the venture so that in the eyes of the owners the feasible investment becomes infeasible.

Associated benefits, both positive and negative, identified in economic impact analysis include (1) linkage effects, (2) employment effects, (3) training effects, (4) capital gains, and (5) other directly associated effects. Linkage effects include the added income stimulated in related economic sectors in the region through the volume of business added by the development. Employment effects include the value of net added employment created by the development. Training benefits arise through additional earning power of workers who are trained for higher paying jobs under the project. Capital gains benefits are evidenced by increases in real market value of land, buildings and other assets in the impact area as result of the development. Other associated benefits for some kinds of projects include such things as environmental protection or enhancement, recreation, savings in time, quality of services, impacts on other planned projects, improved health and safety and national defense which can be attributed to the project. Associated effects may be expected during the construction phase as well as during the operating phase of the project.

Any capital or annual costs associated with the development should be identified and subtracted to obtain the net associated benefits. Associated capital costs include any capital investments outside the project itself which are needed to insure the direct and associated benefits credited to the project. Associated

operating costs include costs for labor, materials and other operating Economic expense outside the project which accompany the direct or associated benefits credited to the program.

The magnitude of associated benefits through linkage effects depends upon (1) the nature and magnitude of the linkages, and (2) the capacity of the economic environment to service the added volume of economic activity created by the linkages. The first of these is defined by the kinds and volumes of inputs used and the kinds and volumes of outputs provided by the development. The second is defined by the existing capacity in the related industries, and to the extent that excess capacity is available, by the fixed cost-variable cost relationships in these industries. Normally it is easier to assign unit values to the added volumes in the linked industries by estimating the effects on net margins rather than by doing so separately for the gross margins and operating costs. If capacity is available to handle the added volume, the net margin in the linked industry is the gross margin minus the unit variable cost. If such capacity is not available, the net margin in the linked industry is the gross margin minus the sum of unit variable cost and unit fixed cost.

The schedule of employment benefits, both positive and negative, created by the project is determined by comparing total payroll earnings in the construction and operating phases of the project with the average earnings of the employees in alternative employment in the absence of the project. Associated benefits are credited to the project for the employment of persons who otherwise would be unemployed, underemployed or employed in lesser work than that for which they are qualified. Credit in this category should not be taken for that percentage of the labor force which is fully employed in suitable regular jobs. Negative employment benefits should be charged against the project for the payroll of workers who will be replaced and who are not likely to find alternative full-time employment in positions of equal wages.

Training benefits are measured by the additional earning power of workers who are trained for higher paying jobs under the development program. These benefits may be credited whether the training is to be accomplished through formal training programs, by on-the-job training, or by a combination of formal and in-service training. In order to properly credit the training benefits, the costs of training also must be charged to the project, if not as direct cost, than as associated cost. The period-by-period training benefit for workers trained in each classification is applied from the time they will complete the training until they reach normal retirement age. It is credited for all workers trained under the program, even though many of them may be expected to move on to other employment during their working careers.

Capital gains or losses in the market value of land, buildings and other assets in the area caused by development of the project are estimated by comparing the expected period-by-period change in asset value of these assets under the development with the change in value of these assets in the absence of the project. Special care should be taken to insure that capital gains benefits credited do not represent double counting of any direct or associated benefits already reflected through increased net income from the assets. For example, if added income from improved rice mills is included in the direct Economic

benefits of the project, capital gains in the market value of such rice mills would be double counting, and should not be included.

Associated benefits from other sources are measured in much the same manner as capital gains benefits. The first step in doing so involves (a) identifying the specific sources of such benefits, and (b) selecting a volume measure for quantifying the benefit from each source. The second step is to develop projected quantities of the identified volumes both (a) with the project and (b) without the project, so that net quantities can be obtained by subtraction. The third step in projecting the associated benefits due to the project involves (a) establishing appropriate unit values for the quantities used, and (b) multiplying the schedules of net quantities by these values to establish associated benefit schedules over the economic horizon for the project.

Associated capital outlays should reflect only additional investments required to assure both the direct and associated benefits as projected for the project. The direct investments in the project already have been reflected, and should not be recounted. Added investments in linked industries to add capacities needed to handle the added volumes need not be included if linkage benefits are computed net of both unit variable and unit fixed costs in those linked industries already operating at full capacity, as suggested above. However, some associated outlay may be required for marketing or institutional infrastructure or other developments which are not included through these direct project outlays and fixed cost components of linked industries.

Associated operating costs which should be charged in the measurement of projected net economic impacts of a project include any added expense for materials, energy, labor, repairs and maintenance or other operating expense item to insure that the direct and associated benefits credited to the project can be realized. Any direct operating costs should not be included again, since they already have been reflected in calculations of net direct benefits. Operating costs in linked industries should be deducted in determining net linkage benefits, as pointed out above, and should not be included again. Depreciation and interest expenses should not be included for items reflected in associated capital outlay schedules, but should be included for any associated cost items which have not been reflected in this manner. Total associated operating costs are estimated period by period through comparison of projected expenses for the added operations with the project to the expenses for these operations without the project. The differences, both plus and minus, represent the projected schedule of associated operating costs for use in calculating the associated rate of return for the project.

The combined schedules of projected associated benefits and associated capital outlays and operating costs are prepared for computer analysis in the same way as followed for the direct benefits and direct operating costs for the project. These schedules are combined with the schedules of total capital outlay and working capital needs to compute the associated rate of return on total capital investment for each project chosen for economic impact analysis.

SECTION XI

ECONOMIC IMPACT CASE: RICE MILLING OPERATION IN PANAMA

Description of the Case

DATA.AR2: 31 Periods X 13 Columns of Projected Annual Impact Data for ARR

The DATA.AR2 Case is designed to introduce use of the feasibility analysis program for economic impact analysis, and at the same time requiring a minimum of additional data input. Although hypothetical, the case is based on actual study of rice mill feasibility in Panama some years ago.

It is not the purpose in this manual to address directly the methodology for developing the estimates and projections of economic impact upon which the input for impact analysis is based. Suffice it to say that a series of worksheets was used to develop estimates of employment benefits, training benefits, output linkage benefits, input linkage benefits, and capital gain benefits, training expense, output linkage expense, input linkage expense, and added investment requirements.

With respect to the impact analysis, relevant features of the case include the following:

1. Estimates are annual figures in US Dollars, with projections in real terms over an economic horizon of 30 years.
2. The mill building outlay estimates are the same as used in DATA.ONE. This is usual procedure for conducting impact analysis of a project for which the internal feasibility analysis has been completed.
3. Equipment estimates also are identical to those for DATA.ONE, as is usual procedure.
4. Construction and start-up schedules follow the plan for DATA.ONE, and the schedules of impacts are computed accordingly.
5. Impacts are expected in five identifiable ways, (1) added employment, (2) higher salaries after training, (3) added income for rice marketing agencies, (4) added income to rice farmers, and (5) capital gains to surrounding properties.
6. Four categories of costs are included, (1) training expense needed to support the training benefits, (2) added expense to rice marketing agencies, (3) added expense to paddy producers and assemblers, and (4) additional investment in marketing infrastructure to insure the impact benefits.
7. In addition to the Associated Rate of Return (ARR), B/C Ratios and Associated Net Present Values (NPVs) are to be computed at alternative annual discount rates of 15, 20, 25, 30, 35 and 40 percent, respectively.
8. DATA.AR2 includes the base case plus sensitivity analysis of two alternatives including (1) 20-percent reduction in projected employment benefits, starting in period 5, and (2) 8-percent reduction in projected output linkage benefits, starting in period 1.

Input data and output results for the impact analysis under DATA.AR2 are presented first for the base case, and then for each of the alternatives in turn.

Listing of Input Information and Data File

Listing of the Headers File for the Data.AR2 Case[1]

```
     DOLLARS     1.     0.     1.
11000.15000.20000.25000.30000.35000.40000
 31.0      2      2      5      4      3      2      0
            Budgeted 100,000 Rice Milling Operation in Panama
                          A. Total Operation
       Site and   Plant   Average   Other   Employ. Training  Output   Input
 Capital  Training  Output   Input   Other
Period  Bldings  Equip.  Invntry  Wrk Cap  Benefit  Benefit  Linkage  Linkage
  Gains   Expense   Expense Expense  Invest.
100,000-Quintal Rice Milling Operation in Panama.

Base Case.
```

Listing of the Data.AR2 Input File

0	1972	147000	72000	0	0	0	0	0	0
1	1973	0	0	81600	32700	23500	13000	47208	25000
2	1974	0	0	0	0	23500	13000	47208	23480
3	1975	0	0	0	0	23500	13000	47208	23480
4	1976	0	0	0	0	23500	13000	47208	23480
5	1977	0	0	0	0	23500	13000	47208	23480
6	1978	0	0	0	0	23500	13000	47208	23480
7	1979	0	0	0	0	23500	13000	47208	23480
8	1980	0	0	0	0	23500	13000	47208	23480
9	1981	0	0	0	0	23500	13000	47208	23480
10	1982	0	72000	0	0	23500	13000	47208	23480
11	1983	0	0	0	0	23500	13000	47208	23480
12	1984	0	0	0	0	23500	13000	47208	23480
13	1985	0	0	0	0	23500	13000	47208	23480
14	1986	0	0	0	0	23500	13000	47208	23480
15	1987	0	0	0	0	23500	13000	47208	23480
16	1988	0	0	0	0	23500	13000	47208	23480
17	1989	0	0	0	0	23500	13000	47208	23480
18	1990	0	0	0	0	23500	13000	47208	23480
19	1991	0	0	0	0	23500	13000	47208	23480
20	1992	0	72000	0	0	23500	13000	47208	23480
21	1993	0	0	0	0	23500	13000	47208	23480
22	1994	0	0	0	0	23500	13000	47208	23480
23	1995	0	0	0	0	23500	13000	47208	23480
24	1996	0	0	0	0	23500	13000	47208	23480
25	1997	0	0	0	0	23500	13000	47208	23480
26	1998	0	0	0	0	23500	13000	47208	23480
27	1999	0	0	0	0	23500	13000	47208	23480
28	2000	0	0	0	0	23500	13000	47208	23480
29	2001	0	0	0	0	23500	13000	47208	23480
30	2002	-47800	0	-81600	-32700	0	0	0	0
0	1972	0	0	0	0	0			
1	1973	18500	24000	19500	6500	11000			
2	1974	18500	0	19500	6500	8000			
3	1975	18500	0	19500	6500	4000			
4	1976	18500	0	19500	6500	1000			
5	1977	18500	0	19500	6500	0			
6	1978	18500	0	19500	6500	0			
7	1979	18500	0	19500	6500	0			
8	1980	18500	0	19500	6500	0			
9	1981	18500	0	19500	6500	0			
10	1982	18500	0	19500	6500	0			
11	1983	18500	0	19500	6500	0			
12	1984	18500	0	19500	6500	0			

[1] See page 60 for identification of items in the Headers file.

13	1985	18500	0	19500	6500	0
14	1986	18500	0	19500	6500	0
15	1987	18500	0	19500	6500	0
16	1988	18500	0	19500	6500	0
17	1989	18500	0	19500	6500	0
18	1990	18500	0	19500	6500	0
19	1991	18500	0	19500	6500	0
20	1992	18500	0	19500	6500	0
21	1993	18500	0	19500	6500	0
22	1994	18500	0	19500	6500	0
23	1995	18500	0	19500	6500	0
24	1996	18500	0	19500	6500	0
25	1997	18500	0	19500	6500	0
26	1998	18500	0	19500	6500	0
27	1999	18500	0	19500	6500	0
28	2000	18500	0	19500	6500	0
29	2001	18500	0	19500	6500	0
30	2002	0	0	0	0	0

No. 1. Employment benefits reduced to 80 percent of base case levels, starting with year 5.
All other factors same as for base case.

0	5	1	1	1	1	0.8	1	1	1
0	0	1	1	1	1	1			

No. 2. Output linkage benefits reduced by 8 percent, starting in year one.
All other factors same as for base case.

0	1	1	1	1	1	1	1	0.92	1
0	1	1	1	1	1	1			

Listing of the Program Output for the Base Case

Listing of Factors Used in the Run

LISTING OF FACTORS CONCERNING THIS RUN:

Unit of Measure for Output Is DOLLARS

Number of Times Discounted per Year = 1.0

"Sunken Investment" Option IS NOT Being Used

Benefit-Costs Computed at Annual Discount Rates of:

.15000 .20000 .25000 .30000 .35000 .40000

Listing of the Input for the Data.AR2 Case

A LISTING OF THE DATA

31.00 1.00 2 2 5 4 3 2 2 0 .110000

Budgeted 100,000 Rice Milling Operation in Panama
A. Total Operation

Period	Site and Bldings	Plant Equip.	Average Invntry	Other Wrk Cap	Employ Benefit	Training Benefit	Output Linkage	Input Linkage	Capital Gains	Training Expense	Output Expense	Input Expense	Other Invest.
0 1972	147000.	72000.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1 1973	0.	0.	81600.	32700.	23500.	13000.	47208.	25000.	18500.	24000.	19500.	6500.	11000.
2 1974	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	8000.
3 1975	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	4000.
4 1976	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	1000.
5 1977	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
6 1978	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
7 1979	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
8 1980	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
9 1981	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
10 1982	0.	72000.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
11 1983	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
12 1984	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
13 1985	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
14 1986	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
15 1987	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
16 1988	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
17 1989	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
18 1990	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
19 1991	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
20 1992	0.	72000.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
21 1993	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
22 1994	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
23 1995	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
24 1996	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
25 1997	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
26 1998	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
27 1999	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
28 2000	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
29 2001	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
30 2002	-47800.	0.	-81600.	-32700.	0.	0.	0.	0.	0.	0.	0.	0.	0.

Listing of the ARR Program Output for the Case

I N V E S T M E N T F E A S I B I L I T Y A N A L Y S I S

Budgeted 100,000 Rice Milling Operation in Panama
A. Total Operation

ASSOCIATED RETURN ON TOTAL CAPITAL 28.706 PERCENT

PERIOD NO.	PERIOD IDENT.	INVESTMENT (DOLLARS) FACILITIES	WORKING CAPITAL	TOTAL	ASSOCIATED EFFECTS (DOLLARS) ASSOCIATED BENEFITS	ASSOCIATED COSTS	ASSOCIATED NET BENEFITS	PRESENT VALUE FACTOR	PRESENT VALUES TOTAL INVESTMENT	ASSOCIATED NET BENEFITS
0	1972	219000.	0.	219000.	0.	0.	0.	1.0000	219000.	0.
1	1973	0.	114300.	114300.	127208.	61000.	66208.	.7770	88807.	51441.
2	1974	0.	0.	0.	125688.	34000.	91688.	.6037	0.	55350.
3	1975	0.	0.	0.	125688.	30000.	95688.	.4690	0.	44881.
4	1976	0.	0.	0.	125688.	27000.	98688.	.3644	0.	35964.
5	1977	0.	0.	0.	125688.	26000.	99688.	.2831	0.	28226.
6	1978	0.	0.	0.	125688.	26000.	99688.	.2200	0.	21931.
7	1979	0.	0.	0.	125688.	26000.	99688.	.1709	0.	17039.
8	1980	0.	0.	0.	125688.	26000.	99688.	.1328	0.	13239.
9	1981	0.	0.	0.	125688.	26000.	99688.	.1032	0.	10286.
10	1982	72000.	0.	72000.	125688.	26000.	99688.	.0802	5772.	7992.
11	1983	0.	0.	0.	125688.	26000.	99688.	.0623	0.	6209.
12	1984	0.	0.	0.	125688.	26000.	99688.	.0484	0.	4825.
13	1985	0.	0.	0.	125688.	26000.	99688.	.0376	0.	3748.
14	1986	0.	0	0.	125688.	26000.	99688.	.0292	0.	2912.
15	1987	0.	0.	0.	125688.	26000.	99688.	.0227	0.	2263.
16	1988	0.	0.	0.	125688.	26000.	99688.	.0176	0.	1758.
17	1989	0.	0.	0.	125688.	26000.	99688.	.0137	0.	1366.
18	1990	0.	0.	0.	125688.	26000.	99688.	.0106	0.	1061.
19	1991	0.	0.	0.	125688.	26000.	99688.	.0083	0.	825.
20	1992	72000.	0.	72000.	125688.	26000.	99688.	.0064	463.	641.
21	1993	0.	0.	0.	125688.	26000.	99688.	.0050	0.	498.
22	1994	0.	0.	0.	125688.	26000.	99688.	.0039	0.	387.
23	1995	0.	0.	0.	125688.	26000.	99688.	.0030	0.	301.
24	1996	0.	0.	0.	125688.	26000.	99688.	.0023	0.	233.
25	1997	0.	0.	0.	125688.	26000.	99688.	.0018	0.	181.
26	1998	0.	0.	0.	125688.	26000.	99688.	.0014	0.	141.
27	1999	0.	0.	0.	125688.	26000.	99688.	.0011	0.	110.
28	2000	0.	0.	0.	125688.	26000.	99688.	.0009	0.	85.
29	2001	0.	0.	0.	125688.	26000.	99688.	.0007	0.	66.
30	2002	-47800.	-114300.	-162100.	0.	0.	0.	.0005	-84.	0.
	TOTAL	315200.	0.	315200.	3646472.	802000.	2844472.		313958.	313958.

INTEREST PER CENT	ASSOCIATED BENEFIT RATIO	PRESENT VALUE IN DOLLARS ASSOC. BENEFITS	OUTLAY	BALANCE
15.000	1.818	614680.	338140.	276540.
20.000	1.405	459668.	327074.	132594.
25.000	1.141	363773.	318800.	44973.
30.000	.958	299470.	312463.	-12993.
35.000	.825	253659.	307406.	-53747.
40.000	.724	219492.	303211.	-83720.

Alternative: 100,000-Quintal Rice Milling Operation in Panama.
Base Case.

Listing of the Program Output for Alternative Number 1

Listing of the Input for Alternative Number 1

A LISTING OF THE DATA

31.00 1.00 2 2 5 4 3 2 2 0 .110000

Budgeted 100,000 Rice Milling Operation in Panama
A. Total Operation

Period	Site and Bldings	Plant Equip.	Average Invntry	Other Wrk Cap	Employ Benefit	Training Benefit	Output Linkage	Input Linkage	Capital Gains	Training Expense	Output Expense	Input Expense	Other Invest.
SCALERS:	1.0000	1.0000	1.0000	1.0000	.8000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
0 1972	147000.	72000.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1 1973	0.	0.	81600.	32700.	23500.	13000.	47208.	25000.	18500.	24000.	19500.	6500.	11000.
2 1974	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	8000.
3 1975	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	4000.
4 1976	0.	0.	0.	0.	23500.	13000.	47208.	23480.	18500.	0.	19500.	6500.	1000
5 1977	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
6 1978	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
7 1979	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
8 1980	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
9 1981	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
10 1982	0.	72000.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
11 1983	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
12 1984	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
13 1985	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
14 1986	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
15 1987	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
16 1988	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
17 1989	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
18 1990	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
19 1991	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
20 1992	0.	72000.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
21 1993	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
22 1994	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
23 1995	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
24 1996	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
25 1997	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
26 1998	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
27 1999	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
28 2000	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
29 2001	0.	0.	0.	0.	18800.	13000.	47208.	23480.	18500.	0.	19500.	6500.	0.
30 2002	-47800.	0.	-81600.	-32700.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SCALE FACTORS APPLIED TO DATA BEGINNING IN PERIOD 5

Listing of the ARR Program Output for Alternative Number 1

I N V E S T M E N T F E A S I B I L I T Y A N A L Y S I S

Budgeted 100,000 Rice Milling Operation in Panama
A. Total Operation

ASSOCIATED RETURN ON TOTAL CAPITAL 28.130 PERCENT

PERIOD NO.	PERIOD IDENT.	INVESTMENT (DOLLARS) FACILITIES	WORKING CAPITAL	TOTAL	ASSOCIATED EFFECTS (DOLLARS) ASSOCIATED BENEFITS	ASSOCIATED COSTS	ASSOCIATED NET BENEFITS	PRESENT VALUE FACTOR	PRESENT VALUES TOTAL INVESTMENT	ASSOCIATED NET BENEFITS
0	1972	219000.	0.	219000.	0.	0.	0.	1.0000	219000.	0.
1	1973	0.	114300.	114300.	127208.	61000.	66208.	.7805	89206.	51673.
2	1974	0.	0.	0.	125688.	34000.	91688.	.6091	0.	55848.
3	1975	0.	0.	0.	125688.	30000.	95688.	.4754	0.	45489.
4	1976	0.	0.	0.	125688.	27000.	98688.	.3710	0.	36615.
5	1977	0.	0.	0.	120988.	26000.	94988.	.2896	0.	27505.
6	1978	0.	0.	0.	120988.	26000.	94988.	.2260	0.	21467.
7	1979	0.	0.	0.	120988.	26000.	94988.	.1764	0.	16754.
8	1980	0.	0.	0.	120988.	26000.	94988.	.1377	0.	13076.
9	1981	0.	0.	0.	120988.	26000.	94988.	.1074	0.	10205.
10	1982	72000.	0.	72000.	120988.	26000.	94988.	.0838	6037.	7965.
11	1983	0.	0.	0.	120988.	26000.	94988.	.0654	0.	6216.
12	1984	0.	0.	0.	120988.	26000.	94988.	.0511	0.	4851.
13	1985	0.	0.	0.	120988.	26000.	94988.	.0399	0.	3786.
14	1986	0.	0.	0.	120988.	26000.	94988.	.0311	0.	2955.
15	1987	0.	0.	0.	120988.	26000.	94988.	.0243	0.	2306.
16	1988	0.	0.	0.	120988.	26000.	94988.	.0189	0.	1800.
17	1989	0.	0.	0.	120988.	26000.	94988.	.0148	0.	1405.
18	1990	0.	0.	0.	120988.	26000.	94988.	.0115	0.	1096.
19	1991	0.	0.	0.	120988.	26000.	94988.	.0090	0.	856.
20	1992	72000.	0.	72000.	120988.	26000.	94988.	.0070	506.	668.
21	1993	0.	0.	0.	120988.	26000.	94988.	.0055	0.	521.
22	1994	0.	0.	0.	120988.	26000.	94988.	.0043	0.	407.
23	1995	0.	0.	0.	120988.	26000.	94988.	.0033	0.	317.
24	1996	0.	0.	0.	120988.	26000.	94988.	.0026	0.	248.
25	1997	0.	0.	0.	120988.	26000.	94988.	.0020	0.	193.
26	1998	0.	0.	0.	120988.	26000.	94988.	.0016	0.	151.
27	1999	0.	0.	0.	120988.	26000.	94988.	.0012	0.	118.
28	2000	0.	0.	0.	120988.	26000.	94988.	.0010	0.	92.
29	2001	0.	0.	0.	120988.	26000.	94988.	.0008	0.	72.
30	2002	-47800.	-114300.	-162100.	0.	0.	0.	.0006	-96.	0.
	TOTAL	315200.	0.	315200.	3528972.	802000.	2726972.		314654.	314654.

INTEREST PER CENT	ASSOCIATED BENEFIT RATIO	PRESENT VALUE IN DOLLARS ASSOC. BENEFITS	OUTLAY	BALANCE
15.000	1.766	597309.	338140.	259169.
20.000	1.371	448453.	327074.	121380.
25.000	1.117	356102.	318800.	37302.
30.000	.941	293993.	312463.	-18470.
35.000	.812	249618.	307406.	-57787.
40.000	.714	216434.	303211.	-86778.

Alternative: No. 1. Employment benefits reduced to 80 percent of base case levels, starting with year 5. All other factors same as for base case.

Listing of the Program Output for Alternative Number 2

Listing of the Input for Alternative Number 2

A LISTING OF THE DATA

31.00 1.00 2 2 5 4 3 2 2 0 .110000

Budgeted 100,000 Rice Milling Operation in Panama
A. Total Operation

Period	Site and Bldings	Plant Equip.	Average Invntry	Other Wrk Cap	Employ Benefit	Training Benefit	Output Linkage	Input Linkage	Capital Gains	Training Expense	Output Expense	Input Expense	Other Invest.
SCALERS:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.9200	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
0 1972	147000.	72000.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1 1973	0.	0.	81600.	32700.	23500.	13000.	43431.	25000.	18500.	24000.	19500.	6500.	11000.
2 1974	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	8000.
3 1975	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	4000.
4 1976	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	1000.
5 1977	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
6 1978	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
7 1979	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
8 1980	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
9 1981	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
10 1982	0.	72000.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
11 1983	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
12 1984	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
13 1985	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
14 1986	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
15 1987	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
16 1988	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
17 1989	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
18 1990	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
19 1991	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
20 1992	0.	72000.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
21 1993	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
22 1994	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
23 1995	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
24 1996	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
25 1997	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
26 1998	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
27 1999	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
28 2000	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
29 2001	0.	0.	0.	0.	23500.	13000.	43431.	23480.	18500.	0.	19500.	6500.	0.
30 2002	-47800.	0.	-81600.	-32700.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SCALE FACTORS APPLIED TO DATA BEGINNING IN PERIOD 1

Listing of the ARR Program Output for Alternative Number 2

I N V E S T M E N T F E A S I B I L I T Y A N A L Y S I S

Budgeted 100,000 Rice Milling Operation in Panama
A. Total Operation

ASSOCIATED RETURN ON TOTAL CAPITAL 27.458 PERCENT

PERIOD NO.	PERIOD IDENT.	INVESTMENT (DOLLARS) FACILITIES	WORKING CAPITAL	TOTAL	ASSOCIATED EFFECTS (DOLLARS) ASSOCIATED BENEFITS	ASSOCIATED COSTS	ASSOCIATED NET BENEFITS	PRESENT VALUE FACTOR	PRESENT VALUES TOTAL INVESTMENT	ASSOCIATED NET BENEFITS
0	1972	219000.	0.	219000.	0.	0.	0.	1.0000	219000.	0.
1	1973	0.	114300.	114300.	123431.	61900.	62431.	.7846	89676.	48982.
2	1974	0.	0.	0.	121911.	34000.	87911.	.6156	0.	54114.
3	1975	0.	0.	0.	121911.	30000.	91911.	.4829	0.	44388.
4	1976	0.	0.	0.	121911.	27000.	94911.	.3789	0.	35962.
5	1977	0.	0.	0.	121911.	26000.	95911.	.2973	0.	28512.
6	1978	0.	0.	0.	121911.	26000.	95911.	.2332	0.	22370.
7	1979	0.	0.	0.	121911.	26000.	95911.	.1830	0.	17551.
8	1980	0.	0.	0.	121911.	26000.	95911.	.1436	0.	13770.
9	1981	0.	0.	0.	121911.	26000.	95911.	.1126	0.	10803.
10	1982	72000.	0.	72000.	121911.	26000.	95911.	.0884	6363.	8476.
11	1983	0.	0.	0.	121911.	26000.	95911.	.0693	0.	6650.
12	1984	0.	0.	0.	121911.	26000.	95911.	.0544	0.	5217.
13	1985	0.	0.	0.	121911.	26000.	95911.	.0427	0.	4093.
14	1986	0.	0.	0.	121911.	26000.	95911.	.0335	0.	3212.
15	1987	0.	0.	0.	121911.	26000.	95911.	.0263	0.	2520.
16	1988	0.	0.	0.	121911.	26000	95911.	.0206	0.	1977.
17	1989	0.	0.	0.	121911.	26000.	95911.	.0162	0.	1551.
18	1990	0.	0.	0.	121911.	26000.	95911.	.0127	0.	1217.
19	1991	0.	0.	0.	121911.	26000.	95911.	.0100	0.	955.
20	1992	72000.	0.	72000.	121911.	26000.	95911.	.0078	562.	749.
21	1993	0.	0.	0.	121911.	26000.	95911.	.0061	0.	588.
22	1994	0.	0.	0.	121911.	26000.	95911.	.0048	0.	461.
23	1995	0.	0.	0.	121911.	26000.	95911.	.0038	0.	362.
24	1996	0.	0.	0.	121911.	26000.	95911.	.0030	0.	284.
25	1997	0.	0.	0.	121911.	26000.	95911.	.0023	0.	223.
26	1998	0.	0.	0.	121911.	26000.	95911.	.0018	0.	175.
27	1999	0.	0.	0.	121911.	26000.	95911.	.0014	0.	137.
28	2000	0.	0.	0.	121911.	26000.	95911.	.0011	0.	108.
29	2001	0.	0.	0.	121911.	26000.	95911.	.0009	0.	84.
30	2002	-47800.	-114300.	-162100.	0.	0.	0.	.0007	-112.	0.
	TOTAL	315200.	0.	315200.	3536949.	802000.	2734949.		315490.	315490.

INTEREST PER CENT	ASSOCIATED BENEFIT RATIO	PRESENT VALUE IN DOLLARS ASSOC. BENEFITS	OUTLAY	BALANCE
15.000	1.745	589939.	338140.	251800.
20.000	1.348	440880.	327074.	113806.
25.000	1.094	348690.	318800.	29890.
30.000	.918	286888.	312463.	-25575.
35.000	.790	242871.	307406.	-64535.
40.000	.693	210051.	303211.	-93161.

Alternative: No. 2. Output linkage benefits reduced by 8 percent, starting in year one. All other factors same as for base case.

SECTION XII

SENSITIVITY ANALYSIS CASE: RICE MILLING OPERATION IN PANAMA

Description of the Case

DATA.TWO: 21 Periods X 10 Columns of Projected Annual Cash Flow Data for IRR

The DATA.TWO Case is an extension of DATA.ONE designed to familiarize the user with manipulating the feasibility analysis program for sensitivity analysis and illustration of further features which the program can address.

It is not the purpose in this manual to address directly the methodology for developing the estimates and projections upon which the input for feasibility analysis is based. Suffice it to say that a series of worksheets for developing engineering estimates, capital budgeting and operating plans had to be completed prior to conducting Rate of Return analysis. For our purposes here we take this information as given.

With respect to the feasibility analysis, several features of the case need to be recognized at the outset:

1. Estimates are annual figures in US Dollars, with projections in real terms over an economic horizon of 20 years.
2. The mill buildings will not need to be replaced over this period; there is expected to be a remaining asset value at the end of the horizon.
3. Equipment is expected to last 10 years, so will need to be replaced once over the period.
4. Construction will take one year, with operation starting the second year and remaining at constant volume thereafter.
5. Income is to be derived from three sources, (1) sales of milled rice, (2) byproduct (bran) sales, and (3) income from storing rough rice until it is to be milled.
6. Three categories of operating cost are entered, (1) fixed expense (other than depreciation and interest on facility loans), (2) variable expense (other than interest on working capital and income taxes), and (3) marketing expense. Except for the latter, the expenses are expected to remain constant in real terms through time.
7. In addition to the Internal Rate of Return (IRR), B/C Ratios and Net Present Values (NPVs) are to be computed at alternative annual compound discount rates of 15, 20, 25, 30, 35 and 40 percent, respectively.
8. DATA.TWO includes the base case plus sensitivity analysis of seven alternatives, including (1) 10 % increase in facility costs, (2) 10 % decrease in facility costs, (3) 10 % increase in all investment and all revenue accounts, (4) 10 % decrease in all investment and all revenue accounts, (5) added outlay and changed product mix for high-tech rice milling equipment, (6) 6.5 % increase in variable cost, and (7) combination of alternatives 3, 5 and 6.

Input data and output results for the sensitivity analysis of the Panama rice mill under Data.Two are presented first for the base case and then for each of the alternatives in turn. An image of the New Data file ordered for alternative 7 is included with this alternative.

Listing of Input Information and Data File

Listing of the Headers File for the Data.Two Case[1]

```
     DOLLARS    1.0      0      1
 .1100 .1500 .2000 .2500 .3000 .3500 .4000
  21.0     2     2     3     6     1     7     0
                Budgeted 100,000 Quintal Rice Milling Operation
                              A. Total Operation
        Site and   Plant   Average   Other   Product   Other  Service   Fixed
 Varable   Mkting  Current  Intrest  Income
 Period  Bldings   Equip.  Invntry  Wrk Cap   Sales    Sales   Income   Expense
 Expense  Expense  Deprec.  Expense     Tax
100,000 Quintal Rice Milling Operation in Panama.
```

Base Case.

Listing of the Data.Two Input File

0	1972	147000	72000	0	0	0	0	0	0
1	1973	0	0	81600	32700	118359	39000	10581	58700
2	1974	0	0	0	0	118359	39000	10581	58700
3	1975	0	0	0	0	118359	39000	10581	58700
4	1976	0	0	0	0	118359	39000	10581	58700
5	1977	0	0	0	0	118359	39000	10581	58700
6	1978	0	0	0	0	118359	39000	10581	58700
7	1979	0	0	0	0	118359	39000	10581	58700
8	1980	0	0	0	0	118359	39000	10581	58700
9	1981	0	0	0	0	118359	39000	10581	58700
10	1982	0	72000	0	0	118359	39000	10581	58700
11	1983	0	0	0	0	118359	39000	10581	58700
12	1984	0	0	0	0	118359	39000	10581	58700
13	1985	0	0	0	0	118359	39000	10581	58700
14	1986	0	0	0	0	118359	39000	10581	58700
15	1987	0	0	0	0	118359	39000	10581	58700
16	1988	0	0	0	0	118359	39000	10581	58700
17	1989	0	0	0	0	118359	39000	10581	58700
18	1990	0	0	0	0	118359	39000	10581	58700
19	1991	0	0	0	0	118359	39000	10581	58700
20	1992	-81900	0	-81600	-32700	0	0	0	0
0	1972	0	0	0	0	0			
1	1973	18500	14000	0	0	0			
2	1974	18500	11000	0	0	0			
3	1975	18500	11000	0	0	0			
4	1976	18500	11000	0	0	0			
5	1977	18500	11000	0	0	0			
6	1978	18500	11000	0	0	0			
7	1979	18500	11000	0	0	0			
8	1980	18500	11000	0	0	0			
9	1981	18500	11000	0	0	0			
10	1982	18500	11000	0	0	0			
11	1983	18500	11000	0	0	0			
12	1984	18500	11000	0	0	0			
13	1985	18500	11000	0	0	0			
14	1986	18500	11000	0	0	0			
15	1987	18500	11000	0	0	0			
16	1988	18500	11000	0	0	0			
17	1989	18500	11000	0	0	0			
18	1990	18500	11000	0	0	0			
19	1991	18500	11000	0	0	0			
20	1992	18500	11000	0	0	0			

[1] See page 53 for identification of items in the HEADERS file.

(1) Outlay for facilities increased by 10 percent.

All other factors same as for the base case.

0	0	1.1	1	1	1	1	1	1	1
0	0	1	1	0	0	0			

(2) Outlay for facilities decreased by 10 percent.

All other factors same as for the base case.

0	0	0.9	1	1	1	1	1	1	1
0	0	1	1	0	0	0			

(3) All capital outlays and all revenues increased by 10 percent.

All other factors same as for the base case.

0	0	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1
0	0	1	1	0	0	0			

(4) All capital outlays and all revenues decreased by 10 percent.

All other factors same as for the base case.

0	0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1
0	0	1	1	0	0	0			

(5) Outlay for equipment increased by 15 percent; milled rice sales increased by 5.1 percent;
Byproduct sales decreased by 7.08 percent. All other factors same as for the base case.

0	0	1	1.15	1	1	1.051	0.9292	1	1
0	0	1	1	0	0	0			

(6) Variable expense increased by 6.5 percent to reflect rising fuel prices.
All other factors same as base case.

0	0	1	1	1	1	1	1	1	1.065
0	0	1	1	0	0	0			

(7) Combination of alternatives (3), (5) and (6).

Scaler factors calculated by multiplication.

0	0	1.1	1.265	1.1	1.1	1.156	1.022	1.1	1.065
0	0	1	1	0	0	0			

Listing of the Program Output for the Base Case

Listing of the Factors Used in the Run

LISTING OF FACTORS CONCERNING THIS RUN:

Unit of Measure for Output Is DOLLARS

Number of Times Discounted per Year = 1.0

"Sunken Investment" Option IS NOT Being Used

Benefit-Costs Computed at Annual Discount Rates of:

.15000 .20000 .25000 .30000 .35000 .40000

Listing of the Input for the Data.Two Case

A LISTING OF THE DATA

21.00 1.00 2 2 3 6 1 7 2 0 .110000

Budgeted 100,000 Quintal Rice Milling Operation

A. Total Operation

Period	Site and Bldings	Plant Equip.	Average Invntry	Other Wrk Cap	Product Sales	Other Sales	Service Income	Fixed Expense	Varable Expense	Mkting Expense	Current Deprec.	Intrest Expense	Income Tax
0 1972	147000.	72000.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1 1973	0.	0.	81600.	32700.	118359.	39000.	10581.	58700.	18500.	14000.	0.	0.	0.
2 1974	0.	0	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
3 1975	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
4 1976	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
5 1977	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
6 1978	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
7 1979	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
8 1980	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
9 1981	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
10 1982	0.	72000.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
11 1983	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
12 1984	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500	11000.	0.	0.	0.
13 1985	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
14 1986	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
15 1987	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
16 1988	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
17 1989	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
18 1990	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
19 1991	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
20 1992	-81900.	0.	-81600.	-32700.	0.	0.	0.	0.	0.	0.	0.	0.	0.

Listing of the IRR Program Output for the Data.Two Case

I N V E S T M E N T F E A S I B I L I T Y A N A L Y S I S

Budgeted 100,000 Quintal Rice Milling Operation
A. Total Operation

INTERNAL RETURN ON TOTAL CAPITAL 24.642 PERCENT

PERIOD		INVESTMENT (DOLLARS)			OPERATING (DOLLARS)			PRESENT	PRESENT VALUE	
NO.	IDENT.	FACILITIES	WORKING CAPITAL	TOTAL	TOTAL REVENUE	OPERATING EXPENSES**	NET REVENUE	VALUE FACTOR	TOTAL INVESTMENT	NET REVENUE
0	1972	219000.	0.	219000.	0.	0.	0.	1.0000	219000.	0.
1	1973	0.	114300.	114300.	167940.	91200.	76740.	.8023	91703.	61568.
2	1974	0.	0.	0.	167940.	88200.	79740.	.6437	0.	51327.
3	1975	0.	0.	0.	167940.	88200.	79740.	.5164	0.	41180.
4	1976	0.	0.	0.	167940.	88200.	79740.	.4143	0.	33038.
5	1977	0.	0.	0.	167940.	88200.	79740.	.3324	0.	26507.
6	1978	0.	0.	0.	167940.	88200.	79740.	.2667	0.	21266.
7	1979	0.	0.	0.	167940.	88200.	79740.	.2140	0.	17062.
8	1980	0.	0.	0.	167940.	88200.	79740.	.1717	0.	13689.
9	1981	0.	0.	0.	167940.	88200.	79740.	.1377	0.	10982.
10	1982	72000.	0.	72000.	167940.	88200.	79740.	.1105	7956.	8811.
11	1983	0.	0.	0.	167940.	88200.	79740.	.0887	0.	7069.
12	1984	0.	0.	0.	167940.	88200.	79740.	.0711	0.	5672.
13	1985	0.	0.	0.	167940.	88200.	79740.	.0571	0.	4550.
14	1986	0.	0.	0.	167940.	88200.	79740.	.0458	0.	3651.
15	1987	0.	0.	0.	167940.	88200.	79740.	.0367	0.	2929.
16	1988	0.	0.	0.	167940.	88200.	79740.	.0295	0.	2350.
17	1989	0.	0.	0.	167940.	88200.	79740.	.0236	0.	1885.
18	1990	0.	0.	0.	167940.	88200.	79740.	.0190	0.	1513.
19	1991	0.	0.	0.	167940.	88200.	79740.	.0152	0.	1214.
20	1992	-81900.	-114300.	-196200.	0.	0.	0.	.0122	-2396.	0.
	TOTAL	209100.	0.	209100.	3190860.	1678800.	1512060.		316263.	316263.

INTEREST PER CENT	BENEFIT/COST RATIO
15.000	1.516
20.000	1.196
25.000	.988
30.000	.841
35.000	.723
40.000	.650

PRESENT VALUE IN DOLLARS		
REVENUE	OUTLAY	BALANCE
491638.	324201.	167438.
383720.	320761.	62960.
311963.	315909.	-3946.
261674.	311113.	-49439.
224846.	306762.	-81917.
196874.	302898.	-106024.

** Excluding Depreciation, Interest, and Income Tax.

Alternative: 100,000 Quintal Rice Milling Operation in Panama.
Base Case.

Listing of the Program Output for Alternative Number 1

Listing of the Input for Alternative Number 1

A LISTING OF THE DATA

21.00 1.00 2 2 3 6 1 7 2 0 .110000

Budgeted 100,000 Quintal Rice Milling Operation
A. Total Operation

Period	Site and Bldings	Plant Equip.	Average Invntry	Other Wrk Cap	Product Sales	Other Sales	Service Income	Fixed Expense	Varable Expense	Mkting Expense	Current Deprec.	Intrest Expense	Income Tax
SCALERS:	1.1000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.0000	.0000	.0000
0 1972	161700.	72000.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1 1973	0.	0.	81600.	32700.	118359.	39000.	10581.	58700.	18500.	14000.	0.	0.	0.
2 1974	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
3 1975	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
4 1976	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
5 1977	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
6 1978	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
7 1979	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
8 1980	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
9 1981	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
10 1982	0.	72000.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
11 1983	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0
12 1984	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
13 1985	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
14 1986	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
15 1987	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
16 1988	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
17 1989	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
18 1990	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
19 1991	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
20 1992	-90090.	0.	-81600.	-32700.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SCALE FACTORS APPLIED TO DATA BEGINNING IN PERIOD 0

Listing of the Output for Alternative Number 1

I N V E S T M E N T F E A S I B I L I T Y A N A L Y S I S

Budgeted 100,000 Quintal Rice Milling Operation
A. Total Operation

INTERNAL RETURN ON TOTAL CAPITAL 23.400 PERCENT

PERIOD		INVESTMENT (DOLLARS)			OPERATING (DOLLARS)			PRESENT	PRESENT VALUE	
NO.	IDENT.	FACILITIES	WORKING CAPITAL	TOTAL	TOTAL REVENUE	OPERATING EXPENSES**	NET REVENUE	VALUE FACTOR	TOTAL INVESTMENT	NET REVENUE
0	1972	233700.	0.	233700.	0.	0.	0.	1.0000	233700.	0.
1	1973	0.	114300.	114300.	167940.	91200.	76740.	.8104	92626.	62188.
2	1974	0.	0.	0.	167940.	88200.	79740.	.6567	0.	52366.
3	1975	0.	0.	0.	167940.	88200.	79740.	.5322	0.	42436.
4	1976	0.	0.	0.	167940.	88200.	79740.	.4313	0.	34389.
5	1977	0.	0.	0.	167940.	88200.	79740.	.3495	0.	27868.
6	1978	0.	0.	0.	167940.	88200.	79740.	.2832	0.	22584.
7	1979	0.	0.	0.	167940.	88200.	79740.	.2295	0.	18301.
8	1980	0.	0.	0.	167940.	88200.	79740.	.1860	0.	14831.
9	1981	0.	0.	0.	167940.	88200.	79740.	.1507	0.	12019.
10	1982	72000.	0.	72000.	167940.	88200.	79740.	.1221	8794.	9740.
11	1983	0.	0.	0.	167940.	88200.	79740.	.0990	0.	7893.
12	1984	0.	0.	0.	167940.	88200.	79740.	.0802	0.	6396.
13	1985	0.	0.	0.	167940.	88200.	79740.	.0650	0.	5183.
14	1986	0.	0.	0.	167940.	88200.	79740.	.0527	0.	4200.
15	1987	0.	0.	0.	167940.	88200.	79740.	.0427	0.	3404.
16	1988	0.	0.	0.	167940.	88200.	79740.	.0346	0.	2758.
17	1989	0.	0.	0.	167940.	88200.	79740.	.0280	0.	2235.
18	1990	0.	0.	0.	167940.	88200.	79740.	.0227	0.	1811.
19	1991	0.	0.	0.	167940.	88200.	79740.	.0184	0.	1468.
20	1992	-90090.	-114300.	-204390.	0.	0.	0	.0149	-3049.	0.
	TOTAL	215610.	0.	215610.	3190860.	1678800.	1512060.		332071.	332071.

INTEREST PER CENT	BENEFIT/COST RATIO	PRESENT VALUE IN DOLLARS REVENUE	CUTLAY	BALANCE
15.000	1.453	491638.	338400.	153238
20.000	1.145	383720.	335247.	48473.
25.000	.944	311963.	330514.	-18551.
30.000	.803	261674.	325770.	-64096.
35.000	.699	224846.	321442.	-96595.
40.000	.620	196874.	317588.	-120714.

** Excluding Depreciation, Interest, and Income Tax.

Alternative: (1) Outlay for facilities increased by 10 percent.
All other factors same as for the base case.

Listing of the Program Output for Alternative Number 2

Listing of the Input for Alternative Number 2

A LISTING OF THE DATA

21.00 1.00 2 2 3 6 1 7 2 0 .110000

Budgeted 100,000 Quintal Rice Milling Operation
A. Total Operation

Period	Site and Bldings	Plant Equip.	Average Invntry	Other Wrk Cap	Product Sales	Other Sales	Service Income	Fixed Expense	Varable Expense	Mkting Expense	Current Deprec.	Intrest Expense	Income Tax
SCALERS:	.9000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	.0000	.0000	.0000
0 1972	132300.	72000.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1 1973	0.	0.	81600.	32700.	118359.	39000.	10581.	58700.	18500.	14000.	0.	0.	0.
2 1974	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
3 1975	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
4 1976	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
5 1977	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
6 1978	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
7 1979	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
8 1980	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
9 1981	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
10 1982	0.	72000.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
11 1983	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
12 1984	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
13 1985	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
14 1986	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
15 1987	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
16 1988	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
17 1989	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
18 1990	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
19 1991	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	0.	0.	0.
20 1992	-73710.	0.	-81600.	-32700.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SCALE FACTORS APPLIED TO DATA BEGINNING IN PERIOD 0

Listing of the Output for Alternative Number 2

I N V E S T M E N T F E A S I B I L I T Y A N A L Y S I S

Budgeted 100,000 Quintal Rice Milling Operation
A. Total Operation

INTERNAL RETURN ON TOTAL CAPITAL 26.021 PERCENT

PERIOD		INVESTMENT (DOLLARS)			OPERATING (DOLLARS)			PRESENT	PRESENT VALUE	
NO.	IDENT.	FACILITIES	WORKING CAPITAL	TOTAL	TOTAL REVENUE	OPERATING EXPENSES**	NET REVENUE	VALUE FACTOR	TOTAL INVESTMENT	NET REVENUE
0	1972	204300.	0.	204300.	0.	0.	0.	1.0000	204300.	0.
1	1973	0.	114300.	114300.	167940.	91200.	76740.	.7935	90699.	60895.
2	1974	0.	0.	0.	167940.	88200.	79740.	.6297	0.	50210.
3	1975	0.	0.	0.	167940.	88200.	79740.	.4997	0.	39843.
4	1976	0.	0.	0.	167940.	88200.	79740.	.3965	0.	31616.
5	1977	0.	0.	0.	167940.	88200.	79740.	.3146	0.	25088.
6	1978	0.	0.	0.	167940.	88200.	79740.	.2497	0.	19908.
7	1979	0.	0.	0.	167940.	88200.	79740.	.1981	0.	15797.
8	1980	0.	0.	0.	167940.	88200.	79740.	.1572	0.	12536.
9	1981	0.	0.	0.	167940.	88200.	79740.	.1247	0.	9947.
10	1982	72000.	0.	72000.	167940.	88200.	79740.	.0990	7127.	7893.
11	1983	0.	0.	0.	167940.	88200.	79740.	.0785	0.	6264.
12	1984	0.	0.	0.	167940.	88200.	79740.	.0623	0.	4970.
13	1985	0.	0.	0.	167940.	88200.	79740.	.0495	0.	3944.
14	1986	0.	0.	0.	167940.	88200.	79740.	.0392	0.	3130.
15	1987	0.	0.	0.	167940.	88200.	79740.	.0311	0.	2483.
16	1988	0.	0.	0.	167940.	88200.	79740.	.0247	0.	1971.
17	1989	0.	0.	0.	167940.	88200.	79740.	.0196	0.	1564.
18	1990	0.	0.	0.	167940.	88200.	79740.	.0156	0.	1241.
19	1991	0.	0.	0.	167940.	88200.	79740.	.0123	0.	985.
20	1992	-73710.	-114300.	-188010.	0.	0.	0.	.0098	-1842.	0.
	TOTAL	202590.	0.	202590.	3190860.	1678800.	1512060.		300284.	300284.

INTEREST PER CENT	BENEFIT/COST RATIO
15.000	1.586
20.000	1.253
25.000	1.035
30.000	.883
35.000	.770
40.000	.683

PRESENT VALUE IN DOLLARS		
REVENUE	OUTLAY	BALANCE
491638.	310001.	181637.
383720.	306274.	77446.
311963.	301303.	10660.
261674.	296457.	-34782.
224846.	292083.	-67237.
196874.	288207.	-91334.

** Excluding Depreciation, Interest, and Income Tax.

Alternative: (2) Outlay for facilities decreased by 10 percent.
All other factors same as for the base case.

Listing of Program Output for Alternative Number 3

Listing of the Input for Alternative Number 3

A LISTING OF THE DATA

21.00 1.00 2 2 3 6 1 7 2 0 .110000

Budgeted 100,000 Quintal Rice Milling Operation
A. Total Operation

Period	Site and Bldings	Plant Equip.	Average Invntry	Other Wrk Cap	Product Sales	Other Sales	Service Income	Fixed Expense	Varable Expense	Mkting Expense	Current Deprec.	Intrest Expense	Income Tax
SCALERS:	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.0000	1.0000	1.0000	.0000	.0000	.0000
0 1972	161700.	79200	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1 1973	0.	0.	89760.	35970.	130195.	42900.	11639.	58700.	18500.	14000.	0.	0.	0.
2 1974	0.	0.	0.	0.	130195.	42900.	11639.	58700.	18500.	11000.	0	0.	0.
3 1975	0.	0.	0.	0.	130195.	42900.	11639.	58700.	18500.	11000.	0.	0.	0.
4 1976	0.	0.	0.	0.	130195	42900.	11639.	58700.	18500.	11000.	0.	0.	0.
5 1977	0.	0.	0.	0.	130195.	42900.	11639.	58700.	18500.	11000.	0.	0	0.
6 1978	0.	0.	0.	0.	130195.	42900.	11639.	58700.	18500.	11000.	0.	0.	0.
7 1979	0.	0.	0.	0.	130195.	42900.	11639.	58700.	18500.	11000.	0.	0.	0.
8 1980	0.	0.	0.	0.	130195.	42900.	11639.	58700.	18500.	11000.	0.	0.	0.
9 1981	0.	0.	0.	0.	130195.	42900.	11639.	58700.	18500.	11000.	0.	0.	0.
10 1982	0.	79200.	0.	0.	130195.	42900.	11639.	58700.	18500.	11000.	0.	0.	0.
11 1983	0.	0.	0.	0.	130195.	42900.	11639.	58700.	18500.	11000.	0.	0.	0.
12 1984	0.	0.	0.	0.	130195.	42900.	11639.	58700.	18500.	11000.	0.	0.	0.
13 1985	0.	0.	0.	0.	130195.	42900.	11639.	58700.	18500.	11000.	0.	0.	0.
14 1986	0.	0.	0.	0.	130195.	42900.	11639.	58700.	18500.	11000.	0.	0.	0.
15 1987	0.	0.	0.	0.	130195.	42900.	11639.	58700.	18500.	11000.	0.	0.	0.
16 1988	0.	0.	0.	0.	130195.	42900.	11639.	58700.	18500.	11000.	0.	0.	0.
17 1989	0.	0.	0.	0.	130195.	42900.	11639.	58700.	18500.	11000.	0.	0.	0.
18 1990	0.	0.	0.	0.	130195.	42900.	11639.	58700.	18500.	11000.	0.	0.	0.
19 1991	0.	0.	0.	0.	130195.	42900.	11639.	58700.	18500.	11000.	0.	0.	0.
20 1992	-90090.	0.	-89760.	-35970.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SCALE FACTORS APPLIED TO DATA BEGINNING IN PERIOD 0

Listing of the Output for Alternative Number 3

I N V E S T M E N T F E A S I B I L I T Y A N A L Y S I S

Budgeted 100,000 Quintal Rice Milling Operation
A. Total Operation

INTERNAL RETURN ON TOTAL CAPITAL 27.536 PERCENT

PERIOD		INVESTMENT (DOLLARS)			OPERATING (DOLLARS)			PRESENT	PRESENT VALUE	
NO.	IDENT.	FACILITIES	WORKING CAPITAL	TOTAL	TOTAL REVENUE	OPERATING EXPENSES**	NET REVENUE	VALUE FACTOR	TOTAL INVESTMENT	NET REVENUE
0	1972	240900.	0.	240900.	0.	0.	0.	1.0000	240900.	0.
1	1973	0.	125730.	125730.	184734.	91200.	93534.	.7841	98584.	73339.
2	1974	0.	0.	0.	184734.	88200.	96534.	.6148	0.	59349.
3	1975	0.	0.	0.	184734.	88200.	96534.	.4821	0.	46536.
4	1976	0.	0.	0.	184734.	88200.	96534.	.3780	0.	36488.
5	1977	0.	0.	0.	184734.	88200.	96534.	.2964	0.	28610.
6	1978	0.	0.	0.	184734.	88200.	96534.	.2324	0.	22433.
7	1979	0.	0.	0.	184734.	88200.	96534.	.1822	0.	17590.
8	1980	0.	0.	0.	184734.	88200.	96534.	.1429	0.	13792.
9	1981	0.	0.	0.	184734.	88200.	96534.	.1120	0.	10814.
10	1982	79200.	0.	79200.	184734.	88200.	96534.	.0878	6957.	8479.
11	1983	0.	0.	0.	184734.	88200.	96534.	.0689	0.	6649.
12	1984	0.	0.	0.	184734.	88200.	96534.	.0540	0.	5213.
13	1985	0.	0.	0.	184734.	88200.	96534.	.0423	0.	4088.
14	1986	0.	0.	0.	184734.	88200.	96534.	.0332	0.	3205.
15	1987	0.	0.	0.	184734.	88200.	96534.	.0260	0.	2513.
16	1988	0.	0.	0.	184734.	88200.	96534.	.0204	0.	1970.
17	1989	0.	0.	0.	184734.	88200.	96534.	.0160	0.	1545.
18	1990	0.	0.	0.	184734.	88200.	96534.	.0125	0.	1211.
19	1991	0.	0.	0.	184734.	88200.	96534.	.0098	0.	950.
20	1992	-90090.	-125730.	-215820.	0.	0.	0.	.0077	-1665.	0.
	TOTAL	230010.	0.	230010.	3509946.	1678800.	1831146.		344776.	344776.

INTEREST PER CENT	BENEFIT/COST RATIO	PRESENT VALUE IN DOLLARS		
		REVENUE	OUTLAY	BALANCE
15.000	1.670	595731.	356621.	239111.
20.000	1.318	465062.	352837.	112225.
25.000	1.088	378171.	347500.	30671.
30.000	.927	317271.	342225.	-24954.
35.000	.808	272668.	337439.	-64770.
40.000	.717	238788.	333187.	-94399.

** Excluding Depreciation, Interest, and Income Tax

Alternative: (3) All capital outlays and all revenues increased by 10 percent.
All other factors same as for the base case.

Listing of the Program Output for Alternative Number 4

Listing of the Input for Alternative Number 4

A LISTING OF THE DATA

21.00 1.00 2 2 3 6 1 7 2 0 .110000

Budgeted 100,000 Quintal Rice Milling Operation
A. Total Operation

Period	Site and Bldings	Plant Equip.	Average Inventry	Other Wrk Cap	Product Sales	Other Sales	Service Income	Fixed Expense	Varable Expense	Mkting Expense	Current Deprec.	Intrest Expense	Income Tax
SCALERS:	.9000	.9000	.9000	.9000	.9000	.9000	.9000	1.0000	1.0000	1.0000	.0000	.0000	.0000
0 1972	132300.	64800.	0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1 1973	0.	0.	73440.	29430.	106523.	35100.	9523.	58700.	18500.	14000.	0.	0.	0.
2 1974	0.	0.	0.	0.	106523.	35100.	9523.	58700.	18500.	11000.	0.	0.	0.
3 1975	0.	0.	0.	0.	106523.	35100.	9523.	58700.	18500.	11000.	0.	0.	0.
4 1976	0.	0.	0.	0.	106523.	35100.	9523.	58700.	18500.	11000.	0.	0.	0.
5 1977	0.	0.	0.	0.	106523.	35100.	9523.	58700.	18500.	11000.	0.	0.	0.
6 1978	0.	0.	0.	0.	106523.	35100.	9523.	58700.	18500.	11000.	0.	0.	0.
7 1979	0.	0.	0.	0.	106523.	35100.	9523.	58700.	18500.	11000.	0.	0.	0.
8 1980	0.	0.	0.	0.	106523.	35100.	9523.	58700.	18500.	11000.	0.	0.	0.
9 1981	0.	0.	0.	0.	106523.	35100.	9523.	58700.	18500.	11000.	0.	0.	0.
10 1982	0.	64800.	0.	0.	106523.	35100.	9523.	58700.	18500.	11000.	0.	0.	0.
11 1983	0.	0.	0.	0.	106523.	35100.	9523.	58700.	18500.	11000.	0.	0.	0.
12 1984	0.	0.	0.	0.	106523.	35100.	9523.	58700.	18500.	11000.	0.	0.	0.
13 1985	0.	0.	0.	0.	106523.	35100.	9523.	58700.	18500.	11000.	0.	0.	0.
14 1986	0.	0.	0.	0.	106523.	35100.	9523.	58700.	18500.	11000.	0.	0.	0.
15 1987	0.	0.	0.	0.	106523.	35100.	9523.	58700.	18500.	11000.	0.	0.	0.
16 1988	0.	0.	0.	0.	106523.	35100.	9523.	58700.	18500.	11000.	0.	0.	0.
17 1989	0.	0.	0.	0.	106523.	35100.	9523.	58700.	18500.	11000.	0.	0.	0.
18 1990	0.	0.	0.	0.	106523.	35100.	9523.	58700.	18500.	11000.	0.	0.	0.
19 1991	0.	0.	0.	0.	106523.	35100.	9523.	58700.	18500.	11000.	0.	0.	0.
20 1992	-73710.	0.	-73440.	-29430.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SCALE FACTORS APPLIED TO DATA BEGINNING IN PERIOD 0

Listing of the Output for Alternative Number 4

I N V E S T M E N T F E A S I B I L I T Y A N A L Y S I S

Budgeted 100,000 Quintal Rice Milling Operation
A. Total Operation

INTERNAL RETURN ON TOTAL CAPITAL 21.120 PERCENT

PERIOD NO.	PERIOD IDENT.	INVESTMENT (DOLLARS) FACILITIES	WORKING CAPITAL	TOTAL	OPERATING (DOLLARS) TOTAL REVENUE	OPERATING EXPENSES**	NET REVENUE	PRESENT VALUE FACTOR	PRESENT VALUE TOTAL INVESTMENT	NET REVENUE
0	1972	197100.	0.	197100.	0.	0.	0.	1.0000	197100.	0.
1	1973	0.	102870.	102870.	151146.	91200.	59946.	.8256	84932.	49493.
2	1974	0.	0.	0.	151146.	88200.	62946.	.6817	0.	42908.
3	1975	0.	0.	0.	151146.	88200.	62946.	.5628	0.	35426.
4	1976	0.	0.	0.	151146.	88200.	62946.	.4647	0.	29249.
5	1977	0.	0.	0.	151146.	88200.	62946.	.3836	0.	24149.
6	1978	0.	0.	0.	151146.	88200.	62946.	.3167	0.	19938.
7	1979	0.	0.	0.	151146.	88200.	62946.	.2615	0.	16461.
8	1980	0.	0.	0.	151146.	88200.	62946.	.2159	0.	13591.
9	1981	0.	0.	0.	151146.	88200.	62946.	.1783	0.	11221.
10	1982	64800.	0.	64800.	151146.	88200.	62946.	.1472	9537.	9264.
11	1983	0.	0.	0.	151146.	88200.	62946.	.1215	0.	7649.
12	1984	0.	0.	0.	151146.	88200.	62946.	.1003	0.	6315.
13	1985	0.	0.	0.	151146.	88200.	62946.	.0828	0.	5214.
14	1986	0.	0.	0.	151146.	88200.	62946.	.0684	0.	4305.
15	1987	0.	0.	0.	151146.	88200.	62946.	.0565	0.	3554.
16	1988	0.	0	0.	151146.	88200.	62946.	.0466	0.	2934.
17	1989	0.	0.	0.	151146.	88200.	62946.	.0385	0.	2423.
18	1990	0.	0.	0.	151146.	88200.	62946.	.0318	0.	2000.
19	1991	0.	0.	0.	151146.	88200.	62946.	.0262	0.	1651.
20	1992	-73710.	-102870.	-176580.	0.	0.	0.	.0217	-3825.	0.
	TOTAL	188190.	0.	188190.	2871774.	1678800.	1192974.		287745.	287745.

INTEREST PER CENT	BENEFIT/COST RATIO
15.000	1.328
20.000	1.047
25.000	.864
30.000	.736
35.000	.641
40.000	.568

PRESENT VALUE IN DOLLARS REVENUE	OUTLAY	BALANCE
387545.	291781.	95765.
302379.	288685.	13694.
245755.	284318.	-38563.
206077.	280002.	-73925.
177023.	276086.	-99063.
154959.	272608.	-117649.

** Excluding Depreciation, Interest, and Income Tax.

Alternative: (4) All capital outlays and all revenues decreased by 10 percent.
All other factors same as for the base case.

Listing of the Program Output for Alternative Number 5

Listing of the Input for Alternative Number 5

A LISTING OF THE DATA

21.00 1.00 2 2 3 6 1 7 2 0 .110000

Budgeted 100,000 Quintal Rice Milling Operation
A. Total Operation

Period	Site and Bldings	Plant Equip.	Average Invntry	Other Wrk Cap	Product Sales	Other Sales	Service Income	Fixed Expense	Varable Expense	Mkting Expense	Current Deprec.	Intrest Expense	Income Tax
SCALERS:	1.0000	1.1500	1.0000	1.0000	1.0510	.9292	1.0000	1.0000	1.0000	1.0000	.0000	.0000	.0000
0 1972	147000.	82800.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1 1973	0.	0.	81600.	32700.	124395.	36239.	10581.	58700.	18500.	14000.	0.	0.	0.
2 1974	0.	0.	0.	0.	124395.	36239.	10581.	58700.	18500.	11000.	0.	0.	0.
3 1975	0.	0.	0.	0	124395.	36239.	10581.	58700.	18500.	11000.	0.	0.	0.
4 1976	0.	0.	0.	0.	124395.	36239.	10581.	58700.	18500.	11000.	0.	0.	0.
5 1977	0.	0.	0.	0.	124395.	36239.	10581.	58700.	18500.	11000.	0.	0.	0.
6 1978	0.	0.	0.	0.	124395.	36239.	10581.	58700.	18500.	11000.	0.	0.	0.
7 1979	0.	0.	0.	0.	124395.	36239.	10581.	58700.	18500.	11000.	0.	0.	0.
8 1980	0.	0.	0.	0.	124395.	36239.	10581.	58700.	18500.	11000.	0.	0.	0.
9 1981	0.	0.	0.	0.	124395.	36239.	10581.	58700.	18500.	11000.	0.	0.	0.
10 1982	0.	82800.	0.	0.	124395.	36239.	10581.	58700.	18500.	11000.	0.	0.	0.
11 1983	0.	0.	0.	0.	124395.	36239.	10581.	58700.	18500.	11000.	0.	0.	0.
12 1984	0.	0.	0.	0.	124395.	36239.	10581.	58700.	18500.	11000.	0.	0.	0.
13 1985	0.	0.	0.	0.	124395.	36239.	10581.	58700.	18500.	11000.	0.	0.	0.
14 1986	0.	0.	0.	0.	124395.	36239.	10581.	58700.	18500.	11000.	0.	0.	0.
15 1987	0.	0.	0.	0.	124395.	36239.	10581.	58700.	18500.	11000.	0.	0.	0.
16 1988	0.	0.	0.	0.	124395.	36239.	10581.	58700.	18500.	11000.	0.	0.	0.
17 1989	0.	0.	0.	0.	124395.	36239.	10581.	58700.	18500.	11000.	0.	0.	0.
18 1990	0.	0.	0.	0.	124395.	36239.	10581.	58700.	18500.	11000.	0.	0.	0.
19 1991	0.	0.	0.	0.	124395.	36239.	10581.	58700.	18500.	11000.	0.	0.	0.
20 1992	-81900.	0.	-81600.	-32700.	0.	0.	0.	0.	0.	0.	0	0.	0.

SCALE FACTORS APPLIED TO DATA BEGINNING IN PERIOD 0

Listing of the Output for Alternative Number 5

I N V E S T M E N T F E A S I B I L I T Y A N A L Y S I S

Budgeted 100,000 Quintal Rice Milling Operation
A. Total Operation

INTERNAL RETURN ON TOTAL CAPITAL 24.737 PERCENT

PERIOD NO.	PERIOD IDENT.	INVESTMENT (DOLLARS) FACILITIES	WORKING CAPITAL	TOTAL	OPERATING (DOLLARS) TOTAL REVENUE	OPERATING EXPENSES**	NET REVENUE	PRESENT VALUE FACTOR	PRESENT VALUE TOTAL INVESTMENT	NET REVENUE
0	1972	229800.	0.	229800.	0.	0.	0.	1.0000	229800.	0.
1	1973	0.	114300.	114300.	171215.	91200.	80015.	.8017	91633.	64147.
2	1974	0.	0.	0.	171215.	88200.	83015.	.6427	0.	53354.
3	1975	0.	0.	0.	171215.	88200.	83015.	.5152	0.	42773.
4	1976	0.	0.	0.	171215.	88200.	83015.	.4131	0.	34291.
5	1977	0.	0.	0.	171215.	88200.	83015.	.3312	0.	27491.
6	1978	0.	0.	0.	171215.	88200.	83015.	.2655	0.	22039.
7	1979	0.	0.	0.	171215.	88200.	83015.	.2128	0.	17668.
8	1980	0.	0.	0.	171215.	88200.	83015.	.1706	0.	14164.
9	1981	0.	0.	0.	171215.	88200.	83015.	.1368	0.	11355.
10	1982	82800.	0.	82800.	171215.	88200.	83015.	.1097	9080.	91[illegible].
11	1983	0.	0.	0.	171215.	88200.	83015.	.0879	0.	7298.
12	1984	0.	0.	0.	171215.	88200.	83015.	.0705	0.	5851.
13	1985	0.	0.	0.	171215.	88200.	83015.	.0565	0.	4691.
14	1986	0.	0.	0.	171215.	88200.	83015.	.0453	0.	3760.
15	1987	0.	0.	0.	171215.	88200.	83015.	.0363	0.	3015.
16	1988	0.	0.	0.	171215.	88200.	83015.	.0291	0.	2417.
17	1989	0.	0.	0.	171215.	88200.	83015.	.0233	0.	1938.
18	1990	0.	0.	0.	171215.	88200.	83015.	.0187	0.	1553.
19	1991	0.	0.	0.	171215.	88200.	83015.	.0150	0.	1245.
20	1992	-81900.	-114300.	-196200.	0.	0.	0.	.0120	-2359.	0.
	TOTAL	230700.	0.	230700.	3253087.	1678800.	1574287.		328153.	328153.

INTEREST PER CENT	BENEFIT/COST RATIO	PRESENT VALUE IN DOLLARS REVENUE	OUTLAY	BALANCE
15.000	1.516	511938.	337670.	174268.
20.000	1.199	399583.	333305.	66278.
25.000	.991	324875.	327869.	-2994.
30.000	.844	272517.	322697.	-50180.
35.000	.736	234172.	316099.	-63928.
40.000	.653	205048.	314071.	-109023.

** Excluding Depreciation, Interest, and Income Tax

Alternative: (5) Outlay for equipment increased by 15 percent; milled rice sales increased by 5.1 percent; Byproduct sales decreased by 7.08 percent. All other factors same as for the base case.

Listing of the Program Output for Alternative Number 6

Listing of the Input for Alternative Number 6

A LISTING OF THE DATA

21.00 1.00 2 2 3 6 1 7 2 0 .110000

Budgeted 100,000 Quintal Rice Milling Operation
A. Total Operation

Period	Site and Bldings	Plant Equip.	Average Invntry	Other Wrk Cap	Product Sales	Other Sales	Service Income	Fixed Expense	Varable Expense	Mkting Expense	Current Deprec.	Intrest Expense	Income Tax
SCALERS:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0650	1.0000	1.0000	.0000	.0000	.0000
0 1972	147000.	72000.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1 1973	0.	0.	81600.	32700.	118359.	39000.	10581.	62516.	18500.	14000.	0.	0.	0.
2 1974	0.	0.	0.	0.	118359.	39000.	10581.	62516.	18500.	11000.	0.	0.	0.
3 1975	0.	0.	0.	0.	118359.	39000.	10581.	62516.	18500.	11000.	0.	0.	0.
4 1976	0.	0.	0.	0.	118359.	39000.	10581.	62516.	18500.	11000.	0.	0.	0.
5 1977	0.	0.	0.	0.	118359.	39000.	10581.	62516.	18500.	11000.	0.	0.	0.
6 1978	0.	0.	0.	0.	118359.	39000.	10581.	62516.	18500.	11000.	0.	0.	0.
7 1979	0.	0.	0.	0.	118359.	39000.	10581.	62516.	18500.	11000.	0.	0.	0.
8 1980	0.	0.	0.	0.	118359.	39000.	10581.	62516.	18500.	11000.	0.	0.	0.
9 1981	0.	0.	0.	0.	118359.	39000.	10581.	62516.	18500.	11000.	0.	0.	0.
10 1982	0.	72000.	0.	0.	118359.	39000.	10581.	62516.	18500.	11000.	0.	0.	0.
11 1983	0.	0.	0.	0.	118359.	39000.	10581.	62516.	18500.	11000.	0.	0.	0.
12 1984	0.	0.	0.	0.	118359.	39000.	10581.	62516.	18500.	11000.	0.	0.	0.
13 1985	0.	0.	0.	0.	118359.	39000.	10581.	62516.	18500.	11000.	0.	0.	0.
14 1986	0.	0.	0.	0.	118359.	39000.	10581.	62516.	18500.	11000.	0.	0.	0.
15 1987	0.	0.	0.	0.	118359.	39000.	10581.	62516.	18500.	11000.	0.	0.	0.
16 1988	0.	0.	0.	0.	118359.	39000.	10581.	62516.	18500.	11000.	0.	0.	0.
17 1989	0.	0.	0.	0.	118359.	39000.	10581.	62516.	18500.	11000.	0.	0.	0.
18 1990	0.	0.	0.	0.	118359.	39000.	10581.	62516.	18500.	11000.	0.	0.	0.
19 1991	0.	0.	0.	0.	118359.	39000.	10581.	62516.	18500.	11000.	0.	0.	0.
20 1992	-81900.	0.	-81600.	-32700.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SCALE FACTORS APPLIED TO DATA BEGINNING IN PERIOD 0

Listing of the Output for Alternative Number 6

I N V E S T M E N T F E A S I B I L I T Y A N A L Y S I S

Budgeted 100,000 Quintal Rice Milling Operation
A. Total Operation

INTERNAL RETURN ON TOTAL CAPITAL 23.278 PERCENT

PERIOD NO.	PERIOD IDENT.	INVESTMENT (DOLLARS) FACILITIES	WORKING CAPITAL	TOTAL	OPERATING (DOLLARS) TOTAL REVENUE	OPERATING EXPENSES**	NET REVENUE	PRESENT VALUE FACTOR	PRESENT VALUE TOTAL INVESTMENT	NET REVENUE
0	1972	219000.	0.	219000.	0.	0.	0.	1.0000	219000.	0.
1	1973	0.	114300.	114300.	167940.	95016.	72925.	.8112	92717.	59155.
2	1974	0.	0.	0.	167940.	92016.	75925.	.6580	0.	49959.
3	1975	0.	0.	0.	167940.	92016.	75925.	.5338	0.	40525.
4	1976	0.	0.	0.	167940.	92016.	75925.	.4330	0.	32873.
5	1977	0.	0.	0.	167940.	92016.	75925.	.3512	0.	26666.
6	1978	0.	0.	0.	167940.	92016.	75925.	.2849	0.	21631.
7	1979	0.	0.	0.	167940.	92016.	75925.	.2311	0.	17546.
8	1980	0.	0.	0.	167940.	92016.	75925.	.1875	0.	14233.
9	1981	0.	0.	0.	167940.	92016.	75925.	.1521	0.	11546.
10	1982	72000.	0.	72000.	167940.	92016.	75925.	.1234	8881.	9365.
11	1983	0.	0.	0.	167940.	92016.	75925.	.1001	0.	7597.
12	1984	0.	0.	0.	167940.	92016.	75925.	.0812	0.	6163.
13	1985	0.	0.	0.	167940.	92016.	75925.	.0658	0.	4999.
14	1986	0.	0.	0.	167940.	92016.	75925.	.0534	0.	4055.
15	1987	0.	0.	0.	167940.	92016.	75925.	.0433	0.	3289.
16	1988	0.	0.	0.	167940	92016.	75925.	.0351	0.	2668.
17	1989	0.	0.	0.	167940.	92016.	75925.	.0285	0.	2164.
18	1990	0.	0.	0.	167940.	92016.	75925.	.0231	0.	1756.
19	1991	0.	0.	0.	167940.	92016.	75925.	.0188	0.	1424.
20	1992	-81900.	-114300.	-196200.	0.	0.	0.	.0152	-2985.	0.
	TOTAL	209100.	0.	209100.	3190860.	1751295.	1439566.		317613.	317613.

INTEREST PER CENT	BENEFIT/COST RATIO
15.000	1.444
20.000	1.139
25.000	.940
30.000	.800
35.000	.698
40.000	.619

PRESENT VALUE IN DOLLARS REVENUE	OUTLAY	BALANCE
467989.	324201.	143788.
365240.	320761.	44479.
296921.	315909.	-18988.
249043.	311113.	-62071.
213981.	306762.	-92782.
187351.	302898.	-115547.

** Excluding Depreciation, Interest, and Income Tax.

Alternative: (6) Variable expense increased by 6.5 percent to reflect rising fuel prices. All other factors same as base case.

Listing of the Program Output for Alternative Number 7

Listing of the Input for Alternative Number 7

A LISTING OF THE DATA

21.00 1.00 2 2 2 6 1 7 2 0 .110000

Budgeted 100,000 Quintal Rice Milling Operation
A. Total Operation

Period	Site and Bldings	Plant Equip.	Average Invntry	Other Wrk Cap	Product Sales	Other Sales	Service Income	Fixed Expense	Varable Expense	Mkting Experse	Current Deprec.	Intrest Expense	Income Tax
SCALERS:	1.1000	1.2650	1.1000	1.1000	1.1560	1.0220	1.1000	1.0650	1.0000	1.0000	.0000	.0000	.0000
0 1972	161700.	91080.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
1 1973	0.	0.	89760.	35970.	136823.	39858.	11639.	62516.	18500.	14000.	0.	0.	0.
2 1974	0.	0.	0.	0.	136823.	39858.	11639.	62516.	18500.	11000.	0.	0.	0.
3 1975	0.	0.	0.	0.	136823.	39858.	11639.	62516.	18500.	11000.	0.	0.	0.
4 1976	0.	0.	0.	0.	136823.	39858.	11639.	62516.	18500.	11000.	0.	0.	0.
5 1977	0.	0.	0.	0.	136823.	39858.	11639.	62516.	18500.	11000.	0.	0.	0.
6 1978	0.	0.	0.	0.	136823.	39858.	11639.	62516.	18500.	11000.	0.	0.	0.
7 1979	0.	0.	0.	0.	136823.	39858.	11639.	62516.	18500.	11000.	0.	0.	0.
8 1980	0.	0.	0.	0.	136823.	39858.	11639.	62516.	18500.	11000.	0.	0.	0.
9 1981	0.	0.	0.	0.	136823.	39858.	11639.	62516.	18500.	11000.	0.	0.	0.
10 1982	0.	91080.	0.	0.	136823.	39858.	11639.	62516.	18500.	11000.	0.	0.	0.
11 1983	0.	0.	0.	0.	136823.	39858.	11639.	62516.	18500.	11000.	0.	0.	0.
12 1984	0.	0.	0.	0.	136823.	39858.	11639.	62516.	18500.	11000.	0.	0.	0.
13 1985	0.	0.	0.	0.	136823.	39858.	11639.	62516.	18500.	11000.	0.	0.	0.
14 1986	0.	0.	0.	0.	136823.	39858.	11639.	62516.	18500.	11000.	0.	0.	0.
15 1987	0.	0.	0.	0.	136823.	39858.	11639.	62516.	18500.	11000.	0.	0.	0.
16 1988	0.	0.	0.	0.	136823.	39858.	11639.	62516.	18500.	11000.	0.	0.	0.
17 1989	0.	0.	0.	0.	136823.	39858.	11639.	62516.	18500.	11000.	0.	0.	0.
18 1990	0.	0.	0.	0.	136823.	39858.	11639.	62516.	18500.	11000.	0.	0.	0.
19 1991	0.	0.	0.	0.	136823.	39858.	11639.	62516.	18500.	11000.	0.	0.	0.
20 1992	-90090.	0.	-89760.	-35970.	0.	0.	0.	0.	0.	0.	0.	0.	0.

SCALE FACTORS APPLIED TO DATA BEGINNING IN PERIOD 0

Listing of the Output for Alternative Number 7

I N V E S T M E N T F E A S I B I L I T Y A N A L Y S I S

Budgeted 100,000 Quintal Rice Milling Operation
A. Total Operation

INTERNAL RETURN ON TOTAL CAPITAL 26.329 PERCENT

PERIOD NO.	PERIOD IDENT.	INVESTMENT (DOLLARS) FACILITIES	WORKING CAPITAL	TOTAL	OPERATING (DOLLARS) TOTAL REVENUE	OPERATING EXPENSES**	NET REVENUE	PRESENT VALUE FACTOR	PRESENT VALUE TOTAL INVESTMENT	NET REVENUE
0	1972	252780.	0.	252780.	0.	0.	0.	1.0000	252780.	0.
1	1973	0.	125730.	125730.	188320.	95016.	93305.	.7916	99526.	73859.
2	1974	0.	0.	0.	188320.	92016.	96305.	.6266	0.	60345.
3	1975	0.	0.	0.	188320.	92016.	96305.	.4960	0.	47768.
4	1976	0.	0.	0.	188320.	92016.	96305.	.3926	0.	37813.
5	1977	0.	0.	0.	188320.	92016.	96305.	.3108	0.	29932.
6	1978	0.	0.	0.	188320.	92016.	96305.	.2460	0.	23694.
7	1979	0.	0.	0.	188320.	92016.	96305.	.1948	0.	18756.
8	1980	0.	0.	0.	188320.	92016.	96305.	.1542	0.	14847.
9	1981	0.	0.	0.	188320.	92016.	96305.	.1220	0.	11752.
10	1982	91080.	0.	91080.	188320.	92016.	96305.	.0966	8798.	9303.
11	1983	0.	0.	0.	188320.	92016.	96305.	.0765	0.	7364.
12	1984	0.	0.	0.	188320.	92016.	96305.	.0605	0.	5829.
13	1985	0.	0.	0.	188320.	92016.	96305.	.0479	0.	4614.
14	1986	0.	0.	0.	188320.	92016.	96305.	.0379	0.	3653.
15	1987	0.	0.	0.	188320.	92016.	96305.	.0300	0.	2891.
16	1988	0.	0.	0.	188320.	92016.	96305.	.0238	0.	2289.
17	1989	0.	0.	0.	188320.	92016.	96305.	.0188	0.	1812.
18	1990	0.	0.	0.	188320.	92016.	96305.	.0149	0.	1434.
19	1991	0.	0.	0.	188320.	92016.	96305.	.0118	0.	1135.
20	1992	-90090.	-125730.	-215820.	0.	0.	0.	.0093	-2014.	0.
	TOTAL	253770.	0.	253770.	3578082.	1751295.	1826787.		359090.	359090.

INTEREST PER CENT	BENEFIT/COST RATIO	PRESENT VALUE IN DOLLARS REVENUE	OUTLAY	BALANCE
15.000	1.600	594310.	371437.	222872.
20.000	1.265	463951.	366635.	97315.
25.000	1.046	377267.	360655.	16611.
30.000	.892	316512.	354967.	-38455.
35.000	.777	272015.	349909.	-77894.
40.000	.690	238216.	345478.	-107262.

** Excluding Depreciation, Interest, and Income Tax.

Alternative: (7) Combination of alternatives (3), (5) and (6).
Scaler factors calculated by multiplication.

Listing of the NEWDATA.IRR File for Alternative Number 7 Created in the Run

0	1972	161700.	91080.	0	0.	0.	0.	0.	0.
1	1973	0.	0.	89760.	35970.	136823.	39858.	11639.	62516.
2	1974	0.	0.	0.	0.	136823.	39858.	11639.	62516.
3	1975	0.	0.	0.	0.	136823.	39858.	11639.	62516.
4	1976	0.	0.	0.	0.	136823.	39858.	11639.	62516.
5	1977	0.	0.	0.	0.	136823.	39858.	11639.	62516.
6	1978	0.	0.	0.	0.	136823.	39858.	11639.	62516.
7	1979	0.	0	0.	0.	136823.	39858.	11639.	62516.
8	1980	0.	0.	0.	0	136823.	39858.	11639.	62516.
9	1981	0.	0.	0.	0.	136823.	39858.	11639.	62516.
10	1982	0.	91080.	0.	0.	136823.	39858.	11639.	62516.
11	1983	0.	0.	0.	0.	136823.	39858.	11639.	62516.
12	1984	0.	0.	0.	0.	136823.	39858.	11639.	62516.
13	1985	0.	0.	0.	0.	136823.	39858.	11639.	62516.
14	1986	0.	0.	0.	0.	136823.	39858.	11639.	62516.
15	1987	0.	0.	0.	0.	136823.	39858.	11639.	62516.
16	1988	0.	0.	0.	0.	136823.	39858.	11639.	62516.
17	1989	0.	0.	0.	0.	136823.	39858.	11639.	62516.
18	1990	0.	0.	0.	0.	136823.	39858.	11639.	62516.
19	1991	0.	0.	0.	0.	136823.	39858.	11639.	62516.
20	1992	-90090.	0.	-89760.	-35970.	0.	0.	0.	0.
0	1972	0.	0.	0.	0.	0.			
1	1973	18500.	14000.	0.	0.	0.			
2	1974	18500.	11000.	0.	0.	0.			
3	1975	18500.	11000.	0.	0.	0.			
4	1976	18500.	11000.	0.	0.	0.			
5	1977	18500.	11000.	0.	0.	0.			
6	1978	18500.	11000	0.	0.	0.			
7	1979	18500.	11000.	0.	0.	0.			
8	1980	18500.	11000.	0.	0.	0.			
9	1981	18500.	11000.	0.	0.	0.			
10	1982	18500.	11000.	0.	0.	0.			
11	1983	18500.	11000.	0.	0.	0.			
12	1984	18500.	11000.	0.	0.	0.			
13	1985	18500.	11000.	0.	0.	0.			
14	1986	18500.	11000.	0.	0.	0.			
15	1987	18500.	11000.	0.	0.	0.			
16	1988	18500.	11000.	0.	0.	0.			
17	1989	18500.	11000.	0.	0.	0.			
18	1990	18500.	11000.	0.	0.	0.			
19	1991	18500.	11000.	0.	0.	0.			
20	1992	0.	0.	0.	0.	0.			

SECTION XIII

CONCEPT OF FINANCIAL RATE OF RETURN ANALYSIS

After a feasible development project or program has been planned, tested and refined, and Proforma financial analysis completed, the Feasibility Analysis Pro-gram is used to measure the financial soundness of the project as planned. This is done by rerunning the selected case with the Feasibility Analysis Program, using the information obtained from the Proforma Financial Analysis Program and requesting the Financial Rate of Return calculation (see Page 51, above). In the FRR computations, I in the Rate of Return algorithm represents Equity Capital (rather than total Capital Assets) and B represents Net Profit after interest, depreciation and income tax.

Proforma financial analysis provides the basis for input data to compute FRR for any project. The input data file for FRR analysis is created by user command in the companion PROFORM3.EXE Program. In such file the budgeted cash flow in equity capital accounts has been substituted for the facility and working capital values in the input for IRR analysis. Additional expense columns have been added for depreciation, interest, and income tax, respectively, as computed in the Proforma analysis.

PROFORM1.EXE places the additional expense data period by period for depreciation, interest and income tax in columns 11, 12 and 13, respectively. If one or more of these columns contained other cost data in the user's IRR input file, such data would have been added by the Program to the costs in column 10 of the original data file. PROFORM3.EXE replaces the facility and working capital in the original input file with equity capital data without explicit direction from the user. Paid-In Equity is placed in column 1; column 2 is left blank; earned reserve capital is placed in column 3, and earned surplus capital in column 4. Remaining columns in the original input file are left unchanged. In preparing the column header files to be read by the Feasibility Analysis Program, the user modifies the headers used for the IRR run to fit that for the FRR (compare the header file on Page 101 to that on Page 53).

Two examples are included in the Manual to illustrate Financial Rate of Return Analysis. The first is FRRINPUT.ONE and the second is FRRINPUT.FSH, corresponding to the DATA.ONE and DATA.FSH cases, respectively.

SECTION XIV

FRR CASE ONE BUDGETED 100,000 QUINTAL RICE MILLING OPERATION IN PANAMA

Description of the Case

FRRDATA.ONE: 20 Periods X 13 Columns of Projected Annual Financial Cash Flow for the FRR Analysis

The FRRDATA.ONE Case was selected to introduce the user to financial rate of return analysis because of its relative simplicity, and at the same time its illustration of the many features which the program can address. It is not presented to represent in any way an optimum financial plan; rather the intention is to illustrate how to use the program and interpret the results.

It is not the purpose in this manual to address directly the methodology for developing the financial and tax accounts upon which the input for financial analysis is based Suffice it to say that a series of analytical runs with the companion Proforma Financial Analysis Program were completed prior to conducting Financial Rate of Return analysis. For our purpose here we take this information and the accompanying FRR input file as given.

With respect to the financial rate of return analysis, relevant features of the case include the following:

1. Estimates are annual figures in US Dollars, with projections in real terms over an economic horizon of 25 years.
2. The mill buildings are financed up to 60 percent of cost with 16-year, 9.5 percent interest, level-payment mortgage financing.
3. Equipment is financed up to 70 percent of cost by 4-year, 9 percent interest level-payment loans.
4. Current assets are financed up to 50 percent with short-term working capital loans at 8.5 percent interest.
5. Bonds and securities (13-year, 10.5 percent interest) are issued up to 15 percent of the value of total fixed assets.
6. Annual income tax rate schedules are taken at 20 percent to $5,000 taxable income, 30 percent to $10,000, and 35 percent over $10,000. U. S. Internal Revenue Service accounting and reporting rules are followed.
7. All of the financial and tax parameters are user-specified for the Proforma Financial Analysis, and the results carried forward to the FRR file.
8. In addition to the Financial Rate of Return (FRR), Financial Ratios and Net Present Values (NPVs) are to be computed at alternative annual compound discount rates of 15, 20, 25, 30, 35 and 40 percent, respectively.
9. FRRDATA.ONE represents the base case only; sensitivity analysis of alternatives is not meaningful in FRR analysis, and could be misleading. Analysis of financial alternatives should be conducted with the companion Proforma Financial Analysis Program instead.

Listing of Input Information and Data File

Listing of the Headers File for the FRR Data.One Case [1]

```
      DOLLARS     1.      0      1
 .11000.15000.20000.25000.30000.35000.40000
   25.0      2      2      3      6      6      0      0

            Budgeted 100,000 Qunital Rice Milling Operation
                          A. Total Operation
        Paid-In                Capital  Capital  Product   Other   Service    Fixed
 Varable   Mkting  Current    Intrest  Income
 Period   Equity              Reserve  Surplus   Sales     Sales   Income   Expense
 Expense  Expense  Deprec.    Expense     Tax
Base case for 100,000 rice milling operation

Proforma analysis based on income tax rate of 35 percent
```

Listing of the FRR Data.One Input File

1	81600.	0.	0.	0.	0.	0.	0.	0.
2	0.	0.	6059.	29084.	118359.	39000.	10581.	58700.
3	0.	0.	3730.	17903.	118359.	39000.	10581.	58700.
4	0.	0.	3992.	0.	118359.	39000.	10581.	58700.
5	2859.	0.	5661.	0.	118359.	39000.	10581.	58700.
6	0.	0.	5769.	0.	118359.	39000.	10581.	58700.
7	0.	0.	4671.	0.	118359.	39000.	10581.	58700.
8	0.	0.	4339.	0.	118359.	39000.	10581.	58700.
9	0.	0.	4555.	0.	118359.	39000.	10581.	58700.
10	0.	0.	6056.	0.	118359.	39000.	10581.	58700.
11	14926.	0.	6252.	0.	118359.	39000.	10581.	58700.
12	0.	0.	4649.	0.	118359.	39000.	10581.	58700.
13	0.	0.	4390.	0.	118359.	39000.	10581.	58700.
14	0.	0.	4560.	0.	118359.	39000.	10581.	58700.
15	13042.	0.	0.	0.	118359.	39000.	10581.	58700.
16	7749.	0.	6554.	0.	118359.	39000.	10581.	58700.
17	2164.	0.	0.	0.	118359.	39000.	10581.	58700.
18	0.	0.	0.	0.	118359.	39000.	10581.	58700.
19	0.	0.	0.	0.	118359.	39000.	10581.	58700.
20	3096.	0.	1.	0.	118359.	39000.	10581.	58700.
21	13597.	0.	7017.	0.	118359.	39000.	10581.	58700.
22	0.	0.	0.	0.	118359.	39000.	10581.	58700.
23	0.	0.	0.	0.	118359.	39000.	10581.	58700.
24	0.	0.	0.	0.	118359.	39000.	10581.	58700.
25	-139033.	0.	-78255.	-46987.	0.	0.	0.	0.
1	0.	0.	0.	0.	0.			
2	18500.	14000.	23924.	12801.	19905.			
3	18500.	11000.	28106.	15223.	11544.			
4	18500.	11000.	26782.	13857.	12485.			
5	18500.	11000.	11142.	12383.	18475.			
6	18500.	11000.	11230.	11188.	18863.			
7	18500.	11000.	20413.	13262.	14923.			
8	18500.	11000.	24865.	12223.	13728.			
9	18500.	11000.	23779.	11089.	14505.			
10	18500.	11000.	9204.	10265.	19895.			
11	18500.	11000.	8508.	8950.	20599.			
12	18500.	11000.	21101.	12802.	14843.			
13	18500.	11000.	25348.	11214.	13912.			
14	18500.	11000.	24938.	9877.	14524.			
15	18500.	11000.	9233.	8001.	20677.			
16	18500.	11000.	8408.	5953.	21683.			
17	18500.	11000.	17655.	7461.	17918.			
18	18500.	11000.	23020.	6218.	16476.			

[1] See page 60 for identification of items in the HEADERS file.

19	18500.	11000.	21871.	5499.	17130.
20	18500.	11000.	6382.	4715.	22825.
21	18500.	11000.	5749.	3860.	23346.
22	18500.	11000.	19257.	8631.	16948.
23	18500.	11000.	23673.	7632.	15752.
24	18500.	11000.	22582.	6526.	16521.
25	0.	0.	0.	0.	0.

Listing of the Program Output for the Case

Listing of the Factors Used in the Run

LISTING OF FACTORS CONCERNING THIS RUN:

Unit of Measure for Output Is DOLLARS

Number of Times Discounted per Year = 1.0

"Sunken Investment" Option IS NOT Being Used

Benefit-Costs Computed at Annual Discount Rates of:

.15000 .20000 .25000 .30000 .35000 .40000

Listing of the Input Data for the Case

A LISTING OF THE DATA

25.00 1.00 2 2 3 6 6 0 2 0 .110000

Budgeted 100,000 Qunital Rice Milling Operation

A. Total Operation

Period	Paid-In Equity		Capital Reserve	Capital Surplus	Product Sales	Other Sales	Service Income	Fixed Expense	Variable Expense	Mkting Expense	Current Deprec.	Intrest Expense	Income Tax
1	81600.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	0.	0.	6059.	29084.	118359.	39000.	10581.	58700.	18500.	14000.	23924.	12801.	19905.
3	0.	0.	3730.	17903.	118359.	39000.	10581.	58700.	18500.	11000.	28106.	15223.	11544.
4	0.	0.	3992.	0.	118359.	39000.	10581.	58700.	18500.	11000.	26782.	13857.	12485.
5	2859.	0.	5661.	0.	118359.	39000.	10581.	58700.	18500.	11000.	11142.	12383.	18475.
6	0.	0.	5769.	0.	118359.	39000.	10581.	58700.	18500.	11000.	11230.	11188.	18863.
7	0.	0.	4671.	0.	118359.	39000.	10581.	58700.	18500.	11000.	20413.	13262.	14923.
8	0.	0.	4339.	0.	118359.	39000.	10581.	58700.	18500.	11000.	24865.	12223.	13728.
9	0.	0.	4555.	0.	118359.	39000.	10581.	58700.	18500.	11000.	23779.	11089.	14505.
10	0.	0.	6056.	0.	118359.	39000.	10581.	58700.	18500.	11000.	9204.	10265.	19895.
11	14926.	0.	6252.	0.	118359.	39000.	10581.	58700.	18500.	11000.	8508.	8950.	20599.
12	0.	0.	4649.	0.	118359.	39000.	10581.	58700.	18500.	11000.	21101.	12802.	14843.
13	0.	0.	4390.	0.	118359.	39000.	10581.	58700.	18500.	11000.	25348.	11214.	13912.
14	0.	0.	4560.	0.	118359.	39000.	10581.	58700.	18500.	11000.	24938.	9877.	14524.
15	13042.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	9233.	8001.	20677.
16	7749.	0.	6554.	0.	118359.	39000.	10581.	58700.	18500.	11000.	8408.	5953.	21683.
17	2164.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	17655.	7461.	17918.
18	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	23020.	6218.	16476.
19	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	21871.	5499.	17130.
20	3096.	0.	1.	0.	118359.	39000.	10581.	58700.	18500.	11000.	6382.	4715.	22825.
21	13597.	0.	7017.	0.	118359.	39000.	10581.	58700.	18500.	11000.	5749.	3860.	23346.
22	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	19257.	8631.	16948.
23	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	23673.	7632.	15752.
24	0.	0.	0.	0.	118359.	39000.	10581.	58700.	18500.	11000.	22582.	6526.	16521.
25	-139033.	0.	-78255.	-46987.	0.	0.	0.	0.	0.	0.	0.	0.	0.

Listing of the FRR Program Output for the Case

I N V E S T M E N T F E A S I B I L I T Y A N A L Y S I S

Budgeted 100,000 Qunital Rice Milling Operation
A. Total Operation

FINANCIAL RETURN ON EQUITY CAPITAL 20.778 PERCENT

PERIOD NO.	IDENT.	EQUITY CAPITAL (DOLLARS) PAID IN	FROM EARNINGS	TOTAL	PROFIT AND LOSS (DOLLARS) TOTAL INCOME	OPERATING COST	NET PROFIT	PRESENT VALUE FACTOR	PRESENT VALUES TOTAL EQUITY	NET PROFIT
1		81600.	0.	81600.	0.	0.	0.	1.0000	81600.	0.
2		0.	35143.	35143.	167940.	147830.	20110.	.8280	29097.	16650.
3		0.	21633.	21633.	167940.	143073.	24867.	.6855	14830.	17047.
4		0.	3992.	3992.	167940.	141324.	26616.	.5676	2266.	15107.
5		2859.	5661.	8520.	167940.	130200.	37740.	.4699	4004.	17736.
6		0.	5769.	5769.	167940.	129481.	38459.	.3891	2245.	14964.
7		0.	4671.	4671.	167940.	136798.	31142.	.3222	1505.	10033.
8		0.	4339.	4339.	167940.	139016.	28924.	.2667	1157.	7715.
9		0.	4555.	4555.	167940.	137573.	30367.	.2209	1006.	6707.
10		0.	6056.	6056.	167940.	127564.	40376.	.1829	1107.	7383.
11		14926.	6252.	21178.	167940.	126257.	41683.	.1514	3206.	6311.
12		0.	4649.	4649.	167940.	136946.	30994.	.1254	583.	3685.
13		0.	4390.	4390.	167940.	138674.	29266.	.1038	456.	3037.
14		0.	4560.	4560.	167940.	137539.	30401.	.0859	392.	2612.
15		13042.	0.	13042.	167940.	126111.	41829.	.0711	928.	2976.
16		7749.	6554.	14303.	167940.	124244.	43696.	.0589	843.	2574.
17		2164.	0.	2164.	167940.	131234.	36706.	.0488	106.	1790.
18		0.	0.	0.	167940.	133914.	34026.	.0404	0.	1374.
19		0.	0.	0.	167940.	132700.	35240.	.0334	0.	1178
20		3096.	1.	3097.	167940.	122122.	45818.	.0277	86.	1268.
21		13597.	7017.	20614.	167940.	121155.	46785.	.0229	473.	1072.
22		0.	0.	0.	167940.	133036.	34904.	.0190	0.	662.
23		0.	0.	0.	167940.	135257.	32683.	.0157	0.	514.
24		0.	0.	0.	167940.	133829.	34111.	.0130	0.	444.
25		-139033.	-125242.	-264275.	0.	0.	0.	.0108	-2847.	0.
	TOTAL	0.	0.	0.	3862620.	3065877.	796743.		143041.	143041.

INTEREST PER CENT	PROFITABILITY RATIO	PRESENT VALUE IN DOLLARS NET PROFIT	EQUITY	BALANCE
15.000	1.334	199634.	149615.	50019.
20.000	1.035	148959.	143991.	4968.
25.000	.847	117030.	138093.	-21063.
30.000	.718	95533.	132997.	-37464.
35.000	.623	80263.	128771.	-48508.
40.000	.550	68941.	125267.	-56326.

Alternative: Base case for 100,000 rice milling operation.
Proforma analysis based on income tax rate of 35 percent.

SECTION XV

FRR CATFISH CASE: LEAN BEEF CATFISH OPERATION

Description of the Case

FRRDATA.FSH: 44 Periods X 13 Columns of Projected Quarterly Financial Cash Flow for the Analysis

The FRRDATA.FSH Case was selected to introduce the user to financial rate of return analysis because of its quarterly cash flow, and at the same time its illustration of many features which the program can address. It is not presented to represent in any way an optimum financial plan; rather the intention is to illustrate how to use the program and interpret the results.

It is not the purpose in this manual to address directly the methodology for developing the financial and tax accounts upon which the input for financial analysis is based. Suffice it to say that a series of analytical runs with the companion Proforma Financial Analysis Program were completed prior to conducting Financial Rate of Return analysis. For our purpose here we take this information and the accompanying FRR input file as given.

With respect to the financial rate of return analysis, relevant features of the case include the following:

1. Estimates are quarterly figures in $1,000, with projections in real terms over an economic horizon of 11.25 years.
2. The production facilities are financed up to 60 percent of cost with 12-year, 9.0 percent interest, level-payment mortgage financing.
3. Equipment is financed up to 80 percent of cost by 6-year, 8.8 percent interest intermediate-term loans.
4. Current assets are financed up to 60 percent with short-term working capital loans at 8.5 percent interest.
5. Bonds and securities (10-year, 10.5 percent interest) are issued up to 11 percent of the value of total fixed assets.
6. Annual income tax rate schedules are taken at 20 percent to $30,000 taxable income, 28 percent to $100,000, and 35 percent over $100,000.
7. All of the financial and tax parameters are user-specified for the Proforma Financial Analysis, and the results carried forward to the Feasibility Analysis Program.
8. In addition to the Financial Rate of Return (FRR), Financial Ratios and Net Present Values (NPVs) are to be computed at alternative annual compound discount rates of 15, 20, 25, 30, 35 and 40 percent, respectively.
9. FRRDATA.ONE represents the base case only; sensitivity analysis of alternatives is not meaningful in FRR analysis, and could be misleading. Analysis of financial alternatives should be conducted with the companion Proforma Financial Analysis Program instead.

Listing of Input Information and Data File

List of the Headers File for the FRR Data.Fsh Case [1]

```
     $1,000     4.     0     1
.11000.15000.20000.25000.30000.35000.40000
 11.25     2     2     2     7     6     0     0
```

LEAN BEEF CATFISH OPERATION
(Units of $1,000 at 1985 Price Levels)

Other Period Expense	Paid-In Equity	Current Deprec.	Capital Intrest Reserve Expense	Capital Income Surplus Tax	Product Sales	Other Income	Material Cost	Labor Costs

Base case.

Proforma analysis based on income tax rate of 35 percent.

Listing of the FRR Data.Fsh Input File

1	0.	0.	0.	0.	0.	0.	0.	0.
2	0.	0.	0.	0.	0.	0.	0.	0.
3	60.	0.	0.	0.	0.	0.	0.	0.
4	6.	0.	0.	-6.	0.	0.	0.	0.
5	347.	0.	0.	-1.	0.	0.	0.	0.
6	388.	0.	0.	-42.	0.	0.	0.	0.
7	354.	0.	0.	-8.	0.	0.	0.	0.
8	254.	0.	0.	-114.	0.	0.	0.	0.
9	209.	0.	0.	-69.	0.	0.	0.	0.
10	345.	0.	0.	-201.	0.	0.	0.	0.
11	124.	0.	0.	-88.	0.	0.	0.	0.
12	0.	0.	138.	625.	1493.	0.	254.	183.
13	0.	0.	39.	178.	1493.	0.	254.	244.
14	0.	0.	212.	962.	2985.	0.	463.	244.
15	0.	0.	213.	965.	2985.	0.	463.	244.
16	0.	0.	194.	877.	2985.	0.	463.	244.
17	0.	0.	222.	1007.	3284.	0.	509.	268.
18	0.	0.	199.	902.	3284.	0.	509.	268.
19	0.	0.	215.	977.	3284.	0.	509.	268.
20	0.	0.	0.	898.	3284.	0.	509.	268.
21	0.	0.	0.	1104.	3612.	0.	556.	295.
22	0.	0.	0.	1025.	3612.	0.	556.	295.
23	0.	0.	0.	1112.	3612.	0.	556.	295.
24	0.	0.	0.	1046.	3612.	0.	556.	295.
25	0.	0.	0.	1247.	3973.	0.	616.	325.
26	0.	0.	0.	1184.	3973.	0.	616.	325.
27	0.	0.	0.	1275.	3973.	0.	616.	325.
28	0.	0.	0.	1209.	3973.	0.	616.	325.
29	0.	0.	0.	1417.	4371.	0.	677.	357.
30	0.	0.	0.	1352.	4371.	0.	677.	357.
31	0.	0.	0.	1422.	4371.	0.	677.	357.
32	111.	0.	0.	0.	4371.	0.	677.	357.
33	37.	0.	0.	0.	4371.	0.	677.	357.
34	43.	0.	0.	0.	4371.	0.	677.	357.
35	0.	0.	0.	0.	4371.	0.	677.	357.
36	81.	0.	0.	0.	4371.	0.	677.	357.
37	0.	0.	0.	0.	4371.	0.	677.	357.
38	75.	0.	0.	0.	4371.	0.	677.	357.
39	0.	0.	0.	0.	4371.	0.	677.	357.
40	71.	0.	0.	0.	4371.	0.	677.	357.
41	0.	0.	0.	0.	4371.	0.	677.	357.
42	75.	0.	0.	0.	4371.	0.	677.	357.
43	0.	0.	0.	0.	4371.	0.	677.	357.

[1] See page 60 for identification of items in the HEADERS file.

42	75.	0.	0.	0.	4371.	0.	677.	357.
43	0.	0.	0.	0.	4371.	0.	677.	357.
44	65.	0.	0.	0.	4321.	0.	677.	357.
45	-2645.	0.	-1432.	-20255.	0.	0.	0.	0.
1	0.	0.	0.	0.	0.			
2	0.	0.	0.	0.	0.			
3	0.	0.	0.	0.	0.			
4	0.	0.	0.	6.	0.			
5	0.	0.	0.	1.	0.			
6	0.	0.	0.	42.	0.			
7	0.	0.	0.	8.	0.			
8	0.	0.	0.	114.	0.			
9	0.	0.	0.	20.	49.			
10	0.	0.	0.	152.	49.			
11	0.	0.	0.	39.	49.			
12	243.	0.	30.	179.	49.			
13	243.	0.	97.	49.	583.			
14	276.	0.	164.	180.	586.			
15	276.	0.	222.	51.	586.			
16	276.	0.	223.	178.	586.			
17	276.	0.	241.	50.	746.			
18	276.	0.	260.	173.	746.			
19	276.	0.	277.	47.	746.			
20	276.	0.	274.	165.	746.			
21	276.	0.	261.	43.	845.			
22	276.	0.	251.	157.	845.			
23	276.	0.	240.	40.	845.			
24	276.	0.	229.	148.	845.			
25	276.	0.	205.	37.	969.			
26	276.	0.	182.	139	969.			
27	276.	0.	156.	32.	969.			
28	276.	0.	154.	129.	969.			
29	276.	0.	144.	29.	1096.			
30	276.	0.	132.	120.	1096.			
31	276.	0.	122.	26.	1096.			
32	276.	0.	123.	112.	1096.			
33	276.	0.	118.	22.	1106.			
34	276.	0.	113.	100.	1106.			
35	276.	0.	110.	18.	1106.			
36	276.	0.	109.	91.	1106.			
37	276.	0.	106.	19.	1109.			
38	276.	0.	106.	88.	1109.			
39	276.	0.	104.	23.	1109.			
40	276.	0.	112.	85.	1109.			
41	276.	0.	120.	26.	1097.			
42	276.	0.	126.	80.	1097.			
43	276.	0.	134.	28.	1097.			
44	276.	0.	135.	74.	1097.			
45	0.	0.	0.	0.	0.			

Listing of the Program Output for the Case

Listing of the Factors Used in the Run

LISTING OF FACTORS CONCERNING THIS RUN:

Unit of Measure for Output Is $1,000

Number of Times Discounted per Year = 4.0

"Sunken Investment" Option IS NOT Being Used

Benefit-Costs Computed at Annual Discount Rates of:

.15000	.20000	.25000	.30000	.35000	.40000

Listing of the Input Data for the Case

A LISTING OF THE DATA
11.25 4.00 2 2 2 7 6 0 2 0 .110000

LEAN BEEF CATFISH OPERATION
(Units of $1,000 at 1985 Price Levels)

Period	Paid-In Equity		Capital Reserve	Capital Surplus	Product Sales	Other Income	Material Cost	Labor Costs	Other Expense	Mkting Expense	Current Deprec.	Intrest Expense	Income Tax
1	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
2	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
3	60.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
4	6.	0.	0.	-6.	0.	0.	0.	0.	0.	0.	0.	0.	0.
5	347.	0.	0.	-1.	0.	0.	0.	0.	0.	0.	0.	6.	0.
6	388.	0.	0.	-42.	0.	0.	0.	0.	0.	0.	0.	1.	0.
7	354.	0.	0.	-8.	0.	0.	0.	0.	0.	0.	0.	42.	0.
8	254.	0.	0.	-114.	0.	0.	0.	0.	0.	0.	0.	8.	0.
9	223.	0.	0.	-83.	0.	0.	0.	0.	0.	0.	0.	114.	0.
10	359.	0.	0.	-215.	0.	0.	0.	0.	0.	0.	0.	20.	63.
11	138.	0.	0.	-102.	0.	0.	0.	0.	0.	0.	0.	152.	63.
12	0.	0.	136.	615.	1493.	0.	254.	183.	243.	0.	30.	39.	63.
13	0.	0.	14.	65.	1493.	0.	254.	244.	243.	0.	95.	179.	63.
14	0.	0.	187.	849.	2985.	0.	463.	244.	276.	0.	162.	49.	755.
15	0.	0.	188.	851.	2985.	0.	463.	244	276.	0.	219.	180.	755.
16	0.	0.	169.	764.	2985.	0.	463.	244.	276.	0.	220.	51.	755.
17	0.	0.	190.	864.	3284.	0.	509.	268.	276.	0.	238.	178.	755.
18	0.	0.	167.	758.	3284.	0.	509.	268.	276.	0.	258.	50.	960.
19	0.	0.	184.	832.	3284.	0.	509.	268.	276.	0.	275.	173.	960.
20	0.	0.	166.	754.	3284.	0.	509.	268.	276.	0.	273.	47.	960.
21	0.	0.	0.	940.	3612.	0.	556.	295.	276.	0.	260.	165.	960.
22	0.	0.	0.	862.	3612.	0.	556.	295.	276.	0.	249.	43.	1087.
23	0.	0.	0.	948.	3612.	0.	556.	295.	276.	0.	238.	157.	1087.
24	0.	0.	0.	882.	3612.	0.	556.	295.	276.	0.	228.	40.	1087.
25	0.	0.	0.	1060.	3973.	0.	616.	325.	276.	0.	204.	148.	1087.
26	0.	0.	0.	995.	3973.	0.	616.	325.	276.	0.	181.	37.	1247.
27	0.	0.	0.	1086.	3973.	0.	616.	325.	276.	0.	155.	139.	1247.
28	0.	0.	0.	1022.	3973.	0.	616.	325.	276.	0.	153.	32.	1247.
29	0.	0.	0.	1203.	4371.	0.	677.	357.	276.	0.	143.	129.	1247.
30	0.	0.	0.	1139.	4371.	0.	677.	357.	276.	0.	131.	29.	1410.
31	0.	0.	0.	1210.	4371.	0.	677.	357.	276.	0.	121.	120.	1410.
32	0.	0.	0.	0.	4371.	0.	677.	357.	276.	0.	122.	26.	1410.
33	0.	0.	0.	0.	4371.	0.	677.	357.	276.	0.	117.	112.	1410.
34	0.	0.	0.	0.	4371.	0.	677.	357.	276.	0.	113.	22.	1422.
35	0.	0.	0.	0.	4371.	0.	677.	357.	276.	0.	109.	100.	1428.
36	0.	0.	0.	0.	4371.	0.	677.	357.	276.	0.	108.	18.	1422.
37	0.	0.	0.	0.	4371.	0.	677.	357.	276.	0.	107.	91.	1422.
38	0.	0.	0.	0.	4371.	0.	677.	357.	276.	0.	105.	19.	1426.
39	0.	0.	0.	0.	4371.	0.	677.	357.	276.	0.	104.	88.	1426.
40	0.	0.	0.	0.	4371.	0.	677.	357.	276.	0.	111.	23.	1426.
41	0.	0.	0.	0.	4371.	0.	677.	357.	276.	0.	118.	85.	1426.
42	0.	0.	0.	0.	4371.	0.	677.	357.	276.	0.	124.	26.	1412.
43	0.	0.	0.	0.	4371.	0.	677.	357.	276.	0.	131.	80.	1412.
44	0.	0.	0.	0.	4371.	0.	677.	357.	276.	0.	133.	28.	1412.
45	-2129.	0.	-1401.	-17128.	0.	0.	0.	0.	0.	0.	0.	74.	1412.
												0.	0.

Listing of the FRR Program Output for the Case

I N V E S T M E N T F E A S I B I L I T Y A N A L Y S I S

LEAN BEEF CATFISH OPERATION
(Units of $1,000 at 1985 Price Levels)

FINANCIAL RETURN ON EQUITY CAPITAL 41.103 PERCENT

PERIOD NO.	IDENT.	EQUITY CAPITAL (DOLLARS) PAID IN	FROM EARNINGS	TOTAL	PROFIT AND LOSS (DOLLARS) TOTAL INCOME	OPERATING COST	NET PROFIT	PRESENT VALUE FACTOR	PRESENT VALUES TOTAL EQUITY	NET PROFIT
1		0.	0.	0.	0.	0.	0.	1.0000	0.	0.
2		0.	0.	0.	0.	0.	0.	.9175	0.	0.
3		60.	0.	60.	0.	0.	0.	.8418	51.	0.
4		6.	-6.	0.	0.	6.	-6.	.7724	0.	-5.
5		347.	-1.	346.	0.	1.	-1.	.7087	245.	-1.
6		388.	-42.	346.	0.	4	-42.	.6502	225.	-27.
7		354.	-8.	346.	0.	8.	-8.	.5966	206.	-5.
8		254.	-114.	140.	0.	114.	-114.	.5474	77.	-62.
9		223.	-83.	140.	0.	83.	-83.	.5023	70.	-42.
10		359.	-215.	144.	0.	215.	-215.	.4608	66.	-99.
11		138.	-102.	36.	0.	102.	-102.	.4228	15.	-43.
12		0.	751.	751.	1493.	952.	541.	.3879	291.	210.
13		0.	79.	79.	1493.	1640.	-147.	.3559	28.	-52.
14		0.	1036.	1036.	2985.	2080.	905.	.3266	338.	296.
15		0.	1039.	1039.	2985.	2008.	977.	.2997	311.	293.
16		0.	933.	933.	2985.	2136.	849.	.2749	257.	233.
17		0.	1054.	1054.	3284.	2301.	983.	.2523	266.	248.
18		0.	925.	925.	3284.	2444.	840.	.2315	214.	194.
19		0.	1016.	1016.	3284.	2335.	949.	.2124	216.	202.
20		0.	920.	920.	3284.	2451.	833.	.1948	179.	162.
21		0.	940.	940.	3612.	2517.	1095.	.1788	168.	196.
22		0.	862.	862.	3612.	2620.	992.	.1640	141.	163.
23		0.	948.	948.	3612.	2492.	1120.	.1505	143.	169.
24		0.	882.	882.	3612.	2590.	1022.	.1381	122.	141.
25		0.	1060.	1060.	3973.	2705.	1268.	.1267	134.	161.
26		0.	995.	995.	3973.	2784.	1189.	.1163	116.	138.
27		0.	1086.	1086.	3973.	2651.	1322.	.1067	116.	141.
28		0.	1022.	1022.	3973.	2746.	1227.	.0979	100.	120
29		0.	1203.	1203.	4371.	2892.	1479.	.0898	108.	133.
30		0.	1139.	1139.	4371.	2971.	1400.	.0824	94.	115.
31		0.	1210.	1210.	4371.	2867.	1504.	.0756	91.	114.
32		0.	0.	0.	4371.	2954.	1417.	.0694	0.	98.
33		0.	0.	0.	4371.	2871.	1500.	.0636	0.	95.
34		0.	0.	0.	4371.	2951.	1420.	.0584	0.	83.
35		0.	0.	0.	4371.	2859.	1512.	.0536	0.	81.
36		0.	0.	0.	4371.	2931.	1440.	.0492	0.	71.
37		0.	0.	0.	4371.	2862.	1509.	.0451	0.	68.
38		0.	0.	0.	4371.	2929.	1442.	.0414	0.	60.
39		0.	0.	0.	4371.	2863.	1508.	.0380	0.	57.
40		0.	0.	0.	4371.	2932.	1439.	.0348	0.	50.
41		0.	0.	0.	4371.	2866.	1505.	.0320	0.	48.
42		0.	0.	0.	4371.	2926.	1445.	.0293	0.	42.
43		0.	0.	0.	4371.	2881.	1490.	.0269	0.	40.
44		0.	0.	0.	4371.	2929.	1442.	.0247	0.	36.
45		-2129.	-18529.	-20658.	0.	0.	0.	.0227	-468.	0.
TOTAL		0.	0.	0.	125353.	86507.	38846.		3921.	3921.

INTEREST PER CENT	PROFITABILITY RATIO	PRESENT VALUE IN $1,000 NET PROFIT	EQUITY	BALANCE
15.000	2.366	14401.	6088.	8314.
20.000	1.836	10831.	5898.	4933.
25.000	1.516	8302.	5475.	2827.
30.000	1.300	6472.	4978.	1494.
35.000	1.143	5123.	4481.	642.
40.000	1.023	4110.	4018.	92.

Alternative: Base case.
Proforma analysis based on income tax rate of 35 percent.