INTRODUCTION TO THE INTERACTIVE FINANCIAL PLANNING SYSTEM (IFPS)

Thomas J. Schriber

Graduate School of Business Administration
The University of Michigan
Ann Arbor, MI 48109

Abstract

A brief introduction to financial modeling is provided; summary information about key aspects of the computer-based, interactive financial modeling system IFPS (Interactive Financial Planning System) is given; alternative financial modeling systems are commented upon; the hardware for which IFPS is available is summarized; and IFPS literature having either an educational or an application orientation is cited. The tutorial itself will focus on the fundamental semantics, syntax, and steps involved in using IFPS to build, solve, and interrogate financial-planning models.

A BRIEF PERSPECTIVE ON FINANCIAL MODELING

A financial model is a collection of equations, logic, and data which describe the relationships and interactions among selected financial and other variables in a specific situation. Such a model can be solved (that is, manipulated computationally) to derive from it the current and projected future implications and consequences of information contained in the model. For example, a financial model can be used to project income statements and balance sheets. Other application settings for financial modeling include cash budgeting, capital budgeting, tax planning, labor contract negotiations, currency exchange-rate analysis, capacity planning, and merger and acquisition analysis. Financial models can be used to simulate the experiences projected to result from alternative management strategies and decisions, and consequently are a powerful planning and decision-support tool.

A recent survey of the Fortune 500 firms indicates that computer-based financial modeling has come into wide use, and that this use is growing rapidly [14].

A BRIEF PERSPECTIVE ON IFPS

IFPS is a computer-based, interactive financial modeling system which supports and facilitates the building, solving, and interrogating of financial models. The output from an IFPS model can be thought of as a spread sheet (that is, a table) in which columns designate a sequence of user-specified time periods (such as months, and/or quarters, and/or years), and the rows are composed of user-specified variables (such as total market, market share, sales volume, unit price, gross income, unit labor cost, unit material cost, unit selling cost, fixed costs, administrative expenses, net present value, and internal rate of return). Entries in the body of the output display the values taken on by the model variables over time.

Some key features of IFPS will now be summarized.

(1) IFPS provides an English-like modeling language whose use does not require an extensive background in computing. Financial personnel and others can consequently build, use, and understand financial models of their own, thus significanthy closing the historical gap between managers and modeling. The attendant advantages of eliminating one or more layers of people positioned between the decision makers and the computer resource are self-evident.

(2) IFPS is non-procedural in nature. This means that the relationships, logic, and data used to compute the various values in the output do not have to appear in any particular top-to-bottom order in an IFPS model.

(3) IFPS has editing capabilities which ease the process of building a model, adding statements to and deleting statements from a model, making changes in existing statements, making copies of parts or all of a model, and so on.

(4) IFPS provides flexible interactive features for outputting column and row subsets of a solved model, and for varying the order in which columns and rows are printed. A report generator is also available for optional use in indicating the format to be followed in producing output.

(5) IFPS offers a collection of built-in financial functions, such as functions for computing net present value, net terminal value, internal rate of

Proceedings of the 1982
Winter Simulation Conference
Highland * Chao * Madrigal, Editors

82CH1844-0/82/0000-0671 $00.75 © 1982 IEEE

return, loan amortization schedules, and a variety of depreciation alternatives.

(6) IFPS has built-in mathematical functions which support the description of relationships among variables. Included are first and second order polynomial autocorrelation, simple and multiple linear regression, linear interpolation, and moving average functions.

(7) The use of leading and/or lagging variables is easily specified in IFPS. For example, cash receipts might lag sales by one or more time periods; or capital expenditures in the current period might depend on results anticipated in future time periods.

(8) IFPS detects the presence of systems of two or more linear or nonlinear equations, then proceeds to solve these equation systems automatically.

(9) IFPS supports both deterministic and probabilistic modeling. In the probabilistic arena, the language provides built-in functions for sampling from uniform, triangular, 10-90 triangular, normal, bivariate normal, and user-described empirical distributions. IFPS also provides options for solving a number of deterministic subsets of a probabilistic model. For example, a probabilistic model can be solved using the most likely value of one or more (or all) of the underlying random variables; or using their expected values; or using combinations of their minimum and maximum values; and so on.

(10) IFPS invites numerical sensitivity analysis by providing these solution options...

(a) WHAT IF

Taking the current model as a base case, the user can re-solve the model in WHAT IF mode to determine how key model variables change in value when one or more changes are made in the relationships, and/or the logic, and/or the data in the base model. A sequence of WHAT IF questions can also be applied cumulatively to a model.

(b) GOAL SEEKING

In GOAL SEEKING mode, the user can ask IFPS to determine what change would have to take place in the value of a specified variable (the independent variable) in a specified time period to achieve a specified value for another variable (the dependent variable) in a stated time period. Or, the desired values of the dependent variable in multiple time periods can be specified, and IFPS will determine the corresponding values of the independent variable needed to bring about these results.

(c) ANALYZE

The ANALYZE command is used to display the elements which contribute to the value calcualted for a given variable. In response to ANALYZE, IFPS will print out the value of the stated variable, the relationship used to calculate this value, and the values of all of the other variables directly used in its calculation

(d) SENSITIVITY

The SENSITIVITY command is used to determine the effect of a sequence of alternative percentage changes in one variable (the independent variable) on one or more other variables (the dependent variables). Output from the SENSITIVITY command consists of a summary of the new values of each specified dependent variable, and both the absolute change and the percentage change from the base case for each of these variables. One such summary is provided for each new alternative value of the independent variable. (In concept, a series of WHAT IF's can be used to achieve these SENSITIVITY results, but awkwardly in terms of the human effort involved, and without the benefit of convenient, model-produced tabular summaries.)

(e) IMPACT

The IMPACT command is used to evaluate the effect on a single variable (the dependent variable) of a given percentage change in another variable or variables (the independent variables). When two or more independent variables are specified, only one of them is changed at a time. Output for each independent variable shows the new value of the independent variable, the new value of the dependent variable, and both the absolute and the percentage change of the dependent variable relative to the base case. (As with SENSITIVITY, the IMPACT results could be achieved with use of one or more WHAT IF's, but awkwardly in terms of the human effort involved, and without the benefit of convenient, model-produced tabular summaries.)

(11) IFPS supports command files, which are permanent files in which IFPS commands are stored. These stored commands can be executed by issuing a single IFPS command.

(12) An IFPS extension, known as IFPS/OPTIMUM, can be used to answer questions of the "what's best?" type. That is, IFPS/OPTIMUM can be used to determine the values of a set of constrained variables which result in the maximum or minimum value of a specified variable. (When strictly linear relationships are involved, a linear programming algorithm is used to answer "what's best?" questions; otherwise, alternative searching strategies may be called into play by IFPS/OPTIMUM, and issues of convergence, local vs. global maxima and minima, and so on, arise.)

Other features of IFPS include IFPS data files (which can contain both data and relationships); support for extracting data from existing non-IFPS files and placing them into IFPS-compatible data files; a consolidation capability which lets the user produce composite reports from two or more models; routine graphic output; and interactive color graphics.

ALTERNATIVES TO IFPS

IFPS is only one example of a variety of financial modeling languages which have become or are becoming available. Among other financial modeling languages

are FORESIGHT, EMPIRE, FCS-EPS, SIMPLAN, and VISICALC. More than fifty selected decision-support system products have recently been tabulated [17].

VARIOUS IFPS IMPLEMENTATIONS

IFPS is designed to operate on all major computer mainframes, and on most super minicomputers. The system is currently available for use on Amdahl, Burroughs, Control Data, Digital Equipment, Harris, Hewlett Packard, Honeywell, IBM, Prime, and Univac computers.

IFPS LITERATURE

An array of IFPS literature is maintained by the IFPS vendor, Execucom, including a user's manual [7], tutorial material [6, 9], and examples of IFPS use [5]. In addition, Execucom maintains a list of IFPS application papers [8], and supplies copies of these papers in limited quantities. Examples of such papers are [1, 4, 12].

Applications of IFPS are also working their way into the journal literature [e.g., 3].

As of this date, there are no known conventional textbooks devoted to the topic of financial modeling using IFPS. Relatively informal introductory student guides are known to exist in some cases [11, 16]. The incorporation of IFPS into case studies of the type sometimes used in business schools has started to take place [e.g., 18].

IFPS CLASSROOM EDUCATION

IFPS is working its way into various academic curricula and classrooms [2, 13]. In at least one known case, it has become the only language used in the required course in computer and information systems in an MBA program [15].

Execucom offers a series of intensive short courses on various aspects of financial modeling using IFPS. Over ten different Execucom IFPS courses exist, ranging from introductory to advanced modeling techniques and lasting anywhere from a half day to two and a half days [10].

THE IFPS TUTORIAL

The 1982 Winter Simulation Conference IFPS tutorial will introduce the fundamental semantics and syntax used to represent financial models in IFPS. The steps involved in constructing a model will be outlined, and the details of several diverse IFPS models will be reviewed to illustrate some of the IFPS capabilities listed above. Selected materials designed to support the tutorial, and to provide further detailed information about the semantics and syntax of IFPS, will be distributed to those attending the tutorial.

BIBLIOGRAPHY

1. Bennett, Earl, "Use of IFPS in the Athletic Department Budgetary Process," Texas A&M University, College Station, TX, 1982.
2. Cain, William O., Jr., "Integrating Computer-Based Modeling into the Entire Business Curriculum," TIMS/ORSA Joint National Meeting, Washington, D.C., May, 1980.
3. Cain, William O., Jr., "Risk Analysis Enhances Exploration," Oil & Gas Journal, November, 1980.
4. Campanella, Frank B., "Use of an Interactive Financial Planning System for University Planning," Boston College, Boston, MA, 1980.
5. Execucom, IFPS Cases and Models, Austin, TX, 1980.
6. Execucom, IFPS Tutorial, Austin, TX, 1980.
7. Execucom, IFPS User's Manual, Austin, TX, 1980.
8. Execucom, "Papers Available from the Execucom University Support Program," Austin, TX, 1980.
9. Execucom, University Seminar Booklet, Austin, TX, 1982.
10. Execucom, "1st Quarter Education-1983," Austin, TX, 1982.
11. Gray, Paul, "The SMU Students' Introductory Guide to the Interactive Financial Planning System," Southern Methodist University, Dallas, TX, 1981.
12. Hayen, Roger, "Applying Decision Support Systems to Small Business Financial Planning," University of Nebraska at Omaha, Omaha, NE, 1981.
13. Klein, Richard, "Teaching Computer-Based Financial Modeling," Journal of Financial Education, Fall, 1980.
14. Klein, Richard, "Computer-Based Financial Modeling," Journal of Systems Management, May, 1982.
15. Perkins, Thomas E., and Paul Gray, "Teaching a Financial Planning Language as the Principal Computer Language for the MBA's," Working Paper 82-301, Southern Methodist University, Dallas, TX, 1982.
16. Schriber, Thomas J., "Introductory Guide to IFPS and its Use in the Michigan Terminal System," The University of Michigan, Ann Arbor, MI, 1982.
17. "Selected Decision Support System Products," Information Systems News, March 8, 1982.
18. Ten Dyke, Richard P., and Samuel E. Bodily, "Disco Mall, Inc." (UVA 0-239), University of Virginia, Charlottesville, VA, 1980.