SECOND EDITION

FINANSIM:

A financial management simulation

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FINANSIM
A Financial Management Simulation
second edition

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Preface

In recent decades, a number of new instructional methods have been developed in the area of education for business. One of the most widely used of these is business simulation, or business gaming as it is often called. A business simulation is a dynamic, sequential decision-making exercise structured around a model of a business operation; in it, students make a number of interrelated decisions in managing the operation.

Our philosophy is that having students play a game simply because it is a stimulating experience is inadequate. We have found that simulations are most valuable if they can serve as a vehicle for the application of the specific concepts, analytical tools, and problem-solving techniques taught in the courses in which they are used. For these reasons, the first edition of the FINANSIM text, published in 1967, included not only simulation rules but also extensive materials showing how many of the basic concepts and analytical tools commonly taught in finance courses could help students become better decision makers as they managed their simulated FINANSIM firms.

FINANSIM was also originally designed so that (1) its computer program could be used easily by instructors having little or no knowledge of computer programming or technology, and (2) the simulation could be used at various

levels of sophistication, depending upon the objectives of the instructor.

Since the publication of the first edition, FINANSIM has proven to be a viable vehicle for teaching financial management in well over a hundred educational institutions in the United States and abroad. FINANSIM has been used in both introductory and advanced undergraduate finance courses, in graduate courses, and in both university-sponsored programs and industrial management development programs. We have been deeply appreciative of this enthusiasm for FINANSIM, and the continued enthusiasm has stimulated its second edition.

In revising FINANSIM, several factors were taken into consideration. The basic rules incorporated into the first edition, which have been found to provide a stimulating and appropriate simulated learning environment for those studying financial management, have not been modified. Thus, instructors who have used the first edition will not find use of the second edition a drastically new experience.

The second edition, however, has been designed to improve upon its predecessor in a number of ways. First, feedback from many instructors indicated that the FINANSIM environment should be made a more difficult and challenging one; thus, parameters in the simulation have been modified so as to make it much more difficult, for example, for the student to earn "unrealistically" high profits. Second, FINANSIM's computer utilization has been simplified to a considerable extent by the development of one source deck that should be highly compatible with many different computer systems; in the first edition the student had to rely on different source decks for different systems. The single new FINANSIM source deck (written in FORTRAN IV—double precision variables only) has operated successfully on such diverse systems as the Xerox 560 at Alfred University, the IBM 370 at both The Pennsylvania State University and at the West Publishing Company, and the Honeywell 636 system at Baylor University.

A third type of revision included in this edition of FINANSIM is the introduction of the discussion of even more conceptual and analytical tools for making FINANSIM decisions. For example, we have added a discussion of accounting (or average) rate of return as a preliminary screening device in evaluating capital investments, as well as a consideration of internal rate of return. We have also emphasized two areas which have become more prominent in finance since the first edition of FINANSIM was published—net present value and financial decision making under conditions of risk and uncertainty. We have included discussions of the latter with respect to the analysis of pro forma income statements and the evaluation of capital budgeting alternatives. For each of the new topics introduced into the second edition, we have added problems for the student to work out. Finally, all quantitative problems appearing in the first edition have been revised. This should be especially helpful for those instructors who have used the first edition of FINANSIM repeatedly.

Our acknowledgments to those who have helped us in developing the second edition of FINANSIM are many. We owe our gratitude to Dr. William D. Biggs of Alfred University for testing the revised FINANSIM computer program on his university's computer system; to Ken Galipeau and Mark

Angelone, who helped those of us at The Pennsylvania State University render the new computer program (originally developed at Baylor University with the assistance of Louis Gray) easily compatible with systems such as the IBM 370; and to Dr. Eugene J. Kelley, Dean of the College of Business Administration at Pennsylvania State University, and both Dr. Michael P. Hottenstein and Dr. Max D. Richards at this College, for their enthusiastic support in making the second edition of FINANSIM possible. We are also grateful to Linda Lang and Terri Partain, who patiently assisted with the requisite typing chores. Last, but not least, we wish to thank our wives, Shirley, Doris, and Frances, for their patience and understanding during the course of this project.

February, 1979

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Chapter 1
Introduction

An exciting new educational technique designed to provide business students with greater insight into the skills for dealing with managerial problems is business simulation. A business simulation is a sequential decision-making problem structured around a model of a business operation in which participants assume the role of managing a simulated firm. One purpose of this text is to prepare the reader for assuming such a managerial role in FINANSIM—a computerized financial management simulation.

THE FINANSIM LEARNING EXPERIENCE

FINANSIM was designed to provide students with a *planned learning experience* in dealing with financial management problems. Aiding them in gaining such an experience—as is graphically shown in Figure 1–1—are:

Numerous sections of this chapter have been patterned after those in Chapter 1 of Paul S. Greenlaw and Fred W. Kniffin, *MARKSIM: A Marketing Decision Simulation* (Scranton, Pa.: International Textbook Company, 1964), with the permission of Harper & Row, Publishers, Inc., which subsequently acquired the rights to *MARKSIM.*

1. The instructor, who will be available for guidance when necessary.
2. This text, which focuses attention on numerous concepts, ideas, and analytical tools relative to financial management and their application to the simulation.
3. The FINANSIM model, which is programmed on an electronic computer. This computer program provides a dynamic simulated financial decision-making environment from which operating data are periodically fed back to participants.

More specifically, the procedure followed in assuming the role of financial manager in the simulation is as follows:

1. Participants familiarize themselves with the simulated environment in which they are to operate by studying the materials presented in this text and possibly also by discussing these materials in class.
2. They are next given an opportunity to analyze available data on their past operations and to make a set of decisions for the first period in which they will manage their firms.
3. When firm decisions are due for this period, they are handed in to the instructor or someone designated as a simulation administrator.
4. Then, each firm's operating results for the period are calculated and printed out by the computer system, and the information is returned to its management.
5. This cycle of decision making, calculation, and feedback of results is repeated for a number of periods of play.

In addition, the instructor may require various problem assignments relative to the simulation to be handed in from time to time and/or meet with company managers on one or more occasions to review their operations. More specific information about the times at which decisions are to be handed in, the types of assignments required, and so on will be indicated by the instructor.

FINANSIM: OBJECTIVES AND FOCUS

The design of FINANSIM as a planned learning experience oriented toward financial management is based on three notions:

1. The central activity engaged in by financial managers is that of making decisions relative to the acquisition and utilization of capital—for example, choosing from among alternative sources of funds to finance capital expansion and developing cash budgets.
2. Basic to making such decisions effectively is an understanding of certain fundamental concepts, ideas, and analytical tools of financial management, such as the cost of capital, the time value of money, and present value analysis.

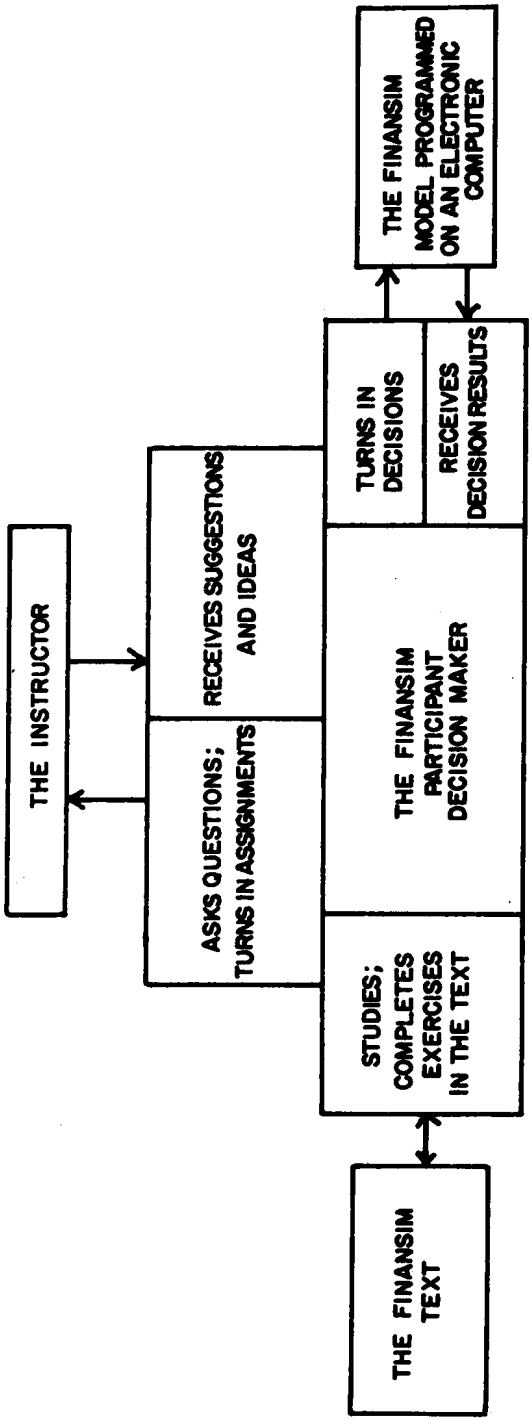

Figure 1-1 THE FINANSIM LEARNING EXPERIENCE

3. An understanding of these concepts, ideas, and tools can be gained more effectively if students are (a) first exposed to them in the classroom and/or by outside reading, and (b) then given the opportunity to *apply them* to a specific financial problem situation.

Thus, the fundamental objective of FINANSIM is to *facilitate the learning and mastery of certain basic concepts and techniques of financial management by providing an opportunity for the student to apply them in making decisions in a simulated financial management–oriented environment.* In accordance with this objective, decision problems in other functional areas of the business firm—for example, production—have been included in FINANSIM only to the extent that they are relevant to financial management.

FUNDAMENTAL CHARACTERISTICS OF THE FINANSIM PROBLEM

The simulated business environment of FINANSIM, like that of many business simulations, is an abstract one. The decision choices included in it are generalized ones, and the simulation environment is not intended to replicate that of any specific real world firm or industry. Further, the relationships among variables which exist in the simulation simply reflect general business and economic principles—for example, the interest rate which must be paid on short-term bank notes will increase as the firm's liquidity position becomes more strained, up to a point—rather than empirical findings developed by any real company.

However, FINANSIM has been designed so that the decision problems the simulation poses to the student possess many of the same *fundamental characteristics as those faced by real world financial managers. FINANSIM managers, like their real world counterparts, are concerned with making a number of interdependent decisions in a dynamic environment* in which *uncertainty exists* and *in which no direct analytical solution to their overall problem is known.* Following are some of the values that can be gained by participants from assuming the role of FINANSIM manager under such conditions.

Dealing with Numerous Interrelated Decision Variables

Few, if any, decisions in FINANSIM can be made effectively in any period without also considering their influence on the other actions contemplated for the period. For example, in deciding how much should be paid out in dividends in any period, the manager must consider what the firm's after-tax earnings are likely to be in light of all fund acquisition and investment decisions made in the period.

Dynamic Decision Making over a Period of Time

The decision situation for each period in FINANSIM is influenced by what has taken place earlier in the simulation. For this reason, FINANSIM manag-

ers must learn to live with their previous successes and failures. Furthermore, considerable attention must be given to advanced planning and to evaluating the implications of decisions made in the present for the firm's operations in future periods. For example, the manager investing in capital improvements should give consideration to the cost savings that will be realized from the investment not only in the immediate period but during its entire economic life, which may extend for several future periods.

Decision Making under Conditions of Uncertainty

The behavior of certain variables in FINANSIM is not known for certain by the decision maker. For example, the manager is given demand forecasts for the firm's product in future periods, but actual demand will usually vary from these forecasts. In consequence, FINANSIM managers, like their real world counterparts, must consider the occurrence of numerous contingencies in financial planning and must weigh the impact of decisions should adverse conditions occur. For instance, if a capital expansion program is undertaken and demand for the firm's product falls short of that forecasted for several consecutive periods, will the firm's liquidity position be strained?

No Direct Analytical Overall Problem Solution

The application of numerous quantitative analytical tools can be useful in arriving at decisions in FINANSIM. However, the simulation problem *in its totality* is so complex that *no direct analytical solution to it is known.* That is, there is no single set of equations or other mathematical procedures that, if followed, will always enable the FINANSIM manager to arrive at an optimum or best answer to the overall management of the firm. Rather, the manager must learn to decide which of the concepts and analytical tools available can be used in dealing with various facets of the FINANSIM problem situation. Thus, the simulation provides the student with experience not only in making decisions per se but also in determining the conditions under which the application of different *approaches* to decision making is appropriate.

FINANSIM LEARNING: SOME CONCLUDING COMMENTS

As indicated previously, the FINANSIM environment is an abstract one, not intended to duplicate any specific real world situation. For this reason, students should not base decisions in the simulation on assumptions drawn from knowledge of any specific real world firm with which they may be familiar. For example, they should not reason: Because the Ajax Company presently is relying heavily upon the issuance of common stock for capital expansion, such a policy would be the most appropriate one to follow in FINANSIM. Rather, they should attempt to *learn* how the variables in the FINANSIM environment behave by a thorough analysis of the data provided in the simulation itself and, in doing so, to master the concepts and techniques which FINANSIM is designed to teach.

Conversely, students should not assume upon conclusion of their FINANSIM managerial experience that they can take any of the specific decision strategies which have proven successful in the simulation and apply them to real world business situations. On the other hand, many of the *concepts, techniques,* and *ways of dealing with* FINANSIM decisions do have direct applicability to real world decision problems. For example, both the payback and net present value models for analyzing capital investment decisions (which we will discuss in Chapter 5) are utilized today by many business firms.

With the focus and objectives of FINANSIM in mind, let us now turn our attention to a description of how the student is to assume the role of manager in the simulated FINANSIM environment.

QUESTIONS

TRUE-FALSE. For each of the following, write a "T" in the appropriate space if the statement is true and an "F" if the statement is false.

____ 1. The three aids to student learning in FINANSIM are the instructor, the FINANSIM text, and the FINANSIM model.

____ 2. FINANSIM permits the FINANSIM manager to apply decision-making concepts to realistic types of financial problem situations.

____ 3. The FINANSIM environment closely resembles the business environment of the automobile industry.

____ 4. The decision-making environment of FINANSIM is one of certainty.

____ 5. In FINANSIM you will always be given demand forecasts which tell exactly how much to produce.

Chapter 2
Participant Instructions

As we indicated in Chapter 1, the FINANSIM manager operating in a simulated environment makes decisions and receives feedback information generated by an electronic computer each period. In this chapter, we will (1) describe this environment, (2) indicate how FINANSIM decisions are to be entered on a decision form, and (3) explain the meaning of each information item that will be returned to participants from the computer each period. The rules, procedures, variables, and relationships discussed in these three sections are basic to the playing of FINANSIM and should be studied carefully until the reader has a thorough understanding of them. It is also suggested that the reader answer the questions provided at the end of the chapter to test personal knowledge of these materials.

THE FINANSIM ENVIRONMENT

Each FINANSIM firm produces and sells an unnamed, unidentified product. For each period of play, which represents one year, FINANSIM managers make a number of decisions: to determine the number of production units to

be manufactured, to purchase or sell marketable securities, to float new or retire existing ten-year debentures, to obtain bank term loans to help finance company operations, to issue new common stock, to make dividend payments on existing common stock, to maintain or expand the firm's plant and machine capacity, and to invest in any or all of three types of capital improvements each period that will effect future savings for the firm by reducing its operating costs. Each FINANSIM firm will begin the simulation by operating a going concern and making decisions for Period 2. Decisions for Period 1, which are the same for all firms, have already been made; they are shown in Figure 2–1. The results of these decisions, along with other pertinent data for Period 2, are illustrated in Figures 2–2, 2–3, and 2–4. In the following sections, we will describe in detail the nature of these decisions within the context of the simulation environment.

Sales, Price, and Sales Revenue

Each period, a given level of demand is generated for the firm's product. These demand levels, which fluctuate from period to period depending upon business conditions, are beyond the control of the FINANSIM manager—that is, decisions made in the simulation do not influence demand in any way whatsoever. Each period, demand forecasts for the following five periods are made available as an aid to planning. The forecast for the period immediately following will always be the most accurate, the one for two periods hence the next most accurate, and so on.

The selling price of the firm's product, which may change from time to time, is also beyond the control of the FINANSIM manager. The manager is informed of the company's price each period on the firm's computer printout from the previous period. All units sold in any given period are the same price.

Demand in any given period can be met from both the beginning inventory that may exist and the units produced in that period. If goods are unavailable for sale to meet demand in any period, the unmet demand is lost to the firm forever; it will not be carried over into future periods.

Some of the FINANSIM firm's sales are made on a cash basis, while others are on credit. Each period in the simulation, the firm will receive payment for 90 percent of the units sold in that period; payment on the remaining 10 percent will be received in the following period. For example, if a FINANSIM company were to sell 100,000 units of its product at $40 per unit in Period 4, its cash collections for the period would be $3,600,000, and its accounts receivable at the end of the period would be $400,000.

Production and Inventories

Each period, the FINANSIM manager must decide upon the number of units the firm is to produce. All production decisions must be made in *even thousands* of units.

The *unit* cost of production is equal to a set of basic production costs over which the FINANSIM manager has no control and which will remain constant

Figure 2–1 FINANSIM DECISION FORM

Period Number ___(1) 1(2) Firm Number ___(3) ___(4)

Capital Improvements

Number to Be Purchased (0, 1, 2, or 3 of each)

Alternative A 0(6)

Alternative B 0(7)

Alternative C 0(8)

Capacity Expansion

Expand Plant Capacity by ___(10) 1(11) 2(12), 000 units

Expand Machine Capacity by ___(13) 2(14) 7(15), 000 units

Production Decision—Produce ___(17) 7(18) 7(19), 000 units

Marketable Securities Decision

+ If Purchase

– If Sell ___(23)

Amount $___(24) ___(25) ___(26), 000

Bank Term Loan Acquisition

Three-Year Loan $___(30) ___(31) ___(32), 000

Four-Year Loan $___(36) ___(37) ___(38), 000

Five-Year Loan $___(42) ___(43) ___(44), 000

Debenture Decision

Issue Debentures $___(48) 3(49) 0(50), 000

Retire Debentures $___(54) ___(55) ___(56), 000

Common Stock Decision

Issue ___(60) ___(61) ___(62), 000 shares

Pay Dividend of $1(66) 0(67) 0(68), 000