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TEACHING A FINANCIAL PLANNING LANGUAGE AS THE PRINCIPAL COMPUTER LANGUAGE FOR MBA'S

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by

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TEACHING A FINANCIAL PLANNING LANGUAGE AS THE
PRINCIPAL COMPUTER LANGUAGE FOR MBA'S

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ABSTRACT

This paper describes the experiences at SMU in using a financial planning
language (specifically, the Interactive Financial Planning System (IFPS)) as
the primary computer language taught to MBA's. The language was introduced to
extend the students' ability to solve business problems. Experiences with
teaching the language, the extent of its use, and the results of a student
survey are discussed.

INTRODUCTION

For a number of years, incoming MBA students at Southern Methodist Uni-
versity (SMU) had been taught to program in BASIC and to use a sophisticated
calculator (such as the TI-58) as part of their first semester introductory
management science and computer course. Part of the reason for the use of
BASIC was that the SMU MBA program attracts large numbers of students with hu-
manities and social science backgrounds. When a new chairman was brought in
from outside the University at the end of the 1970's, he took the view that it
was no longer appropriate to give graduate credit for learning BASIC at a time
when many were learning the language in high school. The problem then was to
redesign the computer portion of the course in a meaningful way.

It was, of course, clear that MBA students would be living in a computer
environment after graduation and that they had to be prepared for it. It was
also clear that the students should know more about computing than merely
putting data into canned programs. Teaching a more complex language than
BASIC (e.g., Pascal) would accomplish little since it was not our objective
nor that of the students to create professional programmers. What we wanted
was a way of getting students to use the computer routinely as a natural means
of solving complex problems and aiding in decision making.

The solution to our problem was to introduce a financial planning lan­
guage into the introductory course and to propagate its use throughout the MBA
program. In the following sections we describe the language chosen (the In­
teractive Financial Planning System, known by the acronym IFPS), the pedagogi­
cal advantages of using such a language, how the language was introduced into
the curriculum, and the student acceptance of this approach.

WHAT IFPS IS

IFPS is a commercial software package designed by Execucom, an Austin,
Texas firm, as a modeling language for financial planning. The original goal
of the designers of IFPS was to provide a package that would allow firms to do
probabilistic risk analysis. However, as the package took form, it became
clear that its capabilities are much broader. The basic structure of IFPS is
shown in Figure 1. From the user's point of view, IFPS is a package that op­
erates on stored files which are written in the modeling language. Each file
contains a collection of models, reports, and data files that can be re­
trieved, changed and, in the case of models, solved under a variety of condi­
tions. Models represent programs, whereas reports contain formats for print­
out results. Datafiles can be called in the course of solving models.

Among the features of IFPS which are generally not available in conven­
tional compiler languages are:
natural language. Ordinary English names can be used with almost no restrictions on name lengths.

order does not matter. IFPS is a non-procedural language. Such languages are not new (e.g., DYNAMO). The only restriction is that each variable has to appear once on the left side of a relation.

spread sheet format. The user perceives the internal world of IFPS as consisting of a two-dimensional matrix. The rows of this matrix are the variables in the model; the columns represent the time periods. IFPS places a value in each cell to represent the value of the row variable during the column's time period.

forward and backward movement in time. Commands are available that allow the use of values from previous and future time periods to be used in the computation of values for individual cells.

"what if" capability. Built-in commands allow asking "what if" questions. These can be in the form of substituting alternative values or relations, sensitivity analysis, and goal seeking. The user thereby can quickly explore the implications of decision alternatives.

simulation analysis. IFPS can be run in simulation mode, with variables being defined in terms of probability distributions. Thus, because of its column structure, IFPS is also a fixed-time interval simulation language.

built-in functions. IFPS relieves the user of programming many of the tedious, repetitive calculations of finance and statistics by containing built-in functions for net present value, internal rate of return, depreciation, trend extrapolation, and many more.

Figure 2 shows a simple deterministic IFPS model and its solution. The decision problem being modeled involves introduction of a new product which will require an initial investment and will have certain variable costs
associated with it. Estimates of the market, the firm's market share, and the
growth of these two quantities drive the values in the model. The financial
functions express the measures of effectiveness. (The model shown in Figure 2
serves as the example used to introduce our students to IFPS.)

WHY IFPS WAS INTRODUCED

As stated in the introduction of this paper, we were seeking a way of
getting students, particularly computer-naive students, to use the computer
routinely as a natural means of solving problems and aiding in decision mak­
ing. We therefore sought a language which:

1. is as close to the language of business as possible,
2. is easy for the student to learn quickly and to achieve sucess in
   rapidly,
3. allows students to see and understand the underlying assumptions of
   their models, and
4. is likely to be related to the languages they would see after
   graduation.

We will now discuss each of these points in turn.

1. The many financial planning languages developed commercially during
   the 1970's were aimed at financial analysts and other corporate staff people.
   These people were interested in having the computer essentially speak the same
   language that they do. The designers of the successful financial planning
   languages understood that the style, format, and conventions of compiler lan­
   guages such as BASIC introduced a psychological barrier to the use of the com­
   puter and had to be eliminated as much as possible. By making the planning
   languages conform to English and to the spread-sheets familiar from accounting
   practice, they gained rapid and widespread acceptance. Since, in our opinion,
a large portion of the business school experience is learning the language of business, financial planning languages are a natural choice to meet the first criterion.

2. From an instructional point of view, one of the primary attractions of the financial planning languages is the simplicity of the underlying conceptual model. This is particularly true for the financial planning languages that are non-procedural. Since the student can write down expressions one after the other in the order in which they occur in their thinking process, the models become easy to formulate and write. The simplicity of the language makes it possible for the student to write and solve a meaningful model after a single class period. Students, particularly computer-naive students, gain success quickly and, as a result, develop faith in their own ability to cope with the computer. The ability of students to learn the language quickly means that more class time can be devoted to the principles of modeling and to applications, thereby increasing the content of the course for the students.

3. Financial planning languages allow students to express their modeling assumptions clearly and explicitly. By stating their assumptions about input values and relationships in a clear form in the model, students can understand what the assumptions are. As G. R. Wagner states, they then "own" their assumptions (Ref. 1).

4. Having decided on a financial planning language, we next sought to find one that was being widely used in business and was available to universities at reasonable cost with good support. We chose IFPS because it has a very large users group (over 1,000 organizations) and is available on a time sharing network commercially, as well as being used in over 60 universities around the country.
HOW IFPS WAS INTRODUCED

IFPS became operational on the SMU CDC-6600 in February 1980. Because of our MBA program's trimester schedule we were then in the middle of the second semester. We therefore used IFPS initially as a supplementary language. The 130 full-time MBA students (in 4 sections) were taking the production and operations management course. We developed a full 2-hour lecture that introduced the deterministic features of the language including the "what if" capabilities. This initial lecture centered around the example shown in Figure 2. Students were told to put this model up on the computer and to run a series of "what if" cases. Without exception, students were able to do this without difficulty. This lecture and assignment are now standard and give students the initial success they need with a new language.

We followed up this initial assignment with one requiring the students to write their own model. Toward the end of the semester, we brought IFPS in again, this time as a way of teaching simulation, which is part of the production and operations management course. IFPS proved to be an efficient way of getting students to write their own simulation models. One of the examples used is shown in Figure 3. A limitation, of course, is that the IFPS structure is set up for fixed time intervals and hence IFPS is not suitable for modeling next event situations such as are encountered in queuing situations. (But then, one can't have everything.)

Our initial success led the engineering school to introduce the language in their engineering economy courses. It also encouraged several students to undertake projects involving the use of the language and/or to do their homework in other courses, particularly finance, in IFPS.

In the Summer 1980 trimester we introduced IFPS into the first (introductory) course for the Executive MBA class and then into the first course for
the full-time group in the fall of 1980. These students received reinforcement in the language throughout the semester and then through the following semester as they took production and operations management. At this point, as in any changeover, we continued to teach both BASIC and IFPS. However, the student response we were receiving to IFPS was so enthusiastic that starting in the summer of 1981, we dropped BASIC and offered IFPS only. (As a backup, students were offered a separate 8-hour BASIC short course. Some 55 students paid $25 to take it.)

Of particular help was the creation of the SMU Student's Guide to IFPS. The IFPS Tutorial supplied by the vendor is designed more for commercial users than students. We felt we needed a simple "how-to" set of instructions that begin with how to get on the computer and obtain IFPS, how to write a simple model, how to use the editor to correct mistakes, how to get out of IFPS, etc. This initial portion of the Guide is essentially a life-support system for the beginning student. The second part of the Guide deals with the useful features of the systems (what if, built-in functions and subroutines, and Monte Carlo simulation). The third and final part covers special features (including data files, formatted reports and some specialized examples) designed for the students who wanted to go into the language more deeply. Figure 4 shows the table of contents of the Student Guide. Figure 5 shows the extremely simple model that we used as an example throughout the Guide and ties the various pieces together.

Today, all 350 MBA's (full-time, part-time, and executive) are taught only IFPS. At the undergraduate level, it is included in most management science electives. In engineering it is used in all engineering economy and production courses. During Fall 1981, IFPS was used for the first time in an economics course.
In summary, we have moved from providing the language as a supplement to relying on it as the primary way of teaching MBA students how to use the computer.

SURVEY RESULTS

To evaluate the use of IFPS as a teaching tool, full-time and Executive MBA students were surveyed at the end of the Fall 1981 semester. The questionnaire used is shown in Figure 6. It asks students about such factors as the student's background experience with computers prior to entering the MBA program, the difficulty they experienced in learning IFPS, and how well they had accepted IFPS as a tool which they could use outside the classes in which it was taught.

Two groups of students were surveyed, each with a different amount of exposure to IFPS. The first group (117 students) consisted of four sections of full-time and one section of part-time students who had just completed the course in which the language was introduced. The second group (19 students) were a section of Executive MBA students who had used the language for two semesters, the same introductory course and the follow-on production course.

Student Background

As anticipated, the survey showed that an appreciable number of the students entering the MBA program have some experience with a computer language. Of all the students surveyed, 60% indicated they had received instruction in at least one computer language prior to the course in which IFPS was introduced. Of these, 81% had programmed in BASIC, 46% had programmed in FORTRAN, and 11% had programmed in COBOL. Of the students with no prior programming experience, over half (52%) recalled experiencing "computer anxiety" prior to starting the program.
The Learning Experience

As the students began to use IFPS as a modeling tool, 34% rated it "easy" to learn; 46% rated it "somewhat hard" to learn. Only 20% found it "hard" or "very hard" to learn.

A common problem in the teaching of computer languages is that students tend to become attached to the first language they learn and resist efforts to introduce a second language. However, this phenomenon did not occur with the students surveyed. Of the 99 students who were able to compare their learning experience in IFPS with other languages, 67 indicated that IFPS was easier to learn. Twenty-eight found the learning experiences comparable, and only 4 found IFPS more difficult to learn.

As we expected, students in the advanced section tended to perceive themselves as more proficient in the language. In the group with two semesters of experience with IFPS, 47% rated themselves as having "intermediate" language skills; the remainder of this group rated themselves as a "novice." No student in either group felt that their skills had yet reached the "expert" level. It is interesting to note that in the group with only one semester of exposure to IFPS, almost 25% described their IFPS language fluency level as "intermediate."

Most students (61%) felt that the IFPS Student Guide in its present form provided sufficient support for IFPS learning outside the classroom. Others expressed a need for more examples of the language features, possibly including cases and related IFPS models as an appendix. Another common suggestion was for more explanation of "what to do when you make a mistake." Some students commented that the availability of an "IFPS expert" teaching assistant in the terminal lab area would have been helpful.
IFPS Use Outside the Classroom

The survey showed that students with two semesters of exposure to IFPS tended to use it more as a personal tool, both for other courses and outside the classroom. In the group for which IFPS had just been introduced, only 9% reported using IFPS for homework in another course. In the more advanced group, however, over 52% used IFPS for other classes and projects.

A similar pattern was found in the students' use of IFPS as a tool for personal calculations or in a work environment. Of the students in the introductory course, 8% had used the language for personal use or on the job. In the Executive MBA section, however, over 68% indicated they had used IFPS for calculations other than classroom work.

IFPS versus Hand-held Calculators

When asked whether they felt instruction in the use of hand-held calculators or instruction in IFPS would be worth more to them for their short-term MBA experience, the students responded overwhelmingly (85%) in favor of the hand-held calculator instruction. We believe this to be a reflection of the methods of teaching in other courses in the program. When asked a similar question regarding the anticipated relative value of the two tools for the long term (in the next five years), 42% responded they felt the IFPS instruction would prove more valuable.

Perceived Future Computer Use

Most of the students anticipate using the computer as an everyday tool in the future. The survey showed that 80% plan to make use of the computer in business once they graduate.

It is interesting to note the students' perception of computer availability. Rather than the difficult-to-get-to computing power of an isolated
main-frame environment, almost two-thirds of the students surveyed said they plan to own a personal computer after graduation.

CONCLUSIONS AND FUTURE DIRECTIONS

This paper has reported the qualitative experiences with using a financial planning language as the principal language for MBA's. Survey data indicates overall satisfaction with the language after the first semester, and the ability of at least some students to use the language outside the course in which it is taught.

Based on our experience, IFPS and similar financial planning languages present a viable approach around which to structure MBA student interaction with the computer. Even students with no prior computer experience found the language easy to learn and apply to a wide range of problems. Since students can readily grasp the syntax of the language, instructional time can be better spent dealing with the principles of business problem analysis and solution. Less time is needed to describe how to represent the problem in a computer language.

In addition to being easy to learn, financial planning languages provide the student with a skill that he can apply directly upon graduation. Since very few of our students plan to become systems analysts or professional programmers, they generally have little need for procedural programming languages.

In the future, we plan to broaden the base of courses at SMU which use IFPS, including the required management science courses at the undergraduate level. Within the introductory MBA course we plan to reinforce IFPS instruction by including additional IFPS examples in the statistics and forecasting portions of the course.
We plan to survey the full-time MBA student group again at the end of the Spring semester and prior to graduation at the end of the summer semester. We anticipate finding a larger and larger percentage of students making more use of the computer as a problem-solving tool, both inside and outside of the classroom.

In general, our experiences with IFPS have been positive. The development of the Student Guide combined with documentation provided by Execucom (the software's creator) have made this a well-documented system. Students grasped the language quickly; we met very little resistance, even from students who were "programming experts" in languages such as FORTRAN or COBOL. Even that prodigious bastion of resistance to pedagogical change, the faculty, had its foundations shaken. Instructors actually became enthusiastic about using the language in their classes.
REFERENCES

FIGURE 1. Basic structure of IFPS
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**NEW PRODUCT MODEL**

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*Figure 2. Introductory Example*
MODEL MONTE VERSION OF 12/15/80 16:22
10 COLUMNS 1=81-1985
20 *
30 *RISK ANALYSIS MODEL USING SIMULATION
40 *
50 ENGINEERING DESIGN=TRIPAND(50000,50000,80000),0
60 MARKET SHAPE=NORRAND(.1,.01)
70 SALES PRICE=UNIPAND(9.00,8.75)
80 TOTAL MARKET=1000000,PREVIOUS TOTAL MARKET=1.1
90 SALES VOLUME=MARKET SHARE*TOTAL MARKET
100 GROSS INCOME=SALES VOLUME*SALES PRICE
110 PRODUCTION COST=7.00 FOR 2,7.25
120 NET INCOME=GROSS INCOME-SALES VOLUME*PRODUCTION COST-ENGINEERING DESIGN
140 INVESTMENT=100000,0
150 DISCOUNT RATE=0.13
160 PRESENT WORTH=IPVF(NET INCOME,DISCOUNT RATE,INVESTMENT)
170 RATE OF RETURN=IRR(NET INCOME,INVESTMENT)
180 TERMINAL VALUE=NTV(NET INCOME,0.08,INVESTMENT)
190 BENEFIT TO COST RATIO=SCRATI0(NET INCOME,DISCOUNT RATE,INVESTMENT)
END OF MODEL
? solve
MODEL MONTE VERSION OF 12/15/80 16:22 -- 5 COLUMNS 14 VARIABLES
ENTER SOLVE OPTIONS
? monte carlo 100
ENTER MONTE CARLO OPTIONS
? freq,hist net income,present worth,none

FREQUENCY TABLE

PROBABILITY OF VALUE BEING GREATER THAN INDICATED

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SAMPLE STATISTICS

| NET INCOME | 1985 | 165433 | 36647 | .2 | 2.3 | 162725 | 168141 |
| PRESENT WORTH | 1985 | 337968 | 102044 | .3 | 2.4 | 330427 | 345503 |

HISTOGRAM FOR COLUMN 1985 OF NET INCOME

FIGURE 3. IFPS Simulation Model

START 92000.0 STOP 252000.0 SIZE OF INTERVAL 0500.00
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NEW SALVAGE 0 0 0 0 0 0
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LIFE 20 20 20 20 20 20

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CASH INFLOWS 5550 6550
DEPRECIATION 2100 2100
BOOKVALUE 3100 1000
PRESENT VALUE 3925 4899
RATE OF RETURN .1137 .1165

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NEW OPERATING SAVINGS 9000 9000 9000 9000 9000 9000
NEW SALVAGE 0 0 0 0 0 0
SALVAGE VALUE FRACTION .0233 .0233 .0233 .0233 .0233 .0233
LIFE 20 20

ENTER SOLVE OPTIONS

model monte
READY FOR EDIT, LAST LINE IS 110
? list
MODEL MONTE VERSION OF 12/29/80 14:55
10 COLUMNS 1-6
20 SALES=INITIAL SALES,PREVIOUS SALES*SALES GROWTH RATE
30 EXPENSES=75,PREVIOUS EXPENSES+25+FIXED EXPENSE GROWTH+VARIABLE EXPENSE GROWTH
40 NET INCOME=SALES-EXPENSES
50 * 60 *
70 *
80 INITIAL SALES=TRIRAND(90,100,120),0
90 SALES GROWTH RATE=1.25*UNIRAND(0.8,1.2)
100 FIXED EXPENSE GROWTH =UNIRAND(-2,4)
110 VARIABLE EXPENSE GROWTH=UNIRAND(-3,1)
END OF MODEL
? solve
MODEL MONTE VERSION OF 12/29/80 14:55 -- 6 COLUMNS 7 VARIABLES
ENTER SOLVE OPTIONS
? all

1 2 3 4 5 6
SALES 103.3 129.2 161.3 201.8 252.3 315.3
EXPENSES 75 100 125 150 175 200
NET INCOME 28.33 29.17 36.46 51.82 77.28 115.3

INITIAL SALES 103.3 0 0 0 0 0
SALES GROWTH RATE 1.250 1.250 1.250 1.250 1.250 1.250
FIXED EXPENSE GROWTH 1 1 1 1 1 1
VARIABLE EXPENSE GROWTH -1 -1 -1 -1 -1 -1

ENTER SOLVE OPTIONS
? monte carlo 300
ENTER MONTE CARLO OPTIONS
? default freq,all
ENTER MONTE CARLO OPTIONS
? net income,none
### FREQUENCY TABLE

**PROBABILITY OF VALUE BEING GREATER THAN INDICATED**

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### SAMPLE STATISTICS

**MEAN** | **STD** | **SKEWNESS** | **KURTOSIS** | **10PC** | **CONF** | **MEAN** | **90PC**
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ENTER POOL OR MODELING LANGUAGE COMMAND

? solve
? solve options
? monte carlo 300
ENTER MONTE CARLO OPTIONS
? hist net income none

### FREQUENCY TABLE

**PROBABILITY OF VALUE BEING GREATER THAN INDICATED**

<table>
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<tr>
<th>NET INCOME</th>
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### SAMPLE STATISTICS

**MEAN** | **STD** | **SKEWNESS** | **KURTOSIS** | **10PC** | **CONF** | **MEAN** | **90PC**
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START -70.0 STOP 420.0 SIZE OF INTERVAL 24.50

ENTER POOL OR MODELING LANGUAGE COMMAND

?
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SALES = 100, PREVIOUS SALES * 1.25
EXPENSES = 75, 100, 125, 150, 175
NET INCOME = SALES - EXPENSES

RATIO ANALYSIS

PERCENT OF SALES
EXPENSE RATIO
NET INCOME RATIO

ENTER SOLVE OPTIONS

FIGURE 5. Example Used In Student Guide
Figure 6.

IFPS QUESTIONNAIRE

We are surveying the MBA class about its responses to the use of the IFPS in the MBA program. We would appreciate your filling out this brief questionnaire. Thanks for your help.

T.E. Perkins and P. Gray

Do you consider yourself a novice _ intermediate _ expert _ in IFPS?

Did you find it easy _ somewhat hard _ hard _ very hard _ to learn IFPS?

Was the IFPS Student Guide sufficient support for learning the language?

Yes _ No

If not, please explain on the back of this page.

Have you used IFPS in any course other than MS&c (e.g., homework, class project, case analysis)?

Yes _ NO

If yes, please describe on the back of this page how and how often you have used it.

Have you ever created an IFPS model for personal use (e.g., personal finances, taxes) or as part of your job or as a research assistant to a professor?

Yes _ NO

If yes, please describe on the back of this page.

Have you received instruction in another computer language either at SMU or elsewhere (include BASIC short course)?

Yes _ NO

If yes, which languages: BASIC _ FORTRAN _ SPSS _ OTHER(specify)

Did you find IFPS easier _ same as _ harder _ to learn than other computer languages?

Do you expect to be using a computer after you graduate?

Yes _ NO

Do you expect to own your own personal computer?

Yes _ NO

As part of your MS&C course work you received instruction in both the use of the MBA calculator and modeling in IFPS. Which of these do you believe is worth more to you:

in the short term (while at SMU) MBA _ IFPS _
in the long term (during next 5 years) MBA _ IFPS _

Answer the following questions only if you did not have computer experience prior to coming to SMU:

Did you have "fear of computer" prior to coming to SMU?

Yes _ NO

If yes, have you overcome that fear?

Yes _ NO

Demographic Data:

Male _ Female

Year of Bachelor's Degree

No. of units of mathematics/statistics as undergraduate

MBA concentration:

Accounting _ Finance _ International _ Marketing _ MS&C _
Organizational Behavior _ Real Estate _ Other

Professor: Aronofsky _ Barr _ Perkins _ Sobol
The following papers are currently available in the Edwin L. Cox School of Business Working Paper Series:

79-100  "Microdata File Merging Through Large-Scale Network Technology," by Richard S. Barr and J. Scott Turner

79-101  "Perceived Environmental Uncertainty: An Individual or Environmental Attribute," by Peter Lorenzi, Henry P. Sims, Jr., and John W. Slocum, Jr.


80-100  "Implementing the Portfolio (SBU) Concept," by Richard A. Bettis and William K. Hall

80-101  "Assessing Organizational Change Approaches: Towards a Comparative Typology," by Don Hellriegel and John W. Slocum, Jr.

80-102  "Constructing a Theory of Accounting--An Axiomatic Approach," by Marvin L. Carlson and James W. Lamb

80-103  "Mentors & Managers," by Michael E. McGill

80-104  "Budgeting Capital for R&D: An Application of Option Pricing," by John W. Kensinger

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80-902  "Hedging Uncertain Foreign Exchange Positions," by Mark R. Eaker and Dwight M. Grant

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80-112 "The Information Needs of Business With Special Application to Managerial Decision Making," by Paul Gray

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80-123 "The Environment For Funds Management Decisions In Coming Years," by George H. Hempel

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81-201 "The SMU Decision Room Project," by Paul Gray, Julius Aronofsky, Nancy W. Berry, Olaf Helmer, Gerald R. Kane, and Thomas E. Perkins

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81-400 "Merchandising Decisions: A New View of Planning and Measuring Performance," by Michael Levy and Charles A. Ingene


81-600 "Managerial Uncertainty and Performance," by H. Kirk Downey and John W. Slocum, Jr.

81-601 "Compensating Balance, Rationality, and Optimality," by Chun H. Lam and Kenneth J. Boudreaux


81-800 "The Chinese-U.S. Symposium On Systems Analysis," by Paul Gray and Burton V. Dean


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