Current and Potential Application of Microcomputers in Banking -- Survey Results

Chun H. Lam
Southern Methodist University

Geogre H. Hempel
Southern Methodist University

Follow this and additional works at: https://scholar.smu.edu/business_workingpapers

Part of the Business Commons

This document is brought to you for free and open access by the Cox School of Business at SMU Scholar. It has been accepted for inclusion in Historical Working Papers by an authorized administrator of SMU Scholar. For more information, please visit http://digitalrepository.smu.edu.
CURRENT AND POTENTIAL APPLICATION OF MICROCOMPUTERS IN BANKING -- SURVEY RESULTS

Working Paper 83-111*

by

Chun H. Lam

and

George H. Hempel

Chun H. Lam
Associate Professor of Finance
Edwin L. Cox School of Business
Southern Methodist University
Dallas, Texas 75275

George H. Hempel
Professor of Finance
Edwin L. Cox School of Business
Southern Methodist University
Dallas, Texas 75275

Chun H. Lam and George H. Hempel also serve on the faculty of the Southwestern Graduate School of Banking at SMU.

*This paper represents a draft of work in progress by the authors and is being sent to you for information and review. Responsibility for the contents rests solely with the authors. This working paper may not be reproduced or distributed without the written consent of the authors. Please address all correspondence to Chun H. Lam or George H. Hempel.
CURRENT AND POTENTIAL APPLICATION OF MICROCOMPUTERS IN BANKING: SURVEY RESULT

Microcomputers have tremendous potential applications in practically all aspects of banking. In the past two years, many banking institutions have utilized microcomputers as tools in asset liability management, loan management, and investment management to improve bank-customer relationship and as a counseling and consulting vehicle. A recent study on microcomputers in banking divided the potential areas of applications into six broad categories, and analyzed each area for its suitability in implementation for banks of various sizes. These areas include (1) strategic management, (2) specific functional management, (3) bank operations, (4) bank consulting services, (5) bank marketing, and (6) bank communication including both external and internal communications. Due to the low price tag of most microcomputer and the increasing availability of user-friendly, menu-driven softwares for banking applications, the authors concluded that microcomputers would have great potentials in improving operating efficiency, lowering costs, and increasing fee income if the technology is properly utilized.

Such conclusions about potential application have not, heretofore, been tested. There are skeptics who say the number of banks currently using or working to use microcomputers is relatively small. Some writers identify specific areas for actual or potential microcomputer application without testing in which areas applications are widely used. For these reasons, the present study empirically investigates the extent to which banks are using microcomputers and in what areas are microcomputers being applied or are planned to be applied in the near future.
METHODOLOGY

The data for this study were obtained via a survey of bankers who were taking an elective course in microcomputers at the Southwestern Graduate School of Banking at Southern Methodist University, Dallas, Texas in June, 1983. For each of the potential areas of application in banking, they were asked to indicate the extent to which their banks are currently using or are contemplating using microcomputers in their organizations. To gauge the commitment in using microcomputers in the future, the survey instructed the bankers to indicate the time frame of the commitment by checking one of two boxes: (i) anticipated and (ii) desired. Anticipated represented those applications that the organization has already planned for within the next six (6) months. Desired represented those applications the organization would like to have in the future.

Respondents were also asked to state the asset size of their banks, the microcomputers employed, and to check off items describing the user characteristics. Bankers from fifty seven different banks responded to the survey. The survey results are discussed below.

SURVEY RESULTS

Bank and User Characteristics

Table 1 provides a summary of the respondent bank's characteristics. Majority of the sample banks are small to medium size banks with asset size of less than $1 billion (80.7%). Banks with assets more than $1 billion represent only 19.3%. The brand names used in these banks are diverse and include IBM, Apple, Osborne, TRS 80, Victor, Hewlett-Packard, and Monroe. At the time of the survey there did not seem to be any significant dominance of any particular machinery in the banking industry. In fact, respondent banks often use
several different brand names in the same organization. This result is not surprising for two reasons: (1) the markets for hardware are very diversified in the past few years, and more importantly, (2) hardware prices are relatively low and purchase decisions are more dominated by the availability of application softwares and the expertise and familiarity of the users on particular softwares.

<Insert Table 1 here>

The reported user characteristics provided interesting data for analysis. When the respondents were asked to check off identity of the users, 11.4% (of total responses) checked the president, 35.09% the vice presidents, 13.16% the managers, 26.32% clerical staff and only 14.04% checked data processing professional. This result indicates that managerial personnel (president, vice president, and managers) are utilizing this powerful tool, most likely as a decision tool. The user friendly, menu driven features of microcomputer softwares facilitate the involvement of decision makers in direct usage. Many bankers we talked with on other occasions have told us they wrote their own application programs for various applications. The ease of use of the microcomputer is further substantiated by the computer programming background of the users. Fifty percent of the users have no previous programming experience, 46.15% have minimal experience. Only 1.92% of the users regard themselves as competent programmer and 1.92% indicated that they were professional.

Areas of Applications

The respondent banks were asked to check off one of 3 columns in each of the potential areas of applications indicating whether the banks (i) were currently using the microcomputer for that application (Current), (ii) had
already planned to use it within the next six (6) months (*Anticipate*), or 
(iii) would desire to use it in the future (*Desire*). For ease of exposition, 
we divided the application areas with its corresponding survey results into 8 
different categories (A) Strategic Management, (B) Loan Portfolio Management, 
(C) Investment Portfolio Management, (D) Deposit Accounts Management, (E) Bank 
Operations (F) Bank Consulting Services (G) Bank Marketing, (H) Bank 
Communication and Miscellaneous. 
(A) **Strategic Management**

Table 2 summarizes the survey result in this category. Asset liability 
management and interest rate sensitivity analysis including gap analysis are 
the two areas of most concern. Over 40% of the respondent banks indicated 
that they were using some forms of software for these applications. Practi­
cally all the remaining respondents indicated that they had either planned for 
this application in the next six (6) months or would like to have these appli­
cations in the future. One interesting fact was revealed in the analysis. 
The percentage of respondents indicating applications of interest rate sensi­
tivity analysis exceeds 100%. Closer scrutiny revealed that three (3) respon­
dents had built an in-house rate sensitivity program but would desire to have 
a more sophisticated version in the future. Discussion with bankers in the 
microcomputer conference reveals that this practice is not at all uncommon.³ 
Initially, some bankers designed their own application using an easy to use 
electronic spreadsheet such as VISICALC. As their experience with microcom­
puters grew, they would purchase a more sophisticated and comprehensive pack­
age from a software vendor.

<Insert Table 2 here>
Tax planning and cashflow analysis were also important areas of applications. More than one third of the respondents indicated that they were currently using microcomputers in these areas. A significant percentage of the remaining respondents either had planned for or desired to use a microcomputer in these areas.

Responses to questions about the more sophisticated tools for strategic planning, such as mathematical programming and hedging by using options and financial futures, reveals that only about 17% were using microcomputers for these purposes. While about 30% would like to or had planned for such applications, the remaining (over 50%) had not indicated any intentions in the future. This result is not at all surprising as these techniques require personnel who have extensive training in these areas.

(B) Loan Portfolio Management

The survey result in Table 3 reveals the diversity of application of the micro in loan portfolio management. Among the eight (8) areas tabulated, credit analysis, customer profitability analysis, calculation of cost of funds, and default account collection, were the most cited areas of current applications. More than 31% of the respondents indicated that they were using the microcomputer for credit analysis for commercial accounts and about 25% indicated the usage of microcomputers for credit analysis for consumer accounts. About 25% of the respondents used micro for customer profitability analysis. More than one third indicated that they were currently using micros for calculation of costs of funds and 28% indicated they were using microcomputers for default account collection efforts. The remaining four areas of applications (credit scoring, loan pricing, performance evaluation, and credit analysis training) did not receive as high a priority as current applications.
A close examination of the Anticipate and Desired columns reveal that the respondents are very interested in future application in all areas. In particular, only 12.28% of the respondents were using microcomputer for commercial accounts loan pricing, 26.32% indicated that they had planned for such a system within the next six (6) months and a whopping 42% desired to have such capability in the future. Such strong interest in desired future applications are also apparent in areas including credit scoring model (28%), loan pricing for consumer (30%), customer profitability analysis (33.3%), calculation of cost of funds (29.8%), and credit analysis training (26.3%).

The loan portfolio application area with the largest proportion of non-responses is credit analysis training (58% non-response) indicating that this area may be less appropriate for microcomputer applications than other areas. However, 26% of the respondents indicated their desire in application for the future.

(C) Investment Portfolio Management

While current interest in using microcomputers in the management of investment portfolio is not as strong as those in the strategic management areas, there appears to be a strong desire for application in certain areas in the future (see Table 4). The most applied areas currently include bond investment strategy using simulation (19.3%), bond yield calculation (29.8%), bond swap strategy (19.3%), and bond coupon tabulation and clipping (24.6%). The three areas which most respondents desired to have in the future also include bond simulation (33.3%), bond yield calculation (24.5%) and bond swap strategy (31.6%). Using microcomputers to identify arbitrage opportunities seemed to receive the least attention by respondents.

<Insert Table 4 here>
(D) Deposit Accounts Management

Similar to the investment category, strong interest was indicated by the respondents in using the microcomputer in deposit account management (see Table 5). The two areas most used currently include pricing (26.3%) and account analysis and forecast (29.8%). Microcomputers were also used in individualized IRA analysis for customers, (19.3%), deposit rates inquiry (24.5%), and signature recognition for cashing checks (12.3%). Strong interest was indicated for future usage in nearly all areas.

<Insert Table 5 here>

(E) Bank Operations

Among the three (3) areas of applications indicated, check pick-up scheduling was the most popular area in this category (see Table 6). However, very few banks indicated a desire for future applications in this area. Using a microcomputer to keep track of bank personnel information, however, received a better score for future application. Overall, it seems that the bank operation category did not have a high priority for those respondent banks. This low priority may be due to the extensive use of mainframes in this area.

<Insert Table 6 here>

(F) Bank Consulting Services

From the summary tabulation in Table 7, it is apparent that the majority of the respondent banks are not currently using the microcomputer as a consulting tool. For example, only 5.26% of the respondents are using the microcomputer to help the business customer or consumer. However, the statistics under the desire column indicates that there is strong interest and recognition of this tool as a fee generating vehicle in the future. As deregulation
continues and competition among institutions increases, it is highly likely that this category of application will become more important.

<Insert Table 7 here>

(G) Bank Marketing

Microcomputers can be a useful tool in bank marketing. For example, with individualized retirement account analysis software available, questions by potential customers regarding their future cashflow from the account can be analyzed and demonstrated to the customers immediately. Microcomputers have also been used in the lobby for customer inquiry. Banks can also use the microcomputers to control video presentations. The survey result in Table 8 indicated that such applications are not widely used currently, but quite a number of banks did recognize and desire such application in the future.

<Insert Table 8 here>

(H) Bank Communication and Miscellaneous

The final category of the applications include using microcomputers as a communication device and in other miscellaneous areas. With the exception of using the microcomputer to access Federal Reserve Services, as a word processor, and for safe deposit box accounting, current applications in these areas are minimal. Furthermore, the desire for using microcomputers in these areas are also much less than other categories. These statistics may reflect the fact that communication software (which is needed to interface with mainframe computers) is not fully developed currently. As the availability of these softwares are widely available inexpensively, one would expect an increase in application in these areas.

<Insert Table 9 here>
Summary and Conclusions

In this paper, we have empirically examined the extent to which banks are using microcomputers and in what areas microcomputers are being applied or planned to be used in the near future. We verified that microcomputers were used in nearly all of the fifty-seven banks surveyed. In addition, we found many of the surveyed banks used microcomputers in many of the potential areas for application.

Areas of particularly extensive current application included strategic management (particularly asset/liability management, cash flow analysis, and interest rate sensitivity analysis), loan portfolio management (with emphasis on credit analysis, customer profitability analysis, cost of funds and default account collection), word processing, and deposit account analysis (particularly pricing and account analysis and forecast). Areas in which applications were anticipated by numerous banks included interest rate sensitivity, and loan pricing, customer profitability analysis. Areas of extensive desired future usage included most categories of strategic management, investment and bond swap strategies, most areas of deposit account management, and most consulting service areas. The area with the lowest current, anticipated, and desired usage was bank operation. Based on current, anticipated, and desired usage and the position of bankers using microcomputers, we conclude microcomputers are being used by upper-level bank management for decision making. Future growth in usage appears likely to continue in this vein.
NOTES


3Microscape 1983, a microcomputer conference sponsored by Bank Administration Institute in Chicago, August, 1983.
### Table 1

Bank and User Characteristics  
*number of respondent banks* n = 57

1. **Bank Asset Size**
   - less than $1 billion: 80.7%  
   - larger than $1 billion: 19.3%

2. **User Characteristics**
   - (i) **User(s) of microcomputers**
     - President: 11.4%  
     - Vice President: 35.09%  
     - Managers: 13.16%  
     - Clerical Staff: 26.32%  
     - Data Processing Professional: 14.04%
   - (ii) **Computer programming background**
     - None: 50%  
     - Minimal: 46.15%  
     - Competent: 1.92%  
     - Professional: 1.92%
Table 2

Application of Microcomputers in Strategic Management
(all numbers are expressed as percentages of the 57 respondent banks)

<table>
<thead>
<tr>
<th>Application</th>
<th>Current</th>
<th>Anticipate</th>
<th>Desire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Asset Liability Management Financial statement projections and analysis</td>
<td>43.86%</td>
<td>20.69%</td>
<td>24.56%</td>
</tr>
<tr>
<td>2. Interest rate sensitivity including gapping analysis</td>
<td>43.86%</td>
<td>28.07%</td>
<td>24.56*</td>
</tr>
<tr>
<td>3. Tax planning for management of the bank</td>
<td>33.33%</td>
<td>22.81%</td>
<td>33.33%</td>
</tr>
<tr>
<td>4. Cash flow analysis for liquidity and reserve management</td>
<td>38.60%</td>
<td>17.54%</td>
<td>28.07%</td>
</tr>
<tr>
<td>5. Optimization Approach using mathematical programming techniques</td>
<td>17.54%</td>
<td>7.01%</td>
<td>24.56%</td>
</tr>
<tr>
<td>6. Hedging strategy using options and financial futures</td>
<td>17.54%</td>
<td>3.51%</td>
<td>26.32%</td>
</tr>
</tbody>
</table>

*Includes 3 cases in which banks were currently using microcomputer in rate sensitivity analysis but would also desire a more comprehensive model from vendors in the future.
Table 3

Application of Microcomputer in Loan Portfolio Management
(all numbers are in percentages of respondents)

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>Anticipate</th>
<th>Desire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Credit analysis for commercial accounts</td>
<td>31.58</td>
<td>19.30</td>
<td>28.07</td>
</tr>
<tr>
<td></td>
<td>consumer accounts</td>
<td>24.56</td>
<td>10.53</td>
</tr>
<tr>
<td>2. Credit analysis using credit models</td>
<td>12.28</td>
<td>7.02</td>
<td>28.07</td>
</tr>
<tr>
<td>3. Loan pricing for commercial accounts</td>
<td>12.28</td>
<td>26.32</td>
<td>42.11</td>
</tr>
<tr>
<td></td>
<td>consumer accounts</td>
<td>12.28</td>
<td>15.79</td>
</tr>
<tr>
<td>4. Customer profitability analysis</td>
<td>24.56</td>
<td>26.31</td>
<td>33.33</td>
</tr>
<tr>
<td>5. Calculation of cost of funds</td>
<td>36.84</td>
<td>14.04</td>
<td>29.83</td>
</tr>
<tr>
<td>6. Default account collection</td>
<td>28.07</td>
<td>3.5</td>
<td>15.79</td>
</tr>
<tr>
<td>7. Performance evaluation</td>
<td>21.05</td>
<td>5.26</td>
<td>24.56</td>
</tr>
<tr>
<td>8. Credit analysis training</td>
<td>10.53</td>
<td>5.26</td>
<td>26.32</td>
</tr>
</tbody>
</table>
Table 4

Application of Microcomputer in Investment Portfolio Management
(all numbers are expressed as percentages of the 57 respondent banks)

<table>
<thead>
<tr>
<th>1. Bond buy, sell hold strategy using simulation</th>
<th>Current</th>
<th>Anticipate</th>
<th>Desire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>19.30</td>
<td>8.77</td>
<td>33.33</td>
</tr>
<tr>
<td>2. Bond yield calculation</td>
<td>29.83</td>
<td>7.02</td>
<td>24.56</td>
</tr>
<tr>
<td>3. Bond swap strategy</td>
<td>19.30</td>
<td>8.77</td>
<td>31.58</td>
</tr>
<tr>
<td>4. Bond coupon tabulation and clipping</td>
<td>24.56</td>
<td>5.26</td>
<td>10.53</td>
</tr>
<tr>
<td>5. Repurchase agreement analysis</td>
<td>17.54</td>
<td>1.75</td>
<td>15.79</td>
</tr>
<tr>
<td>6. Repurchase agreement securities monitoring</td>
<td>15.79</td>
<td>3.50</td>
<td>15.79</td>
</tr>
<tr>
<td>7. Identify arbitrage opportunities</td>
<td>10.53</td>
<td>5.26</td>
<td>15.79</td>
</tr>
</tbody>
</table>
Table 5

Application of Microcomputer in Deposit Accounts Management
(all numbers are expressed as percentage of the 57 respondent banks)

<table>
<thead>
<tr>
<th>1. Deposit accounts pricing</th>
<th>Current</th>
<th>Anticipate</th>
<th>Desire</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>26.32</td>
<td>10.53</td>
<td>31.58</td>
</tr>
<tr>
<td>2. Individualized IRA analysis for (potential) customers</td>
<td>19.30</td>
<td>12.28</td>
<td>29.83</td>
</tr>
<tr>
<td>3. Deposit accounts analysis and forecast</td>
<td>29.83</td>
<td>5.26</td>
<td>26.32</td>
</tr>
<tr>
<td>4. Deposit accounts balance inquiry system</td>
<td>42.11</td>
<td>1.75</td>
<td>22.81</td>
</tr>
<tr>
<td>5. Deposit rates (C.D., MMA) inquiry system</td>
<td>24.56</td>
<td>3.50</td>
<td>24.56</td>
</tr>
<tr>
<td>6. Signature recognition for cashing checks</td>
<td>12.28</td>
<td>5.26</td>
<td>21.05</td>
</tr>
</tbody>
</table>
Table 6
Application of Microcomputer in Bank Operations
(all numbers are expressed as percentages of the 57 respondent banks)

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>Anticipate</th>
<th>Desire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Scheduling of check pick up from branches</td>
<td>21.05</td>
<td>0</td>
<td>3.5</td>
</tr>
<tr>
<td>2. Employee work scheduling</td>
<td>8.77</td>
<td>5.26</td>
<td>12.28</td>
</tr>
<tr>
<td>3. Bank personnel information system</td>
<td>17.54</td>
<td>7.02</td>
<td>21.05</td>
</tr>
</tbody>
</table>
Table 7

Application of Microcomputer in Consulting Services
(all numbers are expressed as percentages of the 57 respondent banks)

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>Anticipate</th>
<th>Desire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Cash management (lock-box and disbursement program)</td>
<td>14.04</td>
<td>1.75</td>
<td>19.30</td>
</tr>
<tr>
<td>2. Financial planning for business</td>
<td>5.26</td>
<td>10.53</td>
<td>35.09</td>
</tr>
<tr>
<td>3. Financial planning for consumers</td>
<td>5.26</td>
<td>5.26</td>
<td>28.07</td>
</tr>
<tr>
<td>4. Investment and financing advice</td>
<td>5.26</td>
<td>8.77</td>
<td>31.58</td>
</tr>
<tr>
<td>5. Trust service and estate planning</td>
<td>12.28</td>
<td>3.50</td>
<td>22.81</td>
</tr>
</tbody>
</table>
Table 8

Application of Microcomputer in Bank Marketing
(all numbers are expressed as percentages of the 57 respondent banks)

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>Anticipate</th>
<th>Desire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Individualize IRA analysis</td>
<td>15.79</td>
<td>10.53</td>
<td>31.58</td>
</tr>
<tr>
<td>2. Direct inquiry via microcomputers in lobby</td>
<td>5.26</td>
<td>5.26</td>
<td>26.32</td>
</tr>
<tr>
<td>3. Microcomputer-controlled video presentation</td>
<td>1.75</td>
<td>5.26</td>
<td>22.81</td>
</tr>
</tbody>
</table>
Table 9

Application of Microcomputer in Communication and Miscellaneous Activities
(all numbers are expressed as percentages of the 57 respondent banks)

<table>
<thead>
<tr>
<th></th>
<th>Current</th>
<th>Anticipate</th>
<th>Desire</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Electronic Mail (memos to branches or subsidiary)</td>
<td>8.77</td>
<td>3.50</td>
<td>21.05</td>
</tr>
<tr>
<td>2. Market information sent to branches or subsidiary</td>
<td>10.53</td>
<td>1.75</td>
<td>14.04</td>
</tr>
<tr>
<td>3. Access national data bases</td>
<td>7.02</td>
<td>8.77</td>
<td>14.04</td>
</tr>
<tr>
<td>4. Access Fed Line Services (of the Fed)</td>
<td>26.32</td>
<td>7.02</td>
<td>15.79</td>
</tr>
<tr>
<td>5. Home banking services</td>
<td>3.50</td>
<td>3.50</td>
<td>19.30</td>
</tr>
<tr>
<td>6. Word processing</td>
<td>49.12</td>
<td>12.28</td>
<td>19.30</td>
</tr>
<tr>
<td>7. Safe deposit box accounting</td>
<td>19.30</td>
<td>14.04</td>
<td>24.56</td>
</tr>
</tbody>
</table>
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

80-200  "Financial Terms of Sale and Control of Marketing Channel Conflict," by Michael Levy and Dwight Grant


80-301  "Controlling the Performance of People in Organizations," by Steven Kerr and John W. Slocum, Jr.

80-400  "The Effects of Racial Composition on Neighborhood Succession," by Kerry D. Vandell


80-801  "Comparison of the EEOCC Four-Fifths Rule and A One, Two or Three σ Binomial Criterion," by Marion Gross Sobol and Paul Ellard

80-900  "Bank Portfolio Management: The Role of Financial Futures," by Dwight M. Grant and George Hempel
80-902 "Hedging Uncertain Foreign Exchange Positions," by Mark R. Eaker and Dwight M. Grant


80-111 "Sources of Performance Differences in Related and Unrelated Diversified Firms," by Richard A. Bettis

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

80-113 "Diversification Strategy, Accounting Determined Risk, and Accounting Determined Return," by Richard A. Bettis and William K. Hall

80-114 "Toward Analytically Precise Definitions of Market Value and Highest and Best Use," by Kerry D. Vandell

80-115 "Person-Situation Interaction: An Exploration of Competing Models of Fit," by William F. Joyce, John W. Slocum, Jr., and Mary Ann Von Glinow

80-116 "Correlates of Climate Discrepancy," by William F. Joyce and John Slocum

80-117 "Alternative Perspectives on Neighborhood Decline," by Arthur P. Solomon and Kerry D. Vandell

80-121 "Project Abandonment as a Put Option: Dealing with the Capital Investment Decision and Operating Risk Using Option Pricing Theory," by John W. Kensinger

80-122 "The Interrelationships Between Banking Returns and Risks," by George H. Hempel

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

81-100 "A Test of Gouldner’s Norm of Reciprocity in a Commercial Marketing Research Setting," by Roger Kerin, Thomas Barry, and Alan Dubinsky

81-200 "Solution Strategies and Algorithm Behavior in Large-Scale Network Codes," by Richard S. Barr

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

81-300 "Cash Discounts to Retail Customers: An Alternative to Credit Card Performance," by Michael Levy and Charles Ingene

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

81-501 "Job Redesign: Improving the Quality of Working Life," by John W. Slocum, Jr.

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


81-900 "Forecasting Industrial Bond Rating Changes: A Multivariate Model," by John W. Peavy, III

81-110 "Improving Gap Management as a Technique for Reducing Interest Rate Risk," by Donald G. Simonson and George H. Hempel


81-112 "The Significance of Price-Earnings Ratios on Portfolio Returns," by John W. Peavy, III and David A. Goodman

81-113 "Further Evaluation of Financing Costs for Multinational Subsidiaries," by Catherine J. Bruno and Mark R. Eaker

81-114 "Seven Key Rules for Successful Stock Market Speculation," by David Goodman

81-115 "The Price-Earnings Relative as an Indicator of Investment Returns," by David Goodman and John W. Peavy, III


81-117 "Sequential Information Dissemination and Relative Market Efficiency," by Christopher B. Barry and Robert H. Jennings

81-118 "Modeling Earnings Behavior," by Michael F. van Breda


81-120 "The Price-Earnings Relatives - A New Twist to the Low-Multiple Strategy," by David A. Goodman and John W. Peavy, III

82-100 "Risk Considerations in Modeling Corporate Strategy," by Richard A. Bettis
<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>82-103</td>
<td>&quot;A Typology of Small Businesses: Hypothesis and Preliminary Study,&quot;</td>
<td>Neil C. Churchill and Virginia L. Lewis</td>
</tr>
<tr>
<td>82-104</td>
<td>&quot;Imperfect Information, Uncertainty, and Credit Rationing: A Comment and Extension,&quot;</td>
<td>Kerry D. Vandelli</td>
</tr>
<tr>
<td>82-200</td>
<td>&quot;Equilibrium in a Futures Market,&quot;</td>
<td>Jerome Baesel and Dwight Grant</td>
</tr>
<tr>
<td>82-201</td>
<td>&quot;A Market Index Futures Contract and Portfolio Selection,&quot;</td>
<td>Dwight Grant</td>
</tr>
<tr>
<td>82-202</td>
<td>&quot;Selecting Optimal Portfolios with a Futures Market in a Stock Index,&quot;</td>
<td>Dwight Grant</td>
</tr>
<tr>
<td>82-203</td>
<td>&quot;Market Index Futures Contracts: Some Thoughts on Delivery Dates,&quot;</td>
<td>Dwight Grant</td>
</tr>
<tr>
<td>82-204</td>
<td>&quot;Optimal Sequential Futures Trading,&quot;</td>
<td>Jerome Baesel and Dwight Grant</td>
</tr>
<tr>
<td>82-300</td>
<td>&quot;The Hypothesized Effects of Ability in the Turnover Process,&quot;</td>
<td>Ellen F. Jackofsky and Lawrence H. Peters</td>
</tr>
<tr>
<td>82-301</td>
<td>&quot;Teaching a Financial Planning Language as the Principal Computer Language for MBA's,&quot;</td>
<td>Thomas E. Perkins and Paul Gray</td>
</tr>
<tr>
<td>82-302</td>
<td>&quot;Put Budgeting Back Into Capital Budgeting,&quot;</td>
<td>Michael F. van Breda</td>
</tr>
<tr>
<td>82-400</td>
<td>&quot;Information Dissemination and Portfolio Choice,&quot;</td>
<td>Robert H. Jennings and Christopher B. Barry</td>
</tr>
<tr>
<td>82-401</td>
<td>&quot;Reality Shock: The Link Between Socialization and Organizational Commitment,&quot;</td>
<td>Roger A. Dean</td>
</tr>
<tr>
<td>82-402</td>
<td>&quot;Reporting on the Annual Report,&quot;</td>
<td>Gail E. Farrelly and Gail B. Wright</td>
</tr>
<tr>
<td>82-601</td>
<td>&quot;Optimal Land Use Planning,&quot;</td>
<td>Richard B. Peiser</td>
</tr>
<tr>
<td>82-602</td>
<td>&quot;Variances and Indices,&quot;</td>
<td>Michael F. van Breda</td>
</tr>
<tr>
<td>82-603</td>
<td>&quot;The Pricing of Small Business Loans,&quot;</td>
<td>Jonathan A. Scott</td>
</tr>
<tr>
<td>82-604</td>
<td>&quot;Collateral Requirements and Small Business Loans,&quot;</td>
<td>Jonathan A. Scott</td>
</tr>
<tr>
<td>82-605</td>
<td>&quot;Validation Strategies for Multiple Regression Analysis: A Tutorial,&quot;</td>
<td>Marion G. Sobol</td>
</tr>
</tbody>
</table>
82-700 "Credit Rationing and the Small Business Community," by Jonathan A. Scott

82-701 "Bank Structure and Small Business Loan Markets," by William C. Dunkelberg and Jonathan A. Scott

82-800 "Transportation Evaluation in Community Design: An Extension with Equilibrium Route Assignment," by Richard B. Peiser

82-801 "An Expanded Commercial Paper Rating Scale: Classification of Industrial Issuers," by John W. Peavy, III and S. Michael Edgar

82-802 "Inflation, Risk, and Corporate Profitability: Effects on Common Stock Returns," by David A. Goodman and John W. Peavy, III

82-803 "Turnover and Job Performance: An Integrated Process Model," by Ellen F. Jackofsky


82-806 "Analytical Review Developments in Practice: Misconceptions, Potential Applications, and Field Experience," by Wanda Wallace

82-807 "Using Financial Planning Languages for Simulation," by Paul Gray

82-808 "A Look at How Managers' Minds Work," by John W. Slocum, Jr. and Don Hellriegel

82-900 "The Impact of Price Earnings Ratios on Portfolio Returns," by John W. Peavy, III and David A. Goodman

82-901 "Replicating Electric Utility Short-Term Credit Ratings," by John W. Peavy, III and S. Michael Edgar

82-902 "Job Turnover Versus Company Turnover: Reassessment of the March and Simon Participation Model," by Ellen F. Jackofsky and Lawrence H. Peters

82-903 "Investment Management by Multiple Managers: An Agency-Theoretic Explanation," by Christopher B. Barry and Laura T. Starks

82-904 "The Senior Marketing Officer - An Academic Perspective," by James T. Rothe

82-905 "The Impact of Cable Television on Subscriber and Nonsubscriber Behavior," by James T. Rothe, Michael G. Harvey, and George C. Michael

82-110 "Reasons for Quitting: A Comparison of Part-Time and Full-Time Employees," by James R. Salter, Lawrence H. Peters, and Ellen F. Jackofsky

82-111 "Integrating Financial Portfolio Analysis with Product Portfolio Models," by Vijay Mahajan and Jerry Wind
<table>
<thead>
<tr>
<th>Volume</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>82-112</td>
<td>&quot;A Non-Uniform Influence Innovation Diffusion Model of New Product Acceptance,&quot;</td>
<td>Christopher J. Easingwood, Vijay Mahajan, and Eitan Muller</td>
</tr>
<tr>
<td>82-113</td>
<td>&quot;The Acceptability of Regression Analysis as Evidence in a Courtroom - Implications for the Auditor,&quot;</td>
<td>Wanda A. Wallace</td>
</tr>
<tr>
<td>82-114</td>
<td>&quot;A Further Inquiry Into the Market Value and Earnings' Yield Anomalies,&quot;</td>
<td>John W. Peavy, III and David A. Goodman</td>
</tr>
<tr>
<td>82-120</td>
<td>&quot;Compensating Balances, Deficiency Fees and Lines of Credit: An Operational Model,&quot;</td>
<td>Chun H. Lam and Kenneth J. Boudreaux</td>
</tr>
<tr>
<td>82-121</td>
<td>&quot;Toward a Formal Model of Optimal Seller Behavior in the Real Estate Transactions Process,&quot;</td>
<td>Kerry Vandell</td>
</tr>
<tr>
<td>82-123</td>
<td>&quot;Compensating Balances, Deficiency Fees and Lines of Credit,&quot;</td>
<td>Chun H. Lam and Kenneth J. Boudreaux</td>
</tr>
<tr>
<td>83-100</td>
<td>&quot;Teaching Software System Design: An Experiential Approach,&quot;</td>
<td>Thomas E. Perkins</td>
</tr>
<tr>
<td>83-102</td>
<td>&quot;An Interactive Approach to Pension Fund Asset Management,&quot;</td>
<td>David A. Goodman and John W. Peavy, III</td>
</tr>
<tr>
<td>83-105</td>
<td>&quot;Robust Regression: Method and Applications,&quot;</td>
<td>Vijay Mahajan, Subhash Sharma, and Jerry Wind</td>
</tr>
<tr>
<td>83-106</td>
<td>&quot;An Approach to Repeat-Purchase Diffusion Analysis,&quot;</td>
<td>Vijay Mahajan, Subhash Sharma, and Jerry Wind</td>
</tr>
<tr>
<td>83-200</td>
<td>&quot;A Life Stage Analysis of Small Business Strategies and Performance,&quot;</td>
<td>Rajeswararao Chaganti, Radharao Chaganti, and Vijay Mahajan</td>
</tr>
<tr>
<td>83-201</td>
<td>&quot;Reality Shock: When A New Employee's Expectations Don't Match Reality,&quot;</td>
<td>Roger A. Dean and John P. Wanous</td>
</tr>
<tr>
<td>83-202</td>
<td>&quot;The Effects of Realistic Job Previews on Hiring Bank Tellers,&quot;</td>
<td>Roger A. Dean and John P. Wanous</td>
</tr>
<tr>
<td>83-204</td>
<td>&quot;Differential Information and the Small Firm Effect,&quot;</td>
<td>Christopher B. Barry and Stephen J. Brown</td>
</tr>
</tbody>
</table>
"Constrained Classification: The Use of a Priori Information in Cluster Analysis," by Wayne S. DeSarbo and Vijay Mahajan


"Small Businesses, the Economy, and High Interest Rates: Impacts and Actions Taken in Response," by Neil C. Churchill and Virginia L. Lewis


"A Closer Look at Stock-For-Debt Swaps," by John W. Peavy III and Jonathan A. Scott

"Small Business Evaluates its Relationship with Commercial Banks," by William C. Dunkelberg and Jonathan A. Scott


"Differential Information and the Small Firm Effect," by Christopher B. Barry and Stephen J. Brown

"Accounting Paradigms and Short-Term Decisions: A Preliminary Study," by Michael van Breda


"Initial Observations from the Decision Room Project," by Paul Gray


83-800 "Multiple Key Informants' Perceptions of Business Environments," by William L. Cron and John W. Slocum, Jr.


83-803 "Business Synergy and Profitability," by Vijay Mahajan and Yoram Wind

83-804 "Advertising, Pricing and Stability in Oligopolistic Markets for New Products," by Chaim Fershtman, Vijay Mahajan, and Eitan Muller

83-805 "How Have The Professional Standards Influenced Practice?," by Wanda A. Wallace

83-806 "What Attributes of an Internal Auditing Department Significantly Increase the Probability of External Auditors Relying on the Internal Audit Department?," by Wanda A. Wallace

83-807 "Building Bridges in Rotary," by Michael F. van Breda

83-808 "A New Approach to Variance Analysis," by Michael F. van Breda


83-810 "Taxes, Insurance, and Corporate Pension Policy," by Andrew H. Chen


83-900 "Networks with Side Constraints: An LU Factorization Update," by Richard S. Barr, Keyvan Farhangian, and Jeff L. Kennington

83-901 "Diversification Strategies and Managerial Rewards: An Empirical Study," by Jeffrey L. Kerr


83-903 "Network Generating Models for Equipment Replacement," by Jay E. Aronson and Julius S. Aronofsky

83-904 "Differential Information and Security Market Equilibrium," by Christopher B. Barry and Stephen J. Brown

83-905 "Optimization Methods in Oil and Gas Development," by Julius S. Aronofsky

83-907 "Security Price Reactions Around Corporate Spin-Off Announcements," by Gailen L. Hite and James E. Owers


83-110 "Microcomputers in the Banking Industry," by Chun H. Lam

83-111 "Current and Potential Application of Microcomputers in Banking -- Survey Results," by Chun H. Lam and George H. Hempel