A COMPUTER BASED MULTI-CURRENCY SHORT-TERM FUNDS MANAGEMENT EXERCISE
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INTRODUCTION

Efficient management of multi-currency short-term assets and/or liabilities is an essential capability of any individual or institution operating in the international economic arena. The International Business Finance and International Banking courses at most universities cover the problems associated with the management of short-term multi-currency portfolios of assets or liabilities. Whether the assets and/or liabilities in question are multi-currency accounts receivable, accounts payable, trade acceptances, marketable securities, purchased interbank funds or sold interbank funds, a number of similar fundamental concepts are required to be mastered to achieve acceptable levels of managerial competence. These important common elements of managerial understanding include mastery of the integrated relationships which link (albeit in a stochastic manner) the set of exchange rates and interest rates of concern to the specific management problem.

While the traditional lecture, problem and case study methods of developing managerial capability among students has provided acceptable results to date, these methods are frequently unable to deliver to students the necessary reality of being able to integrate market and economic information on a real time basis in order to achieve desired results in the management of multi-currency short-term assets and liabilities.

To simulate the desired integrated financial and economic approach to multi-currency short-term funds management in a real-time environment, a computer based exercise has been developed and successfully applied as one element of the educational experience within the undergraduate International Business Finance and International Banking courses at The George Washington University.

THE SHORT-TERM FUNDS EXERCISE

The Short-Term Funds Exercise used at The George Washington University provides students with the opportunity to manage a multi-currency short-term asset portfolio (in International Business Finance courses) or to manage a multi-currency short-term liability portfolio (in International Banking courses). To promote realism and an appreciation for the need to integrate real-time multi-national financial and economic information, actual exchange rates and actual 7 day Eurocurrency deposit yields are used in the exercise. The exercise normally runs for about 10 class weeks, allowing time for effective iterative learning while allowing some time at the beginning of the course for introduction of material essential to student participation in the Short-Term Funds Exercise. Prior to starting, the students are formed into "management groups" for exercise purposes. A brief description of the two available exercises follows.

The Asset Management Exercise

In the asset management implementation of the Short-Term Funds Exercise, student management groups are informed that they are responsible for the multi-currency marketable securities portfolio of a large US dollar numeraire corporation with the initial value of this portfolio set at an arbitrary figure such as $1,000,000. Students are further informed that it is a management policy to invest only in a previously qualified set of assets. The set of assets used to achieve educational objectives has been the 7 day Eurocurrency deposits in eight major currencies (US dollar, Canadian dollar, pound sterling, French franc, W. German mark, Japanese yen, Swiss franc and Netherlands guilder). This set of assets is convenient as it covers a sufficiently broad set of exchange rate and interest rate considerations and because all necessary information to operate this form of the exercise is published in the issues of the London Financial Times.

Each student group is required to assess the international economic, exchange rate and interest rate environment (using methods described in class and sketched in an Exercise Manual discussed later in this paper) and to submit a weekly decision covering their choice of allocation of existing wealth over the available assets. Prior to making the decisions, students are provided a "data sheet" which lists recent historic weekly bid and asked exchange rates and bid and asked Eurocurrency 7 day deposit rates for all currencies included in the exercise. After the initial decisions are made, students are also given their new portfolio value based upon the results of their past decisions made for the most recently completed investment week.
The student group with the maximum wealth at the predesignated exercise termination date is declared the exercise winning team. The associated risk parameters are given heavy emphasis in the classroom material.

The Liability Management Exercise

In the liability management implementation of the Short-Term Funds Exercise, student management groups are informed that they are responsible for the multi-currency interbank borrowing program of an international US dollar numeraire bank with a requirement to manage the borrowing of a specific amount (say US$10,000,000) of capital each week using 7 day Eurocurrency deposits as the funding source. This set of funding sources is convenient as it covers a sufficiently broad set of exchange rate considerations and because all necessary information to operate the exercise is published in the issues of the London Financial Times.

Each student group is required to assess international economic, exchange rate and interest rate parameters (using methods described in class and sketched in an exercise manual to be discussed below) and to submit a weekly decision concerning their choice of allocation of the week's borrowing program over the available sources of funds. Prior to making these decisions, students are provided with a "data sheet" giving time series histories of recent bid and asked exchange rates and bid and asked rates for borrowing 7 day Eurocurrency deposits in the interbank market. After the initial decisions are made, students are also given their prior week and overall exercise average cost of borrowed funds based upon the results of decisions made for the most recently completed borrowing week.

The student group with the lowest overall exercise average cost of borrowed funds at the predesignated exercise termination date is declared the exercise winning team. The associated funding risk parameters are given heavy emphasis in classroom material.

SHORT-TERM FUNDS EXERCISE SUPPORT PROGRAM

To facilitate administration of the short-term funds management exercise, the author prepared a SAS language computer program. The program uses closing bid and asked exchange rate data, closing bid and asked Eurocurrency 7 day deposit data (entered weekly from the tables in the Financial Times) and student management group decisions as essential input information.

The program computes all necessary yields, costs of funds and changes in portfolio values as seen from a US dollar numeraire point-of-view. The program employs standard uncovered borrowing and lending equations which explicitly incorporate trading commissions through careful use of the bid and asked rate information.

The program produces all material needed to effectively operate the exercise. An up-to-date data sheet is prepared by the program each week listing the relevant time series of each exchange rate and Eurocurrency deposit rate used in the exercise (copies of these data sheets are made available to participating students each week). The program also provides each student management group with a weekly report of the current status of their assets (or liabilities as the case may be) and all relevant historical information covering past decisions and group portfolio performance.

In addition, the main program produces class summaries suitable for posting which give performance results for all groups in a class (but which do not disclose group decisions). The program also produces an instructor's information report listing weekly US dollar numeraire yields and costs of borrowing in each available asset and liability. Finally, the main program provides plots of exchange rates and 7 day Eurocurrency deposit rates as a function of time for posting and/or for classroom use (these plots are easily converted into transparencies for classroom use).

The time required for entering the data and decisions each week is about one-half hour using the full-screen editor terminal in the instructor's office. The program runs in less than ten seconds on the University's IBM series 4381 central processing unit.

EXERCISE DOCUMENTATION

The author has prepared an exercise manual which is given to each participating student. The thirty-eight page manual introduces the exercise in much more detail than is given here. Separate chapters of the manual describe the asset and the liability management exercises. Each of these two chapters outline the essential aspects of a soundly based decision process and guide students in the selection of an initial decision set. Another chapter of the manual describes the essentials of the portfolio theoretic aspects of supervising short-term multi-currency portfolios. The last chapter of the
manual lists the main program and provides material that will be of primary interest to instructors administering the exercise.

Appendices to the manual explain the Eurocurrency deposit market data report which is provided to all participating students on a weekly basis, describe the worksheets and decision forms used to facilitate student participation, and list a number of SAS programs which may be used by student management groups as desired (not required) to facilitate and reduce the workload associated with making good decisions. The final appendix of the exercise manual provides a listing of potentially helpful and interesting reading material concerned with the management of short-term multi-currency funds.

The manual is considered sufficiently complete to allow independent adoption and use of this exercise by any instructor having rudimentary knowledge of SAS program operation or having such support available at their institution.

POSSIBLE EXTENSIONS OF THIS EXERCISE

At least four relatively straightforward extensions of the basic exercise discussed in this paper could be incorporated by instructors having somewhat different educational objectives.

To provide students with experience using on-line data sets, the author is currently experimenting with the use of an on-line SAS data set to support the student analysis necessary for successful performance during the exercise. The on-line data set is maintained up-to-date on a weekly basis by the instructor. Students are provided with a data access program and given prompts regarding more efficient computer-based use of this information source. Students have been positive to this variation of the exercise in that it removes the necessity for them to reenter the weekly data for their analytical work. The resultant educational benefits associated with actual student use of on-line data sets are consistent with the goal of providing students with realistic modern short-term funds management experience.

The exercise program is easily extendable to incorporate additional assets and/or liabilities. This might be of interest to instructors wishing to emphasize applications in a market other than the short-term Eurocurrency market. These programs could also be used, with such asset and/or liability extension, by commercial institutions desiring to monitor their actual trader's performance and compare such performance with alternative trading strategies.

The exercise program could be modified to incorporate covered investing and borrowing in the international capital markets should an instructor desire to emphasize this aspect of international capital market operation.

The exercise program can be supplemented with a quadratic program to demonstrate the important applications of this powerful asset and/or liability portfolio performance optimization method to undergraduate students. The author conducts such a demonstration late in the semester-long operation of the exercise. The author has also found that the computation of the variance of the exchange rate and interest rate time series and the provision of plots of the sample distribution of such rates mid-way through the exercise are very beneficial to student comprehension of the important concepts of risk measure and risk consideration in international capital market considerations.

Other instructors with other backgrounds and other interests will find the easy access to the data provided by the main program beneficial to satisfy individual teaching requirements (the benefits of easy data availability have been considerably strengthened by the use of an on-line data set as discussed above.

CONCLUSION

This paper has described a real-time multi-currency short-term funds management exercise which has been implemented to improve the education of future financial managers in multi-national and larger domestic firms. The real-time nature of the reported exercise and the premium placed on a student's ability to integrate international economic and financial information should assist in improving the management skills developed by students taking the traditional International Business Finance and International Banking courses.

ENDNOTES

1. The problems associated with the management of multi-currency asset and liability portfolios by a large multi-national corporation (and some approaches to solving these problems) are discussed in Baker (1981), Bamber (1982), Selby (1982), Dufey and Srinivasulu (1983), Adler and Dumas (1983) and in Makin (1985).

2. Obviously, other assets could be added to the exercise as individual
instructors may desire and for which the necessary data could be obtained on a near real-time basis.

3. Other objectives such as Sharpe or Treynor index maximization could be used as a performance criterion. The author selected wealth maximization at exercise termination as the performance measure to correspond more closely to current business practice.

4. Obviously, other funding sources could be added to the exercise as individual instructors may desire and for which the necessary data could be obtained on a near real-time basis.

5. Other objectives such as minimizing the risk adjusted cost of funds could be used as a performance criterion. The author selected average cost of funds minimization at exercise termination as a performance measure to correspond more closely to current business practice.

6. SAS programming language documentation is available from the SAS Institute, Inc., Box 8000, Cary, North Carolina, 27511. SAS is a trademark of the SAS Institute.

7. Copies of the exercise manual are available from the author at the below given address.

8. The quadratic program used for these demonstrations is written in the SAS language and is documented in Alex Anckonie III, "A Quadratic Program for Determining Efficient Frontier Portfolio Compositions Using the SAS Language," 1985 SAS USERS GROUP INTERNATIONAL CONFERENCE PROCEEDINGS, pp. 55-60, published by the SAS Institute, Box 8000, Cary, North Carolina, 27511.

REFERENCES


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