NATIONAL BUREAU OF ECONOMIC RESEARCH

1964

OFFICERS

Albert J. Hettinger, Jr., Chairman
Arthur F. Burns, President
Frank W. Fetter, Vice-President
Donald B. Woodward, Treasurer

Solomon Fabricant, Director of Research
Geoffrey H. Moore, Associate Director of Research
Hal B. Lary, Associate Director of Research
William J. Carson, Executive Director

DIRECTORS AT LARGE

Robert B. Anderson, New York City
Wallace J. Campbell, Foundation for Cooperative Housing
Erwin D. Canham, Christian Science Monitor
Solomon Fabricant, New York University
Marion B. Folsom, Eastman Kodak Company
Crawford H. Greenewalt, E. I. du Pont de Nemours & Company
Gabriel Hauge, Manufacturers Hanover Trust Company
A. J. Hayes, International Association of Machinists
Albert J. Hettinger, Jr., Lazard Frères and Company

Nicholas Kelley, Kelley Drye Newhall
Maginnes & Warren
H. W. Laidler, League for Industrial Democracy
Charles G. Mortimer, General Foods Corporation
George B. Roberts, Larchmont, New York
Harry Scherman, Book-of-the-Month Club
Boris Shishkin, American Federation of Labor and Congress of Industrial Organizations
Geoige Soule, South Kent, Connecticut
Joseph H. Willits, Langhorne, Pennsylvania
Donald B. Woodward, A. W. Jones and Company

DIRECTORS BY UNIVERSITY APPOINTMENT

V. W. Bladen, Toronto
Francis M. Boddy, Minnesota
Arthur F. Burns, Columbia
Lester V. Chandler, Princeton
Melvin G. de Chazeau, Cornell
Frank W. Fetter, Northwestern
R. A. Gordon, California

Harold M. Groves, Wisconsin
Gottfried Haberler, Harvard
Maurice W. Lee, North Carolina
Lloyd G. Reynolds, Yale
Paul A. Samuelson, Massachusetts Institute of Technology
Theodore W. Schultz, Chicago

Willis J. Winn, Pennsylvania

DIRECTORS BY APPOINTMENT OF OTHER ORGANIZATIONS

Percival F. Brundage, American Institute of Certified Public Accountants
Nathaniel Goldfinger, American Federation of Labor and Congress of Industrial Organizations
Harold G. Halcrow, American Farm Economic Association
Murray Shields, American Management Association
Willard L. Thorp, American Economic Association
W. Allen Wallis, American Statistical Association
Harold F. Williamson, Economic History Association
Theodore O. Yntema, Committee for Economic Development

DIRECTORS EMERITI

Shepard Morgan, Norfolk, Connecticut
Jacob Viner, Princeton, New Jersey

RESEARCH STAFF

Moses Abramovitz
Gary S. Becker
William H. Brown, Jr.
Gerhard Bry
Arthur F. Burns
Phillip Cagan
Joseph W. Conard
Frank G. Dickinson
James S. Earley
Richard A. Easterlin
Solomon Fabricant
Albert Fishlow
Milton Friedman

Victor R. Fuchs
H. G. Georgiadis
Raymond W. Goldsmith
Jack M. Guttentag
Challis A. Hall, Jr.
Daniel M. Holland
Thor Hultgren
F. Thomas Juster
C. Harry Kahn
Irving B. Kravis
Hal B. Lary
Robert E. Lipsey
Ruth P. Mack

Jacob Mincer
Isle Mintz
Geoffrey H. Moore
Roger F. Murray
Ralph L. Nelson
G. Warren Nutter
Richard T. Selden
Lawrence H. Seltzer
Robert P. Shay
George J. Stigler
Norman B. Ture
Herbert B. Woolley
Victor Zarnowitz
1. The object of the National Bureau of Economic Research is to ascertain and to present to the public important economic facts and their interpretation in a scientific and impartial manner. The Board of Directors is charged with the responsibility of ensuring that the work of the National Bureau is carried on in strict conformity with this object.

2. To this end the Board of Directors shall appoint one or more Directors of Research.

3. The Director or Directors of Research shall submit to the members of the Board, or to its Executive Committee, for their formal adoption, all specific proposals concerning researches to be instituted.

4. No report shall be published until the Director or Directors of Research shall have submitted to the Board a summary drawing attention to the character of the data and their utilization in the report, the nature and treatment of the problems involved, the main conclusions, and such other information as in their opinion would serve to determine the suitability of the report for publication in accordance with the principles of the National Bureau.

5. A copy of any manuscript proposed for publication shall also be submitted to each member of the Board. For each manuscript to be so submitted a special committee shall be appointed by the President, or at his designation by the Executive Director, consisting of three Directors selected as nearly as may be one from each general division of the Board. The names of the special manuscript committee shall be stated to each Director when the summary and report described in paragraph (4) are sent to him. It shall be the duty of each member of the committee to read the manuscript. If each member of the special committee signifies his approval within thirty days, the manuscript may be published. If each member of the special committee has not signified his approval within thirty days of the transmittal of the report and manuscript, the Director of Research shall then notify each member of the Board, requesting approval or disapproval of publication, and thirty additional days shall be granted for this purpose. The manuscript shall then not be published unless at least a majority of the entire Board and a two-thirds majority of those members of the Board who shall have voted on the proposal within the time fixed for the receipt of votes on the publication proposed shall have approved.

6. No manuscript may be published, though approved by each member of the special committee, until forty-five days have elapsed from the transmittal of the summary and report. The interval is allowed for the receipt of any memorandum of dissent or reservation, together with a brief statement of his reasons, that any member may wish to express; and such memorandum of dissent or reservation shall be published with the manuscript if he so desires. Publication does not, however, imply that each member of the Board has read the manuscript, or that either members of the Board in general, or of the special committee, have passed upon its validity in every detail.

7. A copy of this resolution shall, unless otherwise determined by the Board, be printed in each copy of every National Bureau book.

(Resolution adopted October 25, 1926, as revised February 6, 1933, and February 24, 1941)
This report is one of a series emerging from an investigation of interest rates made possible by a grant to the National Bureau from the Life Insurance Association of America. The Association is not, however, responsible for any of the statements made or views expressed.
ACKNOWLEDGMENTS

This is one of a series of studies in the behavior of interest rates in progress at the National Bureau of Economic Research under the administration of Joseph W. Conard and William H. Brown, Jr., of Swarthmore College. This research is being financed by a grant from the Life Insurance Association of America. Other studies in this series, and those responsible for them, include (1) an analysis of residential mortgage yields, Jack Guttentag of the University of Pennsylvania and Morris Beck of Rutgers University; (2) direct placement yields, Avery B. Cohan of the University of North Carolina; (3) the cyclical behavior of interest rates, Phillip Cagan of Brown University; (4) seasonal variations in interest rates, William Brown; (5) yield spreads between new and outstanding corporate bonds, Joseph Conard. A summary report on the interest rate series is being prepared by Conard.

Members of the advisory committee for these studies in the behavior of interest rates are W. Braddock Hickman, chairman, Federal Reserve Bank of Cleveland; Julian D. Anthony, Hartford Life Insurance Company; Daniel H. Brill, Board of Governors of the Federal Reserve System, Lester V. Chandler, Princeton University; W. A. Clarke, W. A. Clarke Mortgage Company; George T. Conklin, Jr., The Guardian Life Insurance Company of America; Milton Friedman, The University of Chicago; Raymond W. Goldsmith, National Bureau of Economic Research; Sidney Homer, Salomon Brothers & Hutzler; Norris Johnson, First National City Bank of New York; Robert G. Link, Federal Reserve Bank of New York; Roger F. Murray, National Bureau of Economic Research; James J. O'Leary, Life Insurance Association of America; Roy L. Reiereson, Bankers Trust Company; Eli Shapiro, Harvard University; Henry C. Wallich, Yale University; and C. Richard Youngdahl, Aubrey G. Lanston & Co., Inc. The members of the advisory committee have
Acknowledgments

generously assisted in planning and reviewing the work of the staff of the interest-rate project, but their concurrence with the views expressed in this report is not to be assumed.

The members of the staff reading committee for this manuscript were Gary Becker and Jacob Mincer, both of Columbia University and the National Bureau of Economic Research, and Hyman Minsky of the University of California. All were very helpful.

Earlier versions of this paper were presented at the money workshop of the University of Chicago, faculty seminars at the Universities of Pennsylvania and California at Los Angeles, and the Econometrica Society meetings in Pittsburgh in 1962. I have greatly benefited from the comments of colleagues at both the National Bureau and the University of Chicago.

David Meiselman of the Office of the Comptroller of the Currency, Paul Cootner of the Massachusetts Institute of Technology, and John M. Culbertson of the University of Wisconsin provided invaluable criticism in their roles as discussants at the Econometrica Society meetings in 1962.

I wish to thank Messrs. Melvin G. de Chazeau, George B. Roberts, and Paul A. Samuelson of the National Bureau Board of Directors' reading committee.

Joan Tron edited the manuscript, and H. Irving Forman drew the charts. I am grateful to Judy Tompkins for hand computing and data collection, and to Richard Kilgore for machine computing.

A grant of electronic computer time to the National Bureau of Economic Research by the International Business Machines Corporation was utilized for computing the regressions in this study.

Reuben A. Kessel
CONTENTS

ACKNOWLEDGMENTS vii

INTRODUCTION AND SUMMARY OF PRINCIPAL FINDINGS 1

1. EXPLANATIONS OF THE TERM STRUCTURE OF INTEREST RATES 5
   What Is the Expectations Hypothesis, 5
   Existing Evidence, 7
   New Evidence, 22

2. WHY LIQUIDITY PREFERENCE EXISTS 44

3. HOW SHORT- AND LONG-TERM INTEREST RATES HAVE
   BEHAVED CYCLICALLY 59

4. THE APPLICATION OF THE LIQUIDITY PREFERENCE AND
   EXPECTATIONS HYPOTHESES TO THE CYCLICAL
   BEHAVIOR OF INTEREST RATES 81
   Applications of the Lutz-Meiselman Model, 81
   Applications of the Hicks Model, 84

5. CONCLUSIONS AND IMPLICATIONS FOR FURTHER RESEARCH 96

DIRECTOR'S COMMENT 101

APPENDIX A 103

APPENDIX B 106
<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Meiselman's Error Term and Forecast Revisions</td>
<td>20</td>
</tr>
<tr>
<td>2.</td>
<td>Distribution of Errors in Predicting Treasury Bill Rates</td>
<td>24</td>
</tr>
<tr>
<td>9.</td>
<td>Timing of Peaks and Troughs in Bill Rates Using Seasonally Adjusted and Unadjusted Data</td>
<td>65</td>
</tr>
<tr>
<td>10.</td>
<td>Cyclical Changes in Yields of Government Securities, 1921–45</td>
<td>70</td>
</tr>
<tr>
<td>11.</td>
<td>Average Yield and Standard Deviation in Yields of Government Securities During Five Business Cycles, 1921–45</td>
<td>70</td>
</tr>
<tr>
<td>12.</td>
<td>Timing of Short- and Long-Term Yields of Government Securities at Business Cycle Peaks and Troughs, 1921–45</td>
<td>71</td>
</tr>
<tr>
<td>13.</td>
<td>Basic Yields on Corporate Bonds During Business Cycles, 1900–61</td>
<td>77</td>
</tr>
<tr>
<td>A-1.</td>
<td>Comparison of Actual and Forecast Term Structures of Interest Rates, Measured by Areas Under Curves</td>
<td>104</td>
</tr>
</tbody>
</table>
Tables

A-2. Types of Term Structures, Thirty-Seven Selected Years (1900–42), and Actual Changes in One-Year Rates 105
B-1. Spot and Forward One-Year Rates 107
B-2. Yields of Fixed-Maturity Treasury Securities 109
B-3. Spot and Forward One-Year Rates Adjusted for Liquidity Premiums 113
1. Marginal Rates of Interest with Stable Expectations 15
2. Average Yield as a Function of Term to Maturity, Durand Data, 1900–1954 18
3. Market Expectations of Future 91-Day Bill Rates 30
4. Forward and Spot One-Year Rates on Government Securities 35
5. Yields of U.S. Government Securities, 1942–53 64
9. Average Pattern of Long-Term and Short-Term Interest Rates in the United States During Fourteen Business Cycles, 1858–1914 72
10. Average Pattern of Long-Term and Short-Term Interest Rates in the United States During Five Business Cycles, 1914–33 73
11. Average Pattern of Long-Term and Short-Term Interest Rates in the United States During Four Business Cycles, 1945–61 75
12. Average Pattern of Long-Term and Short-Term Interest Rates in the United States During Two Business Cycles, 1933–45 76
13. Basic Yields of Corporate Bonds, First Quarter, Durand Data, 1900–61 79
14. “Normal” or Average Yield Curve 85
15. Yield Curve at Cyclical Troughs 86
16. A Flat Yield Curve 87
17. Yield Curve at Cyclical Peaks 88
18. Effects of Alternative Expectations of Falling Rates upon the Shapes of Yield Curves 89