

This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: Monetary Trends in the United States and United Kingdom: Their Relation to Income, Prices, and Interest Rates, 1867-1975

Volume Author/Editor: Milton Friedman and Anna J. Schwartz

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-26409-2

Volume URL: <http://www.nber.org/books/frie82-2>

Publication Date: 1982

Chapter Title: Front matter, tables of content, preface

Chapter Author: Milton Friedman, Anna J. Schwartz

Chapter URL: <http://www.nber.org/chapters/c11399>

Chapter pages in book: (p. -33 - 2)

Milton
Friedman
and
Anna J.
Schwartz

Monetary Trends in the United States and the United Kingdom

Their Relation to Income,
Prices, and Interest Rates,
1867-1975

Monetary Trends in
the United States and
the United Kingdom



National
Bureau of
Economic
Research

Milton Friedman and
Anna J. Schwartz



National
Bureau of
Economic
Research



Chicago

Monetary Trends in the United States and the United Kingdom

Their Relation to Income, Prices, and Interest Rates, 1867–1975

Milton Friedman and Anna J. Schwartz

This volume, the culmination of more than twenty-five years of research on money and its effects, is the final installment in a now-classic series of books that had their origin in new estimates of the quantity of money in the United States. It is the first study to provide statistical and theoretical analysis of such a long period of time—allowing the authors to purge the data of cyclical fluctuations so that long-term trends could be examined—and the first to provide a cross-country comparison.

The authors establish the theoretical framework for their empirical study with a comprehensive presentation of the quantity theory of money, including a discussion of recent literature. They then describe their statistical procedures and their data. Presentation of the broad trends and fluctuations in money, income, and prices over a century is followed by a detailed examination of some basic propositions in monetary theory: the determinants of money demand; the financial links between the United States and the United Kingdom; the transmission process from money to income, output, and prices; the relationship between money and interest rates; and the nature of long swings.

(Continued on back flap)

**Monetary Trends in
the United States
and the
United Kingdom**



A National Bureau
of Economic Research
Monograph

Monetary Trends in the United States and the United Kingdom

Their Relation to Income,
Prices, and Interest Rates,
1867–1975

Milton Friedman and
Anna J. Schwartz



The University of Chicago Press

Chicago and London

MILTON FRIEDMAN, winner of the Nobel Prize in Economics, is a senior research fellow at the Hoover Institution, Stanford University, and Paul Snowden Russell Distinguished Service Professor of Economics at the University of Chicago. ANNA J. SCHWARTZ is research associate with the National Bureau of Economic Research.

The University of Chicago Press, Chicago 60637
The University of Chicago Press, Ltd., London

© 1982 by The University of Chicago
All rights reserved. Published 1982
Printed in the United States of America
89 88 87 86 85 84 83 82 5 4 3 2 1

Library of Congress Cataloging in Publication Data

Friedman, Milton, 1912—

Monetary trends in the United States and the United Kingdom, their relation to income, prices, and interest rates, 1867–1975.

(National Bureau of Economic Research monograph)

Bibliography: p.

Includes indexes.

1. Money supply—United States—History.
2. Money supply—Great Britain—History.
3. United States—Economic conditions. 4. Great Britain—Economic conditions. I. Schwartz, Anna Jacobson. II. Title. III. Series.

HG501.F74 332.4'973 81-16273

ISBN 0-226-26409-2

AACR2

National Bureau of Economic Research

Officers

Eli Shapiro, *chairman*
Franklin A. Lindsay, *vice-chairman*
Martin Feldstein, *president*
David G. Hartman, *executive director*
Charles A. Walworth, *treasurer*
Sam Parker, *director of finance and
administration*

Directors at Large

Moses Abramovitz	Franklin A. Lindsay	Richard N. Rosett
George T. Conklin, Jr.	Roy E. Moor	Bert Seidman
Morton Ehrlich	Geoffrey H. Moore	Eli Shapiro
Martin Feldstein	Michael H. Moskow	Stephen Stamas
Edward L. Ginzton	James J. O'Leary	Lazare Teper
David L. Grove	Peter G. Peterson	Donald S. Wasserman
Walter W. Hetter	Robert V. Roosa	Marina v.N. Whitman

Directors by University Appointment

Charles H. Berry, <i>Princeton</i>	James L. Pierce, <i>California, Berkeley</i>
Otto Eckstein, <i>Harvard</i>	Nathan Rosenberg, <i>Stanford</i>
Walter D. Fisher, <i>Northwestern</i>	James Simler, <i>Minnesota</i>
J. C. LaForce, <i>California, Los Angeles</i>	James Tobin, <i>Yale</i>
Paul McCracken, <i>Michigan</i>	William S. Vickrey, <i>Columbia</i>
Daniel McFadden, <i>Massachusetts Institute of Technology</i>	Dudley Wallace, <i>Duke</i>
Almarin Phillips, <i>Pennsylvania</i>	Burton A. Weisbrod, <i>Wisconsin</i>
	Arnold Zellner, <i>Chicago</i>

Directors by Appointment of Other Organizations

Carl F. Christ, <i>American Economic Association</i>	Rudolph A. Oswald, <i>American Federation of Labor and Congress of Industrial Organizations</i>
Robert C. Holland, <i>Committee for Economic Development</i>	Joel Popkin, <i>American Statistical Association</i>
Stephan F. Kaliski, <i>Canadian Economics Association</i>	G. Edward Schuh, <i>American Agricultural Economics Association</i>
Albert G. Matamoros, <i>National Association of Business Economists</i>	James C. Van Horne, <i>American Finance Association</i>
Douglass C. North, <i>Economic History Association</i>	Charles A. Walworth, <i>American Institute of Certified Public Accountants</i>

Directors Emeriti

Arthur Burns	Thomas D. Flynn	Murray Shields
Emilio G. Collado	Gottfried Haberler	Boris Shishkin
Solomon Fabricant	Albert J. Hettinger, Jr.	Willard L. Thorp
Frank Fetter	George B. Roberts	Theodore O. Yntema

Relation of the Directors to the Work and Publications of the National Bureau of Economic Research

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. The President of the National Bureau shall submit to the Board of Directors, or to its Executive Committee, for their formal adoption all specific proposals for research to be instituted.

3. No research report shall be published by the National Bureau until the President has sent each member of the Board a notice that a manuscript is recommended for publication and that in the President's opinion it is suitable for publication in accordance with the principles of the National Bureau. Such notification will include an abstract or summary of the manuscript's content and a response form for use by those Directors who desire a copy of the manuscript for review. Each manuscript shall contain a summary drawing attention to the nature and treatment of the problem studied, the character of the data and their utilization in the report, and the main conclusions reached.

4. For each manuscript so submitted, a special committee of the Directors (including Directors Emeriti) shall be appointed by majority agreement of the President and Vice Presidents (or by the Executive Committee in case of inability to decide on the part of the President and Vice Presidents), 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 notice of the proposed publication is submitted to him. It shall be the duty of each member of the special manuscript committee to read the manuscript. If each member of the manuscript committee signifies his approval within thirty days of the transmittal of the manuscript, the report may be published. If at the end of that period any member of the manuscript committee withholds his approval, the President shall then notify each member of the Board, requesting approval or disapproval of publication, and thirty days additional shall be granted for this purpose. The manuscript shall then not be published unless at least a majority of the entire Board who shall have voted on the proposal within the time fixed for the receipt of votes shall have approved.

5. No manuscript may be published, though approved by each member of the special manuscript committee, until forty-five days have elapsed from the transmittal of the report in manuscript form. 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 the special committee have passed on its validity in every detail.

6. Publications of the National Bureau issued for informational purposes concerning the work of the Bureau and its staff, or issued to inform the public of activities of Bureau staff, and volumes issued as a result of various conferences involving the National Bureau shall contain a specific disclaimer noting that such publication has not passed through the normal review procedures required in this resolution. The Executive Committee of the Board is charged with review of all such publications from time to time to ensure that they do not take on the character of formal research reports of the National Bureau, requiring formal Board approval.

7. Unless otherwise determined by the Board or exempted by the terms of paragraph 6, a copy of this resolution shall be printed in each National Bureau publication.

(Resolution adopted October 25, 1926, as revised through September 30, 1974)

What are large collections of facts for? To make theories *from*, says Bacon: to try ready-made theories *by*, says the history of discovery: it's all the same, says the idolater: nonsense, say we!

Augustus de Morgan, *A Budget of Paradoxes*

Contents

	<i>List of Charts</i>	xv
	<i>List of Tables</i>	xix
	<i>Preface</i>	xxvii
	<i>Principal Empirical Findings</i>	3
1	Scope of the Study	13
2	The General Theoretical Framework	16
2.1	The Quantity Theory: Nominal versus Real Quantity of Money	17
2.2	Quantity Equations	19
	2.2.1 Transactions Equation	19
	2.2.2 The Income Form of the Quantity Equation	22
	2.2.3 Cambridge Cash-Balances Approach	24
	2.2.4 The Transmission Mechanism: Money to Income, Prices, Output	26
	2.2.5 The International Transmission Mechanism	27
	2.2.6 First-Round Effects	29
2.3	Supply of Money in Nominal Units	32
2.4	The Demand for Money	37
	2.4.1 Demand by Ultimate Wealth Holders	37
	2.4.2 Demand by Business Enterprises	40
2.5	The Keynesian Challenge to the Quantity Theory	41
	2.5.1 Long-Run Equilibrium	42
	2.5.2 Short-Run Price Rigidity	43
	2.5.3 Absolute Liquidity Preference	51

2.6	The Adjustment Process	59
2.6.1	Division of a Change in Nominal Income between Prices and Output	60
2.6.2	Short-Run Adjustment of Nominal Income	62
2.6.3	Money Demand and Supply Functions	63
2.6.4	Determination of Interest Rates	64
2.6.5	Determination of Anticipated Values	64
2.7	An Illustration	66
2.7.1	Long-Run Equilibrium	66
2.7.2	The Adjustment Process	68
2.8	Conclusion	70
3	The General Statistical Framework	73
3.1	The Reference Phase Base as the Unit of Observation	73
3.1.1	Phase Reference Dates	74
3.1.2	Computation of Phase Base	75
3.1.3	Weighting of Phase Bases in Statistical Computations	75
3.1.4	Possible Difficulties with Reference Phase Bases	79
3.2	Rates of Change Computed from Phase Bases	85
3.2.1	Weights for Rates of Change	87
3.2.2	Relation between Rates of Change Computed from Successive Triplets of Phase Averages and from Overlapping Cycle Bases	89
3.2.3	Possible Difficulties with Rates of Change Computed from Phase Bases	91
4	The Basic Data	98
4.1	United States Data	99
4.1.1	Money	99
4.1.2	Income	99
4.1.3	Prices	101
4.1.4	Interest Rates	105
4.1.5	Population	111
4.2	United Kingdom Data	111
4.2.1	Money	111
4.2.2	Income	114
4.2.3	Prices	115
4.2.4	Interest Rates	120
4.2.5	Population	121
4.2.6	Exclusion of Southern Ireland	121

4.3	Combined United States and United Kingdom Data	121
4.4	Appendix	121
5	Movements of Money, Income, and Prices	138
5.1	United States and United Kingdom Money Balances at the Beginning and End of a Century	138
5.1.1	Statistical Errors	144
5.1.2	Financial Sophistication	145
5.1.3	Real Income	147
5.1.4	Cost of Holding Money	148
5.2	Long Swings in the Levels of Money, Income, and Prices	153
5.3	Rates of Change of Money, Income, and Prices	165
5.4	Conclusion	184
5.5	Appendix	185
6	Velocity and the Demand for Money	205
6.1	Velocity: A Will-o'-the-Wisp?	207
6.2	Velocity: A Numerical Constant?	208
6.3	Effect of Financial Sophistication	216
6.4	Effect of Real per Capita Income	221
6.4.1	Levels	221
6.4.2	Rates of Change	244
6.5	Effect of Population and Prices	253
6.6	Effect of Costs of Holding Money	259
6.6.1	Yield on Nominal Assets	264
6.6.2	Interest on Deposits	267
6.6.3	Yield on Physical Assets	274
6.7	Effect of All Variables Combined	280
6.8	Appendix A	287
6.9	Appendix B	294
6.9.1	United States Term Structure Data	294
6.9.2	Estimating the Parameters of the Term Structure Yields	295
6.9.3	The Demand for Money, with the Term Structure of Interest Rates	298
7	Velocity and the Interrelations between the United States and the United Kingdom	305
7.1	The Reference Chronology	307
7.2	Correlation of United States and United Kingdom Velocities and Their Determinants	310

7.3	Role of Common Determinants of Velocity	315
7.4	Money and Income	317
7.4.1	Combined Money Stock	320
7.4.2	Own-Country Money, Other-Country Money, and Other-Country Velocity	323
7.5	Conclusion	337
7.6	Appendix	338
8	Monetary Influences on Nominal Income	342
8.1	From the Demand for Balances to the Behavior of Nominal Income	344
8.2	Replacing Yields by Prior Income and Money	355
8.3	Replacing Prior Income by Prior Money	363
8.3.1	Income Elasticity	367
8.3.2	Transient Effects	368
8.3.3	The Effect of Nonunit Elasticity and Transient Effects on the Sum of the b 's	368
8.3.4	Estimates of the Transient Effect	372
8.3.5	Summary	374
8.4	Appendix	377
8.4.1	Relation of Nominal Income to Real per Capita Income and Yields	377
8.4.2	Relation of Nominal Income to Current and Prior Money and Income	379
8.4.3	Relation of Nominal Income to Current and Prior Money Only	385
8.4.4	Allowing for Transient Effects	391
9	Division of Change in Income between Prices and Output	395
9.1	Alternative Simple Explanations	397
9.2	Price and Output Correlations	402
9.3	The Effect of Lengthening the Period	407
9.4	Framework for Further Analysis	413
9.5	Effect of Money and Yields	417
9.6	Effect of Current and Prior Money and Prior Income	427
9.7	Effect of Output Capacity and Anticipations: The Phillips Curve Approach	440
9.8	Effect of Output Capacity and Anticipations: The Approach through Alternative Models of the Formation of Anticipations	453
9.8.1	Alternative Hypotheses	453
9.8.2	Comparison of Alternative Hypotheses	455
9.9	Conclusion	462

9.10	Appendix	465
9.10.1	Relation of Prices and Output to Real per Capita Income and Yields	465
9.10.2	Relation of Prices and Output to Current and Prior Money and Income	468
9.10.3	Relation of Prices and Output to Current and Prior Money Only	470
9.10.4	Transient Effects	472
9.10.5	Alternative Hypotheses about Anticipations	472
10	Money and Interest Rates	477
10.1	The Theoretical Analysis	479
10.1.1	Monetary Disturbances	480
10.1.2	Real Disturbances	497
10.1.3	Conclusion	499
10.2	Average Yields	500
10.3	A Digression on the Measurement of Yields	505
10.4	Yields in Subperiods	512
10.4.1	United States versus United Kingdom	513
10.4.2	Yields on Nominal and Physical Assets	519
10.5	Relation between Yields on Nominal and Physical Assets	522
10.6	Nominal Yields, Price Levels, and Rates of Change of Prices	527
10.7	Alternative Explanations of the Gibson Paradox	546
10.7.1	The Fisher Explanation	546
10.7.2	The Wicksell-Keynes Explanation	563
10.7.3	Other Real Explanations	564
10.7.4	Other Nominal Explanations	568
10.8	The Structural Change in the 1960s	569
10.9	Correlations with Money	574
10.9.1	Impact and Intermediate Effects	574
10.9.2	Price Effects	578
10.10	Conclusion	582
10.10.1	Yields on Nominal and Physical Assets	584
10.10.2	Interest Rates and Prices	585
11	Long Swings in Growth Rates	588
11.1	Past Work on Long Swings	588
11.2	Are the Swings Episodic or Cyclical?	604

	11.3	The Role of Money in Long Swings	618
	11.4	The Transmission Mechanism	620
	11.5	Summary	620
12		The Role of Money	621
	12.1	The Phillips Curve	622
	12.2	Two Extreme Theories	622
	12.3	The Demand for Money	624
	12.4	Common Financial System	625
	12.5	Dynamic Effects on Nominal Income	626
	12.6	Dynamic Effects on Prices and Output	627
	12.7	Interest Rates	627
	12.8	Rational Expectations	630
	12.9	Fisher and Gibson	630
	12.10	Long Swings	632
		<i>References</i>	633
		<i>Author Index</i>	655
		<i>Subject Index</i>	659

Charts

- 2.1 Time Path of Money Stock before and after Time t_0 67
- 2.2 Equilibrium Path of Nominal Income before and after Time t_0 67
- 2.3 Possible Adjustment Paths of Rate of Change of Nominal Income 71
- 3.1 Illustration of a One-Quarter Specific Cycle Lag behind the Reference Cycle 79
- 4.1 Deviation from Trend of Overlapping Five-Year Periods of United States Implicit Prices and Nominal Income: Scatter Diagram of Deviations of Two Central Years of Each Period before and after World War II 106
- 4.2 Deviations from Trend of Overlapping Eight-Year Periods of United Kingdom Implicit Prices and Nominal Income: Scatter Diagram of Deviations of Three Central Years of the Pre-World War I, Interwar, and Post-World War II Periods 118
- 5.1 Phase Values of United States and United Kingdom Nominal Money Stock 154
- 5.2 Phase Values of United States and United Kingdom Nominal Income and Nominal Money Stock and Velocity 159
- 5.3 Phase Values of United States and United Kingdom Population, per Capita Real Income and Money, and Prices and Money Stock per Unit of Output 162

- 5.4** Rates of Change of United States and United Kingdom Nominal Income, Nominal Money Stock, and Velocity 168
- 5.5** United States and United Kingdom Velocity: Levels and Rates of Change 178
- 5.6** Rates of Change of United States and United Kingdom Population, per Capita Real Income and Money, and Prices and Money Stock per Unit of Output 179
- 5.7** Rates of Change of United States and United Kingdom Money, Prices, and Real Income 182
- 6.1** Scatter Diagram of Levels of Real per Capita Income and Real Per Capita Money and Regression Lines 226
- 6.2** Scatter Diagram of Levels of Real per Capita Income and Real per Capita Money and Regression Lines Isolating Effect of Demand Shift 231
- 6.3** Regressions of Real Money per Capita on Real Income per Capita for United States and United Kingdom, Elasticities Different and Constrained to be Equal, Eliminating Common Shift 242
- 6.4** Scatter Diagram of Rates of Change of Real per Capita Income and Real per Capita Money and Regression Lines 245
- 6.5** Ratio of the Purchasing-Power-Parity Exchange Rate to the Market Exchange Rate between the United States Dollar and the United Kingdom Pound, Annually, 1868–1975 291
- 7.1** Levels and Rates of Change of United States and United Kingdom Velocity on United States and United Kingdom Dates 312
- 8.1** Reaction Patterns of Nominal Income to Monetary Change 376
- 9.1** Scatter Diagram of Rates of Change of Real Income and Implicit Prices, United States and United Kingdom, 1873–1975 398
- 9.2** Time Series of Rates of Change of Real Income and Prices, United States and United Kingdom, 1880–1975 401

-
- 9.3 Actual and Predicted Rates of Change of Nominal Income, Post-1937 Phases 405
- 9.4 Rates of Change Computed from Three- and Nine-Phase Average Values, for Money, Nominal Income, Real Income, and Prices, United States and United Kingdom 408
- 9.5 Reaction Patterns of Price and Output to Monetary Change: United States, United Kingdom, United States and United Kingdom 440
- 10.1 Keynesian Liquidity Preference Function 481
- 10.2 Pure Liquidity Effect on the Interest Rate of an Increase in the Rate of Monetary Growth 482
- 10.3 Pure First-Round Loanable Funds Effect on the Interest Rate of an Increase in the Rate of Monetary Growth 483
- 10.4 Liquidity Preference Curve as a Function of Rate of Change of Quantity of Money 486
- 10.5 Combined Impact Effect: Liquidity plus Loanable Funds Effects on the Rate of Interest 487
- 10.6 Combination of Impact and Income Effects on the Rate of Interest 488
- 10.7 Combination of Impact and Income Effects on Nominal Income 489
- 10.8 Effect of an Increase in the Rate of Monetary Growth on the Equilibrium Path of Nominal Income 492
- 10.9 Full Effect of an Increase in Monetary Growth on the Nominal Interest Rate 493
- 10.10 The Effect of Perfectly and Imperfectly Anticipated Price Changes on the Interest Rate 497
- 10.11 Nominal Yields on Nominal Assets for Annual Holding Periods and to Maturity, Annually, United States, 1926-74 506
- 10.12 Three Measures of Yields on United States Physical Assets, 1926-1974 509
- 10.13 Excess of United States Commercial Paper Rate over United Kingdom Rate on Bank Bills, Annually, 1867-1914 515

- 10.14** Excess of Yield on Physical over Yield on Nominal Assets versus Rate of Change of Prices 520
- 10.15** Excess of Return on Physical over Nominal Assets and the Rate of Price Change, Phase Averages 524
- 10.16** Nominal Return on Physical versus Nominal Return on Nominal Assets, Phase Averages 528
- 10.17** Short-Term Nominal Interest Rate and Rate of Price Change, Phase Averages, 1870–1975 532
- 10.18** Short-Term Nominal Interest Rate and the Price Level, 1870–1975 534
- 10.19** Short-Term Nominal Interest Rate and the Rate of Price Change, Six-Month Moving Averages, 1913–75 540
- 10.20** Relation between Interest Rate and Price Change, Monthly, 1965–79 544
- 10.21** Price Level and Real Rate of Return on Physical Assets, 1870–1975 566
- 11.1** Rates of Change Computed from Three, Five, Seven, and Nine Overlapping Phase Averages: Money Stock, Nominal Income, Real Income, United States, United Kingdom 590
- 11.2** Actual and Hypothetical Rates of Change of Money and Nominal Income, and of Prices and Real Income, United States, United Kingdom 610

Tables

- 3.1 Phase Reference Dates for the United States and the United Kingdom 76
- 3.2 Average and Standard Deviations of Deviations from Trends: Expansion and Contraction Phases, for Period Beginning and Ending with Contraction 82
- 3.3 Serial Correlations of Rates of Change between Successive Phase Bases: United States, 1869–1975; United Kingdom, 1874–1975 84
- 3.4 Distribution of Annual Reference Phases in the United States from 1867 to 1975 and in the United Kingdom from 1874 to 1975 85
- 3.5 Number of Rates of Change above or below the Mean, by Kind of Rate, for Selected Series 92
- 3.6 Serial Correlations of Rates of Change for the United States and the United Kingdom 96
- 4.1 Statistics from Regressions of United States Prices on Nominal Income Expressed as Deviations from Five-Year Trends, by Groups of Ordered Years within Trend Periods: World War I and Interwar, Post-World War II, and Full Period 103
- 4.2 Estimated United States Price Index, 1943–46 107
- 4.3 Correction for United States Price Controls, Third Quarter, 1971, through Second Quarter, 1974 108

- 4.4 United States Price and Real Income Annual Estimates: As Reported and Corrected for Price Controls, 1971–74 108
- 4.5 Statistics from Regressions of United Kingdom Prices on Nominal Income Expressed as Deviations from Eight-Year Trends, by Groups of Ordered Years within Trend Periods: Pre–World War I, Interwar, Post–World War II, and Full Period 117
- 4.6 Reported United Kingdom Price Index, 1940–46, and Index Corrected for Effect of Price Control 119
- 4.7 Reported and Corrected United Kingdom Price and Real Income Series, 1965–75 120
- 4.8 United States Annual Data Used to Calculate Phase Averages, 1867–1975 122
- 4.9 United Kingdom Annual Data Used to Calculate Phase Averages, 1868–1975 130
- 5.1 Secular Changes in Money Stock, Income, Velocity, Prices, and Population, United States (1873–1975) and United Kingdom (1874–1975) 140
- 5.2 Money-Holding Propensities in the United States and United Kingdom over a Century 143
- 5.3 United States and United Kingdom Interest Rates in Initial and Terminal Phases 149
- 5.4 Rates of Change of Money, Income, Prices, and Output in Three Post–World War II Periods, United States and United Kingdom 158
- 5.5 Components of Trends and Fluctuations about Trend in Money Stock and Income: United States, 1873–1975, 1873–1914, and 1914–75; United Kingdom, 1874–1975, 1874–1914, and 1914–75 166
- 5.6 Rates of Change of Money, Income, and Velocity: Standard Deviations and Correlations 172
- 5.7 Average Value of Selected Nominal and Real Magnitudes during Reference Phases: United States, 1867–1975 186
- 5.8 Average Value of Selected Nominal and Real Magnitudes during Reference Phases: United Kingdom, 1868–1975 192

- 5.9** Rates of Change Computed from Triplets of Reference Phase Averages: United States, 1869–1975 196
- 5.10** Rates of Change Computed from Triplets of Reference Phase Averages: United Kingdom, 1870–1975 201
- 6.1** Variability in Money and Income Accounted for by Constant-Velocity Demand Curves 212
- 6.2** Effect of Changing Financial Sophistication on Variability in Money and Velocity 219
- 6.3** Standard Deviations of Logarithms of United States and United Kingdom Velocities: United States Velocity Based on Money Adjusted and Unadjusted for Changing Financial Sophistication 220
- 6.4** Income Elasticities and Correlation Coefficients, Calculated from Levels of Real per Capita Money and Income 227
- 6.5** Effect of Allowing for Postwar Adjustment and Shift Dummies on Difference between Variances and Regressions 232
- 6.6** Relation between Real per Capita Money and Real per Capita Income: Effect of Allowing for Upward Shifts in Money Demand during Interwar, World War II and Early Postwar Period, and for Postwar Shifts 234
- 6.7** Income Elasticities and Correlation Coefficients Calculated from Rates of Change of Real per Capita Money and Real per Capita Income, Various Periods, without and with Allowance for Trend by Inclusion of Nonzero Constant Term 246
- 6.8** Relations between Rates of Change of Real per Capita Money and Real per Capita Income: Effect of Allowing for Demand and Postwar Shifts, with Zero and Nonzero Constant Term 250
- 6.9** Relations between Levels of Real per Capita Money and Real per Capita Income: Estimates of the Effects of Population and Prices, Allowing for Demand and Postwar Shifts 255
- 6.10** Relations between Rates of Change of Real per Capita Money and Real per Capita Income: Estimates of the Effects of Population and Prices, Allowing for Demand and Postwar Shifts 257

-
- 6.11 Comparison of Short-Term (R_S) versus Long-Term (R_L) Interest Rate as Variables in Money-Demand Equation 268
- 6.12 Effect of Own Yield on Money in Money-Demand Function 272
- 6.13 Comparison of Rate of Change of Nominal Income (g_Y) and of Prices (g_P) as Variables Representing Nominal Return on Physical Assets in Money-Demand Equation 278
- 6.14 Demand Equations for Money: Final Estimates for Regressions of Real per Capita Money on Other Variables 282
- 6.15 Upper and Lower Limits of Income Elasticity of Money Demand and Semilog Slopes of Differential Yield on Money, and Proxy Yield on Physical Assets 285
- 6.16 Differences in Level of Money Demand in the United States and the United Kingdom at Three Income Levels 286
- 6.17 Estimated Yields of United States Corporate Bonds by Term to Maturity, 1873–1975 296
- 6.18 Parameters of the Yield Curve for Each Phase Observation 299
- 7.1 Relation between United Kingdom and United States Cyclical Turning Points, 1867–1975 309
- 7.2 Correlations of United States and United Kingdom Velocities and Their Determinants, and Also Prices, Nominal Income, and Money: Levels and Rates of Change, United States Dates 314
- 7.3 Role of Various Determinants in Producing Common Movements in Velocity in the United States and the United Kingdom 316
- 7.4 Regressions of Level and Rate of Change of Income and Prices in the United States and the United Kingdom on Level and Rate of Change of Own-Country, Other-Country and Combined-Country Money and Other-Country Velocity, United States Dates, Full Period 322

-
- 7.5** Regressions of Level and Rate of Change of Income in the United States and the United Kingdom on Level and Rate of Change of Own-Country Money, Other-Country Money, and Other-Country Velocity, United States Dates, Various Periods 328
- 7.6** Regressions of Level and Rate of Change of Prices in the United States and the United Kingdom on Level and Rate of Change of Own-Country Money, Other-Country Money, and Other-Country Velocity, United States Dates, Various Periods 330
- 7.7** Regression of Differences between Logarithms of United States and United Kingdom Velocities and Their Rates of Change 339
- 7.8** Estimates of Effects of Specified Determinants: Comparison between Results from Regressions Based on Separate Country Data, and Those Based on Differences between United States and United Kingdom 340
- 8.1** Regressions of Nominal Income on Nominal Quantity of Money and Other Variables 349
- 8.2** Effect of Allowing for Asset Yields on Relation between Nominal Quantity of Money and Nominal Income 352
- 8.3** Alternative Relations between Nominal Income and Other Variables: Standard Errors of Estimate 360
- 8.4** Estimates of Structural Parameters from Alternative Relations between Nominal Income and Other Variables 362
- 8.5** Relation between Nominal Income and Money in Current and Prior Phases 365
- 8.6** Sum of b Coefficients: Effect of Allowing for Trend and Transient Effects; Significance of Difference from Unity 369
- 8.7** Estimates of Income Elasticity Based on Trend Terms 371
- 8.8** Estimates of Transient Effects and Tests of Their Statistical Significance 373

-
- 8.9 Cumulative Effect on the Rate of Growth of Nominal Income of a Sustained One Percentage Point Increase in the Rate of Monetary Growth Initiated in Phase *t*, Eliminating and Including Transient Effects 375
- 9.1 Correlations between Phase Rates of Change in Money, Nominal Income, Prices, and Output 399
- 9.2 Variability of Phase Rates of Change in Money, Nominal Income, Prices, and Output 402
- 9.3 Rates of Change Computed from Varying Number of Phases: Selected Statistical Characteristics of Money, Nominal Income, Prices, and Real Income 412
- 9.4 Relation of Nominal Income, Prices, and Output to Money and Yields, Nonwar Phases 420
- 9.5 Correlation between Price and Output, after Allowing for Money and Trend and for Money, Trend, and Yields 424
- 9.6 Percentage of Nominal Income Change Associated with Monetary Change That Is Absorbed by Prices When Allowance Is Also Made for Trend, or for Trend and Yields 425
- 9.7 Tests of the Significance of the Difference between the United States and the United Kingdom for Relations between Nominal Income, Prices, and Output, and Nominal Money and Yields 426
- 9.8 Cumulative Effect on Prices of a One Percent Increase in the Quantity of Money, and Percentage of Income Change Ultimately Absorbed by Price Change, Estimated from Equations Relating Price Change to Current and Prior Money (Direct) or Current and Prior Money and Prior Income (Indirect): Nonwar Phases, United States and United Kingdom, and for United States, Also Excluding Interwar Phases 429
- 9.9 Estimates of Transient Effect on Income and Prices and Tests of Significance of Transient Effects on Prices, Nonwar Phases, United States and United Kingdom, and for United States, Also Excluding Interwar Phases 434
- 9.10 Variability of Prices and Output, before and after Allowing for Effects of Money; Money and Yields; Cur-

-
- rent and Prior Money; Current and Prior Money and Prior Income; and Trend 438
- 9.11** Cumulative Effect on the Rate of Growth of Prices and Output of a Sustained One Percentage Point Increase in the Rate of Monetary Growth Initiated in Phase t , Eliminating and Including Transient Effects: United States, All Nonwar Phases Excluding Interwar; United Kingdom, All Nonwar Phases; United States Plus United Kingdom, All Nonwar Phases Excluding United States Interwar 438
- 9.12** Estimates of Simple Phillips Curve, Nonwar Phases 444
- 9.13** Estimates of Relations between Rates of Change of Prices and Output, and Prior Price Change and Output Ratio, Nonwar Phases 449
- 9.14** Comparison of Alternative Hypotheses about Anticipations: Residual Variability of Output after Allowing for Anticipations 457
- 9.15** Estimates of Parameters on Two Alternative Hypotheses 459
- 10.1** Nominal and Real Ex-Post Yields: Averages, Standard Deviations, Correlations for All Phases and All Nonwar Phases, 1873–1975 502
- 10.2** Three Measures of Yields on Physical Assets, United States Annual Data, 1929–69 510
- 10.3** Nominal and Real Ex-Post Yields for Subperiods, 1873–1975 511
- 10.4** United States–United Kingdom Yield Differences, Subperiods, 1873–1975 513
- 10.5** Difference between Yields on Physical and Nominal Assets, Related to Rate of Change of Prices 519
- 10.6** Relation between Nominal Interest Rate and Rate of Change and Level of Prices 537
- 10.7** Equations Relating Nominal Interest Rate to Logarithm of Level of Prices 538
- 10.8** Estimates of β : Upper and Lower Estimates Based on Regressions between Rate of Change in Interest Rates

	and in Prices; Standard Errors of Estimate from Simple and Multiple Correlations	561
10.9	Tests of a Gibson Phenomenon for Real Yields	565
10.10	Nominal Rates of Interest Required, at Inflation Rates of 6 or 10 Percent, to Yield Average Ex-Post after-Tax Real Yields Recorded in Table 10.1	573
10.11	Measures of Impact and Intermediate Income Effects: Correlations of Levels of Interest Rates with Money and Trend	575
10.12	Measures of Impact and Intermediate Income Effects: Correlations of Rates of Change of Interest Rates with Rate of Change of Money and Trend	576
10.13	Relation of Interest Rates to Current and Prior Monetary and Price Change	578
10.14	Combined Effect of Current and Past Price and Monetary Changes and Estimate of Real Interest Rate	581
10.15	Estimated Real Return on Nominal and Physical Assets, Ex-Post and Ex-Ante, All Nonwar Periods	583
11.1	Long Swings: Alternative Chronologies for the United States	598
11.2	Long Swings: Alternative Chronologies for the United Kingdom	600
11.3	Mean Rate of Change of War, Additional Special, and Other Phase Observations	618
11.4	Analysis of Variance of Rates of Change during War, Additional Special, and Other Phase Observations	619

Preface

This preface is like the “synopsis” that appears at the head of each new chapter of a serialized novel, recounting the key events of earlier chapters so that the reader who has picked up the story for the first time can make sense out of the installment that follows. It is especially needed for this book because of the long interval that has elapsed between the earlier installments and this one—the fourth and last of a series of books that had their origin in new estimates of the quantity of money in the United States. For the benefit of new arrivals, this preface, like the standard “synopsis,” touches on the highlights of some of the earlier books, repeating for the first two what was said in the preface of the third.

A Monetary History of the United States, 1867–1960, by Milton Friedman and Anna J. Schwartz, was the first in the series. “It traces changes in the stock of money for nearly a century, from just after the Civil War to 1960, examines the factors that accounted for the changes, and analyzes the reflex influence that the stock of money exerted on the course of events.”¹

Determinants and Effects of Changes in the Money Stock, 1875–1960, by Phillip Cagan, examines intensively the sources of changes in the stock of money and gives a detailed statistical analysis of the cyclical and secular behavior of each of the proximate determinants of the quantity of money: high-powered money, the ratio of deposits at banks to their reserves, and the ratio of the public’s holdings of deposits to its holdings of currency.²

Monetary Statistics of the United States, by Friedman and Schwartz, describes in detail how the new estimates of the stock of money were

1. Princeton University Press for the National Bureau of Economic Research, 1963, p. 3.

2. National Bureau of Economic Research, 1965.

constructed and gives supplementary tables that, though by-products of the estimation process, are of interest in their own right.³ Its title, unlike those of the earlier volumes, is not qualified by dates because *Monetary Statistics* also surveys earlier attempts to estimate the United States money stock and gives a comprehensive summary of earlier numerical estimates. Hence its temporal scope is roughly coterminous with that of the Republic. Finally, *Monetary Statistics* surveys the usage of the term *money* in economic literature, examines a number of attempts to settle on a particular definition of money on the basis of theoretical considerations, and presents the criteria and evidence that led us to the particular definition we have selected for the United States for the period covered by our estimates: currency held by the public plus all deposits adjusted of commercial banks.

Monetary Statistics “is for the monetary statistician who is interested in basic data on the quantity of money. It provides raw material for analysis but little economic analysis.”⁴

The present book, like the first two in the series, attempts to provide such analysis. *A Monetary History* presented a chronological and largely qualitative analysis. *Determinants and Effects* presented both a historical and a statistical analysis of the supply of money. The special task of this book is to present a statistical and theoretical analysis of the relation between the quantity of money and other key economic magnitudes over periods longer than those dominated by cyclical fluctuations—hence the term *trends* in the title. Unlike the first three books, this one is not restricted to the United States but includes comparable data for the United Kingdom.

This book has been a long time in the making—indeed, a first draft of it was completed before any of the others in the series had been published. A second draft, more comparable to the present version in topics covered and statistical approach, was completed in 1966 and submitted tentatively to an NBER reading committee (Phillip Cagan, Solomon Fabricant, chairman, and Jack Guttentag). That draft was restricted entirely to the United States. The reading committee suggested that the book’s value would be enhanced by broadening its coverage to include the United Kingdom and perhaps other countries so as to permit international comparisons. At the time the suggestion seemed to us eminently sensible, and we thought it could be implemented with a modest expenditure of time. We were clearly wrong. Getting comparable data for the United Kingdom, making parallel analyses, and consolidating the results for the two countries turned out to be far more difficult and time-consuming than we had expected. We underestimated how much of a start the earlier

3. National Bureau of Economic Research, 1970.

4. *Ibid.*, p. 3

three volumes—all for the United States only—had given us for the United States analysis in this one, and how much of that background material we would have to duplicate for the United Kingdom. Other digressions and interruptions affecting both authors delayed us further, so that the book was not finished until a decade after the latest date at which we initially expected to complete it.

The delay enabled us to lengthen the period studied and to benefit from the flood of research on monetary matters during the past two decades. Needless to say, incorporating the new material added to the delay. Though no doubt the new material, the longer period covered, and the inclusion of the United Kingdom have all added to the value of the book, in retrospect we probably made a mistake in accepting the reading committee's suggestion. We doubt that the added contribution of the book adequately compensates for the additional effort and the long delay. We are somewhat comforted for the mistake—if mistake it was—by the fairly wide informal circulation that the original and subsequent drafts have had among scholars and the economic research that has been stimulated thereby, much of it through the Workshop in Money and Banking at the University of Chicago and through associates at the NBER. We in turn have been able to use the results of that research and have incorporated much of it herein.

In the preface to *Monetary Statistics* we wrote that we planned an additional book on monetary cycles. Much to our regret, that plan has proved another casualty to the unanticipated time it took us to complete this book. Our systematic published work on cycles will therefore be restricted to our earlier article, "Money and Business Cycles."⁵ Perhaps it is pure rationalization, but we have been surprised to find how much of the material in this book has direct relevance to the topics frequently considered under the heading "cyclical fluctuations." Whether that is true or not, we shall have to leave to other hands a fuller study of monetary cycles. Similarly, we shall have to leave to other hands the extension of our study of monetary trends to countries other than the United States and the United Kingdom.⁶

5. *Review of Economics and Statistics* 45 (1, suppl.) (February 1963): 32–64; reprinted in M. Friedman, *The Optimum Quantity of Money* (Aldine, 1969), chap. 10.

6. Such an extension has already been made for some countries and some of the topics we cover. See David Meiselman, ed., *Varieties of Monetary Experience* (University of Chicago Press, 1970), which includes six studies of monetary phenomena: for a cross-section of forty-seven countries during the post-World War II period (Morris Perlman); for Canada from 1867 to 1965 (George Macesich); for Chile, from 1879 to 1955 (John Deaver); for South Korea from 1953 to 1961 and for Brazil from 1948 to 1965 (Colin Campbell); for Argentina from 1935 to 1962 (Adolfo Cesar Diz); and for Japan after World War II (Michael Keran). Other studies include: Allan H. Meltzer, "The Behavior of the French Money Supply: 1938–54," *Journal of Political Economy* 67 (June 1959): 275–91; K. A. J. Hay, "Money and Cycles in Post Confederation Canada," *Journal of Political Economy* 75

Because this book has been such a long time in the making, we have accumulated intellectual debts to many persons. We apologize in advance to any that we fail to acknowledge because of the exponential decay of memory over time.

For a discussion of problems of measurement of the United Kingdom money stock before the 1900s, we are indebted to Shizuya Nishimura, David K. Sheppard, and Michael D. Bordo. Nishimura sent us an unpublished paper, referred to in chapter 4, that helped us to extend into the 1870s the series that Sheppard had constructed beginning 1880 and to revise some of Sheppard's estimates. Sheppard was most generous in extending his money series beyond 1966, the final year of his published estimates. Bordo's work on the nineteenth-century British monetary data was also helpful to us.

A revised and improved money stock series for the United Kingdom is likely to become available as part of a new study of United Kingdom monetary history now under way, under the direction of Brian Griffiths, at the Centre for Banking and International Finance of City University, London. Had that study been completed in time for us to use its results, our task would have been easier. Some of our findings may require revision if the new money series differs appreciably from the one we use.

Problems we encountered with estimates of the British income series before World War I led us to address a memorandum to a group of British economic statisticians concerning the data movements we found defective (see chap. 4 for the details). We acknowledge with thanks the courteous replies we received, especially those from C. H. Feinstein.

Among those who provided criticism, comments, and stimulation especially relevant to this book are the late Clark Warburton, Moses Abramovitz, Solomon Fabricant, Phillip Cagan, and participants in the Workshop on Money and Banking of the University of Chicago. Among those who assisted us in the statistical work of the earliest drafts of this book, dating back to the 1960s, are Lottie Boschan, Juanita Johnson, and Martha S. Lichtenstein; also Nadeschda Bohsack, Antonette Bugar, Marilyn McGirr, Esther D. Reichner, Selma Seligsohn, the late Hanna Stern, Mark L. Wehle, and Tom Teng-pin Yu. Successive drafts that we prepared in the 1970s benefited greatly from the devoted efforts of three

(June 1967): 262-73; Lars Jonung, "Money and Prices in Sweden, 1732-1972," in *Inflation in the World Economy*, ed. J. M. Parkin and G. Zis (Manchester: Manchester University Press, 1975); T. J. Courchene, "An Analysis of the Canadian Money Supply, 1925-34," *Journal of Political Economy* 77 (May/June 1969): 363-91. For Japan, a project at the Institute for Industrial Relations, Rikkyo University, has produced a major study, Kokishi Asakuri and Chiaki Nishiyama, eds., *A Monetary Analysis and History of the Japanese Economy, 1868-1970* (Tokyo: Sobunsha, 1974) [primarily in Japanese but with table titles and caption headings, and summary articles in English]. The extensive bibliography of this volume includes still other studies.

outstanding research assistants: Roy Andersen, Nurhan Helvacian, and Linda Dunn. We gratefully acknowledge their help.

We have also received helpful suggestions on the final draft from the NBER staff and directors' reading committees (Phillip Cagan, Stanley Fischer, and Robert J. Gordon; Walter F. Hoadley, Stephan F. Kaliski, and James Simler).

The National Bureau and its successive directors of research and presidents—Arthur F. Burns, Solomon Fabricant, Geoffrey H. Moore, John R. Meyer, and Martin Feldstein—have been incredibly patient and understanding in giving us their full support during the long period involved in completing this and the earlier studies in the series. In addition, we are most grateful to the Ford Foundation and the J. Howard Pew Freedom Trust for grants for the specific purpose of enabling us to complete this work.

All in all, it is with a sense of satisfaction and relief that we terminate our part in a scholarly venture that we started more than a quarter of a century ago.

**Monetary Trends in
the United States
and the
United Kingdom**

