

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

Volume Title: Determinants and Effects of Changes in the Stock of Money, 1875–1960

Volume Author/Editor: Philip Cagan

Volume Publisher: NBER

Volume ISBN: 0-870-14097-3

Volume URL: <http://www.nber.org/books/caga65-1>

Publication Date: 1965

Chapter Title: Front matter, Determinants and Effects of Changes in the Stock of Money 1875–1960

Chapter Author: Philip Cagan

Chapter URL: <http://www.nber.org/chapters/c1639>

Chapter pages in book: (p. -28 - 0)

PHILLIP CAGAN

BROWN UNIVERSITY

*DETERMINANTS AND
EFFECTS OF CHANGES IN
THE STOCK OF MONEY
1875-1960*

NATIONAL BUREAU OF ECONOMIC RESEARCH

NEW YORK

Distributed by COLUMBIA UNIVERSITY PRESS

NEW YORK AND LONDON

Copyright © 1965, by National Bureau of Economic Research, Inc.

First printing 1965
Second printing 1967

All Rights Reserved

L. C. Card: 65-11216

Printed in the United States of America

*DETERMINANTS AND EFFECTS OF CHANGES IN
THE STOCK OF MONEY, 1875-1960*

NATIONAL BUREAU OF ECONOMIC RESEARCH

Studies in Business Cycles

1. *Business Cycles: The Problem and Its Setting*, by Wesley C. Mitchell
2. *Measuring Business Cycles*, by Arthur F. Burns and Wesley C. Mitchell
3. *American Transportation in Prosperity and Depression*, by Thor Hultgren
4. *Inventories and Business Cycles, with Special Reference to Manufacturers' Inventories*, by Moses Abramovitz
5. *What Happens during Business Cycles: A Progress Report*,
by Wesley C. Mitchell
6. *Personal Income during Business Cycles*, by Daniel Creamer
with the assistance of Martin Bernstein
7. *Consumption and Business Fluctuations: A Case Study of the Shoe,
Leather, Hide Sequence*, by Ruth P. Mack
8. *International Financial Transactions and Business Cycles*,
by Oskar Morgenstern
9. *Federal Receipts and Expenditures During Business Cycles, 1879-1958*,
by John M. Firestone
10. *Business Cycle Indicators: Volume I, Contributions to the Analysis of Current
Business Conditions; Volume II, Basic Data on Cyclical Indicators*,
edited by Geoffrey H. Moore
11. *Postwar Cycles in Manufacturers' Inventories*, by Thomas M. Stanback, Jr.
12. *A Monetary History of the United States, 1867-1960*, by Milton Friedman
and Anna Jacobson Schwartz
13. *Determinants and Effects of Changes in the Stock of Money, 1875-1960*,
by Phillip Cagan

NATIONAL BUREAU OF ECONOMIC RESEARCH
1965

OFFICERS

Frank W. Fetter, *Chairman*
Arthur F. Burns, *President*
Theodore O. Yntema, *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, *Nationwide Insurance*
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*
Walter W. Heller, *University of Minnesota*
Albert J. Hettinger, Jr., *Lazard Frères and Company*
Nicholas Kelley, *Kelley Drye Newhall Maginnes & Warren*
H. W. Laidler, *League for Industrial Democracy*
Geoffrey H. Moore, *National Bureau of Economic Research*
Charles G. Mortimer, *General Foods Corporation*
J. Wilson Newman, *Dun & Bradstreet, Inc.*
George B. Roberts, *Larchmont, New York*
Harry Scherman, *Book-of-the-Month Club*
Boris Shishkin, *American Federation of Labor and Congress of Industrial Organizations*
George Soule, *South Kent, Connecticut*
Gus Tyler, *International Ladies' Garment Workers' Union*
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*
N. I. Stone, *New York City*

RESEARCH STAFF

Moses Abramovitz
Gary S. Becker
William H. Brown, Jr.
Gerhard Bry
Arthur F. Burns
Phillip Cagan
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
John W. Kendrick
Irving B. Kravis
Hal B. Lary
Robert E. Lipsey
Ruth P. Mack
Jacob Mincer
Ilse 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

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. 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)*

To My Mother and Father

CONTENTS

Preface	xix
Foreword, by Milton Friedman	xxiii
1. The Money Stock and Its Three Determinants	1
1. Nature and Scope of the Study	1
2. Cyclical Behavior of the Rate of Change in the Money Stock	4
3. Framework of the Analysis	8
4. The Problem of Interdependence	15
2. Contributions of the Three Determinants to the Rate of Change in the Money Stock	17
1. Contributions of the Determinants to Secular Growth of the Money Stock	18
2. Contributions of the Determinants to Cyclical Movements in the Rate of Change in the Money Stock	21
Specific Cycle Patterns	23
Relative Contributions of the Determinants to the Rate of Change in the Money Stock	25
Amplitude of Fluctuations in the Contributions of the Determinants	31
Regularity of Fluctuations in the Contributions of the Determinants	32
Interdependence of Fluctuations in the Contributions of the Determinants	34
Summary of Contributions of the Determinants to Cyclical Movements in the Rate of Change in the Money Stock	42
3. High-Powered Money	45
1. Secular Movements in Sources of Change in High-Powered Money	49
The Gold Stock	52
Federal Reserve Credit Outstanding	68

Silver Purchases	74
Treasury Operations, Excluding Silver Purchases	78
National Bank Notes	86
Summary of Secular Movements	95
2. Cyclical Movements in the Sources of Change in High-Powered Money	98
Pre-World War I Cycles	105
Post-World War I Cycles	111
Summary of Cyclical Movements	116
4. The Currency Ratio	118
1. Secular Movements in the Demand for Currency	119
Shifts in the Demand Relative to Other Assets	119
Net Rate of Return on Deposits	123
Income Growth and Urbanization	126
Factors Responsible for the Wartime Rise in Currency Demand	129
Summary of Secular Movements	132
2. Cyclical Movements in the Demand for Currency	134
The General Pattern	134
Explanations of Cycles in Currency Demand Examined	143
5. The Reserve Ratio	151
1. Shifts in the Distribution of Deposits	152
Shifts in Deposits Between National or Member Banks and Other Commercial Banks	153
Shifts in Deposits Among National or Member Banks in Different Reserve Classifications	159
Shifts Between Time and Demand Deposits	164
Summary of Shifts in Deposits	179
2. Legal Reserve Requirements	181
Major Changes in National or Member Bank Reserve Requirements	182
Changes in Requirements of Other Commercial Banks	184
Effects of Changes in Member Bank Reserve Requirements	188
3. The Long-Run Decline in the Usable Reserve Ratio	203
Timing of the Decline	204
Possible Explanations of the Decline	208
4. Cyclical Movements	219

6. The Cause-and-Effect Relation Between Money, Prices, and Output	234
1. Secular Movements in Money and Prices	235
The Evidence	235
Some Long-Standing Objections Reconsidered	249
Concluding Remarks on Secular Movements in Money and Prices	259
2. Cyclical Movements in Money, Prices, and Output	261
Large Fluctuations: War and Severe Cycles	262
Alterations in Monetary Institutions and Practices: Mild Cycles	268
Implications of Mutual Dependence	276
7. Summary	279
1. Secular Movements	280
Contributions of Three Determinants to Growth in the Money Stock	280
Factors Affecting the Three Determinants	281
Effects of Changes in the Money Stock on Prices and Output	283
2. Cyclical Movements	287
Contributions of Three Determinants to Cycles in Monetary Growth	287
Factors Affecting the Three Determinants	290
The Interrelation of Cycles in Monetary Growth and Business	293
Appendixes	
A. Supplementary Measures of the Relative Contributions of the Three Determinants	299
B. Some Evidence on Fisher's Explanation of the Gibson Paradox	305
C. Four Theories of How Price Changes May Affect Output in the Long Run	310
D. Mathematical Analysis of a Purely Monetary Cycle	313
E. Interest Payments and Service Charges on Bank Deposits	317
F. Reference Tables, F-1 to F-18	322
Indexes	373

TABLES

1. Timing and Amplitude of Specific Cycles in the Rate of Change in the Money Stock, 1870–1960	6
2. Sources of the Rate of Change in the Money Stock: Averages for Selected Periods, August 1875 to December 1955	19
3. Relative Contributions of Determinants to Five Stages of Nonwar Specific Cycles in the Trend-Adjusted Rate of Change in the Money Stock, 1877–1953	25
4. Relative Contributions of Determinants to Specific Cycles in the Trend-Adjusted Rate of Change in the Money Stock, 1877–1953	26
5. Average Amplitude of Contributions of Determinants to Specific Cycles in the Trend-Adjusted Rate of Change in the Money Stock, 1877–1953	32
6. Regularity of Contributions of Determinants to Specific Cycles in the Trend-Adjusted Rate of Change in the Money Stock, 1877–1953	33
7. Correlations Between the Contributions of the Determinants to Five Stages of Specific Cycles in the Trend-Adjusted Rate of Change in the Money Stock	34
8. Correlations Between the Combined Contribution of the Currency and Reserve Ratios and That of High-Powered Money to Various Stages of Specific Cycles in the Rate of Change in the Money Stock	36
9. Description of Sources of Change in High-Powered Money	46
10. Sources of Changes in High-Powered Money, for Selected Periods, 1876–1955	51
11. Sources of Secular Growth of the U.S. Gold Stock: Average Rates of Change Between Reference Cycle Peaks, 1873–1913	62

12. Sources of Change in High-Powered Money, June 30, 1875, Through December 31, 1878	81
13. Comparison of Return on National Bank Notes with Change in Their Circulation, 1879-97	88
14. Change in the Currency-Money Ratio During Reference Cycles, 1879-1954	138
15. Correction of Currency-Money Ratio for Unauthorized Note Issues in Panics of 1893, 1907, and 1933	140
16. Effect on Reserve Ratio of Five Largest Shifts in Deposits Between National or Member Banks and Other Commercial Banks, 1875 to 1955	157
17. Ratio of Time Deposits to Total Deposits at Commercial Banks, Selected Areas, 1896 and 1914	170
18. Changes in the Member Bank Reserve Ratio, Selected Periods, 1914-55	176
19. Summary of Effects on Commercial Bank Reserve Ratio of Shifts in Deposits, Three Selected Periods, 1898-1940	180
20. Required Reserve Ratio of Other Commercial Banks, Selected Years, 1909-50	186
21. Effects of All Major Changes in Reserve Requirements on National or Member Bank Reserves, 1875-1955	190
22. Reserve Ratios of Selected Financial Institutions, Annually, 1929-40	197
23. Effect of 1936-37 Increases in Reserve Requirements on Usable Reserve Ratios, Three Classes of Member Banks	198
24. National Bank Reserve Ratios, Annually, 1865-75	205
25. Average Levels of Reserve Ratios During Reference Cycles, 1869-1907	207
26. Ratio of U.S. to Individual Deposits at National Banks: Average During Reference Expansions and Contractions, 1873-1918	216
27. Changes in the Reserve Ratio During Reference Cycles, 1879-1954	222
28. Secular Movements in Prices and in the Money Stock, and Sources of Movements in the Money Stock, 1877-1954: Average Rates of Change Between Reference Cycle Bases Centered at Peaks	236
29. Correlation Between Secular Movements in Prices and in the Money Stock and Its Sources, 1877-1954	237

A-1. First Alternative Measure of the Relative Contributions of Determinants to Specific Cycles in the Trend-Adjusted Rate of Change in the Money Stock, 1877-1953	300
A-2. Relative Contributions of Determinants to Amplitude of Contractions in Nonwar Specific and Step Cycles in the Rate of Change in the Money Stock, 1877-1953	302
A-3. Second Alternative Measure of the Relative Contributions of Determinants to Specific Cycles in the Trend-Adjusted Rate of Change in the Money Stock, 1877-1953	303
B-1. Bond and Stock Yields and Their Differentials: Average Reference Cycle Standings, 1873-1913	305
E-1. Average Rate of Interest or Charge on Demand and Time Deposits, Annually, 1927-60	318
E-2. Average Rate of Interest Paid by Mutual Savings Banks, Annually, 1920-34 and 1945-60	319
E-3. Average Rate of Interest Paid on Deposits at State and Private Banks in Kansas, 1897-1927, and at All Member Banks, 1919-26	320
F-1. Contributions of the Three Determinants to Matched Specific Cycles in the Rate of Change in the Money Stock, 1877-1953	322
F-2. Contributions of the Three Determinants to Nonwar Reference Cycle Patterns of the Rate of Change in the Money Stock, 1878-1961	326
F-3. Contributions of the Three Determinants to Step Cycles in the Rate of Change in the Money Stock, 1877-1954	331
F-4. Contributions of the Three Determinants to Secular Movements in the Money Stock, 1877-1953: Average Rate of Change Between Specific Cycle Bases Centered at Peaks	332
F-5. Sources of Change in High-Powered Money, Fiscal Years, 1876-1955	333
F-6. Sources of Change in High-Powered Money as Percentage of High-Powered Money, Fiscal Years, 1876-1955	338
F-7. Stock of Monetary Gold, Its Relation to High-Powered Money, and Commodity Value of Gold, Annually, 1875-1955	340
F-8. Deposits and Reserves at Commercial Banks, Annually and Semiannually, 1875-1955	342

F-9. Percentage of Commercial Bank Deposits Created by National or Member Banks, Annually and Semiannually, 1875-1955	355
F-10. Reserve Ratios of Commercial Banks, Annually and Semiannually, 1875-1955	356
F-11. Reserve Ratios of National Banks, by Class of Bank, Annually, 1875-1917	359
F-12. Required and Usable Reserve Ratios of Member Banks, Semiannually, 1914-55	361
F-13. Reserve Ratios of Member Banks, by Class of Bank, Annually, 1918-55	363
F-14. Hypothetical Reserve Ratio of National or Member Banks, Based on 1914 Distribution of Deposits Among Banks, Annually, 1875-1955	364
F-15. Total Cash Reserve Ratio of National or Member Banks, by Class of Bank, Annually, 1875-1955	366
F-16. Total Cash Reserve Ratio of Other Commercial Banks, Annually and Semiannually, 1896-1955	368
F-17. Deposits, Reserves, and Reserve Ratio of Mutual Savings Banks, Annually and Semiannually, 1875-1955	369
F-18. Ratio of Currency to Consumer Expenditures, Decennially and Annually, 1869-1960	372

CHARTS

1. The Money Stock and the Three Determinants, 1875–1955 <i>facing</i>	14
2. Average Contributions of the Three Determinants to Specific Cycles in the Rate of Change in the Money Stock	22
3. Sources of Change in High-Powered Money, Fiscal Years, 1876–1955	48
4. Relation Between High-Powered Money and the Gold Stock, Annually, 1875–1955	56
5. The U.S. Monetary Gold Stock and Commodity Value of Gold, Annually, 1875–1955	58
6. Reference Cycle Patterns of Sources of Change in High-Powered Money, 1879–1954	100
7. Average Reference Cycle Patterns of Sources of Change in High-Powered Money	102
8. Reference Cycle Patterns of Balance of Commodity Trade, and Residual Changes in the Gold Stock, 1879–1914	106
9. Nonwar Reference Cycle Patterns of Change in Federal Reserve Loans to Member Banks and of Residual Nongold Sources of Change in High-Powered Money, 1919–54	112
10. The Currency-Money Ratio, the Currency-Expenditures Ratio, and Velocity of Money, Annually, 1874–1960	120
11. Average Pattern and Deviations from Trend of the Currency-Money Ratio for Two Sets of Reference Cycles, 1879–1954	135
12. Nonwar Reference Cycle Patterns of Currency-Expenditures Ratio, Annual Data, 1891–1958	144
13. Nonwar Reference Cycle Patterns of Currency-Personal Income Ratio, Monthly Data, 1933–58	146
14. Nonwar Reference Cycle Patterns of the Fraction of the Money Stock Held by the Consumer Sector, Annual and Quarterly Data, 1933–61	149

15. Percentage of Commercial Bank Deposits Created by National or Member Banks, Annually and Semiannually, 1875–1955	154
16. Actual and Hypothetical Reserve Ratios and the Difference Between Them, National or Member Banks, Annually, 1875–1955	160
17. Ratio of Time Deposits to Total Deposits at Commercial Banks, Annually, 1914–60	165
18. Share of Time Deposits and Demand Deposits in Total Liquid Assets, and Rates of Return, 1896–1960	168
19. High-Powered Reserve Ratio of Other Commercial Banks, Annually and Semiannually, 1875–1955	188
20. Reserve Ratios of National or Member Banks, Annually and Semiannually, 1875–1955	192
21. Reference Cycle Patterns of the Reserve Ratio of All Commercial Banks, 1879–1954	220
22. Scatter Diagram of the Reserve Ratio and Short-Term Interest Rates: Changes in Reference Cycle Relatives over Expansions and Contractions, 1879–1954	230
23. Reference Cycle Patterns of the Rate of Change in the Money Stock and the Contributions of the Three Determinants, Six Cycles with the Most Severe Business Contractions, 1878–1938	264
24. Reference Cycle Patterns of the Rate of Change in the Money Stock and the Contributions of the Three Determinants, Non-war Cycles with Mild Business Contractions, 1885–1961	270
25. Yield Differentials of Stocks over Bonds: Average Reference Cycle Standings, 1873–1913	306

FIGURES

1. The Ω Function	314
2. Phase Map of ψ	315

PREFACE

BY LONG TRADITION prefaces to monetary works note the wide attention given the subject by the public. The remark is still appropriate today. Few subjects have entertained and alarmed the public for so long. A debate continuing for centuries pits the classical writers, who view money as an independent source of economic disturbance, against the critics of this view, who say money is a passive adapter to business conditions with little independent influence. Indeed, recent statements of the passive view sound much like the old real-bills doctrine propounded in the Bullion controversy over a century and a half ago. The active and passive theories of money appear to be antagonists in an unending saga: periodically one or the other side proclaims its adversary dead and laid to rest, but neither one stays buried. Hopefully the rapidly accumulating empirical work will eventually settle the matter, though my interpretation of the evidence—that money is both active and passive—obscures the sharp lines of the old debate and may please neither side.

The present work has become a collection of related but separate studies, each of which merits book-length treatment, so different are the factors affecting the various parts of the money supply in its secular and cyclical movements. Giving due attention to each part has prolonged the work, though there are still many gaps in the analysis. Drawing on the evidence of an eighty-five-year period has enlarged the work as well, but is worthwhile. Important relationships can be misjudged if studied in a few short periods because of special factors which, at short range, give an impression of dramatic impact but in a longer view lose significance. Some studies of the money stock rely too much on the unusual events of the 1930's and 1940's. The financial panic and the fluctuations in bank reserve ratios in those decades obscure the typical behavior of monetary variables and may lead to error. Comparisons with other periods lessen the danger of exaggerating the effects of some factors and missing others.

A statistical work like the present has one author responsible for the conclusions but many contributors. I have used new estimates of the U.S. money stock derived by Milton Friedman and Anna Jacobson Schwartz.¹ Their estimates are based on annual data back to 1896 compiled by the Division of Research and Statistics of the Federal Reserve System, and on nonnational bank data for the period 1875–96 prepared by David I. Fand at the Money and Banking Workshop of the University of Chicago.² Part of the present study was done during my association with the Workshop from 1955 to 1958, for which thanks are due to the Rockefeller Foundation for financial support.

I have benefited immeasurably at all stages of the study from the work and suggestions of Milton Friedman and Anna Schwartz. Their two volumes and this one are related, but separate, parts of the National Bureau's study of monetary influences on the economy. Through exchange of ideas and findings there is some overlap in the reports of our studies, though I hope not more than clarity requires. Mine differs from theirs in analyzing specifically and systematically the major factors affecting the determinants of the money stock, which they take up only incidentally. To draw out some implications of the findings I also discuss in Chapter 6 the effects of monetary changes on the economy. Although the conclusions reached are in general the same as those of Friedman and Schwartz, the subject is approached from a different angle. Each of the three volumes, written to stand alone, serves to supplement the others.

I wish to acknowledge also helpful suggestions from many people who commented on earlier drafts of the manuscript: Joseph Conard and Richard Selden, who served with Friedman and Schwartz on a National Bureau staff reading committee for the manuscript, Frank W. Fetter, Ilse Mintz, Geoffrey H. Moore, Jerome L. Stein, and Clark Warburton.

My debt is great to those who helped at various stages with compiling data and computing tables: at the National Bureau, Charlotte Boschan, Sophie Sakowitz, Hanna Stern, Mark Wehle, and

¹ *A Monetary History of the United States, 1867–1960*, Princeton University Press for National Bureau of Economic Research, 1963; and their forthcoming "Trends and Cycles in the Stock of Money in the United States, 1867–1960," also a National Bureau study, in preparation.

² "Non-National Banks Estimates: 1867–1896," unpublished Ph.D. dissertation, University of Chicago, 1954.

Tom Yu; at Chicago, Roy Elliot, George Macesich, and Lily Monheit.

Margaret T. Edgar deserves special thanks for a careful job of editing the manuscript; and H. Irving Forman, for expertly drawing the charts.

P. C.

FOREWORD

As Josh Billings wrote many years ago, "The trouble with most folks isn't so much their ignorance, as knowing so many things that ain't so." Pertinent as this remark is to economics in general, it is especially so to monetary economics. Because money is so pervasive and yet hidden, so susceptible to manipulation and yet seemingly beyond the ordinary man's control, it has attracted to itself far more than its share of "crackpots" offering easy panaceas for solving the ills of the world. And among professional economists, it has for centuries been the focus of dispute, both at the rarefied level of abstract theory and at the more mundane level of interpretation of day-to-day experience. In the process, opinion has tended to rigidify into strongly held views—on some dates precisely the opposite of those held at others—which derive their support less from carefully examined and well-organized evidence than from initial statement by great men and subsequent tiresome repetition.

It is not the least of the virtues of Phillip Cagan's monograph that it examines systematically and thoroughly many of these views in light of empirical evidence on factors affecting the quantity of money during nearly a century of United States history, and separates the propositions that "ain't so" from those that might be so from those that are so. A few specimens will document this assertion.

1. Cagan's general topic is the supply of money, so we may begin with a proposition that is almost uniformly taken for granted in current theoretical discussions of that general topic, namely, the proposition that the nominal quantity of money supplied tends to be positively related to interest rates (though, of course, the real quantity demanded tends to be negatively related). The positive effect is assumed to occur primarily through a trimming of reserve ratios by banks when the return they can get on loans and investments rises and, secondarily, through an expansion of the volume of reserves by member-bank borrowing from the Federal Reserve. Cagan examines both

channels, using evidence for both secular movements and cyclical fluctuations. He concludes that the first channel is inoperative: "Cyclical fluctuations in the reserve ratio mainly reflect business conditions, not the cost of holding reserves [interest rates], insofar as the two differ, as they often do." Though he finds some positive relation between rates of interest and member-bank borrowing, he attributes relatively little importance to this effect. Two other channels seem to him somewhat more important: effects on the demand for currency and on the division of deposits between time and demand deposits. "A rise in rates paid on time and savings deposits appears to reduce the demand for currency A rise in interest rates also induces a shift from demand to time deposits, which reduces the required reserve ratio of banks and hence the total reserve ratio. These effects produce a slight positive relation between interest rates and the money stock (defined to include time deposits)." Yet, all in all, "interest rates . . . appear to have very minor effects on the money stock."

2. A related, though far less basic, issue is the effect of changes in legal reserve requirements on the reserve ratio of the banking system. One view is that such changes will be transmitted in full to the ratio of total reserves to deposits, i.e., that what Cagan calls the "usable reserve ratio" will be unaffected. An alternative view is that changes in legal reserve requirements will affect the total reserve ratio only when usable reserves are small, that otherwise they will leave it unchanged, an increase in requirements being absorbed by a decline in the usable reserve ratio and a decrease in requirements by a rise in the usable reserve ratio. Both views can be found in the literature, and the Federal Reserve System has at times based policy on the one view and at times on the other. After examination of the evidence and consideration of various plausible interpretations, Cagan concludes that the "desired level of usable reserves . . . is usually independent of required reserves, no matter how large the usable reserve ratio may be," although the speed with which banks adjust to a change in required reserves may depend on the size of the usable reserve ratio.

3. Probably the most important issue to which the monograph contributes is the long-standing dispute about the causal relation between money and prices. Do changes in the quantity of money produce changes in the same direction in prices, as the classical economists contended for centuries? Or, as some economists have

argued in recent decades and many noneconomists for much longer, are the price movements the result of a variety of other independent influences, and the observed common movements in the quantity of money a result rather than cause of the price movements? It turns out that Cagan's examination of the source of changes in the quantity of money yields highly relevant evidence for discriminating between these alternatives, or, on a more sophisticated level, for indicating the role of each.

(a) The major source of long-period changes in the quantity of money in the United States has been changes in high-powered money, which, until 1914, reflected mostly changes in the amount of gold. Price rises tend to discourage gold output and encourage gold exports and thereby tend to reduce the quantity of high-powered money. Conversely, price decreases tend to increase the quantity of high-powered money. These effects show up in the data—but with a very long lag, measured in decades rather than years. The contemporaneous relation is precisely the opposite: price increases accompany a higher than average rate of rise in high-powered money; price decreases, a lower than average rate of rise.

If this variation is not coincidental, or the common result of some unspecified third factor, it must reflect the effect of money on prices. Cagan concludes, "The lagged reaction of the gold stock to changes in commodity prices . . . is what makes the gold standard a poor means of stabilizing the price level, rather than failure of gold-stock changes to affect prices." And "to explain secular movements in prices . . . we should look primarily to the money stock, and then secondarily to nonmonetary factors that may also have important influence."

(b) For short-period fluctuations involving severe business contractions, the evidence is equally decisive and in the same direction. Each such contraction is associated with a sharp decline in the rate of monetary growth. Cagan's examination of the sources of the decline "rules out . . . a sharp fall in business activity as the main reason." The care with which he builds the foundation for this conclusion is most impressive, especially his painstaking, and rather successful, attempt to separate out the effects of banking panics from those of severe business contractions. He concludes, "The evidence is therefore consistent with, and, taken as a whole, impressively favors emphasis on the decline in the rate of monetary growth as the main reason some

business contractions, regardless of what may have initiated them, became severe.”

(c) For mild cycles, the evidence is no less decisive but yields a different substantive result. For these, Cagan finds clear evidence of the influence of business changes on the quantity of money. Surprisingly, in light of most of the cycle literature which emphasizes the reactions of banks and monetary authorities, cyclical fluctuations in the fraction of its money that the public holds in the form of currency account for roughly half of the cyclical fluctuations in the quantity of money. These movements in the currency ratio, and also most of the less important cyclical fluctuations in the banks' reserve ratio, seem to reflect the contemporaneous movements in economic activity. Yet there is also evidence of the reverse influence of money on business. Hence, Cagan concludes that “mutual dependence” is the rule for mild cycles.

4. A by-product of Cagan's analysis of the causal relation between money and prices is his examination of the so-called Gibson paradox, the observed tendency for the long-period movements of prices and interest rates to be in the same direction. Knut Wicksell and John M. Keynes hypothesized that both movements were the common result of independent changes in the demand for loans. An increase in the demand for loans, they argued, would directly raise interest rates; indirectly, because of lagged reactions by the banking system, it would also raise the quantity of money, which, in its turn, would raise prices; and conversely for a decline in the demand for loans. Cagan demonstrates that this explanation, despite its wide acceptance—or at least repetition—is contradicted by the facts—not because there is any flaw in the theoretical reasoning but because the hypothesis requires that the major source of long-period changes in the nominal quantity of money be changes in reserve ratios, whereas in fact it has been changes in the quantity of high-powered money. One relevant fact can deprive the most rigorous chain of reasoning of explanatory value—though, I hasten to add, no assortment of facts, however numerous, have any explanatory value unless they can be organized by a theory.

Cagan considers also an alternative explanation suggested by Irving Fisher, which relies on a delayed effect of actual price changes on expectations about the future course of prices. Cagan finds that the evidence he examines neither clearly contradicts nor strongly supports

that explanation. This remains one of those propositions that might be so.

Rather than adding to these examples—which the reader will find it more profitable to do for himself—let me supplement briefly Cagan's comments in his preface on the relation between his study and the two companion volumes by Anna Jacobson Schwartz and myself. All three deal with U.S. experience over the same period. All three attempt to use the factual evidence for that period and that country to illuminate the role of money in economic affairs and to test and enrich our theoretical understanding of the working of a money economy. All three use as a central element our estimates of the quantity of money. All reach compatible and, to some extent, overlapping conclusions—as is natural since the three are products of the same project and each has benefited from the others. Yet each makes its own distinctive contribution to the common objective.

Our *Monetary History of the United States*, already published, is primarily an analytical narrative, organized chronologically, which seeks to extract inferences about the role of money from an examination of successive historical episodes. We were able to do so the better because we had access to Cagan's work and could use it as statistical underpinning for our historical account.

The special task of Cagan's monograph was, as already said, to isolate and measure the factors responsible for changes in the stock of money. In doing so, he has provided basic material that no future student of the subject will be able to do without or need duplicate—in his tables and the careful statistical calculations that underlie them, no less than in his text. There does not exist any other study of conditions determining the supply of money that is remotely comparable to Cagan's in its empirical scope and thoroughness, though, thanks partly to his work, this subject, like the study of money in general, is experiencing something of a boom.

Originally, we did not expect the examination of the supply of money to provide evidence on such general issues as the causal relation between money and prices. We regarded it primarily as a study that, by examining one side of the monetary problem, would provide raw material for the other studies to combine with evidence from the demand side. But research leads a life of its own and has no respect for

initial expectations. As the earlier examples illustrate, evidence on the supply of money has turned out to yield unexpectedly powerful evidence on more general monetary relations—perhaps because it has been neglected and hence not already taken into account in the theoretical generalizations enshrined in the literature.

The monograph on *Trends and Cycles in the Stock of Money in the United States*, now in preparation, begins where Cagan leaves off, namely, with the behavior of the stock of money itself. It is a statistical analysis which seeks to find and interpret regularities in the secular and cyclical behavior of the stock of money and of monetary velocity in relation to other economic magnitudes. In addition, it gives a detailed explanation of the derivation of our estimates of the stock of money.

In contrast with our *History*, it is organized by statistical categories rather than by chronological episodes, and takes as its basic data numerical aggregates rather than qualitative events and the actions of individual human beings. In contrast with Cagan's monograph, it deals primarily with the demand for money, rather than the supply. Like the other monographs, it will unfortunately still leave for the future and for other scholars a full development of a monetary theory of the cycle which incorporates both demand and supply in an empirically meaningful way. Cagan's Appendix D is a foretaste of the most general outlines of such a development.

It is now well over a decade since the group of research studies of which this monograph is the second major product was begun at the National Bureau. In that period there has been a flourishing of monetary research in this country and abroad. This monograph, begun at a barren period, comes to fruition to join a rich and growing stream of work, to provide new material and new insights to numerous fellow workers, who will in their turn hopefully render it obsolete. It is an honor to introduce such a book to such a fellowship.

MILTON FRIEDMAN