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# CHANGES IN THE CYCLICAL BEHAVIOR OF INTEREST RATES\*

Phillip Cagan

## I Introduction

**A**LONG with growth in size and complexity of the financial system over the past century, changes have occurred in the cyclical behavior of interest rates. This paper describes changes in the behavior of a broad group of rates and, in Part III, presents some evidence on the contribution to these changes of cycles in the growth rate of the money stock. The long-term interest rates covered are yields on U.S. bonds and high- and low-grade corporate bonds for the period since World War I, and yields on high-grade corporate, municipal, and railroad bonds for a longer period. The short-term series are rates on Treasury certificates and bills, acceptances, bank loans, and discounts, which cover the period since World War I, and rates on call money and prime commercial paper for a much longer period. These are the main monthly and quarterly data available for an extended period. Annual series are less reliable for examining cyclical behavior, and were not used.

An obvious problem in working with interest-rate data is that institutional developments have

altered the character of the markets and the financial instruments from which the series are derived, making it difficult to distinguish between changes affecting particular rates and changes of broader significance. No series with long coverage exists for which the financial instrument has not changed substantially in quality or function. For example, no instrument of earlier periods quite compares to the role of Treasury bills in the post-World War II money market. Series are available for a long period on call money and commercial paper, but these instruments do not have the same characteristics they used to.<sup>1</sup> Some series for long-term bonds are fairly comparable over a long period, but they are compiled from a changing list of securities over time (to maintain roughly the same average term to maturity) and are subject to the inaccuracies of a changing composition.<sup>2</sup> It should be kept in mind, therefore, that the changing character and possible inaccuracies of these series affect their cyclical timing and amplitude of fluctuation to some extent, particularly over long periods of time. Yet there is no need for undue pessimism; interest rates are largely free of many difficulties inherent in measuring expenditure and income streams or stocks of wealth. The rates need no adjustment for changes in the value of money or in the unit of measurement, and reporting errors appear comparatively small. For business cycle research, interest rates rank among our more reliable and useful time series and provide a body of evidence on cycles that can hardly be ignored.

\* I wish to acknowledge the suggestions of the late William H. Brown, Jr., the late Joseph W. Conard, Milton Friedman, Jack M. Guttentag, F. Thomas Juster, Allan H. Meltzer, Geoffrey H. Moore, Sophie Sakowitz, and members of the advisory committee for the interest rate project. Thanks are due also to Lester V. Chandler, Joseph H. Willits, and Theodore O. Yntema of the National Bureau Board of Director's reading committee.

I am grateful to Josephine Trubek, who assisted in the statistical computations; to James F. McRee, Jr., for editorial help; and to H. Irving Forman for the charts.

<sup>1</sup>Richard T. Selden, *Trends and Cycles in the Commercial Paper Market*, Occasional Paper 85, New York, National Bureau of Economic Research, 1963.

<sup>2</sup>See the discussion in F. R. Macaulay, *The Movements of Interest Rates, Bond Yields and Stock Prices in the United States since 1856*, New York, NBER, 1938, Chap. III.

## BEHAVIOR OF INTEREST RATES

The dates of cyclical turning points in the series, seasonally adjusted,<sup>3</sup> are listed in Appen-

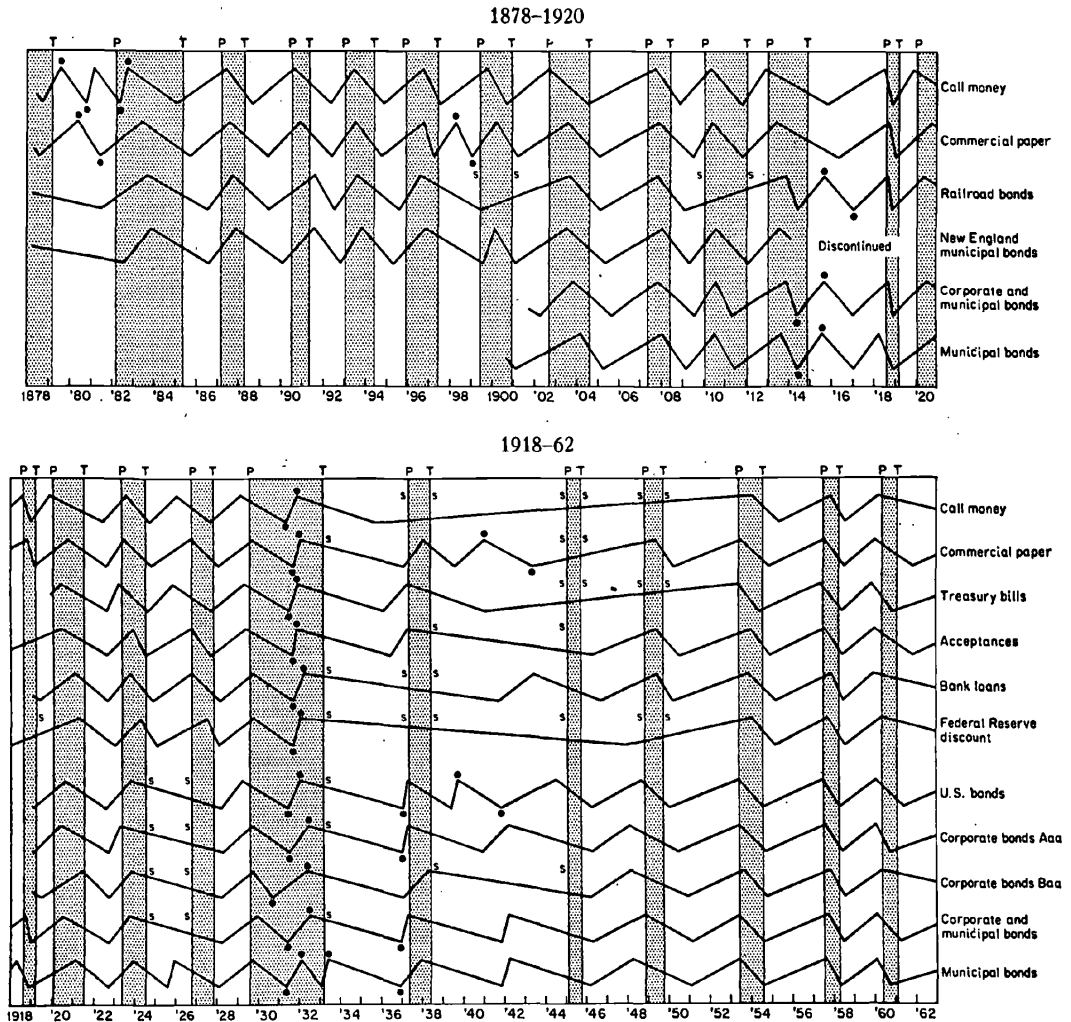
<sup>3</sup> The adjustments for the post-World War II period were done by the late William H. Brown, Jr., as part of the NBER interest rate project.

The dates of some turning points in Appendix A for the post-World War II period differ from those presented for the same series by Thomas E. Holland ("Cyclical Movements of Interest Rates, 1948-61," *Journal of Business*, Oct. 1964, pp. 364-369). His seasonal adjustment may differ slightly (the Shiskin-Eisenpress computer program, also used here, allows certain options), but the main differences probably reflect

dix Table A and shown graphically in Chart 1. The series referred to as Treasury bills is based on Treasury notes and certificates to 1929 and three-month bills thereafter. The dates of the 1919 trough shown for U.S. bonds and corporate bonds Aaa appear correct but might be too late

Holland's decision to remove "irregular movements" (by a moving average) before dating the turning points. A moving average can shift the date of turning points and was not used in deriving Appendix A.

CHART 1. — CHRONOLOGY OF SPECIFIC CYCLES IN INTEREST RATES COMPARED WITH REFERENCE CYCLES



● Denotes turns not matched with reference cycles.  
 s Denotes reference turns skipped.

SOURCE: Appendix Table A. Municipal bonds are the Standard and Poor's series through 1930's and Moody's Aaa series thereafter.

Note: Shaded areas represent reference cycle contractions; white areas, expansions.

by a few months, since the series begin in that year and an earlier turn cannot be ruled out for certain. For comparison with peaks and troughs in general business activity, the chart shades periods of business contraction.<sup>4</sup> Cyclical movements in the rates that do not correspond to reference cycles, and reference phases skipped by the rates, are noted on the chart. Many such discrepancies occurred, but on the whole all the rates usually conform well to business activity, as has long been recognized. Many of the discrepancies pertain to the 1930-49 period. Financial disorders produced extra cycles in rates in the early 1930's; then, with depressed business activity and rapid growth in the money stock during the second half of the 1930's, interest rates declined steeply and did not respond in the usual way to the business cycle. During and after World War II the Federal Reserve pegged U.S. bond and bill yields, indirectly affecting all interest rates, which explains skipped cycles during the 1940's. Aside from these episodes, the only other discrepancy from 1919 to 1961 was the 1924-26 reference expansion skipped by most bond yields, reflecting prolonged declines from the high levels attained in 1920. Between 1878 and 1913 there were few discrepancies. Beginning the analysis with 1878 avoids atypical behavior in the 1870's, when most series had extra cycles during the 1873-79 business depression; in that respect the period resembles the 1930's.

Since 1953 the rates covered by Chart 1 have conformed to every reference phase, which some commentators take as indication of a fundamental change in the money market. Important changes have occurred, to be sure, but the conformity does not appear exceptional. Call money and commercial paper rates had nearly perfect conformity to the ten reference cycles from 1885 to 1919. The chief discrepancies are associated with special disturbances in the money market. After all, price and output series, most of which conform closely to general business activity, also undergo unusual movements when subject to special developments such as strikes and wartime controls. Yet there is a clear difference: Interest

rates appear to reflect special influences more often than price and output series do, and each time for a longer period. The highly volatile behavior of financial markets is well known and needs no documentation here.

For present purposes it appears more fruitful to confine the analysis to the typical behavior of interest rates. Most of the analysis therefore excludes the 1930's and 1940's, World War I, and the post-Civil War period to 1878. That leaves the period since 1953 to compare with the 1920's, and these two decades to compare with the four and a half decades between 1878 and 1914.

Chart 2 shows the cyclical behavior of interest rates on a reference cycle basis. The patterns suggest two tendencies to be examined in detail: a shift toward earlier turning points in relation to reference turns and a greater amplitude of fluctuation in the 1950's than earlier. Timing is discussed in Section A and amplitude in Section B of Part II.

## II Changes in Cyclical Behavior

### A *Timing*

The generally lagged timing of interest rates at reference turns, evident in Chart 1, is summarized by Table 1, which gives the median lag of each rate in selected periods. The table covers the 1920's and 1950's (excluding World War I and the period from 1930 to the post-World War II unpegging of long-term rates in 1951), and the period 1879 to 1913 divided at 1900. (The main reason for dividing at 1900 is that two long-term rates are first covered just before that year.) Extra turns in the rates not matching reference cycles are ignored. Also, reference turns which a series skips are excluded. A comparison of median lags for rates that cover a different number or set of turns can be misleading. The medians appear satisfactory, however, for bringing out the changes in timing of each rate over time.

The length of the average lag of long rates has clearly declined at peaks and troughs. Some decline occurred between each period, and by the 1950's the lag had disappeared and in many series gave way to short leads. For short rates the table suggests closer timing to reference peaks

<sup>4</sup> For the dates see Geoffrey H. Moore (ed.), *Business Cycle Indicators*, Princeton University Press for National Bureau of Economic Research, 1961, I, 670. The latest reference trough is February 1961.