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Volume Title: What Happens During Business Cycles: A Progress Report

Volume Author/Editor: Wesley Clair Mitchell

Volume Publisher: NBER

Volume ISBN: 0-870-14088-4

Volume URL: http://www.nber.org/books/mitc51-1

Publication Date: 1951

Chapter Title: A Sample of Reference-Cycle Patterns

Chapter Author: Wesley Clair Mitchell

Chapter URL: http://www.nber.org/chapters/c3167

Chapter pages in book: (p. 27 - 50)

Part II

VARIETIES OF CYCLICAL BEHAVIOR

CHAPTER 4

A Sample of Reference-Cycle Patterns

'Observing business cycles' is a figurative expression. What we actually see are tables of figures or charts that purport to show in standardized symbols one among several species of changes found in time series, which are themselves bleak numerical records of certain mass activities. These series give many glimpses of our cycles, but none of them gives a well rounded view. The changes on which we focus attention never occur by themselves in the way our symbols suggest. Our measures are averages covering groups of cycles; rarely if ever do they fit snugly any one cycle. Like other scientific concepts, ours is a man-made entity, created by pulling apart items of experience that can be observed directly; then putting like parts together into a new whole that cannot be seen by the eye or touched by the fingers. Such synthetic products of the mind have often turned out to be useless or worse, in that they led to logical contradictions, conflicts with factual evidence, or futile practices. Most of the useful ones have to be reconstructed from time to time in the light of fresh discoveries they have helped men to achieve.

One standard procedure for trying to test or improve such a concept is to repeat with greater care and thoroughness the process by which it was produced. In this recapitulation, the investigator first defines the concept as best he can, considers the elements of experience he should separate from their original matrix, devises analytic methods for that purpose, applies them to appropriate materials, and finally assembles his findings to see whether they form a whole corresponding to the idea with which he started. If they do, he judges the concept as he defined it to be valid, at least for the time being. If not, he

may learn how the definition should be amended; or he may conclude that the whole concept should be abandoned as one more illusion from which men should free themselves.

Part I has presented our working definition of business cycles, outlined our methods of segregating cyclical fluctuations plus intracycle trends from movements of other types, and indicated the kinds of time series we have analyzed. In the results of this analysis, we have a stockpile of prefabricated parts designed to be assembled into a business cycle complying with the specifications laid down in advance. These parts are our average reference-cycle patterns, average rates of change per month from one reference stage to the next, and measures of conformity to business cycles.[1]

Before starting the job of final assembly, we should inspect these parts critically. One aim is to discover defects. Though the parts have been made by uniform methods, the materials used differ widely in kind, quality, and abundance. Because of such differences, some parts are oversized and some too small, while others are of such doubtful precision that we must use them with caution, if at all. A not less important aim of the inspection is to increase our own skills as assemblers. It would be a rash and wasteful effort to start selecting parts from our stockpile and trying to fit one to another before we had gained familiarity with their many shapes, sizes, and other peculiarities. Further, the knowledge we acquire of the parts by studying them individually will contribute directly to our ultimate aim by enabling us to make some subassemblies that should be delivered as units to the final assembly line.

Part II is devoted to this job of inspection. It begins with a sample of reference-cycle patterns selected to illustrate the diversities of business-cycle behavior found among the economic activities represented by the time series of our sample. Reference-cycle patterns afford the easiest and best introduction to the varieties of cyclical behavior. Readers are advised

[1] Little use is made here of the specific-cycle measures described in *Measuring Business Cycles*. They were not available in comparable form when this report was prepared.

to study the sample patterns in Chart 1 thoughtfully, comparing not only the two or more patterns in each figure but also the patterns in different figures, considering the nature of the activities represented, and thinking of reasons why these activities differ from or resemble one another in cyclical behavior. That exercise should prove interesting, and whet the appetite for the analytic chapters to follow.

All of the 'figures' in the chart have been derived by uniform methods. They are drawn on the same scale of time and the same scale of amplitude, so that the differences are due wholly to the data. Horizontal lines (TT) at the top and the bottom of each figure show the average durations of the reference cycles represented by the patterns. Since the varying groups of cycles covered by our series differ in average duration, these lines are not of uniform length, but the differences among them are not very large.[2] Amplitudes are to be read from the vertical scales on the left. Here 100 represents the cycle bases (that is, the average value of a series during each cycle covered), in percentages of which the average standings are expressed. The average standing of a series at each of the nine stages into which reference cycles are divided is plotted at the center of the stage as indicated by the time scale. One percent on the amplitude scale equals one month on the time scale, so that a slope of 45 degrees represents change at the rate of 1 percent monthly. A vertical line is drawn at the central point of each stage to represent the average deviation of standings in individual cycles from their mean. Like the average standings themselves, the average deviations from them are expressed in percentages of the cycle bases.

Our practice of plotting average standings at the midpoints of cycle stages and connecting them by straight lines tends to give the patterns an angularity that may at times be specious. A test of this effect is reported in *Measuring Business Cycles*, pages 347–9. We made special patterns of pig iron production covering 15 specific and 15 reference cycles by using 19 'stages' per cycle instead of 9. The resulting patterns are somewhat

[2] T stands for reference trough, and P for reference peak.

Chart 1

Average Reference-Cycle Patterns of a Sample of American Series

FIG. 1

Industrial and Agricultural Production

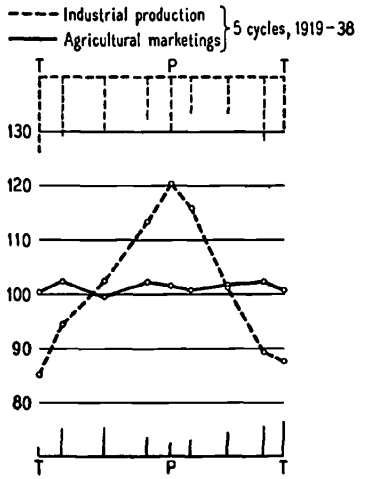


FIG. 2

Production of Producer and Consumer Goods

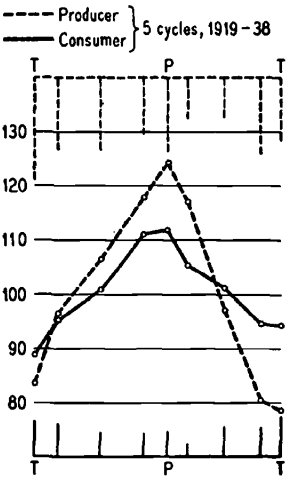
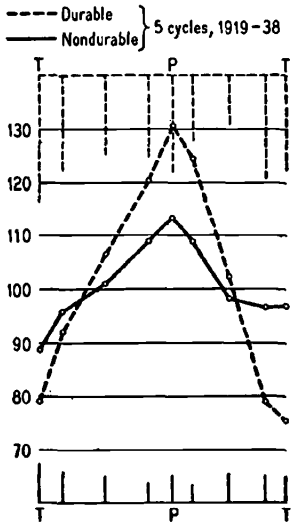


FIG. 3

Production of Durable and Nondurable Goods



See Table 42 for data on which chart is based and Appendix B for sources.

Chart 1 (cont.)

FIG. 4

Automobile Production

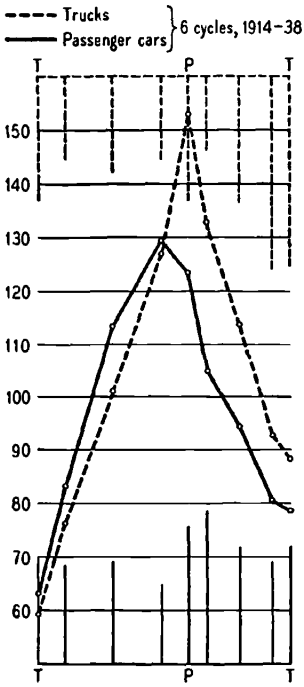


FIG. 5

Animal Slaughter

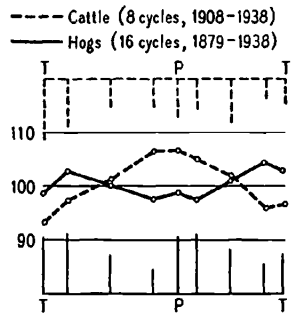


FIG. 6

Butter and Ice Cream Production

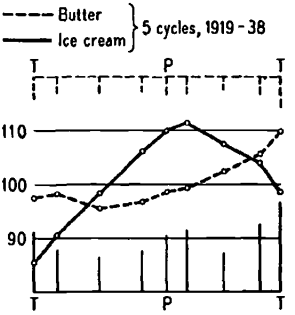
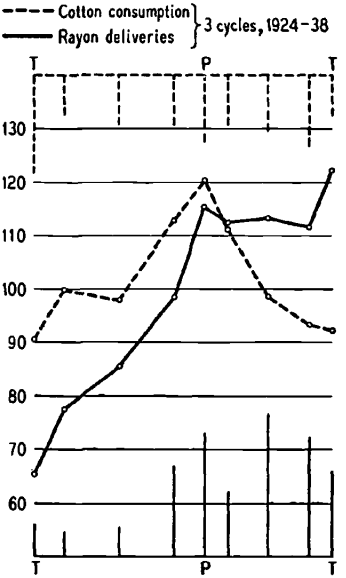


FIG. 7

Textile Manufacturing Activity



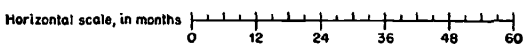


Chart 1 (cont.)

FIG. 8

Beehive Coke Production

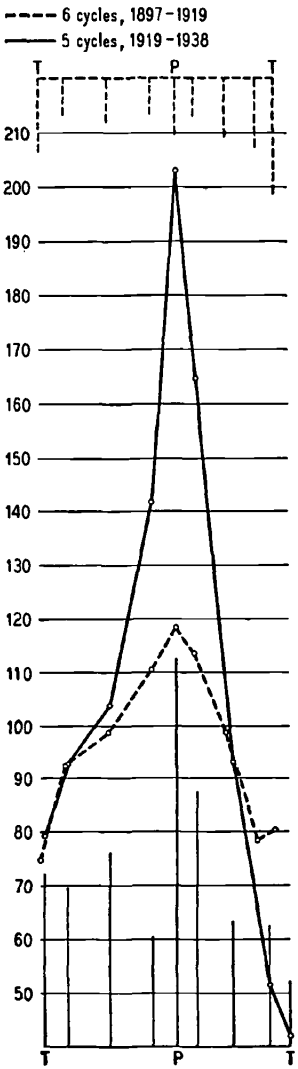


FIG. 9

Construction Contracts and Building Permits, Value

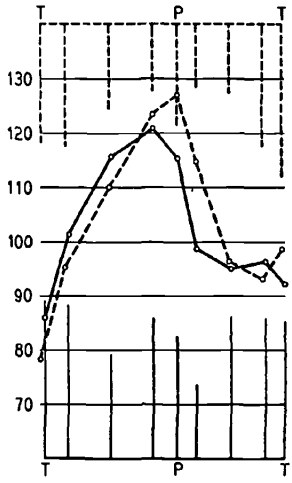


FIG. 10

Private and Public Construction Contracts, Value

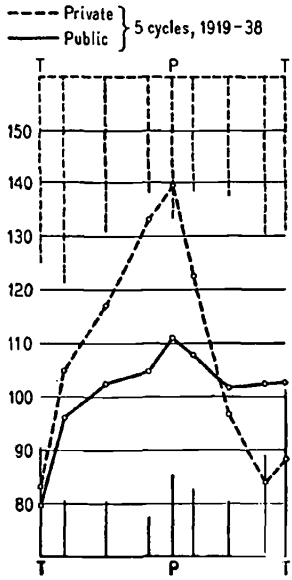


FIG. 11

Nonresidential Building Contracts, Value

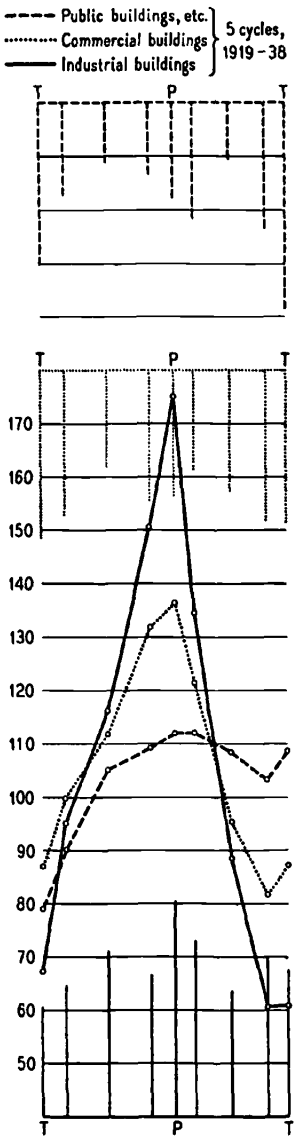


FIG. 12

Residential Building Contracts

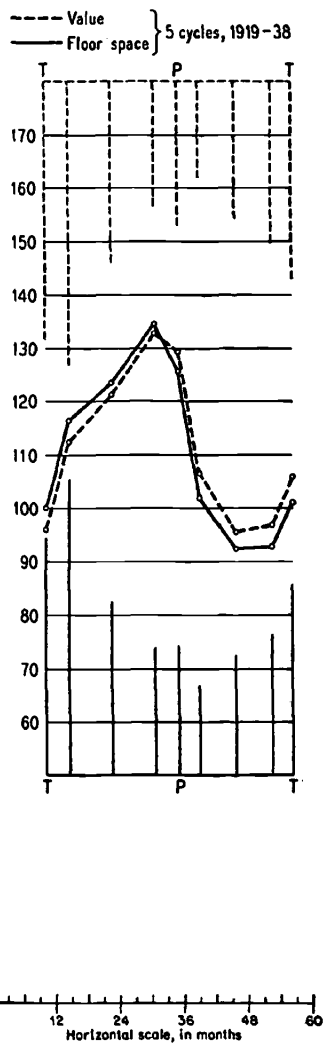


Chart 1 (cont.)

FIG. 13

Railroad Traffic, 1867–1904

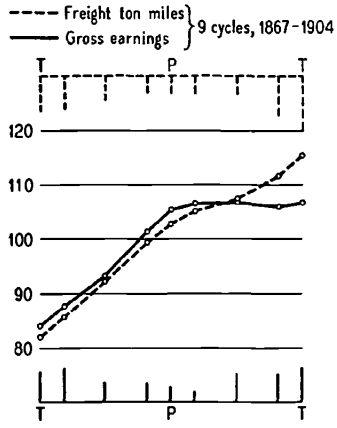


FIG. 14

Railroad Traffic, 1904–1938

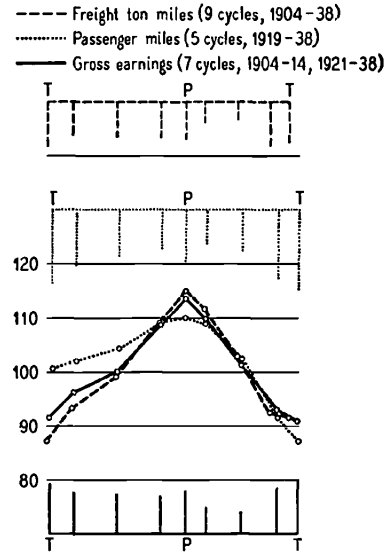


FIG. 15

Factory Employment, Hours, and Payrolls

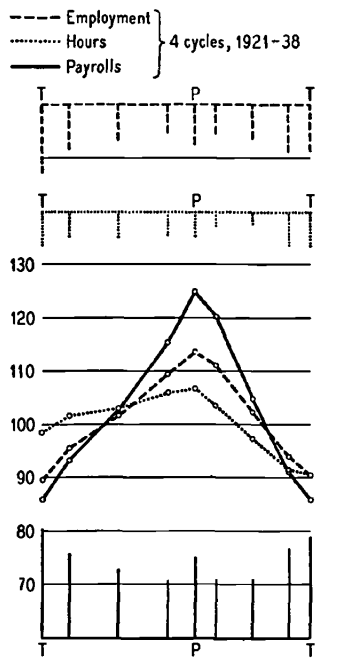


FIG. 16

Factory Employment: Four Industries

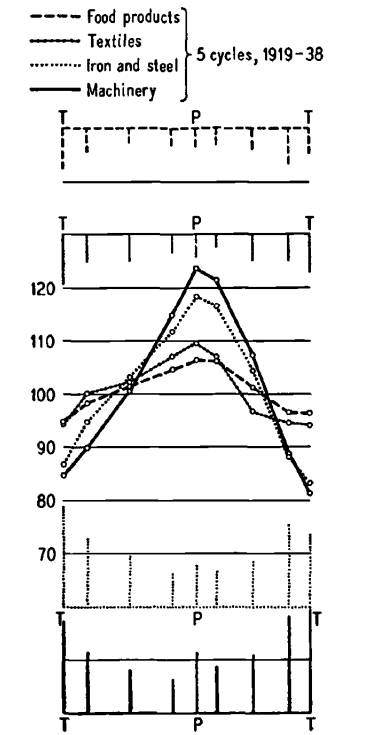


FIG. 17

Wholesale Price Indexes in Peace and War

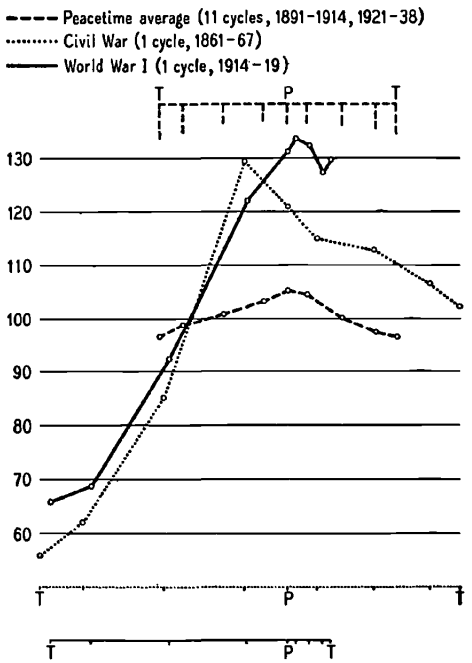


FIG. 18

Wholesale Price Indexes

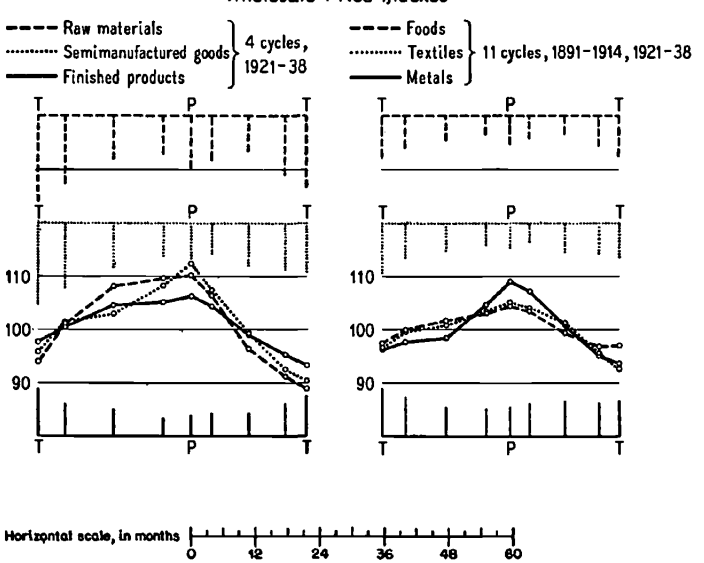


Chart 1 (cont.)

FIG. 19

Wholesale and Retail Prices, Foods

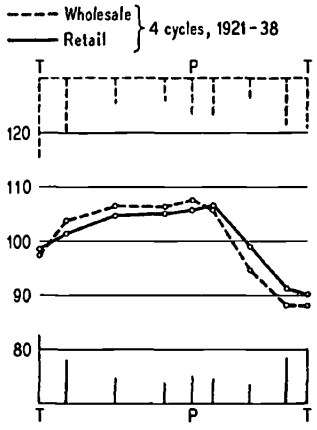


FIG. 20

Farm and Retail Price Indexes, Foods

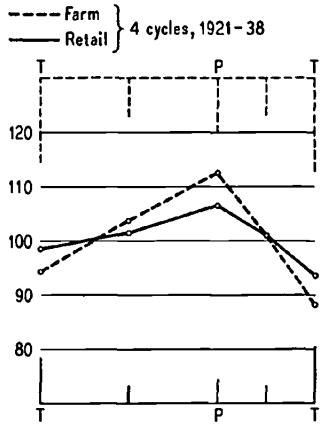


FIG. 21

Production and Price of Pig Iron

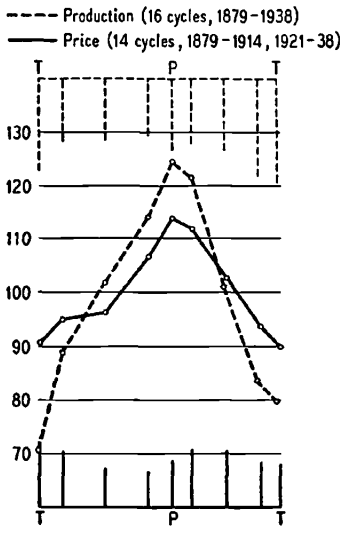


FIG. 22

Production and Price of Cotton

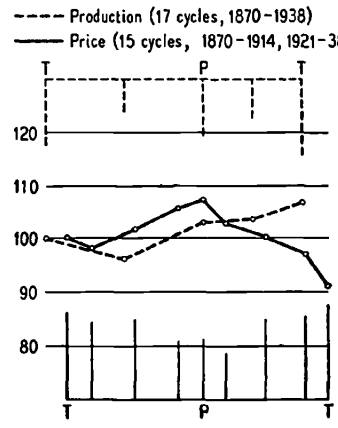


Chart 1 (cont.)

FIG. 23

Production and Price of Wheat

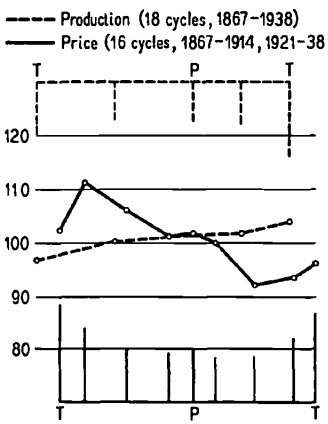


FIG. 24

Production and Price of Corn

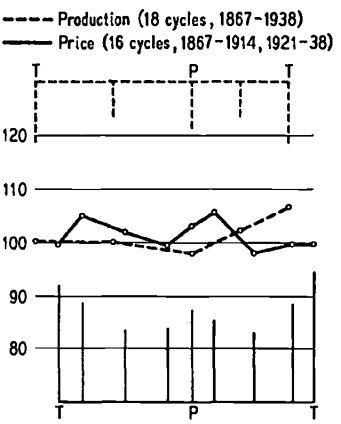


FIG. 25

Production and Price of Potatoes

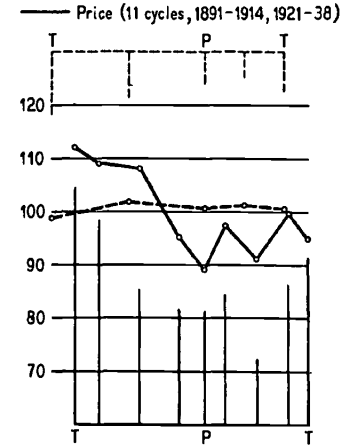
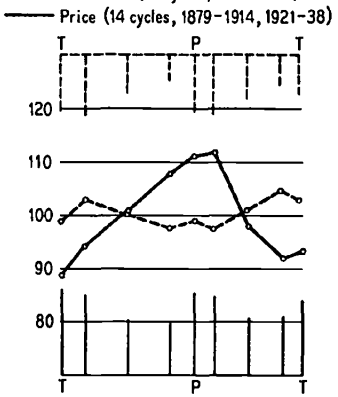


FIG. 26

Production and Price of Hogs



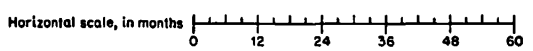


FIG. 27

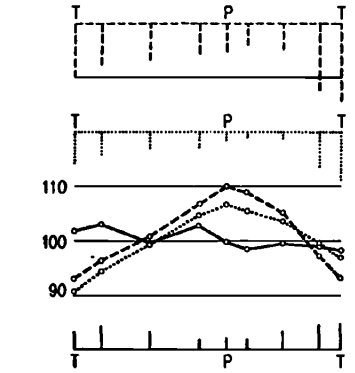
Retail Sales

4 cycles, 1921-38

---- Department store sales

..... Department store sales, deflated

—— Grocery chain store sales, trend-adjusted & deflated



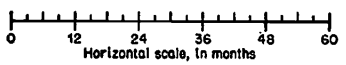


FIG. 28

Flow of Consumers' Perishables and Durables

---- Butter consumption

..... Newsprint paper consumption } 5 cycles, 1919-38

—— Vacuum cleaner shipments

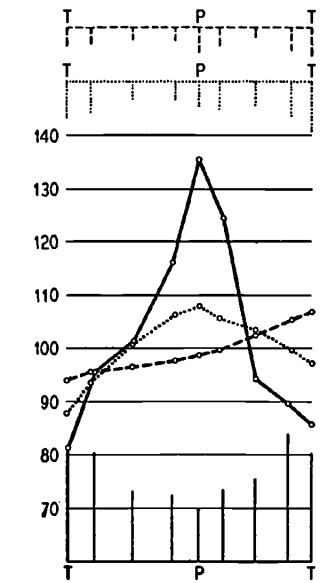


Chart 1 (cont.)

FIG. 29

New Orders for Durable Goods

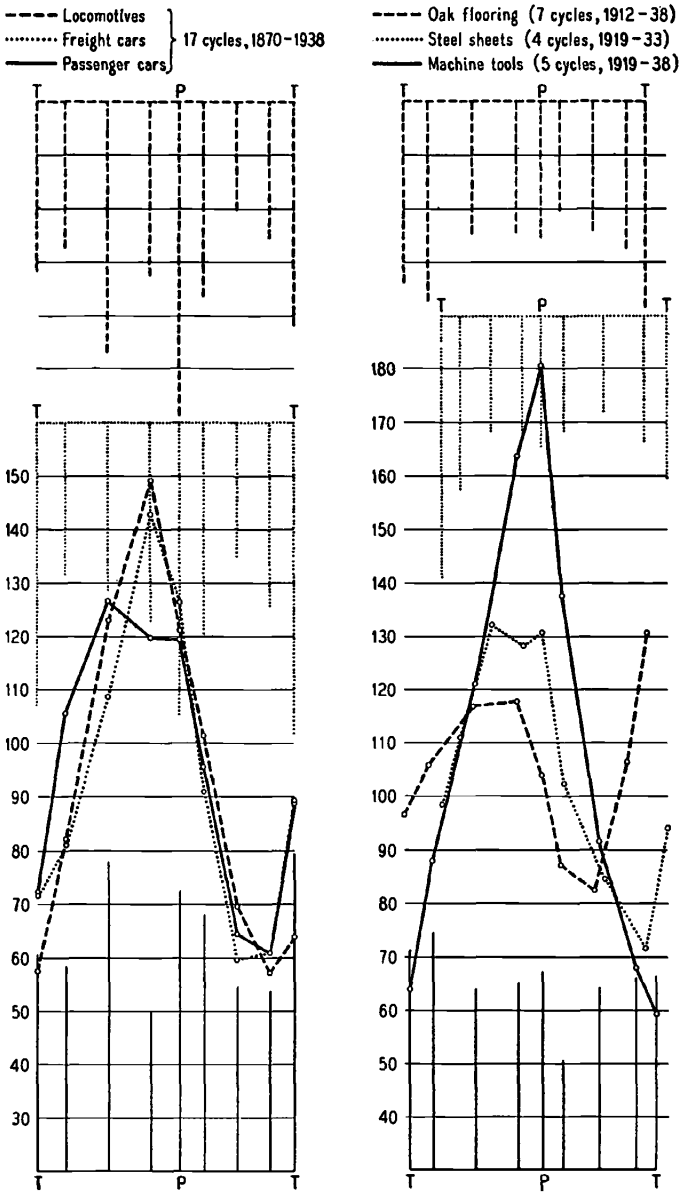


FIG. 30

Foreign Trade

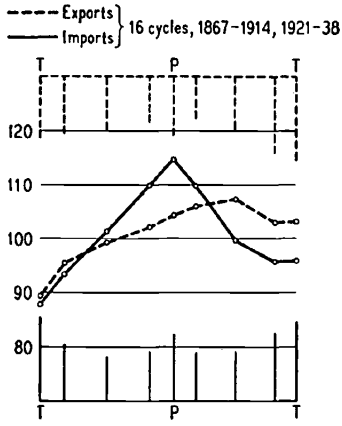
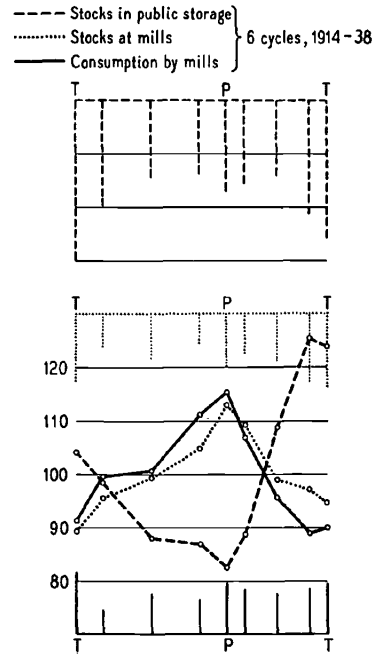


FIG. 31

Consumption and Stocks of Raw Cotton



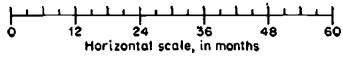


Chart 1 (cont.)

FIG. 32

Short-Term Interest Rates, New York City

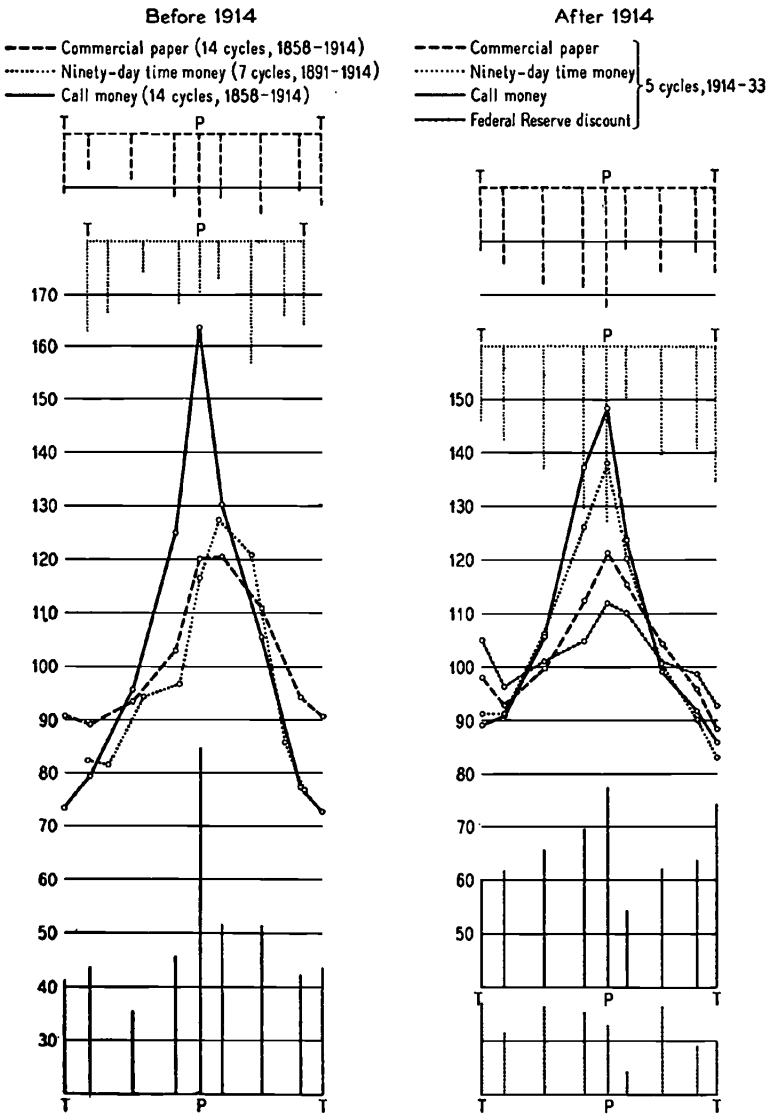


Chart 1 (cont.)

FIG. 33

Interest Rates Charged Customers by Banks

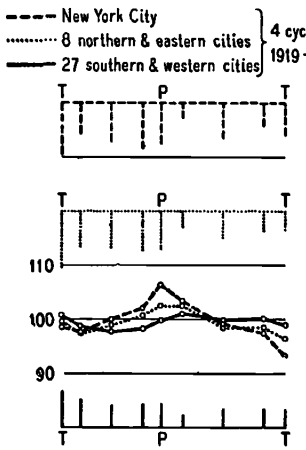


FIG. 34

Bond Yields

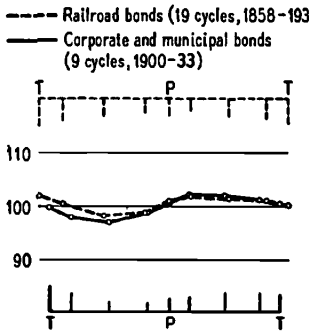


FIG. 35

Railroad Bond Yields

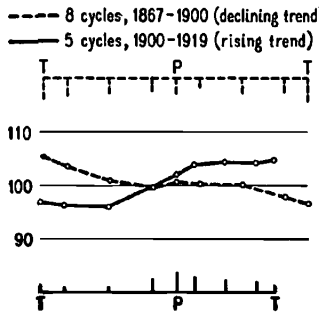


FIG. 36

National Banks Asset and Liability Items

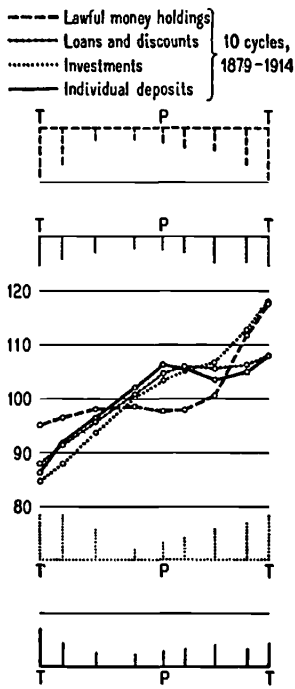


FIG. 37

National Banks Loans and Discounts

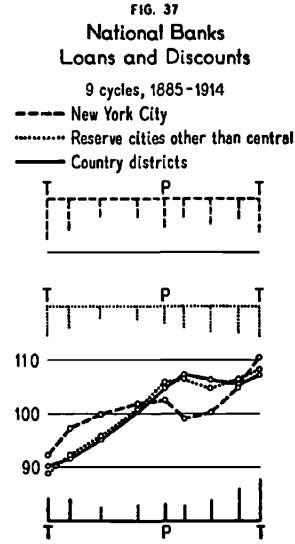


Chart 1 (cont.)

FIG. 38

National Banks
Lawful Money Holdings

9 cycles, 1885-1914

---- New York City

..... Reserve cities other than central

——— Country districts

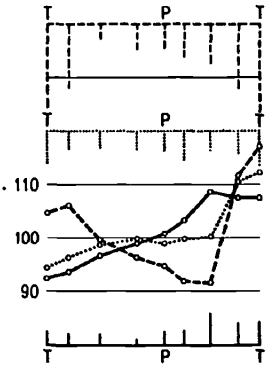


FIG. 39

National Banks
Investments

9 cycles, 1885-1914

---- New York City

..... Reserve cities other than central

——— Country districts

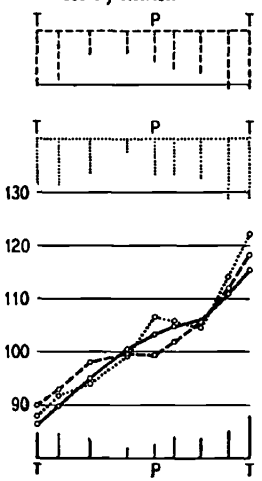


FIG. 40

National Banks
Individual Deposits

9 cycles, 1885-1914

---- New York City

..... Reserve cities other than central

——— Country districts

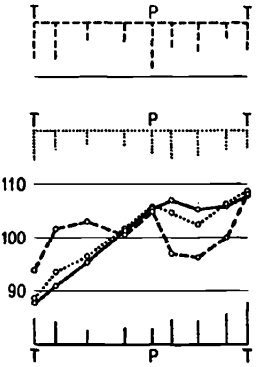


FIG. 41

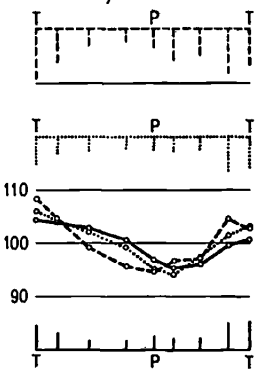
National Banks
Reserve Ratio

9 cycles, 1885-1914

---- New York City

..... Reserve cities other than central

——— Country districts



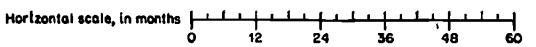


Chart 1 (cont.)

FIG. 42

Federal Reserve Member Banks
Loans and Investments

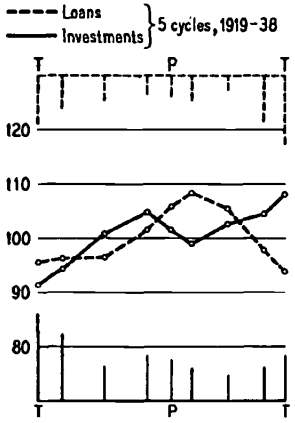


FIG. 43

Federal Reserve Member Banks
Reserve Ratio

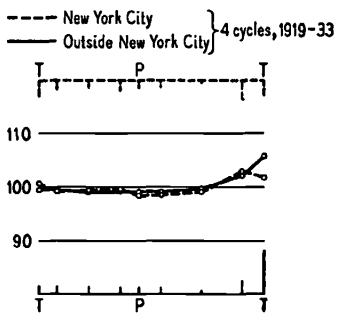
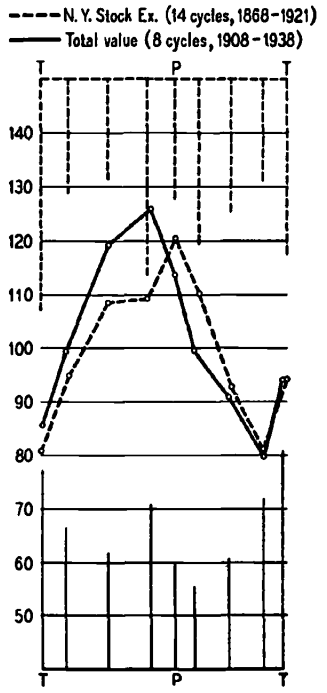


FIG. 44

Corporate Security Issues
New and Refunding



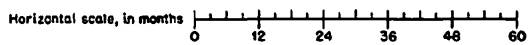


Chart 1 (cont.)

FIG. 45

Corporate Security Issues

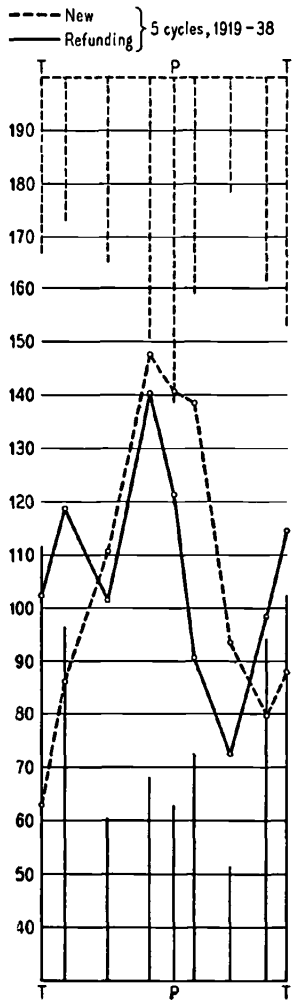


FIG. 46

Corporate Security Issues, New

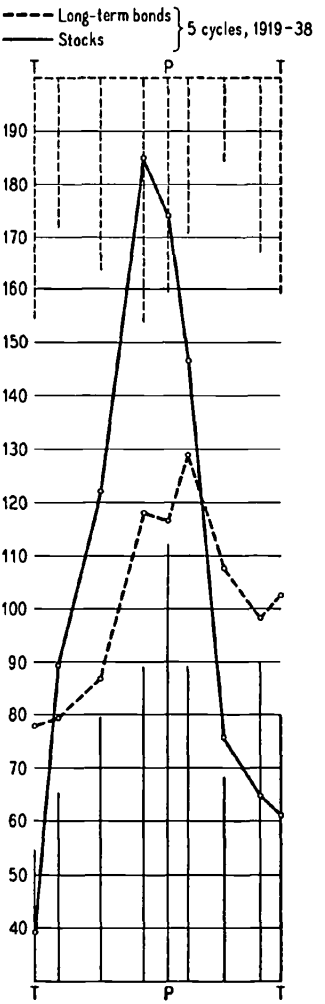


Chart 1 (cont.)

FIG. 47

Indexes of Security Prices

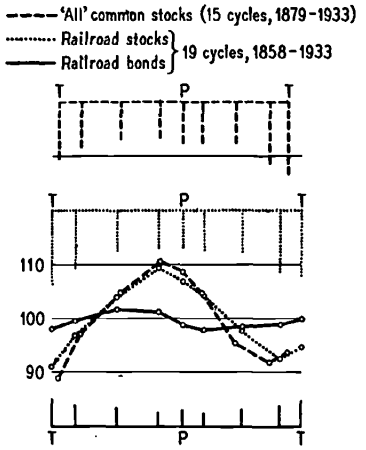


FIG. 48

N. Y. Stock Exchange Transactions

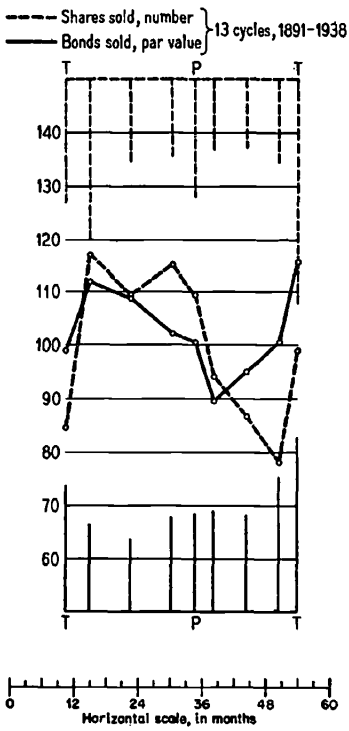


FIG. 49

Corporate Profits

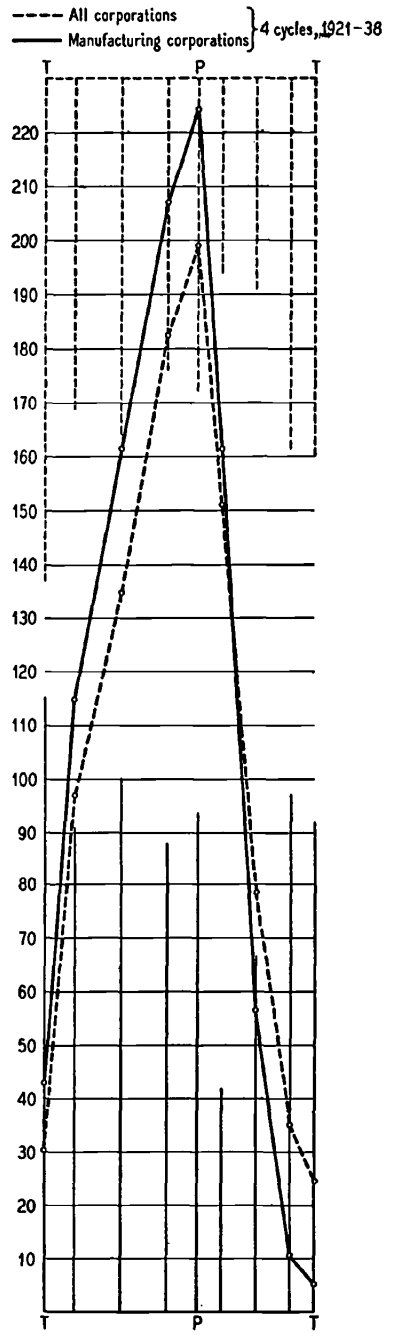


Chart 1 (concl.)

FIG. 50

Corporate Profits and Losses

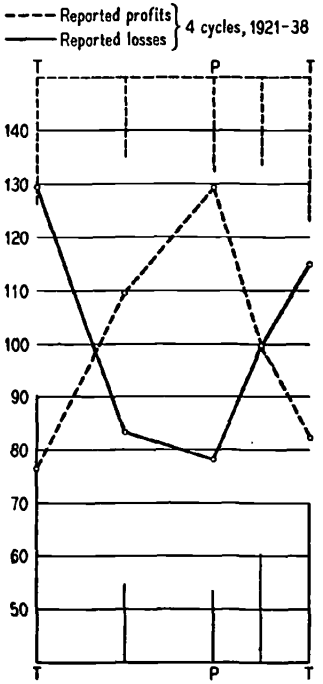


FIG. 51

Business Failures

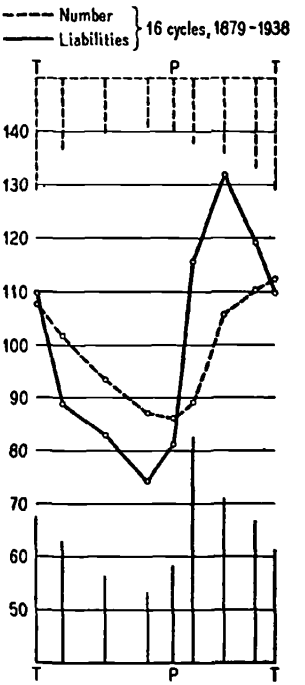
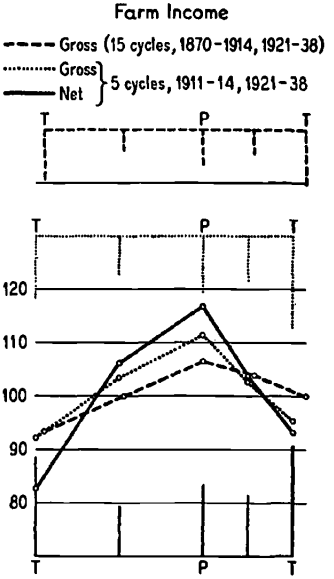


FIG. 52

Farm Income



less regular than their standard counterparts, but one can hardly call them less angular. This single experiment is not conclusive, but in view of its result we cannot be sure that exaggerated angularity is a common fault in our patterns.

Figures 20, 50, and 52 are drawn from annual data such as we must use now and then to supplement the quarterly and monthly series in our regular sample. In them, we use 5-stage instead of 9-stage patterns, but call the stages I, III, V, VII, and IX. Even so, standings in stage III must often be interpolated between the standings in I and V, and standings in VII between V and IX. However, the annual reference dates of Table 1 show that 17 of the 21 expansions between 1855 and 1937 and 6 of the following contractions last two years or more, so that the average standings at III and VII rest in part upon independently reported values.[3]

In subsequent chapters the chief reference-cycle measures are discussed one by one, and an effort is made not only to exhibit but also to explain the varieties they present. What kinds of activities conform to business activities with a high degree of regularity and what do not? To what are these differences due? Why do certain of the regular conformers have positive, others neutral, and still others inverted patterns? In what sectors of the economy do we find leads and in what do we find lags at business-cycle peaks and troughs? How can these varieties of timing be accounted for? Most striking of all are the differences in the average amplitudes of the reference-cycle patterns. Why do some series have amplitudes approximating zero, while others rise and then fall by twice their average value? Finally, why do the cycle-by-cycle deviations from the average patterns differ so widely, and what have they to tell about the representative value of the patterns we wish to use? Such are the leading questions asked, and partly answered.

[3] On the chart, the character of the activities represented is indicated by very brief captions. Fuller titles are given in Appendix A, together with the numerical values plotted, average reference-cycle amplitudes, and indexes of conformity.