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: The Evidence of Comprehensive Series

Chapter Author: Wesley Clair Mitchell

Chapter URL: http://www.nber.org/chapters/c3173

Chapter pages in book: (p. 255 - 310)

CHAPTER 10

The Evidence of Comprehensive Series

I A Statistical Summary

Table 31 shows how the most comprehensive series in our American sample have typically behaved during business cycles. Concerning each series the table tells (1) the period and (2) number of reference cycles covered by our analysis, (3) the timing variety, (4) the indexes of conformity, (5) the mean reference-cycle amplitudes, (6) the reference-cycle pattern, (7) the average deviation from the average pattern, (8) the average rates of change per month from segment to segment of reference cycles, and (9) the average deviation of these rates of change. As far as possible we have used monthly or quarterly data; but 3 annual series are so important for present purposes that we add them in a final section of the table. Chart 7, which follows the table, exhibits graphically the reference-cycle patterns of all series in the table. No specific-cycle measures are included, which means that the full amplitudes of the fluctuations characteristic of the individual series are understated in varying degrees; also that the information concerning leads and lags is limited to the broad inferences that can be drawn from the variety of timing and the direction of average patterns from one stage to the next.

Since this is our first attempt to see how several of the National Bureau's measures of cyclical behavior in various parts of the economy fit together, and what composite picture they give of business cycles, we should examine Table 31 with critical care before forming any opinion about the trustworthiness and adequacy of the evidence it gives.

II Scope and Adequacy of Comprehensive Series

In its small and technical fashion, Table 31 is an epitome of the nation's cultural progress toward knowing itself. Most of

Table 31

Typical Behavior of Comprehensive American Series with Respect to Business Cycles

A CONFORMITY AND AMPLITUDE

	Series[a]	Period Covered[f]	No. of Cycles	Expansion Stages	Index of Conformity to Reference exp.	Index of Conformity to Reference contr.	Index of Conformity to Business cycles	Av. Reference-Cycle Amplitude: Expansion	Av. Reference-Cycle Amplitude: Contraction	Av. Reference-Cycle Amplitude: Full cycle
	PHYSICAL VOLUME OF PRODUCTION									
1	Industrial production (FRB index)	1919-1938	5	I-V	+100	+100	+100	+35	−32	+68
2	Fuel and electricity (NBER index)	1919-1938	5	I-V	+100	+100	+100	+26	−15	+40
3	Pig iron	1879-1938	16	I-V	+100	+100	+100	+54	−45	+99
	TRANSPORTATION									
4	Railroad freight ton miles	1904-1938	9	I-V	+100	+78	+100	+28	−23	+51
	PRICES									
5	'All' commodities, wholesale (BLS index)	1891-1938[b]	11	I-V	+64	+82	+100	+9	−9	+18
	TRADE									
6	Wholesale trade sales, 9 lines, value (FRB index)	1919-1927	3	I-V	+100	+100	+100	+18	−19	+37
7	Department store sales (FRB index), deflated	1921-1938	4	I-V	+100	+50	+100	+16	−10	+26
8	Agricultural marketings, phys. vol. (DC index)	1919-1938	5	Irreg.	+60	−20	+33	+1.4	−0.8	+2.2
9	Exports, value	1867-1938[b]	16	Irreg.[d]	+62	0	+27	+15	−1	+16
10	Imports, value	1867-1938[b]	16	VIII-V	+88	+50	+77	+26	−19	+45
	EMPLOYMENT AND INCOMES									
11	Factory employment (BLS index)	1914-1938	6	I-V	+100	+100	+100	+22	−23	+45
12	Factory payrolls (BLS index)	1919-1938	5	I-V	+100	+100	+100	+36	−40	+76
13	Income payments, total (Barger, Commerce)	1921-1938	4	I-V	+100	0	+100	+23	−18	+40
	INVESTMENTS									
14	Construction contracts, value (Dodge)	1912-1938	7	VIII-IV	+71	+50	+86	+43	−30	+74

Table 31 (cont.)

15	Security issues, corporate, value (*Jour. of Com.*)	1908-1938	8	VIII-IV	+100	+50	+60	+47	−46	+93
16	Cash from security issues on N.Y. Stock Exchange (Ayres)	1868-1921	14	VIII-V	+87	+73	+93	+58	−39	+97
17	Incorporations, no. (Evans)	1861-1938	19	VIII-V	+68	+60	+84	+27	−10	+37
	DEALINGS IN SECURITIES									
18	Shares sold on N.Y. Stock Exchange, no.	1879-1938	16	VIII-IV	+88	+75	+94	+41	−36	+77
19	Bonds sold on N.Y. Stock Exchange, par value	1891-1938	13	VII-II	−57	−71	−70	−15	+35	−50
20	Common stock prices, 'all' (Cowles index)	1879-1938	16	VIII-IV	+88	+65	+88	+27	−20	+47
21	R.R. bond prices (Macaulay index)[a]	1858-1933	19	VI-III	−42	−45	−66	−3.5	+6.4	−9.9
	BUSINESS PROFITS AND FAILURES									
22	Net profits, all corporations (Barger)	1921-1938	4	I-V	+100	+100	+100	+169	−175	+343
23	Business failures, no. (Dun's)	1879-1938	16	V-IX	−50	−75	−84	−22	+26	−48
24	Business failures, liabilities (Dun's)	1879-1938[b]	14	IV-VII	−71	−100	−100	−67	+59	−125
	BANK CLEARINGS OR DEBITS									
25	Total	1879-1938[b]	14	VIII-V	+100	+86	+92	+30	−21	+51
26	New York City	1854-1938[c]	18	VIII-IV	+100	+78	+94	+32	−28	+60
27	Outside New York City	1879-1938[b]	14	VIII-V	+100	+57	+85	+26	−11	+37
	INDEXES OF BUSINESS ACTIVITY									
	Adjusted for trend									
28	Ayres	1854-1938	21	I-V	+100	+100	+100	+17	−19	+36
29	American Tel. and Tel. Co.	1879-1938	16	I-V	+100	+100	+100	+23	−25	+48
30	Persons	1879-1938	16	I-V	+100	+100	+100	+22	−23	+45
31	Deposits activity (Snyder)	1879-1938	16	VIII-IV	+88	+75	+94	+14	−17	+31
	Not adjusted for trend									
32	Axe-Houghton	1879-1938	16	I-V	+100	+88	+100	+29	−21	+50
33	American Tel. and Tel. Co.	1900-1938	10	VIII-V	+100	+100	+100	+32	−23	+55
34	Babson	1908-1938	8	I-V	+100	+100	+100	+29	−23	+52

Table 31 (cont.)

B REFERENCE-CYCLE PATTERNS

	Series[a]	*Average Standing at Stage* I	II	III	IV	V	VI	VII	VIII	IX	*Mean Av. Deviation, All Stages*[g]
	PHYSICAL VOLUME OF PRODUCTION										
1	Industrial production	85.1	94.4	102.5	113.3	120.3	115.9	101.2	89.4	87.8	9.4
2	Fuel and electricity	87.3	93.0	93.8	104.8	112.8	112.3	107.8	99.7	98.3	5.8
3	Pig iron	70.5	88.9	101.9	114.0	124.7	121.6	101.0	83.7	79.8	13.6
	TRANSPORTATION										
4	Railroad freight ton miles	87.3	93.4	99.1	109.0	115.0	111.7	102.9	92.6	91.6	6.2
	PRICES										
5	'All' commodities, wholesale	96.4	98.8	100.9	103.1	105.1	104.6	100.1	97.2	96.3	4.3
	TRADE										
6	Wholesale trade sales, 9 lines, value	92.9	98.5	100.6	109.0	110.6	106.8	96.9	93.5	91.5	6.6
7	Department store sales, deflated	90.8	94.4	99.4	104.8	106.7	105.6	103.8	99.6	97.0	3.5
8	Agricultural marketings, phys. vol.	100.2	102.3	99.6	102.2	101.6	100.8	101.8	102.3	100.8	4.3
9	Exports, value	89.4	95.5	99.2	102.1	104.4	106.0	107.2	103.0	103.1	10.7
10	Imports, value	87.9	93.4	101.3	109.9	114.7	109.8	99.7	95.8	95.9	10.8
	EMPLOYMENT AND INCOMES										
11	Factory employment	90.9	96.4	103.4	109.2	112.7	110.2	101.1	92.1	89.9	6.8
12	Factory payrolls	86.9	93.1	102.9	113.1	123.1	120.3	104.3	88.0	83.2	12.5
13	Income payments, total	90.0	94.6	100.3	108.9	112.7	111.5	105.3	97.8	95.1	9.1
	INVESTMENTS										
14	Construction contracts, value	78.3	95.3	110.1	123.5	127.1	114.8	96.3	93.2	98.7	17.6
15	Security issues, corporate, value	85.5	99.3	119.2	125.9	113.8	99.5	90.8	79.8	94.1	25.8
16	Cash from security issues on N.Y. Stock Exchange	80.7	94.9	108.6	109.1	120.4	110.2	92.8	81.1	94.2	26.3
17	Incorporations, no.	85.6	90.6	97.9	107.5	109.6	107.3	100.3	99.4	104.2	12.0

Table 31 (cont.)

	DEALINGS IN SECURITIES									
18	Shares sold on N.Y. Stock Exchange, no.	83.3	113.3	108.7	113.8	108.6	95.0	89.6	77.7	95.6	18.2
19	Bonds sold on N.Y. Stock Exchange, par value	98.9	111.8	108.6	102.3	100.4	89.6	95.0	100.5	115.4	19.7
20	Common stock prices, 'all'	86.6	96.1	103.7	111.7	110.3	106.3	95.5	91.5	92.9	9.3
21	R.R. bond prices	98.2	99.6	101.7	101.1	98.9	97.9	98.5	98.9	99.9	3.4
	BUSINESS PROFITS AND FAILURES									
22	Net profits, all corporations	30.4	97.0	134.8	182.4	199.2	151.3	78.4	35.2	24.6	58.1
23	Business failures, no.	107.8	101.7	93.3	87.1	86.1	89.1	105.7	110.2	112.2	13.4
24	Business failures, liabilities	109.1	89.0	86.4	76.6	85.3	120.0	135.4	118.5	107.2	22.0
	BANK CLEARINGS OR DEBITS									
25	Total	85.0	95.0	101.4	111.4	112.3	108.0	98.1	91.7	95.8	8.5
26	New York City	86.2	97.3	105.4	114.9	114.9	105.5	92.4	87.0	91.9	10.4
27	Outside New York City	84.9	91.8	97.7	107.4	110.1	109.4	102.9	98.8	99.7	6.6
	INDEXES OF BUSINESS ACTIVITY									
	Adjusted for trend									
28	Ayres	91.7	99.2	103.5	107.2	108.7	104.6	96.9	90.9	89.8	5.6
29	American Tel. and Tel. Co.	88.4	97.3	102.7	107.8	111.6	108.1	97.0	88.9	87.1	5.8
30	Persons	89.2	97.6	103.1	108.4	111.0	107.8	98.1	89.9	88.0	5.8
31	Deposits activity	94.2	102.1	103.7	107.1	107.1	103.5	96.0	90.4	91.6	6.4
	Not adjusted for trend									
32	Axe-Houghton	84.2	93.0	100.0	108.3	113.4	111.1	101.1	93.1	92.6	6.7
33	American Tel. and Tel. Co.	82.8	92.3	100.9	108.7	114.5	110.9	99.7	91.4	90.8	6.7
34	Babson	85.5	93.6	101.2	109.8	114.9	109.6	100.6	92.9	92.2	6.7

Table 31 (cont.)

C RATES OF CHANGE IN SUCCESSIVE REFERENCE-CYCLE SEGMENTS

	Series[a]	*Weighted Av. Rate of Change per Month*[b] *in Segment* I-II	II-III	III-IV	IV-V	V-VI	VI-VII	VII-VIII	VIII-IX	*Mean Av. Deviation, All Segments*[c]
	PHYSICAL VOLUME OF PRODUCTION									
1	Industrial production	+2.0	+1.0	+1.4	+1.6	−1.2	−2.2	−1.8	−0.4	0.92
2	Fuel and electricity	+1.3	+0.1	+1.4	+1.8	−0.1	−0.7	−1.2	−0.4	0.85
3	Pig iron	+4.0	+1.6	+1.5	+2.3	−0.9	−3.3	−2.8	−1.1	2.46
	TRANSPORTATION									
4	Railroad freight ton miles	+1.3	+0.7	+1.2	+1.3	−0.9	−1.4	−1.7	−0.3	0.98
	PRICES									
5	'All' commodities, wholesale	+0.5	+0.3	+0.3	+0.5	−0.2	−0.7	−0.5	−0.3	0.49
	TRADE									
6	Wholesale trade sales, 9 lines, value	+1.6	+0.4	+1.4	+0.4	−1.3	−1.9	−0.7	−0.7	1.46
7	Department store sales, deflated	+0.7	+0.5	+0.6	+0.4	−0.3	−0.3	−0.6	−0.7	1.26
8	Agricultural marketings, phys. vol.	+0.5	−0.3	+0.3	−0.1	−0.2	+0.2	+0.1	−0.4	0.39
9	Exports, value	+1.3	+0.5	+0.4	+0.5	+0.4	+0.2	−0.6	+0.02	0.94
10	Imports, value	+1.2	+1.0	+1.1	+1.0	−1.2	−1.4	−0.5	+0.04	1.42
	EMPLOYMENT AND INCOMES									
11	Factory employment	+1.1	+0.8	+0.6	+0.7	−0.7	−1.5	−1.5	−0.7	0.64
12	Factory payrolls	+1.4	+1.2	+1.3	+2.2	−0.7	−2.4	−2.4	−1.3	1.15
13	Income payments, total	+0.8	+0.7	+1.0	+0.7	−0.3	−1.0	−1.2	−0.6	0.48
	INVESTMENTS									
14	Construction contracts, value	+3.7	+1.8	+1.6	+0.8	−3.5	−3.0	−0.5	+1.6	3.14
15	Security issues, corporate, value	+3.1	+2.5	+0.8	−2.7	−3.9	−1.4	−1.7	+3.9	5.52
16	Cash from security issues on N.Y. Stock Exchange	+2.8	+1.8	+0.1	+2.2	−2.3	−3.0	−2.0	+2.9	8.31
17	Incorporations, no.	+1.1	+0.9	+1.1	+0.4	−0.6	−1.0	−0.1	+1.2	1.78

Table 31 (cont.)

	DEALINGS IN SECURITIES								
18	Shares sold on N.Y. Stock Exchange, no.	+6.6	−0.6	+0.7	−1.1	−3.9	−0.9	−1.9	+5.1	4.76
19	Bonds sold on N.Y. Stock Exchange, par value	+2.9	−0.4	−0.8	−0.4	−3.1	+0.9	+0.9	+4.2	4.14
20	Common stock prices, 'all'	+2.1	+1.0	+1.0	−0.3	−1.1	−1.8	−0.6	+0.4	1.18
21	R.R. bond prices	+0.3	+0.3	−0.1	−0.5	−0.3	+0.1	+0.1	+0.3	0.48
	BUSINESS PROFITS AND FAILURES								
22	Net profits, all corporations	+11.8	+4.4	+5.5	+3.0	−10.7	−11.4	−6.8	−2.3	3.89
23	Business failures, no.	−1.3	−1.1	−0.8	−0.2	+0.8	+2.9	+0.8	+0.6	1.79
24	Business failures, liabilities	−4.1	−0.3	−1.3	+1.8	+9.0	+2.6	−2.8	−2.9	6.48
	BANK CLEARINGS OR DEBITS								
25	Total	+2.2	+0.8	+1.3	+0.2	−1.2	−1.5	−1.0	+1.1	1.14
26	New York City	+2.4	+1.0	+1.2	−0.1	−2.4	−1.9	−0.8	+1.2	1.84
27	Outside New York City	+1.5	+0.8	+1.2	+0.6	−0.2	−1.0	−0.6	+0.2	0.69
	INDEXES OF BUSINESS ACTIVITY								
	Adjusted for trend								
28	Ayres	+1.6	+0.5	+0.5	+0.3	−1.1	−1.1	−0.9	−0.3	0.84
29	American Tel. and Tel. Co.	+2.0	+0.7	+0.6	+0.8	−1.0	−1.8	−1.3	−0.5	0.81
30	Persons	+1.8	+0.7	+0.7	+0.6	−0.9	−1.6	−1.3	−0.5	0.79
31	Deposits activity	+1.7	+0.2	+0.4	0.0	−1.0	−1.2	−0.9	+0.3	0.89
	Not adjusted for trend								
32	Axe-Houghton	+1.9	+0.9	+1.0	+1.1	−0.7	−1.6	−1.3	−0.1	0.84
33	American Tel. and Tel. Co.	+2.1	+1.1	+1.0	+1.3	−1.0	−1.8	−1.3	−0.2	0.89
34	Babson	+1.8	+1.0	+1.1	+1.1	−1.5	−1.4	−1.2	−0.2	0.80

Table 31 (concl.)

D CYCLICAL MEASURES OF KUZNETS' ANNUAL SERIES

Series[a] *(in current prices)*	Period Covered	No. of Cycles	Expansion Stages	Index of Conformity to *Reference exp.*	*Reference contr.*	*Business cycles*	Av. Reference-Cycle Amplitude[f] *Expansion*	*Contraction*	*Full cycle*
Gross national product	1921-38	4	I-V	+100	+50	+100	+21	−16	+38
National income	1921-38	4	I-V	+100	+50	+100	+22	−18	+40
Personal incomes	1921-38	4	I-V	+100	0	+100	+16	−12	+28

	Av. Reference-Cycle Standing at Stage I	III	V	VII	IX	*Mean Av. Deviation, All Stages*[g]	*Weighted Av. Change per Month*[h] *in Reference-Cycle Segment* I-III	III-V	V-VII	VII-IX	*Mean Av. Deviation, All Segments*[i]
Gross national product	92.6	98.3	113.9	107.0	97.5	8.6	+0.3	+0.9	−0.8	−1.0	0.38
National income	92.2	98.5	114.6	107.0	97.0	9.2	+0.4	+1.0	−0.8	−1.1	0.40
Personal incomes	94.0	98.3	110.4	105.9	98.9	6.3	+0.3	+0.7	−0.5	−0.8	0.34

[a] For full identification of series, see Appendix B.

[b] Omits 1914-21.

[c] Omits 1861-67 and 1914-21.

[d] I-V after 1914.

[e] The series fits VI-III and VII-III timing equally well. The conformity and amplitude entries are averages of measures made on both timing plans.

[f] Identifies the complete reference cycles covered by the series. This period, however, differs somewhat from that covered by some of the conformity and amplitude measures; see *Measuring Business Cycles*, Ch. 5, Sec. X. The conformity indexes include an additional contraction at the beginning in series 12, 14, 16, 17, 20, 21 (VI-III version), and 33; they include an additional expansion at the end in series 6, 16, and 21 (VII-III version); and both the conformity indexes and the amplitude measures include an additional cycle at the beginning in series 19.

[g] In deriving the mean of the average deviations at all stages, the average deviations at stages I and IX receive a weight of one-half each. The average deviations at individual stages are given in Table 43.

[h] See *Measuring Business Cycles*, pp. 150-1, 167.

[i] The average deviations for the individual segments are given in Table 43.

[j] See the supplementary measures in Table 15.

the records upon which economic series rest have been started to meet administrative needs, public or private. Only of late have Americans begun to grasp the social value of systematic knowledge of how their economy is working. Hence, when a student tries to summarize what has happened in past decades, he finds the data at his disposal extremely uneven in scope and quality. What he wants most to know is frequently reported least adequately, if at all, while matters of secondary interest can sometimes be traced back by months for a century.

The most comprehensive daily record of economic activities kept in the United States represents payments made through banks. Not all, but most transactions are 'settled' by a payment in coin, paper money, or check.[1] If we could total all payments, we would come nearer to including all economic dealings than in any other way. Though no one really knows how large is the share of payments by check, all authorities agree that it makes some four-fifths or more of the total.[2] According to Federal Reserve reports, supplemented in minor degree by estimates for nonreporting institutions, debits charged by banks to deposit accounts averaged $723 billion a year in 1919–38.[3] This imposing figure excludes not only the substantial volume of payments in paper money and coin, but also payments of one bank to another. Even so, it is almost ten times as large as Simon Kuznets' estimate of average gross national product at current prices in these years. The chief reasons why the volume of payments by check so vastly exceeds the total value of goods produced annually are (1) that most costs of producing a good are paid out before it is ready for its first sale, (2) that these partially or wholly finished products then commonly change hands several times on their

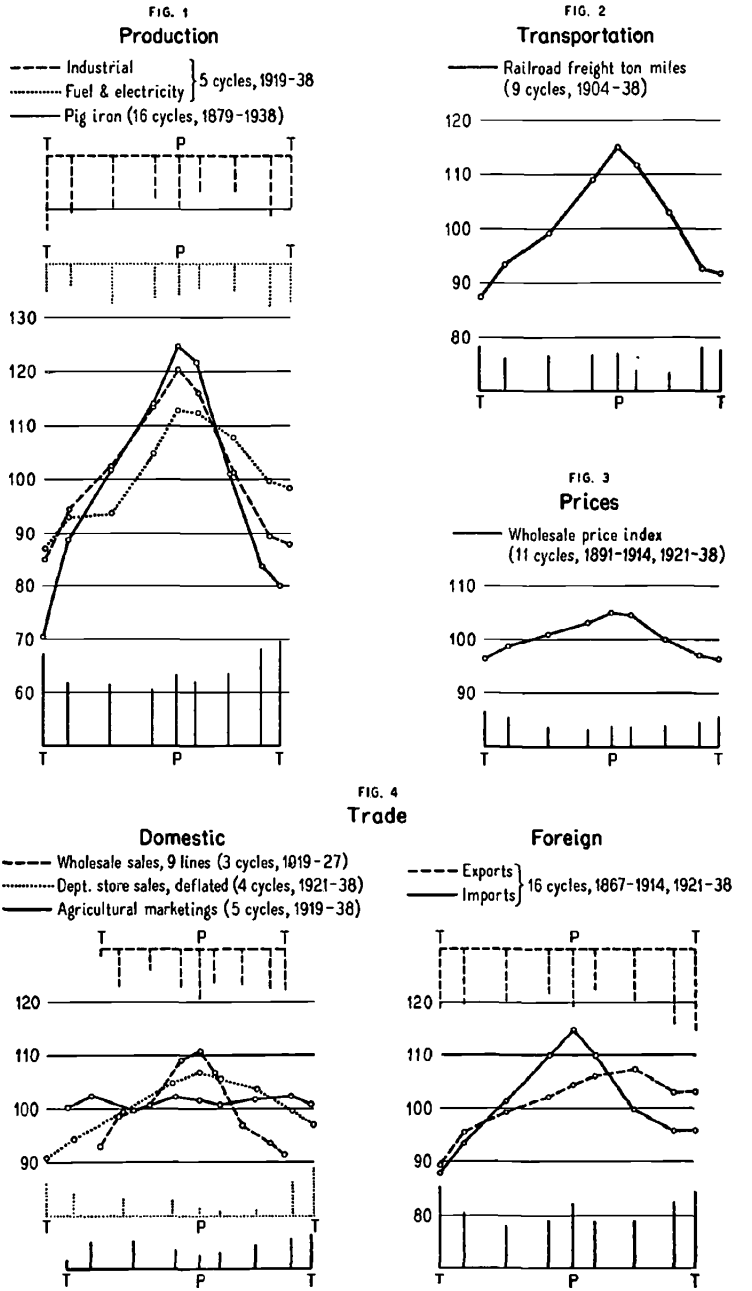
[1] Among the exceptions are agricultural rents paid by sharing the actual produce, and settlements effected mainly by offsetting sums payable against sums receivable in books of account (a method largely used in interbank transactions). Formal organizations for clearing claims are operated by stock exchanges, railroads, and banks.

[2] Cf. *Business Cycles: The Problem and Its Setting*, pp. 117–8.

[3] Computed from Table 55 in *Banking and Monetary Statistics* (Board of Governors of the Federal Reserve System, 1943), p. 254.

Chart 7

Average Reference-Cycle Patterns of American Comprehensive Series



See Tables 31 and 43 for data on which chart is based and Appendix B for sources.

Chart 7 (cont.)

FIG. 5

Employment and Incomes

- Factory employment (6 cycles, 1914-38)
- Factory payrolls (5 cycles, 1919-38)
- Income payments (4 cycles, 1921-38)

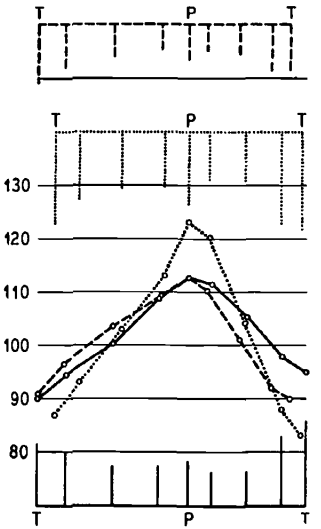
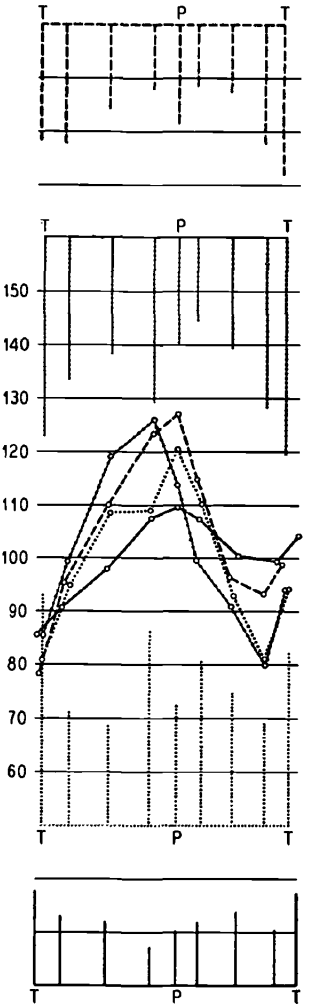


FIG. 6

Investments

- Construction contracts (7 cycles, 1912-38)
- Corporate security issues (8 cycles, 1908-38)
- Cash from N.Y. St. Ex. issues (14 cycles, 1868-1921)
- Number of incorporations (19 cycles, 1861-1938)



Horizontal scale, in months: 0, 12, 24, 36, 48, 60

Chart 7 (cont.)

FIG. 7

Dealings in Securities

– – – – Shares sold, number (16 cycles, 1879-1938)

– – – – Bonds sold, par value (13 cycles, 1891-1938)

····· Common stocks, price index (16 cycles, 1879-1938)

——— Railroad bonds, price index (19 cycles, 1858-1933)

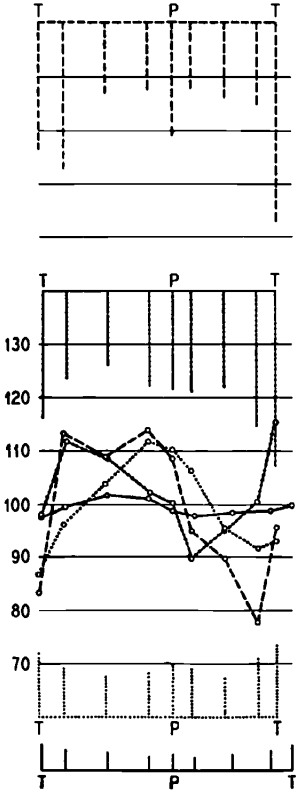


FIG. 8

Business Profits and Failures

– – – – Net profits, all corporations (4 cycles, 1921-38)

····· Business failures, number (16 cycles, 1879-1938)

——— Business failures, liabilities (14 cycles, 1879-1914, 1921-38)

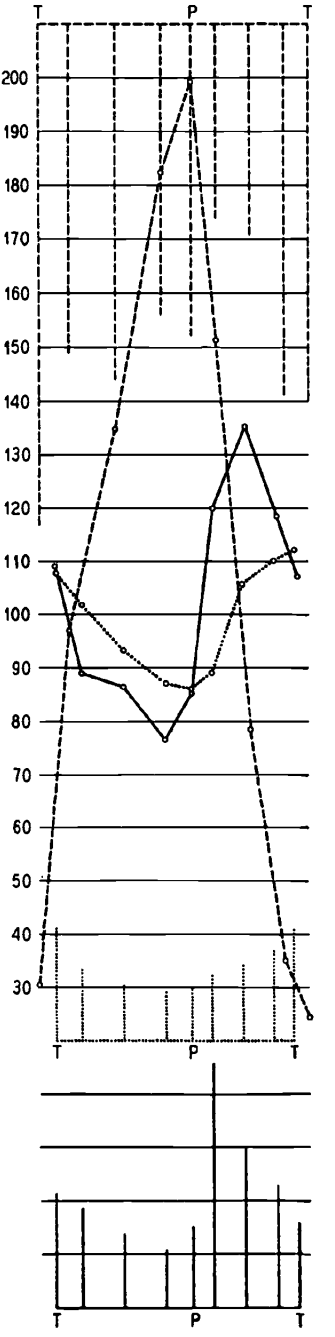


Chart 7 (concl.)

FIG. 9

Bank Clearings or Debits

New York City (18 cycles, 1854-61, '67-1914, '21-38)
Outside New York City } 14 cycles, 1879-1914, 1921-38
Total

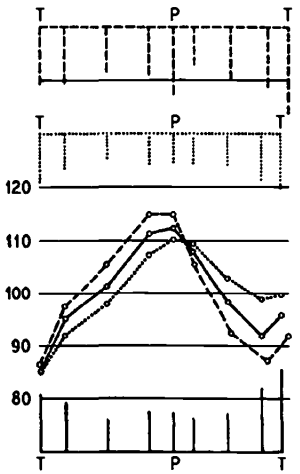


FIG. 10

Indexes of Business Activity Trend-Adjusted

Ayres (21 cycles, 1854-1938)
A. T. & T.
Persons } 16 cycles, 1879-1938
Deposits activity, Snyder

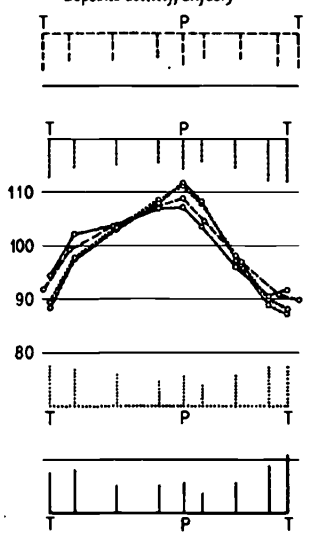


FIG. 11

Indexes of Business Activity Unadjusted for Trend

A. T. & T. (10 cycles, 1900-38)
Axe-Houghton (16 cycles, 1879-1938)
Babson (8 cycles, 1908-38)

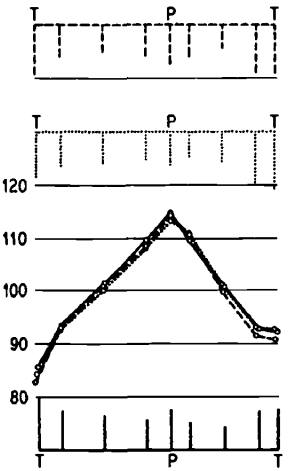
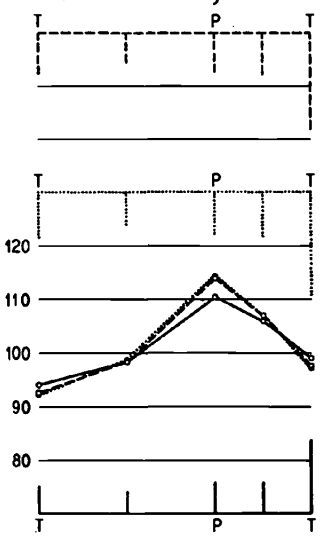


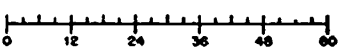
FIG. 12

National Product and Income

Gross national product
National income } 4 cycles, 1921-38
Personal incomes



Horizontal scale, in months



way to final consumers, (3) that there is a vast volume of trading in durable property, especially securities and real estate, (4) that these dealings are usually conducted through brokers and thus swell the volume of payments, and (5) that another large volume of payments arises from the making and repaying of loans. So comprehensive, indeed, are the grand totals of debits to deposit accounts, and so vague has been knowledge about the relative magnitudes of its components, that not much analytic use has been made of the figures.[4] Economists have usually preferred to take debits in New York City and outside of it separately, holding that the New York figures are dominated by fluctuations in financial transactions, especially dealings on the Stock Exchange, and that the 'outside' figures are dominated by fluctuations in the production and distribution of current income.

What we do here with these intriguing data is to present our reference-cycle measures of total, New York, and outside debits, spliced upon their somewhat less inclusive predecessors—the reports of bank clearings. For we believe that the time-honored distinction drawn between the meaning of New York and 'outside' clearings or debits is justified. But no more than our predecessors can we say how much financial transactions influence outside debits, or how much the production and distribution of current income influence debits in New York. And even if we could separate these components we should still regard the record of payments as too comprehen-

[4] Morris A. Copeland has recently made a material addition to our knowledge of the magnitude and composition of money payments. See his "Study of Money Flows in the United States", a forthcoming publication of the National Bureau. By dividing the economy into sectors and estimating the volume of each sector's transactions with the others, he obtains the total amount and the major components of transactions in the 'main money circuit'. Subtracting these totals from debits, he derives estimates of the volume of 'technical transactions', which include money changing (as in transferring deposits from one bank to another), duplicate payments made through a third party, and the large volume of payments on account of trading in assets, making loans, and repaying loans. These 'technical transactions' apparently amounted to between 300 and 400 billion dollars a year in 1936–42, or roughly half of total debits in those years. The transactions in the 'main money circuit', nevertheless, are more than three times as large as gross national product in the same years.

sive for most of our purposes. Certainly we should wish to separate financial operations into new investments and trading in existing property. Not less we should wish to find out how far the changes in payments connected with current production and distribution of income represent fluctuations in the physical volume of goods flowing to final users, fluctuations in the number of times these goods change hands, and fluctuations in their unit prices. In short, as soon as we try to use comprehensive series, our thoughts run beyond what the stately totals tell us, and we demand other series that are more meaningful because more homogeneous, yet broad enough to cover some analytic concept that will seem to be a satisfactory stopping point for whatever we have in mind—until we begin to think carefully about it.[5]

In following this lead, we are handicapped by the fragmentary character of the record of physical production. No comprehensive index by months can be carried far back of World War I.[6] Thereafter we have the Federal Reserve Board index of industrial production, which makes use of the wealth of

[5] George Garvy of the Research Department, Federal Reserve Bank of New York, has provided a valuable analysis of what clearings and debits include. See his *Debits and Clearings Statistics: Their Background and Interpretation* (Board of Governors of the Federal Reserve System, Oct. 1947), and "Development of Bank Debits and Clearings and Their Use in Economic Analysis" (Columbia dissertation, 1950, unpublished). See also Copeland, *op. cit.*, Ch. 2 and 10. Similar scholarly critiques of other statistical records are much to be desired. As economics advances beyond the stage of speculation, it will require ever more exact knowledge of what its observational data actually represent.

It is significant that Copeland does not base his "Study of Money Flows in the United States" upon the record of debits. Instead Copeland's "underlying idea is that money flows register themselves in the accounts of business enterprises, governments, and various other transactors in the economy, and that consequently we should be able to construct a picture of money flows from *accounting reports*" (italics mine). See the National Bureau's *Twenty-Seventh Annual Report,* March 1947, p. 33.

[6] The best approximations are to be found among the 'business indexes'. For example, the 1944 revision of the American Telephone and Telegraph Company's series, which was carried back to 1899, was called an 'index of *industrial* activity'; and the Babson series, our analysis of which begins in 1904, is properly named 'index of the *physical volume* of business activity'. But the sample of monthly production data available before 1919 is meager at best.

detailed data on mining and manufactures that have become available. The difficulty of measuring the output of highly fabricated products that undergo frequent qualitative changes has been met after a fashion by using data on manhours adjusted for changes in productivity. But despite its broad coverage the index has notable gaps: it omits farming, construction work, and the vast volume of services that are not incorporated in commodities.[7]

To supplement this official index we use the National Bureau's own index of the production of coal, petroleum, and electricity, because all industries, including farming in recent years, have become dependent upon mechanical power, while all families use these goods (indirectly if not directly) for heating, cooking, lighting, and transportation. So, also, we may regard the ton miles of freight hauled by railroad as a general index of physical output, because virtually all products must be moved once or several times from their place of origin to their final destination, and the nation's railroads are still incomparably greatest among its common carriers.[8] Finally, I include pig iron among the comprehensive series, partly because the other indexes and records of production are so short, partly because it typifies the heavy industries that play so large a role in business cycles.

To represent commodity prices in the United States, the Bureau of Labor Statistics index has no serious rival. The indexes of wholesale prices that have been carried back into years before 1890 are almost inevitably overweighted with farm products. We might have included also the official index of the cost of living; but it has no such industrial range as the wholesale index, and we are not ready for detailed comparisons between prices at wholesale and retail.

Concerning the number of times commodities change ownership on their way from the producers of raw materials to final users, there seem to be few if any systematic data. But in recent years attempts have been made to extend statistical

[7] See *Measuring Business Cycles*, pp. 73–5.

[8] See Thor Hultgren, *op. cit.*, Ch. 1.

recording into the field of mercantile distribution. The index of sales at wholesale in 9 lines formerly used by the Federal Reserve Board has been supplanted by improved measures, though it still stands as perhaps the best indicator in its field before 1939. Department store sales cover a wider range of merchandise and of customers than any other retail series in the years that concern us. Agricultural marketing as estimated by the Department of Commerce is the best record of farmers' sales before the middle 'thirties. Since then the Bureau of Agricultural Economics has prepared improved estimates. The grievous gap in this section of the table is the lack of comprehensive series on orders from manufacturers—a gap that has been partially filled since 1929 by the National Industrial Conference Board and since 1939 by the Department of Commerce indexes of the value of orders. The historical dominance of political or administrative over economic considerations in shaping statistical records is illustrated by the contrast between our recent and still fragmentary data on domestic trade upon the one hand, and upon the other the relatively long and complete records of commodity imports and exports. To the American businessman and worker, the ill reported domestic trade must have represented markets and sources of supply running to perhaps ten times the dollar volume of foreign trade.

Use of resources is implied, of course, by all records of current output. Direct monthly records of employment are recent and as imperfect as similar records of production. The Bureau of Labor Statistics indexes in the table represent only the number of workers whose names are on factory payrolls from month to month, and the total wages paid to them—a sum that is influenced by the number of hours worked, wage rates, and the industrial composition of the working forces. Fortunately, the third series in this group—the estimates of income based on Barger's quarterly data[9] in 1921–28, and the Department of Commerce's monthly figures for 1929–38—is supposed to cover personal incomes of all types.

[9] See Harold Barger, *Outlay and Income in the United States, 1921–1938* (National Bureau, 1942), Ch. V; see also Appendix B, series 13 of Table 31.

Comprehensive data on investment expenditure prior to 1939 are available only by years. Monthly data are largely limited to records of early stages in the business planning of investments soon to be made. That is probably a fair interpretation to put upon most, though by no means all, charters of incorporation taken out by business enterprises, a sample of which running back by months to 1860 we owe to the enterprise of G. Heberton Evans.[10] The letting of contracts for construction work is fairly conclusive evidence that certain parties will presently be 'putting money into' buildings, railroads, dams, and other structures a modern nation wants. And the two series on the issuing of corporate securities, one fairly long but confined to cash raised by issues upon the New York Stock Exchange, the other shorter but wider in scope, show one of the early stages through which large-scale investment operations pass when the capital to be invested is raised from the public.

Of course, the New York Stock Exchange is one of the chief agencies for obtaining 'capital' to put into new investments. In even larger measure, however, it is the country's chief market for dealing in outstanding securities. Here more than in any other place are determined the prices of stocks and bonds that have so many direct and indirect, obvious and subtle, influences upon cyclical movements, and here more than anywhere else are centered the speculative booms and collapses upon which earlier economists laid such stress. Would that we had similar comprehensive series recording real estate transactions and prices; but this phase of economic activities is by its nature so dispersed that summaries would be exceedingly difficult to make or interpret.

According to our basic definition, business cycles occur in nations where most economic activities are organized in business enterprises conducted for profit. If so, profits and losses should play critical roles in generating and propagating cyclical movements. It has long been known that the net incomes of

[10] For details, see his *Business Incorporations in the United States, 1800–1943* (National Bureau, 1948).

most enterprises are subject to wide oscillations; but our definite information on this crucially important item was long confined to a relatively brief and doubtfully representative list of corporations whose accounts were published for special reasons either by their own officials or by some public agency. The relatively comprehensive information available for recent years in the United States is a byproduct of federal taxes upon the income of business corporations. By using, as his chief guide, the quarterly income statements of the corporations that publish such figures, Harold Barger put the official annual data of the Internal Revenue Bureau upon a quarterly basis from 1921 to 1938.[11] Along with this series we use the much longer record of commercial failures compiled by one of the country's leading agencies that has made a business of reporting upon the credit worthiness of other enterprises. Bank failures are not included.

The monthly and quarterly section of the table closes with cyclical measures of several of the best known indexes specifically designed to represent changing business conditions. A critique of these constructions, as they stood in the middle 1920's, was given in *Business Cycles: The Problem and Its Setting* (pp. 290–357). Though the indexes designed by Ayres, Axe and Houghton, and Babson are of later date, and though some of the older series have been revised since 1927, I shall not elaborate further the limitations imposed upon all general indexes of business conditions by the paucity of data, especially before World War I, or the logical limitations inherent in an effort to summarize what happens during business cycles by a single figure for each month in a stretch of years. Rather must I stress again the considerable extent to which different compilers perforce use the same data, and the general similarity among their technical methods, despite countless differences of detail. So prominent are these common features of the business indexes in the table, barring Snyder's index of deposits activity, that the likeness among our measures of the different indexes may be supposed to be mathematically foreordained. That

[11] See Barger, *op. cit.*, Appendix B.

conclusion, however, would be an exaggeration. Granted the similarity in statistical procedures, there remain sufficient differences among the data and weighting schemes used by the compilers of these indexes to prevent close agreement among their results, unless there were a marked consensus in the cyclical behavior of series that various compilers think fit for admission to an index of business activity.

So much for the present concerning the matters represented in our table. It is scarcely less important to notice what sectors of the economy are omitted. I have mentioned the lack of comprehensive series on orders from manufacturers and real estate transactions; also I have explained why no index of retail prices is used. Among other matters conspicuous by their absence are inventories, wage rates, hours of work per week, the output per manhour, interest rates, the external operations and internal conditions of the banks, the volume of the circulating medium and its velocity of circulation, taxes, and savings. On some of these subjects systematic data can be had, but we have not yet analyzed them—taxes, for example. On others we have numerous series that we hope to present later. Few if any of them are of comprehensive scope.[12]

A further defect of the table is the diversity of periods covered. The extremes are 3 reference cycles in wholesale trade sales and 21 in Ayres' index of business activity. Of course we might have established strict uniformity in this respect by cutting the longest series down to match the shortest. We deem it more important to give each series the best possible chance to show what cyclical behavior is typical of the factor it represents. The more cycles we can include the better this chance is, except when so marked a change has occurred in typical behavior that the series should be divided into segments, or when potent irregular factors have produced exceptionally violent movements in a few cycles. There is no example of the

[12] Of course, 'comprehensiveness' is a matter of degree and purpose, and perhaps some of the series singled out here as 'comprehensive' are no more so than a few that are omitted. See in this connection, Table 13 above.

first type of exception in the present table,[13] and the second type is limited to the exclusion from price and value series of cycles accompanying the Civil War and World War I. While uniformity of the periods covered is highly desirable in close comparisons between matched series, it is of minor moment here. Indeed, the demonstration of a consensus among our comprehensive series may be regarded as all the more striking when some of the series cover less than 20 and others more than 70 years.

Another technical blemish is that, despite the defects for our purposes of so coarse a time unit as a year, we have had to take Kuznets' estimates of gross national product and national income in annual form, or go without these most significant of all comprehensive series. But this cloud also has its silver lining: cyclical movements in different parts of the economy must be much alike in timing and direction to shine through the obscuring veil of annual reporting during so disturbed and confused a period as that between the two world wars.

Finally, I may point out in very general terms that doubts can be raised concerning the evidence regarding cyclical behavior given by every series in our sample. (1) Seldom can the consumer of statistics suppose that the compilers of comprehensive series had accurate information at their disposal. For example, the actual value of every lot of merchandise exported, or every contract let for construction, or the liabilities of every commercial enterprise that fails, can hardly be ascertained by any clerk or field agent, however faithful. (2) In a few instances, precision is probably approximated very closely. I know no reason to question the arithmetical cor-

[13] However, we confine railroad ton miles to the period since 1904 because of the great secular changes in the cyclical behavior of railroading. See above, Chart 1, Figures 13–14; and *Measuring Business Cycles*, Ch. 10, Sec. VIII. Also, in the interests of simplicity, our table blinks a notable shift in the cyclical behavior of exports. Prior to 1914 exports bore a decidedly irregular relation to business cycles; since then they have conformed well. The conformity indexes for 1867–1914 are +50, −33, +4; for 1921–38, +100, +100, +100. The average full-cycle amplitude for the first period is 0.5; for the second, 63.6.

rectness of the long series on bank clearings in New York City, apart from possible errors of transcription and printing. But doubts of another sort come in. What revisions have been made since the 1850's in the rules concerning items admissible to exchange through the clearing house; how has the volume of clearings been affected by the admission of new banks to membership and by amalgamations among old members; what effects were produced by the creation of the New York Stock Clearing House in 1892 and its reorganization in 1920; what part of the transactions represent financial activities and what part represent industry and trade?[14] (3) When some aggregate or index is built up by combining numerous components, as in making a comprehensive price index or estimating gross national product, problems of weighting arise and introduce new uncertainties. (4) Closely related are the problems of sampling encountered whenever an effort is made to approximate some 'universe' by measuring individual items that are accessible to observation.

To give an adequate account of how all the comprehensive series in Table 31 have been made, of what they cover and of the varying margins of uncertainty surrounding them, would constitute a large and tedious contribution to economic knowledge.[15] How much there is to be known about some of the more significant series may be judged by examining the second volume of Simon Kuznets' *National Income and Its Composition.* Gaining fuller knowledge of the observations of economic processes is one of the sure ways to improve the trustworthiness of our conclusions. But we cannot now extemporize the results of investigations that must be made, if at all, by many men with special access to records and special familiarity with numerous branches of business and government. Only in the fields it is cultivating intensively can the National Bureau go much further than other consumers of statistics toward

[14] See the discussion of these matters in Garvy's dissertation, *op. cit.*, Ch. 2.

[15] Many of the series in Table 31 are briefly described in *Historical Statistics of the United States, 1789–1945* (Bureau of the Census, 1949), especially Appendix I which was prepared by Geoffrey H. Moore.

testing the data it draws from reputable sources, public and private. In the present case, we have to take many of the comprehensive series on trust, knowing that they have respectable antecedents and supposing that they represent more or less faithfully what their titles suggest. If we find a large measure of agreement in these fallible efforts to summarize what has typically happened during business cycles in various sectors of the economy over periods that differ considerably, we can argue that the consensus would probably be more notable if the observations were less subject to errors and omissions, and if the periods were more uniform.

III Typical Behavior of Comprehensive Series during Business Cycles

A CYCLICAL TIMING

Most basic of all our measures are those concerned with the reference-cycle stages during which a series has typically expanded and the other stages during which it has typically contracted. For the crucial question concerning business cycles, as we define them, is whether there actually have been general tides of expansion and of contraction in the economic activities of nations within which private enterprise prevails during the periods marked off by our reference dates. Unless our timing measures indicate a decided preponderance of expansion in stages I–V, and of contraction in stages V–IX, it is scarcely worth while to examine the reference-cycle patterns or any of their derivatives.

But before we can take seriously our judgments concerning the varieties of timing typical of comprehensive series, we should face the element of circuitous reasoning implicit in our statistical operations. In fixing our reference dates for the United States, we attached considerable importance to the specific-cycle turning dates of certain among the comprehensive series in Table 31. So far as the troughs and peaks in any group of series determined our choice of reference dates, it is a foregone conclusion that the reference-cycle timing of

series in this group will show a regular relation of some sort to our business-cycle chronology. But we see nothing vicious in this relation. A series that influences our choice of reference dates appreciably because it is comprehensive is a series that represents an appreciable fraction of aggregate activity; its peaks and troughs therefore contribute appreciably to what we are seeking to find—the peaks and troughs in aggregate activity itself. Suppose that we could divide aggregate activity into 100 components, that we had an excellent time series to represent each component, that we knew precisely what weight to assign each series, and that their specific-cycle turns followed one another in an immutable order. Then we could fix a superlative set of reference dates, to which each of the hundred series would bear a predetermined relation. The degree of intercorrelation between the reference dates and the specific-cycle turning dates of the series would be at a maximum, and doubts about the significance of the results at a minimum.

In Table 4, we found that 43.5 percent of the 794 monthly or quarterly series of our full American sample typically have their troughs in stage I and their peaks in stage V, while another 4.8 percent typically have their peaks in I and their troughs in V. Among the comprehensive series in Table 31, the concentration of cyclical turns on the reference dates is only a little greater than in the whole sample: 50 instead of 48 percent have I–V or V–IX timing. But 35 percent of the comprehensive series as against 15 percent of all series have VIII–IV or VIII–V timing, and the proportion of series scattered among the other timing types is smaller in the comprehensive group than in the full sample.

Thus there is a striking consensus in the direction of movements typical of comprehensive series during the phases of expansion and contraction, if our judgments of typical timing are not grievously in error. But this consensus differs significantly from stage to stage, as the schedule in Table 32 shows.

This schedule gives a summary view of a typical business cycle in the United States as reflected by comprehensive series

Table 32

Summary of Typical Movements of 34 Monthly or Quarterly Comprehensive Series in Successive Reference-Cycle Stages[a]

From Stage I to II

30 of the 34 comprehensive series typically rise.
2 typically fall: the number and liabilities of failures. Of course, a decline in these series means an improvement in business conditions.
2 series with irregular timing, agricultural marketings and total exports, sometimes rise and sometimes fall.

From Stage II to III

29 of the comprehensive series rise.
3 fall: the two series on failures, and bond sales on the New York Stock Exchange.
2 series with irregular timing sometimes rise and sometimes fall.

From Stage III to IV

28 of the comprehensive series rise.
4 fall: the two series on failures, bond sales, and bond prices.
2 series with irregular timing sometimes rise and sometimes fall.

From Stage IV to V

23 series rise, including the liabilities of firms failing—a bad sign.
9 series fall: the number of failures, bond sales, bond prices, shares sold on the New York Stock Exchange, prices of common stocks, bank clearings or debits in New York City, Snyder's index of deposits activity, construction contracts let, and corporate security issues as compiled by the *Journal of Commerce*.
2 series with irregular timing sometimes rise and sometimes fall.

From Stage V to VI

2 series rise: the number and liabilities of failures.
30 series fall.
2 series with irregular timing sometimes rise and sometimes fall.

From Stage VI to VII

2½ series rise: the two series on failures, and bond prices in one of the timing varieties that seem equally appropriate.
29½ series fall, including bond prices in its alternative timing variety.
2 series with irregular timing sometimes rise and sometimes fall.

From Stage VII to VIII

3 series rise: the number of failures, bond prices, and bond sales.
29 series fall, including the liabilities of firms failing.
2 series with irregular timing sometimes rise and sometimes fall.

From Stage VIII to IX

15 series rise: the number of failures, bond prices, bond sales, shares sold, stock prices, 3 series on bank clearings or debits, Snyder's index of deposits activity, the A T & T index of business before adjustment for trend, total imports, construction contracts let, both our series on security issues, and Evans' series on the number of incorporations.
17 series fall, including the liabilities of firms failing.
2 series with irregular timing sometimes rise and sometimes fall.

[a] Based upon 'expansion stages' in Sec. A of Table 31.

on production, prices, trade, employment, incomes, investments, dealings in securities, business profits and losses, bank clearings or debits, and finally several indexes of business activity. Fallible as these series may be, they embody a large part of the most careful and prolonged observations that have been made by public and private agencies upon economic activities of numerous sorts over variable periods that stretch back in one or two instances to the 1850's.

Two of these series have no regular relation in time to the cyclical tides. For reasons stated in Chapter 5, Section II, farm crops, and hence a major part of what farmers have to sell, have irregular cyclical timing. So also do total exports from the United States before World War I, when exports were dominated largely by agricultural products. Let us put these two series aside.

Of the 32 remaining monthly or quarterly series, *all* indicate a bettering of business conditions from stage I to stage II; the two records of business failures, by declining. Thereafter, the consensus becomes less complete stage by stage to the culmination of expansion. In stages II–III bond sales begin to drop; in III–IV bond prices begin to fall; in IV–V the declines are swelled by prices and sales of stocks, clearings in New York, two series representing plans for investments, and a business index especially sensitive to financial operations. Also, the liabilities of failures begin to rise. Thus the tide that had been rising so generally, becomes confused by crosscurrents in the last stage of expansion. In the transition from IV–V to V–VI the mixed condition of affairs gives way to a new unanimity of movement: except for the two irregulars we have set aside, all the comprehensive series denote a worsening of business conditions. As contraction continues, countercurrents begin to develop much as they did in expansion. Now it is bond prices that give the first signs of recovery, in VI–VII; then in VII–VIII bond sales, and the liabilities of failures (which begin to decline); finally in VIII–IX no less than 15 of the 32 series move upward, including the number of failures, while liabilities fall further. On this evidence the last stage of contraction is even

more marked by crosscurrents than the last stage of expansion. But this confusion, like that of IV–V, gives place to near unanimity after the tide has turned.[16]

These statements, the reader should bear in mind, are based upon our judgments concerning the 3, 4, or 5 consecutive reference-cycle stages during which a series tends to rise, and the remaining 5, 4, or 3 consecutive stages during which it tends to fall—provided, indeed, that the series exhibits any variety of regular cyclical timing.[17] Average reference-cycle patterns do not always rise in fact during each of the stages that we put down as characteristic of expansion in a series, or fall invariably during each stage put down as characteristic of contraction. Still less do series always behave during individual cycles as their timing varieties suggest. Both sorts of departures from what we deem typical will be examined in the sequel. We are merely putting first our broadest and simplest sketch of business cycles, with the intent of filling in details after the reader has seen where these details belong.

B CONFORMITY TO BUSINESS CYCLES

We noted in Chapter 6 that the wider the range of activities covered by a series, the higher tend to be its indexes of conformity to the cyclical tides, because the broader the coverage of a series the more mutual offsetting will occur among the irregular movements of less than economy-wide incidence that impinge upon it. But we noted also that the relatively long series in our sample have lower conformity indexes on the average than the short series. "Granted the tendency of a series to conform, it is more likely to have a perfect record for 3 or 4 cycles than it is to continue conforming perfectly throughout a run twice or thrice as long." [18] Our comprehensive series, it

[16] For further analysis, see the essay "New Facts on Business Cycles", in the *Thirtieth Annual Report* of the National Bureau, May 1950; also Geoffrey H. Moore, "Statistical Indicators of Cyclical Revivals and Recessions", *op. cit.*, Sec. 3 and 6.

[17] Perhaps the reader should refresh his memory of how the timing varieties are determined. See Ch. 5, Sec. I.

[18] See Ch. 6, Sec. II.

so happens, are decidedly longer on the average than the other series in the full sample. Series covering 10 or more cycles form only 23 percent of the full sample and 62 percent of the comprehensive group.

Perhaps more important than the influence of broad coverage in raising the conformity indexes of the comprehensive group, or the influence of long duration in lowering these indexes, are the more or less accidental differences between the full sample and the comprehensive group in the economic character of the activities represented. For example: the comprehensive group has a relatively larger number of business indexes, which are practically designed to conform perfectly, and no series on inventories, which conform only moderately well on the whole. It has only one series on commodity prices, and that one a close conformer, whereas the full sample has 147 series on commodity prices, with a rather modest record of conformity. Some of the differences in makeup count in the opposite way; for example, the lack of a comprehensive series on new orders from manufacturers—a 17-series group of excellent conformers in the full sample. But on the whole, the differences in economic composition seem to favor higher conformity indexes in the smaller sample.[19]

About the net resultant of the various factors bearing upon the two sets of conformity measures, there can be no doubt. Table 33 makes it clear that, despite their greater average length, the comprehensive series conform better to cyclical expansions, to cyclical contractions, and to business cycles as wholes than do the other series of our sample. If we relied merely upon the evidence of comprehensive series, we would find a more striking consensus in their cyclical movements than we find in our larger and far more detailed sample of series.

C REFERENCE-CYCLE AMPLITUDES

Our basic definition hypothesizes a consensus of cyclical movements in timing and direction only; it says nothing about a

[19] A reader who wishes to make more detailed comparisons between the two samples can cover most of the materials by using Tables 8 and 31.

Table 33

Summaries of Numerical Values of Conformity Indexes of 34 Comprehensive Series and of Full Sample of Monthly or Quarterly Series[a]

MEDIAN AND QUARTILES OF CONFORMITY INDEXES

	Expansion		Contraction		Business Cycles	
	Comprehensive series	*Full sample*	*Comprehensive series*	*Full sample*	*Comprehensive series*	*Full sample*
Upper quartile	100	100	100	100	100	100
Median	100	67	78	60	100	78
Lower quartile	71	45	57	33	85	50

DISTRIBUTION OF INDEXES OF BUSINESS-CYCLE CONFORMITY

	Number of Series		% of Total Number[b]	
Business-Cycle Index	*Comprehensive series*	*Full sample*	*Comprehensive series*	*Full sample*
100	18	291	52.9	36.7
90-99	5	19	14.7	2.4
80-89	5	70	14.7	8.8
70-79	2	95	5.9	12.0
60-69	2	64	5.9	8.1
50-59	..	73	...	9.2
40-49	..	40	...	5.0
30-39	1	43	2.9	5.4
20-29	1	34	2.9	4.3
10-19	..	36	...	4.5
1- 9	..	12	...	1.5
0	..	17	...	2.1
Total	34	794	100.0	100.0

[a] Based upon Table 6 and Sec. A of Table 31. The conformity indexes are taken without regard to sign.

[b] Failure of detail to total 100 percent is due to rounding.

consensus in amplitudes. What theoretical expectations we entertain regarding the relations among the degrees of expansion or contraction in different parts of a national economy are based upon our conviction that all these parts are interdependent, and that therefore some proportion must be maintained among their changes if the system is to continue functioning. Indeed, this matter of the interrelations among

Table 34

Summaries of Reference-Cycle Amplitudes of 34 Comprehensive Series and of Full Sample of Monthly or Quarterly Series[a]

AVERAGES AND QUARTILES OF AMPLITUDES

	Reference-Cycle Amplitude	
	Comprehensive series	*Full sample*
Lower quartile	37	18
Median	48	34
Upper quartile	68	60
Arithmetic mean	59.7	50.7

DISTRIBUTION OF AMPLITUDES

	% of Series[b]	
Reference-Cycle Amplitude	*Comprehensive series*	*Full sample*
0- 9.9	5.9	12.2
10- 19.9	5.9	16.0
20- 29.9	2.9	15.4
30- 39.9	14.7	13.1
40- 49.9	23.5	10.8
50- 59.9	20.6	7.6
60- 69.9	17.6	4.3
70- 79.9	5.9	3.3
80- 89.9	...	3.4
90- 99.9	8.8	1.1
100-149.9	2.9	7.3
150-199.9	...	2.1
200-249.9	...	2.0
250-299.9	...	1.3
300-349.9	2.9	0.1
350-399.9	...	0.1
400 & over	...	0.1
Total	100.0	100.0

[a] The unit of observation is the average full-cycle amplitude of a series, taken without regard to sign. Based upon Tables 10 and 35.

[b] Failure of detail to total 100 percent is due to rounding.

reference-cycle amplitudes may well be a promising clue to follow in searching for explanations of cyclical recessions, and also of revivals.

The last section of Chapter 7 demonstrated that the reference-cycle amplitude of a comprehensive series tends to be lower than the mean amplitude of its component series. Each component has its individual amplitude measured from standings in the peak and trough stages that are characteristic of its own behavior. When these stages differ from one component to another, the peaks of the comprehensive series will not be so high as the correspondingly weighted mean of the individual peaks; nor will the troughs in the comprehensive series be so low as the mean troughs of the components. And our amplitudes are merely differences between average standings at peaks and troughs, when these standings are expressed in percentages of reference-cycle bases.

Yet the amplitudes of our comprehensive series, taken without regard to sign, run on a higher level than those of our full sample. Table 34 shows that the quartiles, medians, and arithmetic means of the small sample of series with wide coverage are all substantially higher than the corresponding measures of the full sample. The explanation appears when we compare the makeup of the two samples as presented in Tables 11 and 31, or better Table 35. The groups with mean amplitudes below 25 points in Table 11 (bond yields, production of foodstuffs, employment in factories making perishable goods, hours of work per week, rates of pay, prices of semidurable goods, and prices of farm products and foods) are represented sketchily if at all in the sample of comprehensive series. On the other hand, this sample is relatively strong in series that represent financial operations concerned with investments, dealings in stocks, business failures, and profits. Not our choice so much as the availability of data is responsible for these differences between the two samples.

A second comparison between the two samples in Table 34 concerns the range covered by the reference-cycle amplitudes from lowest to highest, and the degree of concentration

Table 35

ARRAY OF AVERAGE REFERENCE-CYCLE AMPLITUDES OF COMPREHENSIVE SERIES[a]

Series	Average Amplitude		
	Expansion	*Contraction*	*Full cycle*
Agricultural marketings	+1.4	−0.8	+2.2
Bond prices	−3.5	+6.4	−9.9
Exports	+15	−1	+16
Prices, wholesale	+9	−9	+18
Department store sales	+16	−10	+26
Deposits activity	+14	−17	+31
Business index, Ayres	+17	−19	+36
Wholesale trade sales	+18	−19	+37
Bank clearings outside N.Y. City	+26	−11	+37
Incorporations	+27	−10	+37
Production of fuels	+26	−15	+40
Income payments	+23	−18	+40
Imports	+26	−19	+45
Factory employment	+22	−23	+45
Business index, Persons	+22	−23	+45
Common stock prices	+27	−20	+47
Failures, no.	−22	+26	−48
Business index, A T & T, adj.	+23	−25	+48
Bond sales	−15	+35	−50
Business index, Axe-Houghton	+29	−21	+50
R.R. freight ton miles	+28	−23	+51
Bank clearings, total	+30	−21	+51
Business index, Babson	+29	−23	+52
Business index, A T & T	+32	−23	+55
Bank clearings, N.Y. City	+32	−28	+60
Industrial production	+35	−32	+68
Construction contracts	+43	−30	+74
Factory payrolls	+36	−40	+76
Shares traded	+41	−36	+77
Security issues	+47	−46	+93
Cash from issues on N.Y. Stock Exchange	+58	−39	+97
Pig iron production	+54	−45	+99
Failures, liabilities	−67	+59	−125
Net corporate profits	+169	−175	+343

[a] Based upon Table 31, Sec. A. For fuller titles, see that table.

around the central tendencies of the two arrays. One of the comprehensive series has an amplitude close to zero while another runs above 300, so that in range covered the smaller sample virtually matches the larger. But there is a considerable

contrast in the distribution of the two arrays, arising mainly from the above-mentioned paucity of comprehensive series with low amplitudes.

Finally, Table 35 lists the comprehensive series in the order of their mean amplitudes. Low amplitude measures may be due primarily to irregular timing, as in agricultural marketings and exports, or to inherent steadiness. Thus the prices of the railroad bonds collected by Frederick R. Macaulay, and adjusted for gradual improvement in quality, have been notably more stable than common stocks or even commodity prices at wholesale. The comprehensive indexes support our previous conclusion based upon more carefully matched evidence that these commodity prices in turn are subject to less violent cyclical fluctuations than industrial output.[20] At the higher end of the range we find the most volatile form of income—net profits of business enterprises—and various indicators of plans for investing capital, producing investment goods, and trading in securities. In the middle range, say reference-cycle amplitudes of 25 to 75, come the indicators of mass production and mercantile distribution of commodities, employment, and the payment of incomes to persons, together with some financial operations closely connected with the mass flow of goods through the economy, and all the indexes specifically designed by statisticians to measure business or industrial activity.

Simple and reasonable as this summary sounds, the table presents puzzles aplenty. For example: how comes it that our index of retail purchases has an amplitude of only 26, while income payments rise and fall by 40 percent? If industrial production has a typical amplitude of 68, wholesale prices have one of 18, and the two sets of movements are positively correlated, why do not outside clearings rise and fall by more than 37 percent? Why does the number of incorporations rise and fall less than the number of business failures fall and rise? The time has not yet come to attempt answers to these questions and others like them that may arise in the reader's mind; but it is well to realize now that our statistical findings are piling up,

[20] See Ch. 7, Sec. IVF.

not merely a bulky mass of factual evidence, but also a host of problems that we must eventually face.

D REFERENCE-CYCLE PATTERNS

What we have learned about the cyclical timing, conformity, and amplitude of the comprehensive series tells us much about their reference-cycle patterns. The dominance of I–V timing and of close conformity assures us that most of these patterns will rise from reference-cycle troughs to peaks, then decline to the terminal troughs. The considerable divergences among amplitudes suggest that the standings of the 34 series at stages I, V, and IX will cover a rather wide range. At the intermediate stages the scatter will presumably be less, though still appreciable. These differences among the standings at successive stages will be augmented by the presence in our comprehensive sample of two series with irregular timing, three that are inverted, and larger numbers that have leads of one or two stages at one or both turns. They will be augmented also by divergences among the intracycle trends. Thus, when the reference-cycle patterns of our comprehensive series are assembled in a single table, we should get the impression of tidal movements that sweep over the economy as a whole but that are no more uniform in its various parts than the oceanic tides are uniform in all ports.

How well Table 36 confirms these expectations, the reader can see for himself. No one will doubt the dominance of a common pattern in the stage-by-stage arrays. Unless the comprehensive series grossly misrepresent the activities suggested by their titles, we can say in the language of our basic definition that expansions occur "at about the same time in many economic activities, followed by similarly general recessions, contractions, and revivals". But at no stage of the cycle are the movements wholly unanimous in direction; still less do different activities expand or contract in the same degree. These minority divergences in direction of change and the pervasive differences in amplitude are no less characteristic traits of business cycles than the common features stressed by our definition,

Table 36

Stage-by-Stage Distribution of Average Reference-Cycle Standings of 34 Monthly or Quarterly Comprehensive Series[a]

Reference-Cycle Standing	*Percentage of Series Having Indicated Standing in Stage*								
	I	II	III	IV	V	VI	VII	VIII	IX
190-199.9	....	....	....	....	2.9	....	....	....	....
180-189.9	....	....	....	2.9	....	....	....	....	....
170-179.9	....	....	....	....	....	....	....	....	....
160-169.9	....	....	....	....	....	....	....	....	....
150-159.9	....	....	....	....	....	2.9	....	....	....
140-149.9	....	....	....	....	....	....	....	....	....
130-139.9	....	....	2.9	....	....	....	2.9	....	....
120-129.9	....	....	....	5.9	14.7	8.8	....	....	....
110-119.9	....	5.9	5.9	20.6	47.1	26.5	....	5.9	5.9
100-109.9	8.8	8.8	64.7	64.7	26.5	47.1	47.1	8.8	11.8
90- 99.9	26.5	79.4	23.5	....	2.9	8.8	44.1	55.9	58.8
80- 89.9	55.9	5.9	2.9	2.9	5.9	5.9	2.9	20.6	17.6
70- 79.9	5.9	....	....	2.9	....	....	2.9	5.9	2.9
60- 69.9	....	....	....	....	....	....	....	....	....
50- 59.9	....	....	....	....	....	....	....	....	....
40- 49.9	....	....	....	....	....	....	....	....	....
30- 39.9	2.9	....	....	....	....	....	....	2.9	....
20- 29.9	....	....	....	....	....	....	....	....	2.9
Total[b]	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

SUMMARIES OF DISTRIBUTIONS

	I	II	III	IV	V	VI	VII	VIII	IX
Highest standing	109.1	113.3	134.8	182.4	199.2	151.3	135.4	118.5	115.4
Next to highest standing	107.8	111.8	119.2	125.9	127.1	121.6	107.8	110.2	112.2
Upper quartile	91.7	98.8	103.7	111.7	114.9	111.5	102.9	98.9	98.7
Median	87.3	95.4	101.6	108.8	112.0	108.0	99.9	92.8	94.2
Lower quartile	85.0	93.4	99.6	104.8	107.1	104.6	96.3	89.4	90.8
Next to lowest standing	70.5	89.0	93.3	87.1	86.1	89.6	89.6	77.7	79.8
Lowest standing	30.4	88.9	86.4	76.6	85.3	89.1	78.4	35.2	24.6
Range									
Full	78.7	24.4	48.4	105.8	113.9	62.2	57.0	83.3	90.8
Excl. both extreme items	37.3	22.8	25.9	38.8	41.0	32.0	18.2	32.5	32.4
Interquartile	6.7	5.4	4.1	6.9	7.8	6.9	6.6	9.5	7.9
No. of series with standings of									
100 or higher	3	5	25	32	31	29	17	5	6
Under 100	31	29	9	2	3	5	17	29	28

[a] Based upon Table 31, Sec. B.

[b] Failure of detail to total 100 percent is due to rounding.

and illustrated by the present table among many others. Indeed, the rather wide ranges covered by the arrays of reference-cycle standings and their shifts from stage to stage are among the most significant features of the exhibit.

Nor are these differences in standings, or the stage-by-stage shifts in the ranges they cover, inscrutable results of chance. We know in advance much about the types of activity that will hold very low or very high rankings in the arrays for stages I, V, and IX; we can foretell something about the rankings of these series at stages intermediate between troughs and peaks; we can even formulate certain expectations concerning the nature of the series that will occupy middle positions in the arrays.

The series that have very low standings at stage I tend to have very high rankings at stage V; for these series are predominantly characterized by large reference-cycle amplitudes, I–V timing, and close conformity. Rapidly rising intracycle trends also tend to produce low standings at I and high standings at V; but this influence is usually of secondary moment. However, rising trends often suffice to prevent series that stand high at V from standing as low at IX as they stood at I.

Similarly, the series that stand very high at stage I tend to rank low at V. Their characteristics are like those which produce low standings at I and high at V, except that V–IX takes the place of I–V timing, and falling take the place of rising intracycle trends. But inversion is not very common—less than 10 percent of all our series are inverted, and only 3 of the 34 comprehensive series. As many or more of the high rankings at I and low rankings at V are due to irregular timing, or to very low amplitudes combined with trends that decline or approach the horizontal. For the reference-cycle patterns of irregular series tend to approximate straight lines, that is, a set of values that differ from 100 only as the intracycle trend makes the later stages somewhat higher (or lower) than the earlier ones. Any series that stands close to 100 at stage I will have a high rank in the array for that stage, and any that stands

close to 100 at stage V will then rank low. Similar remarks apply to series with very narrow cyclical amplitudes: whatever their timing, their standings at the reference-cycle peaks and troughs will not differ much from 100, and so will rank high at the troughs, low at the peaks.

It is harder to specify what types of series will occupy middle positions in the array at stage I or, for that matter, at any of the later stages; for the central parts of these arrays are much more densely populated than their outer parts, and small, accidental differences in standing may produce considerable differences in ranking. However, we can lay down three or four rules. (1) Series that have some claim to represent changes in business or industrial activity at large are likely to have I–V timing or a nearly related variant, close conformity, and medium amplitudes. Hence their reference-cycle standings should hover in and about the central portions of the range covered by the full arrays of reference-cycle standings in successive stages. This rule covers not only business indexes specifically designed by competent statisticians to represent (as best may be) the cyclical fluctuations of the whole economy, but also such series as total movements of freight, total volume of payments effected through banks, total number of factory employees, total income payments to individuals, and even total imports. (2) The series we have already noticed that tend to stand very low at stage I, very high at stage V, and low again at IX have to work their way up through the economy during the successive stages of expansion, and slide down again during the stages of contraction. Hence some of these series belonging to the 'prince or pauper' class are likely to find themselves temporarily in a middling position at stage II, III, IV, VI, VII, or VIII. (3) Similarly, the series that stand very high at the troughs and low at the peaks of business cycles sometimes approximate the median position at an intermediate stage, as they recede in relative position during expansion or climb upward again during contraction. (4) The effects of these dominant factors upon the ranking of series at successive stages are more or less tangled by leads or lags (which create most con-

Table 37

Comprehensive Series Having Very Low, Middle, and Very High Average Standings at the Nine Stages of Reference Cycles[a]

Stage I

	Standing
VERY LOW STANDING	
Net corporate profits	30.4
Pig iron production	70.5
Construction contracts	78.3
Cash from issues on N.Y. Stock Exchange	80.7
MIDDLE STANDING	
Factory payrolls	86.9
Production of fuels	87.3
R.R. freight ton miles	87.3
Imports	87.9
Business index, A T & T, adj.	88.4
VERY HIGH STANDING	
Bond sales	98.9
Agricultural marketings	100.2
Failures, no.	107.8
Failures, liabilities	109.1

Stage II

VERY LOW STANDING	
Pig iron production	88.9
Failures, liabilities	89.0
Incorporations	90.6
Bank clearings outside N.Y. City	91.8
MIDDLE STANDING	
Bank clearings, total	95.0
Construction contracts	95.3
Exports	95.5
Common stock prices	96.1
Factory employment	96.4
VERY HIGH STANDING	
Deposits activity	102.1
Agricultural marketings	102.3
Bond sales	111.8
Shares traded	113.3

Stage III

VERY LOW STANDING	
Failures, liabilities	86.4
Failures, no.	93.3
Production of fuels	93.8
Bank clearings outside N.Y. City	97.7
MIDDLE STANDING	
Imports	101.3
Bank clearings, total	101.4
Bond prices	101.7
Pig iron production	101.9
Industrial production	102.5
VERY HIGH STANDING	
Shares traded	108.7
Construction contracts	110.1
Security issues	119.2
Net corporate profits	134.8

Stage IV

VERY LOW STANDING	
Failures, liabilities	76.6
Failures, no.	87.1
Bond prices	101.1
Exports	102.1
MIDDLE STANDING	
Business index, Persons	108.4
Business index, A T & T	108.7
Income payments	108.9
Wholesale trade sales	109.0
R.R. freight ton miles	109.0
VERY HIGH STANDING	
Bank clearings, N.Y. City	114.9
Construction contracts	123.5
Security issues	125.9
Net corporate profits	182.4

Stage V

VERY LOW STANDING	
Failures, liabilities	85.3
Failures, no.	86.1
Bond prices	98.9
Bond sales	100.4
MIDDLE STANDING	
Business index, Persons	111.0
Business index, A T & T, adj.	111.6
Bank clearings, total	112.3
Factory employment	112.7
Income payments	112.7
VERY HIGH STANDING	
Factory payrolls	123.1
Pig iron production	124.7
Construction contracts	127.1
Net corporate profits	199.2

Table 37 (concl.)

Stage VI	*Standing*
VERY LOW STANDING	
Failures, no.	89.1
Bond sales	89.6
Shares traded	95.0
Bond prices	97.9
MIDDLE STANDING	
Business index, Persons	107.8
Bank clearings, total	108.0
Business index, A T & T, adj.	108.1
Bank clearings outside N.Y. City	109.4
Business index, Babson	109.6
VERY HIGH STANDING	
Failures, liabilities	120.0
Factory payrolls	120.3
Pig iron production	121.6
Net corporate profits	151.3

Stage VII	
VERY LOW STANDING	
Net corporate profits	78.4
Shares traded	89.6
Security issues	90.8
Bank clearings, N.Y. City	92.4
MIDDLE STANDING	
Imports	99.7
Business index, A T & T	99.7
Prices, wholesale	100.1
Incorporations	100.3
Business index, Babson	100.6
VERY HIGH STANDING	
Failures, no.	105.7
Exports	107.2
Production of fuels	107.8
Failures, liabilities	135.4

Stage VIII	*Standing*
VERY LOW STANDING	
Net corporate profits	35.2
Shares traded	77.7
Security issues	79.8
Cash from issues on N.Y. Stock Exchange	81.1
MIDDLE STANDING	
Factory employment	92.1
R.R. freight ton miles	92.6
Business index, Babson	92.9
Business index, Axe-Houghton	93.1
Construction contracts	93.2
VERY HIGH STANDING	
Agricultural marketings	102.3
Exports	103.0
Failures, no.	110.2
Failures, liabilities	118.5

Stage IX	
VERY LOW STANDING	
Net corporate profits	24.6
Pig iron production	79.8
Factory payrolls	83.2
Business index, A T & T, adj.	87.1
MIDDLE STANDING	
Common stock prices	92.9
Security issues	94.1
Cash from issues on N.Y. Stock Exchange	94.2
Income payments	95.1
Shares traded	95.6
VERY HIGH STANDING	
Incorporations	104.2
Failures, liabilities	107.2
Failures, no.	112.2
Bond sales	115.4

• Based upon Sec. B of Table 31. See that table for fuller titles of series.

fusion around the cyclical turns), by differences among intra-cycle trends, and by random movements, that we may or may not be able to explain.

Indications of the net outcome of these various influences that determine the relative standings of our comprehensive

Table 38

STAGES IN WHICH COMPREHENSIVE SERIES HAVE EXTREME AND MIDDLE STANDINGS[a]

Series	*Very Low in Stages*	*Middling in Stages*	*Very High in Stages*
Failures, liabilities	II,III,IV,V	...	I,VI,VII,VIII,IX
Net corporate profits	I,VII,VIII,IX	...	III,IV,V,VI
Failures, no.	III,IV,V,VI	...	I,VII,VIII,IX
Pig iron production	I,II,IX	III	V,VI
Shares traded	VI,VII,VIII	IX	II,III
Bond sales	V,VI	...	I,II,IX
Construction contracts	I	II,VIII	III,IV,V
Security issues	VII,VIII	IX	III,IV
Agricultural marketings	...	...	I,II,VIII
Exports	IV	II	VII,VIII
Factory payrolls	IX	I	V,VI
Bond prices	IV,V,VI	III	...
Production of fuels	III	I	VII
Cash from issues on N.Y. Stock Exchange	I,VIII	IX	...
Incorporations	II	VII	IX
Bank clearings, N.Y. City	VII	...	IV
Bank clearings outside N.Y. City	II,III	VI	...
Business index, A T & T, adj.	IX	I,V,VI	...
Deposits activity	...	...	II
Bank clearings, total	...	II,III,V,VI	...
R.R. freight ton miles	...	I,IV,VIII	...
Imports	...	I,III,VII	...
Factory employment	...	II,V,VIII	...
Income payments	...	IV,V,IX	...
Business index, Persons	...	IV,V,VI	...
Business index, Babson	...	VI,VII,VIII	...
Common stock prices	...	II,IX	...
Business index, A T & T	...	IV,VII	...
Industrial production	...	III	...
Prices, wholesale	...	VII	...
Wholesale trade sales	...	IV	...
Business index, Axe-Houghton	...	VIII	...

[a] Based upon Table 37.

series are supplied by Tables 37 and 38. The full array of 34 series might be presented for each of the nine stages, but that would make the tables very bulky. Our skeleton arrays enable the reader to trace for himself the most striking migrations of series that start at the bottom, work their way to the top, then

fall back to the lowest rank, and the opposite migrations from top rank to lowest, and back to the top. Table 38 makes it especially easy to follow the cyclical fortunes of individual series.

It is interesting to note that all but 2 of our comprehensive series appear at some stage in one of the 4 very low, the 5 middle, or the 4 very high positions. The exceptions are department store sales and Ayres' index of business activity. One series (the liabilities of firms that fail) ranks among the lowest or the highest 4 in each of the 9 stages. Two more series, corporate profits and the number of firms failing, appear in the top or bottom groups of 8 stages. Fifteen times series that are moving out of or into one of the extreme positions find themselves in one of the middle positions; but 30 times these middle positions are occupied by series that have at no time ranked very high or very low.

Thus our comprehensive series picture the American economy as expanding rather vigorously on the average between the months we have selected to mark the troughs of business cycles and the months selected to mark the next peaks; then contracting somewhat less than they had expanded between the peak dates and the next later months selected to mark cyclical troughs. But these movements differ so widely in amplitude from one series to another that the course of business cycles cannot well be represented by a single line, however many factors have been considered in drawing it. The very essence of the phenomenon is omitted unless the chart of business cycles contains numerous lines that indicate the wide differences among the rates at which, and also some of the differences in the times at which, various elements in the economy expand and contract. For, unless these divergencies in cyclical behavior are pictured by fit symbols, we have no suggestion of the basic business-cycle problem: how an economic system of interrelated parts develops internal stresses during expansions, stresses that bring on recessions, and how the uneven contractions of its varied parts pave the way for revivals.

The tables of this section go far beyond assuring us that a large majority of economic activities fluctuate in unison; they tell us also some of the systematic changes these activities undergo in relation to one another as the cycle progresses from stage to stage and phase to phase. Table 37 makes these cyclical alterations in the proportions of the economic system concrete by naming in each of the nine stages some of the factors that are relatively most shrunken, relatively most bloated, and relatively nearest to the median condition of the other comprehensive series. On the basis of what these series can be made to tell, we could go some distance toward describing what happens during business cycles. And we could attempt to explain these cycles by the interlocking developments that the present evidence reveals. But, significant as this evidence is, the full sample, which includes the few comprehensive series used here and much besides, provides a far better basis for description and analysis. Also, the measures most effective for describing and analyzing a continuous process are not average standings during certain months, but rather the average rates of change per month from stage to stage of reference cycles. To avoid confusion with the intervals we have been calling stages and yet be concise, the second set of intervals (from the middle of stage I to the middle of stage II, from the middle of II to the middle of III, and so on) will be called reference-cycle 'segments'.

E RATES OF CHANGE DURING SUCCESSIVE SEGMENTS OF REFERENCE CYCLES

The average rates of change from stage to stage of the reference cycles are closely related to the average standings with which we have been dealing; they are made by subtracting the average standing of a series during one reference-cycle stage from its average standing in the following stage, and dividing the difference by the average number of months between the middle of the earlier and the middle of the later stage. Both the average standings and the average rates of change per month are expressed in percentages of reference-cycle

bases; but of course the standings run on a much higher level than the rates of change. In each cycle the monthly standings must average 100; there is no 'must' about the rates of change per month. Empirically we find that, among our comprehensive series, these rates range from −11.4 to +11.8; disregarding signs they equal or exceed 1 percent of the reference-cycle bases per month more often than they fall short of 1 percent per month.[21] Running on so low a level, these measures are subject to average deviations much smaller absolutely than the deviations of the standings, but the deviations of the rates of change are large in relation to their own mean values.[22] Other characteristics are brought out in Table 39, which corresponds in general to Table 36 for the reference-cycle standings.

As summarized here, the average rates of change per month merely exhibit the consensus among the characteristic cyclical movements of our comprehensive series in a fresh fashion. A large majority of the series rise in segments I–II to IV–V; a slightly smaller but still large majority fall in segments V–VI to VII–VIII; only when the tide is turning in VIII–IX is the majority narrow (19 series fall, 15 rise). If we reversed the signs of the two series on commercial failures, as we well might, the consensus would be still more emphatic. The rates as well as the directions of change seem rather orderly for the most part, decidedly so if we exclude the most volatile pair of series —net profits of corporations and the liabilities of commercial failures, which provide 6 of the 8 entries exceeding ±5.0 percent per month and 12 of the 32 entries exceeding ±2.5 percent. Half or more of the entries in each segment fall within a range that is never more and usually less than 1.3 percent. If we take the band across Table 39 between +1.9 and −1.9 percent per month we include more than four-fifths of the

[21] According to Table 39, the 34 comprehensive series equal or exceed a change of 1 percent monthly 149 times and fall short of that level 123 times. The arithmetic mean rate computed without regard to sign is 1.39 percent of reference-cycle bases.

[22] The reader who wishes to experiment with the two sets of average deviations of the comprehensive series will find convenient data in Sections B and C of Table 31.

Table 39

Segment-by-Segment Distribution of Average Rates of Change in 34 Monthly or Quarterly Comprehensive Series[a]

Average change per month	I-II	II-III	III-IV	IV-V	V-VI	VI-VII	VII-VIII	VIII-IX
	% of series moving at indicated rate during segment							
+11.9 to +11.0	2.9	....	....	....	....	....	....	....
+10.9 to +10.0	....	....	....	....	....	....	....	....
+9.9 to +9.0	....	....	....	....	2.9	....	....	....
+8.9 to +8.0	....	....	....	....	....	....	....	....
+7.9 to +7.0	....	....	....	....	....	....	....	....
+6.9 to +6.0	2.9	....	....	....	....	....	....	....
+5.9 to +5.0	....	....	2.9	....	....	....	....	2.9
+4.9 to +4.0	2.9	2.9	....	....	....	....	....	2.9
+3.9 to +3.0	5.9	....	....	2.9	....	....	....	2.9
+2.9 to +2.0	23.5	2.9	....	8.8	....	5.9	....	2.9
+1.9 to +1.0	41.2	29.4	50.0	23.5	....	....	....	11.8
+0.9 to 0.0	14.7	50.0	35.3	41.2	5.9	11.8	11.8	20.6
−0.1 to −0.9	....	11.8	8.8	17.6	41.2	11.8	35.3	44.1
−1.0 to −1.9	2.9	2.9	2.9	2.9	29.4	52.9	38.2	5.9
−2.0 to −2.9	....	....	....	2.9	5.9	5.9	11.8	5.9
−3.0 to −3.9	....	....	....	....	11.8	8.8	....	....
−4.0 to −4.9	2.9	....	....	....	....	....	....	....
−5.0 to −5.9	....	....	....	....	....	....	....	....
−6.0 to −6.9	....	....	....	....	....	....	2.9	....
−7.0 to −7.9	....	....	....	....	....	....	....	....
−8.0 to −8.9	....	....	....	....	....	....	....	....
−9.0 to −9.9	....	....	....	....	....	....	....	....
−10.0 to −10.9	....	....	....	....	2.9	....	....	....
−11.0 to −11.9	....	....	....	....	....	2.9	....	....
Total[b]	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Summaries of distributions							
Fastest rise	+11.8	+4.4	+5.5	+3.0	+9.0	+2.9	+0.9	+5.1
Next to fastest rise	+6.6	+2.5	+1.6	+2.3	+0.8	+2.6	+0.8	+4.2
Upper quartile	+2.2	+1.0	+1.2	+1.3	−0.3	−0.7	−0.6	+0.6
Median	+1.65	+0.75	+1.00	+0.60	−0.95	−1.40	−1.10	−0.20
Lower quartile	+1.1	+0.3	+0.4	0.0	−1.3	−1.8	−1.7	−0.5
Next to fastest fall	−1.3	−0.6	−0.8	−1.1	−3.9	−3.3	−2.8	−2.3
Fastest fall	−4.1	−1.1	−1.3	−2.7	−10.7	−11.4	−6.8	−2.9
Range								
Full	15.9	5.5	6.8	5.7	19.7	14.3	7.7	8.0
Excl. both extreme items	7.9	3.1	2.4	3.4	4.7	5.9	3.6	6.5
Interquartile	1.1	0.7	0.8	1.3	1.0	1.1	1.1	1.1

Table 39 (concl.)

	I-II	II-III	III-IV	IV-V	V-VI	VI-VII	VII-VIII	VIII-IX
Arithmetic mean								
With regard to sign	+1.93	+0.78	+0.86	+0.65	−1.12	−1.39	−1.19	+0.27
Without regard to sign	2.25	0.94	1.04	0.97	1.72	1.80	1.31	1.09
No. of series that								
Rise	32	29	30	25[c]	3	6	4	15
Fall	2	5	4	8[c]	31	28	30	19
No. of series in which change								
Equals or exceeds 1% per month	29	13	19	14	18	26	18	12
Is less than 1% per month	5	21	15	20	16	8	16	22

[a] Based upon Table 31, Sec. C. The rates of change are expressed in reference-cycle relatives.

[b] Failure of detail to total 100 percent is due to rounding.

[c] One series remains constant.

entries. But all this is merely saying again what has already been said once or twice in other terms about the general dominance of a common cyclical pattern in the movements of our comprehensive series.

What Table 39 adds to our knowledge concerns a feature of business cycles that is revealed by our reference-cycle patterns but may not have caught the reader's attention. In Chart 7 it is easy to see that most of the reference-cycle patterns rise less steeply in segment II–III than in I–II. In segments III–IV or IV–V a goodly proportion of the series show a partial recovery from this retardation; in general, however, the pace of expansion slackens before recession sets in. During contraction a somewhat different pattern prevails. Declines dominate the economy from the peak to the trough; but the fall accelerates somewhat in the second segment of contraction, whereas the rise is much retarded in the second segment of

expansion. Then VII–VIII brings a moderate retardation, whereas III–IV brought a moderate reacceleration. Finally VIII–IX is like IV–V in that the rate of change becomes slower; but this retardation is much more marked at the end of contraction than at the end of expansion.

Thus the notions often suggested by the picturesque phrasing beloved of writers upon 'booms and busts'—that prosperity grows at a dizzier pace the longer it lasts, and that slumps gather momentum as they proceed—are wrong if our measures are right. Scarcely less misleading are the implications of the mathematical constructions often used to represent business cycles. A set of straight lines sloping upward to represent expansion, connected at a sharp peak with downward sloping straight lines to represent contraction, misrepresents the facts in that the pace of change is pictured as uniform between trough and peak, and likewise between peak and trough, whereas in fact the pace changes from segment to segment in ways that recur in cycle after cycle, as will be shown more clearly below (Sec. F). Sine curves are not less objectionable; they place the fastest rate of change in the middle of expansion and of contraction. What our observations suggest is that the shapes of business cycles are phenomena *sui generis.*

While the quartiles, medians, and arithmetic means of Table 39 give us a clearer view of these changes in pace as well as in direction of movement than any of our earlier exhibits, Table 40 leads to a more intimate view. In this table the characteristic cyclical movement of each of our 34 comprehensive series during each segment of business cycles is compared with its behavior during the subsequent segment. The entries are to be read as follows: During reference-cycle segment I–II, 32 of our comprehensive series rise and 2 fall. In segment II–III, 1 of the 32 series that had risen in the preceding segment continues to rise at the same rate; 28 series continue to rise, but more slowly, while 3 of the series that had risen in I–II now fall. Finally, the 2 series that had fallen in segment I–II (the number and liabilities of commercial failures) fall further in segment II–III but more slowly. Thus, while business conditions con-

Table 40

Change from Segment to Segment of Reference Cycles in the Typical Direction and Rate of Movement of 34 Monthly or Quarterly Comprehensive Series[a]

Behavior during Given Segment	Following Segment	Segments I-II	Segments II-III	Segments III-IV	Segments IV-V	Segments V-VI	Segments VI-VII	Segments VII-VIII	Segments VIII-IX	Segments IX-I
		No. of series that change during given and following segments in the way indicated								
Rise		*32* ..	*29* ..	*30* ..	*25* ..	*3* ..	*6* ..	*4* ..	*15* ..	..
	Rise faster	0	16	12	1	1	0	2		9
	Rise same rate	1	4	1	0	0	2	0		1
	Rise slower	28	8	11	1	2	2	1		4
	No change	0	0	1	0	0	0	0		0
	Fall	3	1	5	23	0	2	1		1
No change		*0* ..	*0* ..	*0* ..	*1* ..	*0* ..	*0* ..	*0* ..	*0* ..	..
	Rise	0	0	0	0	0	0	0		0
	No change	0	0	0	0	0	0	0		0
	Fall	0	0	0	1	0	0	0		0
Fall		*2* ..	*5* ..	*4* ..	*8* ..	*31* ..	*28* ..	*30* ..	*19* ..	..
	Rise	0	2	1	1	3	0	12		18
	No change	0	0	0	0	0	0	0		0
	Fall slower	2	1	2	1	5	20	15		0
	Fall same rate	0	0	0	0	2	2	1		0
	Fall faster	0	2	1	6	21	6	2		1

[a] Based upon Table 31, Sec. C.

tinue to improve during the second segment of reference cycles, according to our comprehensive series the rate of improvement becomes slower. For none of these series rise faster in II–III than in I–II: 1 rises at the same rate, 28 rise more slowly, while in 3 series the retardation goes to the length of producing a fall; even the two series on bankruptcies are retarded in their decline.

What happens during business cycles, as represented by comprehensive series, is summed up by the following schedule of the developments shown by Tables 31, 39, and 40.

Segment I–II

All 34 of the comprehensive series indicate that business conditions are improving. The 2 series on failures give this indication by falling. The average rate of improvement, as shown by the median, quartiles, and arithmetic means, is more rapid than at any other stage of the cycle.

Segment II–III

Business continues to expand, but the rate of improvement suffers a sharp and general retardation. The only comprehensive series that escapes this setback is bond prices, which continue to rise at the same rate as in I–II. The 2 series on failures fall more slowly; 28 series rise more slowly; 3 series that rose in I–II now fall—the number of bonds and of shares sold on the New York Stock Exchange, both of which led the revival, and agricultural marketings, a series with irregular timing.

Segment III–IV

Reacceleration is the rule as expansion continues; but the pace of advance, while faster than in II–III, does not regain the speed of I–II. Of the 29 comprehensive series that rose in II–III, 16 now rise faster; 4 rise at the same rate (wholesale prices, stock prices, and 2 indexes of business conditions); 8 are further retarded (iron production, exports, factory employment, total contracts for construction, both our series on security issues, and a pair of business indexes), while 1 series begins to

fall (bond prices). It will be noted that these further retardations are largely in series that represent investments. Finally, the 5 series that fell in II–III show an even more mixed state of affairs in III–IV: agricultural marketings and shares sold on the Stock Exchange rise again; the number of failures goes on falling but more slowly; bond sales and the liabilities of failures go on falling but at a faster rate.

Segment IV–V

While the business tide continues to rise during IV–V, it becomes fuller of eddies. More series fall than in any earlier segment of expansion: the list includes the *Journal of Commerce* series on corporate issues, sales on the Stock Exchange of both bonds and stocks, also their prices, bank clearings in New York which are much influenced by security transactions, and the number of failures. Quite as ominous as any of the declines is the rise in the liabilities of failures. All these declines, be it noted, and also the threatening rise, occur in financial activities rather than in those concerned immediately with the production and distribution of goods. True, agricultural marketings decline slightly, but our averages for this irregular series do not express typical behavior. Further, of the 24 series that rise in both III–IV and IV–V, almost half rise at slower rates in the later segment. The retarded series include wholesale and retail sales, imports, income payments, construction contracts, incorporations, profits, total clearings, clearings outside New York (as noted above, New York clearings fall), and a couple of business indexes. Snyder's index of deposits activity ceases to rise. The series that rise at higher rates include our indexes of production, transportation, prices, factory employment, payrolls, Ayres' series on issues of securities, 3 business indexes, and exports—the last an irregular series. There is a suggestion here that the accumulating financial difficulties are accompanied (perhaps in part produced) by a slower growth of distribution to consumers at the same time that physical output is growing faster. But there are conflicts of evidence (for example, between Ayres and the

Journal of Commerce regarding issues of securities) and the evidence is far from complete.

Segment V–VI

In comparison with segment IV–V the situation becomes clearer immediately after recession. Apart from exports (an irregular series as already noted), the pair on failures are the only comprehensive series that rise. Of those that had begun to fall before the peak, most now fall at a faster rate.

Segment VI–VII

Whereas the second segment of expansion was dominated by retardation of the rise then in progress, the second segment of contraction is dominated by acceleration of the fall. Aside from failures, the only series to rise are the irregularly timed agricultural marketings and exports, bond sales on the Stock Exchange, and bond prices. This recuperating interest in bonds may be called the first sign of reviving investments; it may also be called a sign that investors are trying to minimize risks rather than to maximize incomes.

Segment VII–VIII

One notable improvement comes in the realm of finance: the liabilities, though not the number, of failing firms fall rather sharply, which may mean that the process of 'liquidation' has passed its most explosive stage and may presently begin working its drastic cures. Bond sales and prices continue to rise at the same rates as in VI–VII, but one of our irregulars (exports) at last begins to fall. In short, the business situation continues to get worse, but it gets worse at a slower rate. That is the story of the various averages presented in Table 39, while Table 40 shows that 20 of the 28 series that fell in VI–VII fall more slowly in VII–VIII.

Segment VIII–IX

If our comprehensive series can be trusted, and that is not a foregone conclusion, revival is a more gradual change than recession. In the last segment of expansion only 8 series fall;

in the last segment of contraction fully 15 rise. Of the 30 series that fell in VII–VIII, 12 now rise, 15 decline more slowly, 1 sags at the same rate, and only 2 fall faster (the liabilities of failures and department store sales). True, the net resultant of the many mixed movements is a further decline in aggregate activity, if we have dated cyclical troughs aright. But among the series that now turn upward are all of our comprehensive series representing preparations for investments soon to be made and readiness to incur business risks. The near future certainly looks more promising for the employment of economic resources, above all labor, than the present.

Segment I–II again

In coming back to the point in the cycle at which we broke into it, we may note how abundantly these promises of improvement are kept in the segment with which we began. Every series expands, except the two that indicate improvement by falling. We found one exception to the general downturn of activities in V–VI; now we find no genuine exception to the upturn.

However, let us recall once again that we are dealing not only with a limited body of evidence, but also with what we have ventured to call 'characteristic' cyclical behavior. Before we go on to exploit our full sample of time series, we should see how gravely the conclusions we have drawn from the evidence of comprehensive series concerning the consensus of cyclical behavior would be undermined if, instead of dealing with what happens in a typical cycle, we dealt with what happens in each individual cycle covered by our data.

F CYCLE-BY-CYCLE DIFFERENCES

Our standard measures cover two closely related but not identical concepts of the segment-by-segment changes that are characteristic of a series. One is the set of changes implied by the variety of timing under which we classify a series. Assignment to any variety of regular timing is tantamount to a statement of the reference-cycle segments during which the

series has typically risen, and of the remaining segments during which it has typically fallen. The second concept and set of measures comes from the average reference-cycle pattern of a series, or the rates of change per month that we derive from the average pattern. We expect and find close agreement between the first and second set of measures; for observation of the direction of change of the average pattern from segment to segment is one, though not the sole, factor in forming our judgment concerning the variety of timing.[23]

There is still a third plan of ascertaining the direction of movements of our series in successive segments of the reference cycles. In each segment of each reference cycle covered by each of our series, we can observe whether the series rises, remains unchanged, or falls. That is, we can drop our judgments of characteristic timing and the average standings during all cycles covered by a series, and inspect what actually happens in each segment of each cycle.

In Table 41 observations of this simple sort upon our 34 comprehensive series are compared with observations based upon average reference-cycle patterns, and with the implications of our judgments concerning the timing varieties to which the series in question severally belong. According to Table 31 the analyses of our comprehensive series cover in the aggregate 400 reference cycles. In the first segment of these cycles, I find 339 advances, 6 cases of no change, and 55 declines. Reduced to a percentage basis to facilitate comparison, these figures mean that in almost 85 percent of the instances we are considering there was a rise in segment I–II, although our sample includes 30 observations upon business failures in I–II and 21 more observations upon series with irregular timing.

Now the consensus in cyclical behavior determined by observing individual cycles is less striking than the consensus determined by observing the stage-by-stage movements in

[23] The average standings of a series do not always rise during all the stages selected as characteristic of its expansion, or fall during all the stages assigned to contraction by its timing variety. See *Measuring Business Cycles*, Ch. 5, Sec. X.

Table 41

THREE SETS OF OBSERVATIONS UPON CONSENSUS IN THE MOVEMENTS OF 34 MONTHLY OR QUARTERLY COMPREHENSIVE SERIES DURING SUCCESSIVE SEGMENTS OF REFERENCE CYCLES

DIRECTION OF MOVEMENT	REFERENCE-CYCLE SEGMENT							
	I-II	II-III	III-IV	IV-V	V-VI	VI-VII	VII-VIII	VIII-IX
	% of 34 Comprehensive Series That Typically Rise or Fall According to Their Variety of Cyclical Timing[a]							
Rise	91.2	88.2	85.3	70.6	8.8	11.8	11.8	47.1
Fall	8.8	11.8	14.7	29.4	91.2	88.2	88.2	52.9
	% of Same Series in Which the Average Reference-Cycle Standings Rise or Fall[b]							
Rise	94.1	85.3	88.2	73.5	8.8	17.6	11.8	44.1
Do not change	...	...	...	2.9	...	...	...	...
Fall	5.9	14.7	11.8	23.5	91.2	82.4	88.2	55.9
	% of 400 Reference Cycles Covered by Same Series in Which the Reference-Cycle Standings Rise or Fall[b]							
Rise	84.8	77.8	72.2	66.0	28.8	27.8	28.0	45.8
Do not change	1.5	2.2	3.0	2.2	2.8	1.8	2.0	2.5
Fall	13.8	20.0	24.8	31.8	68.5	70.5	70.0	51.8

[a] It is assumed that one of the two series with irregular timing (exports and agricultural marketings) rises in each segment and that the other falls. The 'expansion stages' of Macaulay's series of bond prices are taken as VI-III; see Table 31, note *e*.

[b] Failure of detail to total 100 percent is due to rounding.

average reference-cycle patterns, or by drawing inferences from judgments concerning typical timing. Table 41 indicates that the latter two methods yield similar results: the largest difference is 5.9 percent between the percentages of series that fall in IV–V. In general, observations of average reference-cycle standings show a slightly more marked consensus than do inferences from timing varieties. But in every segment these changes in average reference-cycle standings show an appreciably greater concentration of movements in the up-

ward or the downward direction than do the observations of individual cycles. This is least (4.1 percent) in segment VIII–IX when the economy is fullest of crosscurrents; it is greatest (22.7 percent) in segment V–VI; it averages 12.2 percent.

Of course, a difference of this sort is to be expected, though we have no *a priori* basis for saying how large it should be. The random movements that influence the direction of change in every series, during every segment of every cycle, push now in the same direction as the cyclical movements that characteristically impinge upon a series, now in the opposite direction. The net resultant of all random forces acting during a given segment of a given cycle upon a given series may be feeble or strong in comparison with the corresponding cyclical influences. But what we have learned concerning the behavior of time series by analyzing hundreds of them from several countries over various periods, and then trying to account for what we find, leaves with us a healthy respect for the potency of irregular movements. That every now and then a relatively strong irregular impulse counter to the current cyclical movements will bring about a rise in some segment when a decline is expected, or force a decline when a rise occurs in most cycles, is no reason for distrusting the representative value of our timing judgments or of the average reference-cycle patterns. For the cycle-by-cycle indications of direction of change and the indications of direction we get by observing average behavior over all cycles covered by a series represent different concepts; they should not produce numerically equal results.

All three ways of summing up the consensus in the direction of movement of our comprehensive series agree, however, upon certain fundamental features of American business cycles during the period covered by our investigation to date: (1) A substantial majority of economic activities rise in stages I–V and a substantial majority fall in V–IX. (2) These majorities are greater if we seek to eliminate irregular cycle-by-cycle movements by averaging of some sort; but they remain significantly large if we take each segment of each cycle as a unit

to be counted by itself. (3) The majorities of series that rise during the segments dominated by cyclical expansion are on the whole larger than the majorities that fall during the segments dominated by contraction, presumably because our sample includes many more rising than declining intracycle trends. Of course, the rising trends tend to reinforce compliance with cyclical expansions and to oppose compliance with cyclical contractions. (4) Crosscurrents in the business situation are most prominent in the last segment of cyclical expansion and the last segment of cyclical contraction.