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CHAPTER 6

Degrees of Conformity to Business Cycles

I Numerical Values of the Conformity Indexes

Table 6 and Chart 3 offer evidence concerning the trustworthiness of the measures of 'characteristic' cyclical timing described in Chapter 5.

We shall save time by recalling what was said in Chapter 3 about conformity indexes before trying to interpret the table and chart. (1) In making the indexes of conformity, a series is first divided into stages characteristic of its own expansions and contractions. (2) Its index of conformity to reference expansions shows the consistency of movement from cycle to cycle during the stages matched with reference expansions. (3) Similarly, the contraction index shows the consistency of movement during the stages matched with reference contractions. (4) While the two phase indexes relate to consistency only in direction of change, the business-cycle index shows the consistency of *differences* in response to expansion and to contraction. Like the phase indexes, it is limited to direction of movement when the directions in the two phases differ; it compares *rates* of change when the direction is the same. (5) These indexes are percentages of conforming movements not offset by nonconformities. Ordinary percentages of conforming movements would run on a higher level. If a 10-cycle series rises in its characteristic expansion stages in 9 cycles and falls in 1 cycle, our expansion index is $(900 - 100) \div 10 = 80$; the percentage of conforming movements is 90. If we disregard zero entries, indexes of 50 are equivalent to conformity percentages of 75, indexes of 33 to percentages of 67, and indexes of 0 to percentages of 50. (6) When the number of cycles covered by a series is small, our indexes can assume only a few values separated by wide intervals. With 4 cycles, for example, the pos-

Table 6

TWO SUMMARIES OF THE NUMERICAL VALUES OF CONFORMITY INDEXES OF 794 MONTHLY OR QUARTERLY SERIES

RANGE, DECILES, AND QUARTILES OF ARRAYS OF INDEXES, TAKEN WITHOUT REGARD TO SIGN				PERCENTAGE DISTRIBUTION OF BUSINESS-CYCLE INDEXES BY SIGN AND NUMERICAL VALUE			
Extreme & Partition Values	Indexes of Conformity to *Ref. exp.*	*Ref. contr.*	*Bus. cycles*	Numerical Value of Indexes	Indexes with *Plus sign*	*Minus sign*	*Either sign*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Highest	100	100	100	100	35.0	1.6	36.7
9th decile	100	100	100	90–99	2.1	0.3	2.4
8th decile	100	100	100	80–89	7.3	1.5	8.8
7th decile	100	100	100	70–79	10.8	1.1	12.0
6th decile	100	69	88	60–69	6.2	1.9	8.1
Median	67	60	78	50–59	7.4	1.8	9.2
4th decile	60	50	69	40–49	3.9	1.1	5.0
3rd decile	50	40	57	30–39	4.0	1.4	5.4
2nd decile	33	25	43	20–29	2.1	2.1	4.3
1st decile	20	17	24	10–19	3.0	1.5	4.5
Lowest	0	0	0	1– 9	0.8	0.8	1.5
				0	...	...	2.1
Upper quartile	100	100	100	50–100	68.9	8.2	77.1
Lower quartile	45	33	50	0–49	13.9[a]	6.9[a]	22.9[b]
Range	100	100	100	*Total*[c]	82.7[a]	15.1[a]	100.0[b]

[a] Excludes zeros.

[b] Includes zeros.

[c] Failure of detail to total precisely in every instance is due to rounding.

sible values of the phase indexes are plus or minus 100, 75, 50, 25, and 0. The business-cycle index, however, rests on 7 comparisons and may take these numerical values: 100, 86, 71, 57, 43, 29, 14, 0. When a series covers 20 cycles the possible numerical values of the phase indexes are 100, 95, 90, 85 . . . 0, and those of the business-cycle index are 100, 97, 95, 92, 90 . . . 0.[1]

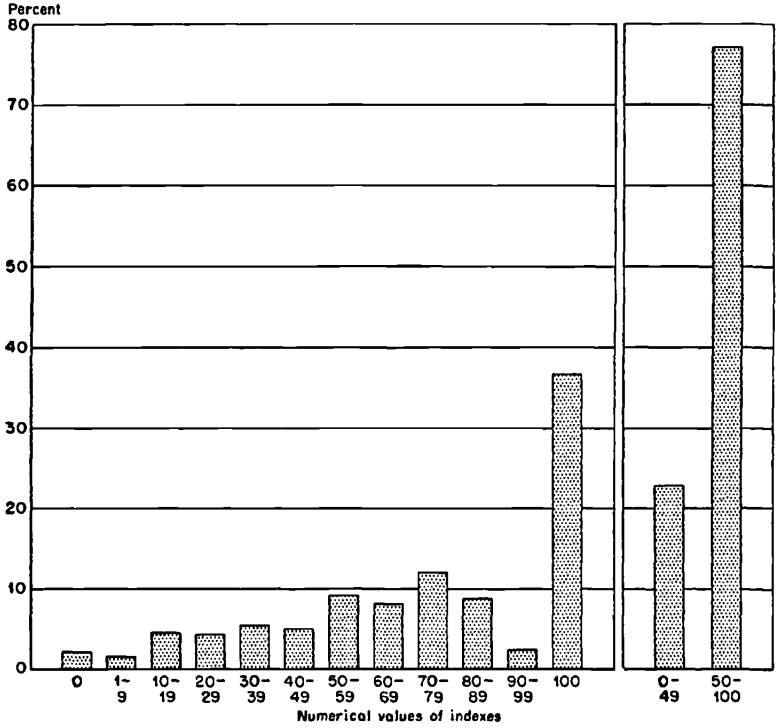
Table 6 shows that the conformity indexes of our sample run the full gamut from 100 to 0. Of the 794 series, 149 have indexes of +100, +100, +100; that is, they invariably conform positively to successive reference expansions, contractions, and full cycles. Four series have indexes of −100, −100, −100. As it happens, no series has indexes of 0, 0, 0; the nearest approach is −20, 0, 0, or 0, −20, 0.

Conformity to expansion is decidedly more regular than

[1] For fuller explanations see *Measuring Business Cycles*, pp. 176–97.

Chart 3

Percentage Distribution of 794 Series According to the Numerical Value of Their Indexes of Conformity to Business Cycles



See Table 6.

conformity to contraction—a result of the prevalence of rising secular trends and of positive timing in our sample. Of course, rising trends reenforce cyclical expansions in positive series and tend to weaken their cyclical contractions.

Business-cycle indexes with plus signs outnumber those with minus signs by more than 5 to 1. This distinction is not equivalent to that between positive and inverted timing, primarily because series with irregular timing may have either plus or minus indexes. As it happens, 34 irregulars are in the plus and 40 in the minus list, while 11 have indexes of zero. Otherwise stated, about 1 in 20 of the series with plus, and 1 in 3 of the series with minus indexes are irregular conformers. Since irregularity in timing usually means a low conformity index, this

distribution of the irregular series tends to depress the average of negative conformity indexes below the positive average. The mean business-cycle index for all negative series is −52, that for all positive series +76. If we exclude irregular series from both lists, these averages become −66 and +79. Even after this adjustment half of the original difference remains to be explained, a problem to which we shall return in Section IV.

The peculiar distribution of the business-cycle indexes is best seen in the chart. These indexes include fewer values of ±100 than the indexes for expansion, which, as already noted, are raised by the prevalence of positive timing and rising trends. But all the deciles in column (4) of Table 6 except one are equal to or higher than their opposite numbers in column (2). Almost 37 percent of our series conform to every business cycle they cover, and more than half of this list conform also to every expansion and every contraction. Forty-eight percent conform to full business cycles 9 or more times out of 10; 68 percent 4 or more times out of 5; 77 percent 3 or more times out of 4; and 88 percent 2 or more times out of 3.[2]

II The Problem of Bias in the Indexes

Could they be taken at face value these findings would justify considerable confidence in the representativeness of our judgments concerning cyclical timing. But an offhand acceptance of the indexes is not warranted. They have hidden defects and merits.

1) The series that conform to business cycles less than 2 times out of 3 form 12½ percent of our sample. Nearly two-

[2] The small number of business-cycle indexes in the '90–99' column of the chart is due to the unfortunate preponderance of short series in our sample. To attain a business-cycle index in the 90's, a series must cover at least 6 cycles, must have only one lapse from perfect conformity, and that lapse must be confined to identity of direction and rate of change in one of the 11 comparisons between a contraction and the preceding or following expansion. Then the index will be $1000 \div 11 = 91$. Barring the infrequent zero entries, we need at least 11 cycles to get into the 90's (21 comparisons; 20 with plus signs, 1 with minus, or 1 plus to 20 minus; then we get $1900 \div 21 = 90$). Only 41 percent of our 794 series cover 6 or more business cycles; 18 percent cover 11 or more.

thirds of this poorly conforming group are classified as having irregular timing. A judgment that a series has irregular timing is confirmed by a *low* index. Only 6 percent of our positive, none of our neutral, and 6 percent of our inverted series conform less frequently than 2 times out of 3. Of course these observations tend to strengthen confidence.

2) On the other hand, the brevity of many series raises doubts about the significance of any decisions regarding the regularity of responses to business cycles. 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. So, also, a record of nonconformity in a few consecutive cycles may well be spoiled if the number is doubled or tripled. Our 291 series with business-cycle indexes of ±100, and our 17 series with business-cycle indexes of 0, both include proportionately more series covering fewer than 5 cycles and proportionately fewer series covering 10 or more cycles than does the rest of the sample. Table 7 presents the relevant figures and percentages.

If all the series in our sample could be extended backward or forward to include more cycles, and new short series were not added, it is virtually certain that the distribution of the business-cycle indexes in Chart 3 would be altered considerably. None of the 291 indexes of ±100 could be raised; but any of them could and many of them would be lowered. The 17 indexes of 0 could not be lowered, but they could and some would be raised. All these changed indexes would fall into the intermediate group. Of course the present intermediate indexes ranging from ±3 to ±95 might be either raised or lowered. However, the average value of the whole sample of indexes would probably be reduced if their signs continued to be disregarded, since the average absolute value of the conformity indexes of 'irregular' series would fall as the series lengthened. The percentages of horizontal sums in Table 7 indicate what sort of effects the 'aging' of our sample would tend to produce.

In short, however sound our judgments concerning the

Table 7

SERIES WITH BUSINESS-CYCLE CONFORMITY INDEXES OF ±100, 0, AND INTERMEDIATE VALUES CLASSIFIED BY THE NUMBER OF BUSINESS CYCLES THEY COVER

NO. OF CYCLES COVERED	NO. OF SERIES HAVING INDEXES OF CONFORMITY OF ±100	Intermediate values	Zero	ALL SERIES IN SAMPLE
1– 4	119	90	8	217
5– 9	141	244	8	393
10–21	31	152	1	184
1–21	291	486	17	794
		Percentages of vertical sums[a]		
1– 4	40.9	18.5	47.1	27.3
5– 9	48.5	50.2	47.1	49.5
10–21	10.7	31.3	5.9	23.2
1–21	100.0	100.0	100.0	100.0
		Percentages of horizontal sums[a]		
1– 4	54.8	41.5	3.7	100.0
5– 9	35.9	62.1	2.0	100.0
10–21	16.8	82.6	0.5	100.0
1–21	36.6	61.2	2.1	100.0

[a] Failure of detail to total 100% is due to rounding.

timing characteristic of our series in their present form may be, these judgments do exaggerate the prevalence of perfect conformity to business cycles and may exaggerate the prevalence of zero conformity. So would judgments based upon any other sample whose compilers were more concerned to include a wide range of economic activities than to exclude recent additions to statistical records because of their brevity.

How serious this bias is we can estimate after a fashion by comparing the business-cycle indexes of the 184 series covering 10 or more cycles with the indexes of the whole sample. Chart 4, which shows the distribution of the long-series indexes, has a much lower spike at ±100 than Chart 3; also a squattier column at 0. On the other hand, 7 of the 10 intermediate columns are higher in Chart 4 than their counterparts in Chart 3. Especially marked are the increases at 90–99, 80–89, and 40–49. The median is 78 in the full sample, 68 in the sample of long series; the arithmetic means are respectively 71 and 64. Ignor-

ing possible zero entries once more, we find that conformity prevails in 3 business cycles out of 4, or oftener, in 70 percent of the long series as contrasted with 77 percent of the full sample.[3]

3) But the relatively low conformity of the long series is due partly to a second bias, arising from defective economic coverage. This sample includes no series on retail or wholesale trade, employment, hours of work, earnings per employee, or payrolls. It gives scanty representation to production, construction work, inventories, or the issuing of securities. These two sets of groups form no less than 56 percent of our full sample and only 14 percent of the sample of long series. On the other hand, the long series give much greater weight than the full sample to prices of commodities, banking under the National Banking Act, indexes of business activity, bank clearings, bankruptcies, and imports. These groups furnish 71 per-

[3] Detailed comparisons can be made more readily from the following figures than from the chart.

DISTRIBUTION OF ALL SERIES AND OF SERIES COVERING 10 OR MORE CYCLES ACCORDING TO INDEXES OF CONFORMITY TO BUSINESS CYCLES, TAKEN WITHOUT REGARD TO SIGN

BUSINESS-CYCLE INDEX	LONG SERIES (% OF 184)	ALL SERIES (% OF 794)	BUSINESS-CYCLE INDEX	LONG SERIES (% OF 184)	ALL SERIES (% OF 794)
100	16.8	36.7	40–49	10.3	5.0
90–99	7.6	2.4	30–39	3.8	5.4
80–89	13.0	8.8	20–29	7.6	4.3
70–79	11.4	12.0	10–19	4.3	4.5
60–69	9.8	8.1	1– 9	3.8	1.5
50–59	10.9	9.2	0	0.5	2.1
50–100	69.6	77.1	0–49	30.4	22.9

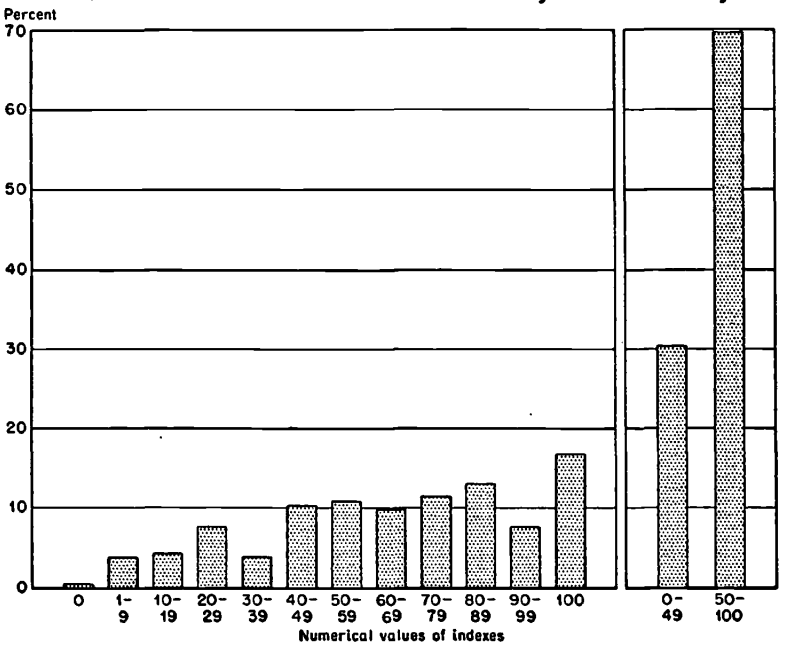
A simpler summary is afforded by the following arithmetic means of the business-cycle indexes of conformity:

	NO. OF SERIES	MEAN INDEX	SERIES WITH INDEXES ABOVE 0 AND LESS THAN 100	
			Number	Mean Index
Full sample	794	71.1	486	56.3
Series covering 10 or more business cycles	184	64.2	152	57.3
Series covering less than 10 business cycles	610	73.2	334	55.8

It will be noted that the exclusion of series with indexes of 0 and 100 lifts the mean index of the long series from decidedly the lowest to slightly the highest rank.

Chart 4

Percentage Distribution of 184 Series Covering 10 or More Cycles According to the Numerical Value of Their Indexes of Conformity to Business Cycles



See this chapter, note 3.

cent of the long series and only 31 percent of the full sample. Though I have pointed out serious deficiencies in the economic coverage of the full sample,[4] the deficiencies in the long-series sample are more glaring. The great advances of the last generation in collecting economic statistics have been largely in processes that conform closely to business cycles—industrial production, building, employment, merchandising, and the distribution of money income, especially wages. In our sample at least, the conformity indexes of the groups not represented at all, or seriously underrepresented by the long series, average

[4] See Ch. 3, Sec. XI.

higher than the indexes of the groups that are overrepresented.[5]

Still other factors may influence the relative conformity of our samples. (4) For reasons given in the next section, index numbers and national aggregates tend to conform more closely to business cycles than do their component series on the aver-

[5] The influence exerted by differences in economic coverage upon indexes of conformity to business cycles may be illustrated by comparing the group most overrepresented in the sample of long series (commodity prices) with the group most underrepresented (production). In this comparison, differences in the number of cycles should be neutralized so far as possible. Also, series on farm products and foods should be segregated because their prices conform better to business cycles than their output, instead of less well, which is the rule among other commodities. These steps are taken in the accompanying table, and a fourth sample of price and production series is added to the three derived by dividing the full sample into long and short series. This additional sample, prepared by Geoffrey H. Moore, includes 60 commodities for which we have comparable data on prices and quantities covering in each instance identical cycles, which average 4.7 in number. The mean number of cycles covered by the full sample is 8.2 in prices and 5.6 in production; the corresponding means for the sample of long series are 12.0 and 14.1 and for the sample of short series, 5.0 and 4.7. Here, as elsewhere in this volume, certain series that reflect production indirectly, such as shipments or consumption of materials, are classified as production series.

MEAN CONFORMITY TO BUSINESS CYCLES AND THE WEIGHTING OF PRICES AND PRODUCTION OF AGRICULTURAL AND NONAGRICULTURAL COMMODITIES IN FOUR SAMPLES OF SERIES

		PRICES			PRODUCTION		
	ALL SERIES	Agri-cultural	Nonagri-cultural	Both	Agri-cultural	Nonagri-cultural	Both
Number of series							
Full sample	794	51	96	147	47	141	188
Long series	184	21	47	68	9	9	18
Short series	610	30	49	79	38	132	170
Matched pairs	120	18	42	60	18	42	60
Percent of number							
Full sample	100.0	6.4	12.1	18.5	5.9	17.8	23.7
Long series	100.0	11.4	25.5	37.0	4.9	4.9	9.8
Short series	100.0	4.9	8.0	13.0	6.2	21.6	27.9
Matched pairs	100.0	15.0	35.0	50.0	15.0	35.0	50.0
Mean conformity index							
Full sample	71.1	51.6	64.2	59.8	41.8	84.2	73.6
Long series	64.2	46.2	60.0	55.8	27.4	64.9	46.2
Short series	73.2	55.5	68.2	63.4	45.2	85.5	76.5
Matched pairs	66.1	52.7	71.7	66.0	36.3	79.0	66.2

When we compare the conformity of agricultural with nonagricultural series within any sample, we find the agricultural index lower in both prices

age. The long-series sample seems to have a higher ratio of such broadly inclusive series than the full sample; it is hard to be precise because inclusiveness is difficult to measure in a uniform fashion from one of our samples to another. (5) In the next chapter we shall see that the business cycles between the two world wars seem to have been more 'violent' on the average than their predecessors. The larger the amplitude of cyclical fluctuations, the more generally they stamp their pattern upon the many sectors of a national economy; that is, the more prevalent conformity tends to become. This suggestion may contain a partial explanation of the relatively high indexes of our short series.

Of these several factors, the first is most fundamental. Irregular cyclical timing is a genuine behavior trait of certain activities. As said in the preceding chapter, our sample of time series would seriously misrepresent the workings of the American economy if it did not include numerous and important series of this sort, and their low conformity indexes confirm the soundness of our judgments that the timing is irregular. Whether the 11 percent of irregular series included is too large or too small a proportion we cannot say with assurance.

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and production. When we compare prices in any sample with production, we find that prices conform better than production in agriculture; the reverse is true in other industries. Hence, a large representation of agricultural series tends to lower the mean conformity index of a sample, and this tendency is stronger when the agricultural series are for quantities produced than for prices.

The long series have the lowest mean conformity index of the four samples, not merely because they cover more cycles than the others, but also because they include no more series on nonagricultural than on agricultural production, and many more series on prices than on production. It is the only sample in which all the production series taken together have a lower mean index than all the price series.

The sample of matched series has the next lowest index primarily because of its relatively large number of agricultural series.

Finally, we may note that differences among the samples in respect of conformity are smaller in prices than in production, whether we compare agricultural or nonagricultural commodities, or the two groups combined.

Though these observations refer specifically to the results of a single investigation, they have some interest in that they illustrate the importance of knowing the economic coverage of historical data, and the behavior characteristic of different activities.

The low conformity indexes that should concern us are confined to series we classify as having positive, neutral, or inverted timing. If we exclude all irregulars, the mean conformity index of the full sample is 77, that of the long series 70, and of the short series 79. These indexes are equivalent to conformity percentages of 88, 85, and 90. Another way of summarizing the results is to say that, if zero entries are neglected, conformity to 3 business cycles out of 4, or oftener, occurs among our regulars in 85 percent of the series in the full sample, 77 percent of the long, and 87 percent of the short series.

In choosing among the results, we prefer the lowest—that for the long series. True, we have found evidence that the economic coverage of this sample is defective in a fashion that tends toward low conformity. But this consideration is counterbalanced in part at least by what seems to be a large proportion of comprehensive series with relatively high indexes. Regular conformity in 3 or more cycles out of 4 may not be significant when the number of cycles covered by a series is small, but we think it is significant when the number exceeds 9. And that level of conformity is equaled or surpassed by more than three-quarters of our positive, neutral, and inverted series covering from 10 to 21 cycles. On the other hand, we think our short series exaggerate the prevalence of conformity, and so also does the full sample in slightly less degree.

These conclusions indicate merely the measure of confidence we may repose in indexes of conformity made by our methods from samples that include both comprehensive series and series of narrow coverage. As will be shown in the next section, we could obtain much higher average indexes if we included only broad index numbers and aggregates, somewhat higher averages if we weighted our present series by some acceptable criterion of 'importance', and we should obtain much lower averages if we used only series of limited coverage. But the effort to appraise the general economic significance of our measures belongs in Part III on 'The Consensus of Cyclical Behavior'.

III What Activities Conform Well and What Ill

Table 8 and its three 'summaries' need only a word of explanation. Signs are disregarded except in the last summary, because we have found reason to believe that inverted and neutral timing are dominated by business cycles in much the same manner as is the timing we call 'positive'. But when we classify the series by timing types, the signs are not always what the type indicates, which suggests that we strike a second set of averages in which the signs are respected. The contrast between the average indexes of the full sample computed in these two ways is instructive.

Of the 29 groups listed in Table 8, only 3 have average indexes of business-cycle conformity less than 50, which is equivalent to regularity of timing 3 times out of 4. If the reader will turn back to the discussion of irregular timing, he will find explanations of these low indexes. We expect irregular inventories to rank low in conformity, and they rank lowest.[6] Public construction work is not undertaken for profit. The production of foodstuffs is dominated by the weather.

Only 3 more groups have averages below 60, that is, a conforming frequency of less than 4 out of 5. They represent the prices of farm products and foods, which, as we have learned, conform somewhat better than output; the prices of semidurable commodities, such as textiles and leather; and that highly volatile process, the issuing of corporate stocks, notes, and bonds.

At the opposite end of the array, in the business-cycle column, 5 groups have average frequencies of conformity exceeding 19 out of 20, and 7 more groups have frequencies exceeding 9 out of 10. In only one group does every series conform perfectly to every expansion, every contraction, and

[6] The mechanical classification of inventories in the table is awkward, and should be replaced in time by an economic classification. It may be noted, however, that numerous commodities whose output is not subject to close business control in the short run are included in 'inverted inventories', though finished staples held by manufacturers also bulk large in this category.

Table 8

Groups of Series Ranked According to Their Indexes of Conformity to Business Cycles[a]

AVERAGES COMPUTED WITHOUT REGARD TO SIGN

	Group	No. of Series	Indexes of Conformity to *Reference exp.*	*Reference contr.*	*Business cycles*
1	Inventories, irregular timing	18	35	31	24
2	Construction contracts, public	16	54	28	32
3	Production, foodstuffs	47	44	43	42
4	Prices, farm products & foods	51	41	42	52
5	Prices, semidurables	18	35	46	52
6	Security issues, corporate	14	75	48	55
7	Prices, perishables other than foods	22	50	61	63
8	Inventories, inverted timing	24	53	57	64
9	Prices, durables	45	48	68	65
10	Bond yields & other long-term interest rates	12	39	42	66
11	Inventories, positive timing	18	64	68	69
12	Payrolls, perishable goods industries	8	70	71	76
13	Interest rates, short-term	11	38	71	77
14	Employment, semidurable goods industries	13	85	69	77
15	Employment, perishable goods industries	8	62	85	78
16	Payrolls, semidurable goods industries	13	85	75	78
17	Production, semidurables	29	80	64	79
18	Production, durables	57	76	75	82
19	Retail sales	10	88	49	82
20	Production, perishables other than foods	29	92	57	83
21	Bank clearings or debits	8	100	49	83
22	New orders from manufacturers	17	68	85	86
23	Construction contracts, private	26	80	81	87
24	Wholesale sales	15	77	72	87
25	Earnings per week, month, or year	10	85	55	94
26	Employment, durable goods industries	9	87	96	98
27	Indexes of business activity	11	99	97	99
28	Payrolls, durable goods industries	6	93	100	100
29	Hours of work per week	9	100	100	100
	Summaries				
	All series on				
	Prices of commodities	147	44	56	60
	Construction contracts or permits	58	74	60	71
	Production	188	74	65	74
	Payrolls & other income payments	30	84	78	84
	Employment	37	81	83	87
	All series on				
	Prices of commodities or services	168	47	55	61
	Financial activities	135	72	52	73
	Flow of commodities, services, or income	478	73	65	74
	General business activity	13	99	87	98
	All series in sample	794	68	61	71

[a] The 29 groups include 574 series. Omitted are groups consisting of only a very few series, large groups of such miscellaneous character that an average would have little meaning, and groups consisting of broad indexes that overlap subdivisions. The first set of summaries includes series of the last type. The second set of summaries includes all series in the sample (see Table 3).

Table 8 (concl.)

AVERAGES COMPUTED WITH REGARD TO SIGN

Summaries	No. of Series	Indexes of Conformity to *Reference exp.*	*Reference contr.*	*Business cycles*
All series with				
Irregular timing	85[b]	+14	−9	0
Inverted timing	77[c]	−48	−55	−68
Neutral timing	24	+74	+45	+75
Positive timing	608[d]	+73	+62	+78
All series in sample	794	+55	+43	+55

[b] Includes one series analyzed in part as positive.

[c] Includes one series analyzed also as neutral.

[d] Includes two odd cases: rail orders (see note 7) and one series analyzed also as neutral.

every full cycle. That group is composed of 9 series on hours of labor per week, covering only 4 cycles. The next group in rank, payrolls in durable goods industries, consists of six 5-cycle series. In the long run, the indexes of business activity, all except two of which already cover 10 or more cycles, presumably will take the lead. Only 2 of the 11 fall short of perfect records—Carl Snyder's 'index of deposits activity' (VIII–IV: +88, +75, +94), and the Axe-Houghton 'index of trade and industrial activity' unadjusted for trend (I–V: +100, +88, +100).

The summaries indicate that, despite the low record of farming, production conforms more faithfully than prices, employment and payrolls more faithfully than production. When we put together all series that represent the producing and distributing of goods—including such services as transportation and merchandising—average conformity is higher than in the best corresponding aggregate we can make for commodity prices, wage rates, and freight rates.

The final summary, average indexes of timing groups, which be it noted again are computed with regard to signs, meets expectations. Zero conformity to business cycles on the average among irregular series; negative and relatively modest conformity among inverted series, which swim against the cyclical tides most or all of the time; decidedly higher conformity among the two varieties of neutral series, both of which swim half of the time with and half against the cyclical tides; finally,

the highest indexes among positive series, which swim with the tides except when they are leading or lagging—these results seem so natural that the explanation to be offered in a moment may strike the reader as superfluous.

Of course all these averages would be a little or considerably higher if they were made like the others in Table 8. The largest increase would appear in the irregular group, but disregard of signs would raise its mean business-cycle index only to 23. Even the positive group would be affected, for of its 608 series[7] 4 have low negative indexes of conformity to business cycles —a paradoxical but not a nonsensical result, since a variety of considerations sways our timing decisions in marginal instances.[8]

Of the two averages for the whole sample of 794 series, we rate the one made without regard to signs as far more significant. Even the smaller of the business-cycle indexes, +55, is equivalent to 77 percent of positive conformities. But if we think that characteristic inversions are cyclical in origin, that the same is true of neutral timing, and that irregular series can be taken at whatever values their indexes assume, we must accept the higher index, 71, as a better expression of the average regularity with which our sample responds to business cycles. This figure, however, is slightly swollen by ignoring signs of 'irregular' series and by permitting a few minus indexes of 'positive' series to count as if they were plus. These difficulties can be removed by casting an average in still another way; that is, by striking an algebraic mean of all conformity indexes in our sample after the signs of series classified as 'inverted' have been reversed. On this basis the average business-cycle

[7] Table 4 gives 607 series in the positive group; but we have analyzed one series, orders of rails, on a positive basis although its characteristic expansion stages, VI–III, are inverted according to our rules.

[8] For example, the index of farm prices of crops is treated as a positive series, but its business-cycle conformity index is −11. The index is based on the period 1910–14, 1921–38, the war cycles being omitted. If the cycles during 1914–21 had been included, the conformity index would mount to +29. And even this value fails to indicate that the lapses from conformity occur predominantly during mild cyclical phases.

index comes out 69, which means a conforming percentage of 84.[9] These figures are the best estimates we can now frame of the average regularity with which the series in our sample have responded to business cycles.

IV Factors Influencing Degree of Conformity

Of the factors influencing conformity to business cycles, logically the most basic and perhaps practically the most important cropped up in our examination of irregular timing. We cannot expect any activity to respond regularly to business cycles unless it is subject to man's control within the periods occupied by cyclical phases, and unless this control is swayed, consciously or not, by short-period economic considerations. The domination of harvests by weather, the 'migratory property' of petroleum underground, the mixed motives of governments in undertaking construction work, the long-range planning that weighs with many men in a position to set 'administered prices', the time-consuming negotiations that prevent prompt adjustments of certain other prices and many wage rates, the existence of long-term contracts, the years required to complete some large undertakings—these are concrete examples of the multifarious obstacles that interfere with prompt and regular response to the cyclical tides. My negatively stated proposition about the basic importance of short-period control on business lines is a blatant matter of course that thrusts itself upon one's attention in a realistic inquiry, but has not been given its due place in economic theorizing.

Another factor affecting conformity cropped up first near the beginning of the chapter when we observed the values of conformity indexes with plus and minus signs. Even after we had excluded all series with irregular timing from both groups, we found mean business-cycle indexes of +79 and −66. The same factor cropped up again when I spoke surreptitiously of "relatively modest conformity among inverted series, which swim against the cyclical tides most or all of the time", and of

[9] The average expansion index is 64 and the average contraction index is 53; the corresponding conformity percentages are 82 and 77.

high conformity among positive series "which swim with the tides". If inverted and neutral timing are due no less than positive timing to the impact of business cycles upon certain activities, why should the countermovements be less regular than movements with the cyclical tides?

An answer is suggested by conflicts among the numerous cyclical influences that impinge upon every segment of an economy in which business enterprise prevails. To take a large-scale example: a cyclical expansion in employment brings higher family incomes and so encourages larger expenditures; but expansion brings also higher prices, which tend to restrict purchases. Both of these conflicting influences affect the demand for most consumer goods. The outcome is usually a rise in purchases. We noted, however, in Chapter 5, Section III that expansion has another effect: it tends to shift demand toward goods of higher quality and away from cheap staples. This influence appears to decide the issue against an increase in the purchases of such staples as pork, flour, coffee, and potatoes. But in none of these instances is the inversion so regular as the positive conformity of the more costly articles toward which demand shifts. Somewhat similar reasoning applies to the contrast between the relatively low inverted conformity of note issues of national banks and the higher positive conformity of their deposits; also to the contrast between the inverted conformity of bond sales on the New York Stock Exchange and the higher positive conformity of stock sales. In general, influences that tend to repress an activity in expansion encounter more opposition than influences favoring an increase, and when repressing influences win out, their victories are less regular from cycle to cycle than the victories won by influences that push upward. *Mutatis mutandis,* the like holds true in contraction.

A third factor affecting the conformity of time series is the volume and variety of the activities they severally represent. Inclusive indexes and national aggregates tend to conform more closely to business cycles than do their components. By way of illustration, Table 9 contrasts the average conformity

Table 9

Average Conformity of Groups of Series Compared with Conformity of Inclusive Indexes or Aggregates

GROUPS					INCLUSIVE SERIES[d]			
		Mean Index of Conformity[a] to				Index of Conformity to		
	No. of Series	*Reference exp.*	*Reference contr.*	*Business cycles*		*Reference exp.*	*Reference contr.*	*Business cycles*
Prices of commodities	147	44	56	60	Index of wholesale prices, 'all' commodities	+64	+82	+100
Construction contracts[b]	58	74	60	71	Construction contracts, total, value	+71	+50	+86
Production	188	74	65	74	Index of industrial production	+100	+100	+100
Payrolls[c]	30	84	78	84	Index of factory payrolls	+100	+100	+100
Employment	37	81	83	87	Index of factory employment	+100	+100	+100

[a] The group indexes are computed without regard to sign.

[b] Includes building permits.

[c] Includes a series on total income payments.

[d] For sources of data, see Appendix B.

indexes of the 5 broad groups in the first summary of Table 8 with the corresponding indexes of the most inclusive series in each group. Of course the rule is not invariable, especially when the group includes both positive and inverted series, and the average group index is computed without regard to sign. The rule may fail also because of differences between an even-weighted average of series and the formal or implicit weighting of the comprehensive index or aggregate. But the prevalence of the rule is deducible from the logic of time series analysis such as we practice. Cyclical and irregular movements are intertwined in our data. While a few of the movements classified as irregular, such as those produced by major wars, influence the whole economy, most of them are virtually peculiar to certain areas, markets, industries, enterprises, or individuals. Our method of segregating cyclical behavior from these haphazard changes relies upon averaging. The wider the variety of activities included in a series, the more mutual offsetting will occur among irregular movements of less than economy-wide incidence.

This point is of more than technical interest. First, it sets a limit upon our observations of cyclical behavior. As we press deeper and deeper into the detail of economic activities in an effort to grasp economic problems as they confront the man on the street, our view of cyclical movements is obscured by a thicker and thicker cloud of random happenings. The United States Steel Corporation is so huge and makes such a variety of products that its record of unfilled orders conforms perfectly to business cycles. We should not expect that to be true of the unfilled orders of a small concern building one type of machine tools. Still less could we expect the sales of a corner grocery or the income of an individual carpenter to obey faithfully the cyclical tides.

Further, the conditions that obstruct observation of cyclical fluctuations in records of small units explain why businessmen have been slow to grasp the importance of business cycles. In looking back over his own experience, or that of his associates and competitors, the average man rightly concludes that per-

sonal factors and conditions peculiar to his industry or locality have had more to do with success and failure than the general tides of expansion and contraction. One who has acquired self-assurance from minding his own business with profit often generalizes his personal experience, and concludes wrongly that recurrent cycles are at worst a figment of the academic imagination and at best a minor factor in practice. Doubtless, this skeptical attitude is becoming less common. The secular trend toward closer integration of the economy is laggingly followed by a secular trend toward a fuller realization of our dependence upon one another's fortunes. About this trend twines a cyclical curve of popular interest in business cycles that falls during expansions and rises during contractions. Yet there is still almost as much need of broadcasting what is known about business cycles as there is of lifting that knowledge to a scientific level. A factor that affects the fortunes of millions in much the same way, though almost always in secondary degree, has far greater significance to the nation than any one of the numberless factors that seem, and are, of decisive importance to individuals taken one at a time.

A fourth factor influencing conformity is the amplitude of the cyclical movements characteristic of different series. The larger this amplitude, the higher tend to be the indexes of conformity. Conversely, the more closely a series conforms to business cycles, the larger tends to be the amplitude of its reference-cycle pattern. These complex relations are explored in the next chapter, which will borrow from and add to what we have learned about cyclical timing.