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## Postwar Growth Cycles in the United Kingdom: An Interim Report

**ABSTRACT:** As part of the National Bureau's International Economic Indicators project, the entire 1966 short list of economic indicators for the United States was successfully duplicated for the United Kingdom for 1950-1972, using monthly or quarterly time series. The U.K. list was then used to establish a preliminary chronology of postwar growth cycles. Results of analyzing the timing and duration of the U.K. series support the hypotheses of the IEI project: reference chronologies can be constructed for other industrialized market economies, using techniques developed in the United States; techniques developed for classical cycles can be adjusted to identify growth cycles; and the timing classification of series can be carried over from the United States to other countries and from classical cycles to growth cycles. Results of timing comparisons among growth cycle turning points for the United States, United Kingdom, and West Germany indicate that since World War II, U.S. turns have more often followed rather than preceded those of the other two countries, a reversal of a long-standing relationship observed before the war. The implications of such changes for traditional explanations of how cycles spread from country to country are explored briefly to illustrate the kinds of work that can be facilitated with the data and analyses emerging from the IEI project.

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**NOTE:** The work on U.K. indicators reported here has received financial support from the Office of Competitive Assessment of the U.S. Department of Commerce, from The Scherman Foundation, Inc., and from the general funds of the National Bureau. It has benefited substantially from the studies recently undertaken by Desmond J. O'Dea at the National Institute for Economic and Social Research and by John

## INTRODUCTION

This report is being issued now in order to present the tentative findings on the United Kingdom of the National Bureau's larger study on international economic indicators which Geoffrey H. Moore and I began in 1973. While certain details may well be slightly affected by subsequent revisions, the essential pattern is very clear and is unlikely to be changed significantly. It is presented in order to make available the growth cycle chronology I developed for the United Kingdom, as well as the timing comparisons based on it. At its completion, the full report of the IEI project will include more than a dozen industrialized, market-oriented economies.

It is well to bear in mind that this report was largely prepared in 1974, before the full analysis of all U.S. indicators on a growth cycle basis was available. Clearly, the ultimate objective of the IEI project will be to analyze the behavior of all indicators—whether leading, lagging, or roughly coincident—at growth cycle turning points. The analysis of U.S. indicators on the basis of a growth cycle chronology is now available. Indeed, the classical turns relied on here were themselves officially revised yet again in May 1975 on the basis of the review of them under way in 1974 by a special committee for the Department of Commerce. Comparing classical cycle turning points for the United States with growth cycle turning points for the United Kingdom and at times for West Germany is clearly a temporary expedient. The addition, indeed, of a growth cycle chronology to the classical chronology already available for the United States is, of course, a generally complicating factor and is justified, in my view, only because it is a demonstrably useful and valuable addition to our analytical techniques for studying instability in the United States. It is, moreover, indispensable for the study of postwar instability in other industrial economies where rates of growth have often been so rapid and consistent as altogether to prevent the occurrence of classical cycles.

The report to follow must be viewed from the perspective of when it was prepared, what it tries to do, and why it is being published. It was prepared in order to test whether the initial effort to duplicate the U.S. short list with data from other countries was likely to prove a promising approach to the development of reference chronologies and indicators essentially like our

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Dryden and others at the Central Statistical Office in London, under the direction of Owen Nankivell. Their generous cooperation is gratefully acknowledged. Thanks are also due the CSO for having made available to me the basic data used in the study as well as computer facilities for analyzing them, and I thank Walter Ebanks at the NBER for additional computer analysis. I am grateful to the members of the Directors' reading committee—Atherton Bean, Gottfried Haberler, and Murray Shields—for their service. I thank the members of the NBER staff reading committee—Ilse Mintz, Anna J. Schwartz, and Victor Zarnowitz—for the perceptive comments they made on an earlier draft. The charts were drawn by H. Irving Forman with his customary skill. He has my thanks, as does Ester Moskowitz, who greatly improved the text with her skillful editing. My greatest debt is to my colleague in the larger endeavor, Geoffrey H. Moore, who has worked closely with me throughout. Finally, I offer my deepest gratitude to Mildred E. Courtney for secretarial assistance above the call of either pleasure or duty.

own for other market-oriented, industrialized economies. It is our aim in the IEI project ultimately to test every chronology with our computer program and to evaluate each series carefully before including it on any final list of currently most reliable indicators of cyclical turning points for each country we study. What in my view is shown in this study is partly, therefore, the relevance to the growth cycles of recent years of much of our traditional arsenal of analytical tools for studying classical cycles and the positive potential of applying our approach to other countries.

One of the crucial steps in utilizing the National Bureau's indicator approach to the analysis of cyclical disturbances lies in the choice of reference dates. These dates ultimately form the basis for subsequent analysis of all time series, including the classification into leading, roughly coincident, or lagging indicators. The choice begins with the selection of appropriate turning points in a number of individual time series, primarily those coincident series that constitute measures of aggregate economic activity—that is, income, output, employment, and the like. The conversion of such information into reference dates involves judicious determination of what constitutes the "preponderance" of evidence of the existence of a genuine change in direction (for classical cycles) or cyclical deviations from trend (for growth cycles). Ultimately, the appropriateness of the reference dates can be judged by the behavior of a variety of measures of economic activity occurring at about the same time as the reference dates. Thus, while the reference dates are required to differentiate leading, roughly coincident, and lagging indicators, the appropriateness of the dates can also be judged, most especially when there is a considerable historical record on which to base timing classifications, by the consistency with which leaders lead, coinciders coincide, and laggards lag.

Since the original formulation of the technique by Burns and Mitchell, such an historical record has, of course, been built up, most particularly for the United States. While the list of "most reliable indicators" has been revised a number of times (the first such publication was in 1938, and revisions were made in 1950, 1960, and 1966) and most recently in 1975, there has been remarkably little change in the basic classification of time series. The changes made have been far more likely to reflect changes in the adequacy of our statistics or in the basic importance of the economic activity reflected (e.g., structural changes) than in the timing behavior of the series.

If the dating of changes in the fundamental activity of economies is even now less exact than perhaps we should like it to be, it has come a significant way down the scientific path since Willard Thorp (1926) commented with disarming simplicity that his annals "cover the grand divisions of economic activity." Today we have been able to convert much of what may have begun as a form of codified economic intuition on the part of

Wesley Clair Mitchell and his early associates, particularly Thorp, Simon Kuznets, and Arthur Burns, into a computer program which not only dates turning points in individual time series, but helps to select reference dates as well. To be sure, it is desirable to review the selections made by these computer programs, and trained specialists occasionally may reject the choice made by the computer as having overlooked some special feature of the series or the period which should have been taken into account. But the critical point is that what began as a procedure grounded in informed, partially intuitive analysis of cyclical activity has over the years resulted in a body of evidence and experience that enables us now to state a fairly specific set of rules for choosing turning points, in series and reference dates as well.

Although the National Bureau's original program encompassed the development of a technique of cyclical analysis appropriate to "the aggregate economic activity of [all] nations that organize their work mainly in business enterprises" (Burns and Mitchell 1946, p. 3), and Thorp's *Business Annals* were developed for some eighteen countries, most of the Bureau's research effort in this field has been devoted to the analysis of cyclical instability in the United States. From time to time, however, studies have been undertaken which recall the perspective from which the Bureau's work in business cycle analysis originated; for example, the study by Ilse Mintz (1969) of postwar business cycles in Western Germany.

Mintz's study was significant partly because it refocused attention on the original intention of the National Bureau to develop a technique of cyclical analysis which could be usefully applied in all industrialized, market-oriented economies. It was significant as well, however, because it was the first major effort to date turning points in business cycles defined and measured in trend-adjusted series rather than as changes in direction, as in the classical chronologies typical of the period before World War II. The emphasis is thus appropriately placed on the kind of instability most characteristic of present-day, market-oriented economies. In this approach, classical recessions (periods of negative growth) are subsumed under low-growth phases. The classical recession of the 1970s suggests the continued importance of the classical chronology, along with the growth cycles more commonly encountered since World War II.

Mintz measured growth cycles in terms of both "deviation cycles"—essentially cycles in the deviations of a series from its trend—and "step cycles." The latter is an adaptation of a method originally used by Milton Friedman and Anna Schwartz in their study of money, and concentrates directly on rates of change. Cycle turns are dated in terms of the endings of periods of growth deemed particularly high or low. Mintz found virtually no substantial differences between the two methods in the dating of German cycles. In this study deviation cycles only are used.

It is always tempting to look for single or at least simple indicators of cyclical changes. Some analysts still choose to rely on a single aggregate—frequently the index of industrial production or some measure of GNP, or employment, or unemployment—and argue that cyclical turning points in that measure provide an adequate guide to instability, suitable for reference dates.<sup>1</sup> The disadvantages of using single measures are, however, serious. Although our data, methods, and experience with business cycle measurement have, as noted above, advanced greatly in the past quarter century, Burns and Mitchell's conclusion about the search for short cuts in dating business cycles still appears appropriate (1946, p. 76):

The conclusion to be drawn from this condensed review of statistical data bearing on aggregate economic activity is obvious. If there is no monthly or quarterly series in any of our countries<sup>2</sup> that can serve by itself as a criterion for setting a reference scale of business cycles, whether because the series is not long enough, or not accurate enough, or not broad enough in its coverage, or not stable enough in its relation to business cycles, or for all these reasons, then it is necessary to use a more laborious method; that is, a reference scale of business cycles must be extracted from the fallible indications provided by time series for varied economic activities.

In the United States the National Bureau's techniques have in a real sense stood the test of time. While cyclical analysis involves constant revision and reappraisal we do have confidence in our approach because of accumulated experience. The Burns and Mitchell warning is, however, most important to reconsider as we embark on the application of these methods to other economies.

The relationship between reference dates and indicators is complex. The reference dates summarize the behavior of the coincident indicators and are used to measure the timing of leading and lagging indicators. The basic classification into the three groups is based on customary and reliable behavior over a long period, but the timing of an individual indicator at an individual turning point may on occasion be contrary to the general timing classification of the series.

The techniques involved here have stood the test of time in the sense that a large and diverse professional audience finds them useful in analyzing business instability. (In the United States there is virtual unanimity in acceptance of the NBER-based business cycle dates.) However, despite the emphasis on aggregate economic activity in Burns and Mitchell's definition, major measures of aggregate economic activity cannot be relied on invariably to turn even roughly in unison. While we understand much more about business cycles than we did when Burns and Mitchell cautioned against relying on any single series for dating cycles, we still cannot always adequately or completely explain that lack of unison.<sup>3</sup> But we do also know that, despite that lack, the notions of both pattern and

process which lie behind the NBER approach to measuring and analyzing instability are valid: the timing relationships that have emerged from the NBER approach have remained in evidence for many years. The exceptions, the occasional changes in the behavior of particular series, the emergence of better data and better techniques for measuring and adjusting all data, the real changes in the character of business cycles in the United States and elsewhere, all these and related changes have not affected the basic interrelationships that emerged from the introduction of the NBER technique and led conceptually to the introduction of leading, roughly coincident, and lagging indicators of the reference dates selected for successive business cycles.

The experience with dating business fluctuations just summarized has largely been confined to classical cycles. The Mintz study, already mentioned, on West Germany, and her more recent development of a growth cycle chronology for the United States (Mintz 1974) represent first efforts to apply the techniques previously developed for dating classical cycles to the kind of growth cycle typical of enterprise-oriented economies since World War II. The analysis presented here is restricted to my preliminary work with data for the United Kingdom, the first country for which the National Bureau's International Economic Indicators project has produced a fairly complete set of data. Perusal of the progress reports emerging from the International Economic Indicators project will show that variants of *Business Conditions Digest*, the Department of Commerce's monthly updating of U.S. indicators based on the NBER methodology, have been roughly duplicated for both Japan and Canada, using somewhat the same methodology as in BCD. Preliminary work suggests that the method will indeed be applicable to many if not all of the countries for which Burns and Mitchell originally viewed it as being appropriate.

#### A NOTE ON METHODOLOGY

To measure the U.K. growth cycles, I employed deviations from a sixty-month moving average, selected to approximate the trend (Mintz used a seventy-five-month moving average). As I noted above, Mintz very carefully compared the results obtained with step cycles and with deviation cycles, and while there were discrepancies from time to time in the determination of individual turning points, in the final analysis the cycles that emerge in the two methods are remarkably alike (Mintz 1970, p. 20). In view of her results it was decided early in the present work to dispense with the laborious, hence expensive, step cycle technique.

Recently, in connection with deviation cycles, work has proceeded at

the National Bureau designed to avoid one of the defects in the moving average representation of the trend, namely, undue flexibility in the trend rate of growth. The technique that is being developed, however, will not greatly affect the turning points of deviation cycles, which are our primary concern. For example, in an experiment with this new technique the U.K. industrial production index produced ten turning points in deviation cycles between 1951 and 1972 with both a sixty-month moving average and the new phase-averaging method. In both trials, all the turning points but one occurred in the same month. In that one case, there was a difference of one month. This test supports my experimental use in this paper of the moving average trend for the U.K. data: I was in fact able to approximate the basic pattern of turns in growth cycles by the simple method of deviation from a sixty-month moving average.

The deviations were, of course, calculated with seasonally adjusted data. In order to obtain deviations for all the data, a straight line was fitted, utilizing the first sixty and last sixty months in each series, and then drawn so as to pass through the thirtieth month from the beginning and from the end. Then the fitted line was used only for the first thirty and last thirty months in each series, with the moving average used for the rest. In this way an approximation was obtained to a sixty-month moving average for the entire length of each series, and the turns were selected in the ratio of the seasonally adjusted data to this trend.<sup>4</sup>

### DATING GROWTH CYCLES IN THE UNITED KINGDOM

In order to make the task of data collection and analysis manageable the initial effort was limited to obtaining the closest possible equivalents to the NBER short list of twenty-six cyclical indicators, plus some few other series deemed important for one reason or another. Since Mintz's sole aim was to date cycles, she restricted herself with few exceptions to the acquisition and analysis of roughly coincident series, whereas I include leaders and lagers as well. Thus the business cycle turning points chosen for the United Kingdom can be tested somewhat more fully than Mintz could test her German turning points. Furthermore, Mintz utilized the NBER computer program for all turning point selections. While the turning points for the United Kingdom and all other countries will ultimately be checked by computer, the turns in this initial study have been selected (as described below) according to the rules embodied in the Bry-Boschan program, but applied by the conventional judgmental method customarily utilized at the NBER. The following are my tentatively selected turning points in postwar U.K. growth cycles:<sup>5</sup>



Peaks	Troughs
February 1951	October 1952
December 1955	November 1958
November 1960	February 1963
August 1965	August 1967
December 1968	February 1972

These choices were made on the basis of twelve time series which approximate the roughly coincident indicators on the U.S. short list. Of the eight indicators on the list, only one—manufacturing and trade sales—was not available for the United Kingdom. I obtained more or less precisely comparable U.K. time series dealing with the index of industrial production and with total wholly unemployed. For quarterly GNP in current and in constant dollars I used gross domestic product at current prices and at 1970 prices. I also used a British series on GNP at factor costs, although it is currently available only for a short period of time. For the personal income series on the U.S. list, I employed a series on personal disposable income in 1963 prices for the United Kingdom, and a second series on total personal income before taxes. Both series were available only quarterly. For employees on nonagricultural payrolls I used two rough equivalents: a monthly index on employees in employment in production industries (mining, manufacturing, construction, and utilities) and a quarterly series on total employees in employment. For the U.S. series on sales of retail stores I employed both a volume and a value index of retail sales, corresponding to ones on the U.S. short list, and I added a series on adult job vacancies. It is included in the U.S. long list of coincident series, and is being increasingly viewed as of considerable significance both in the United States and elsewhere.<sup>6</sup>

The detailed examination of growth cycle turning points in each of these roughly coincident indicators suggests the extent to which the British economy experienced these mild but nonetheless clearly visible cyclical changes in its postwar rate of growth. They appear in each roughly coincident indicator. However, because the ratios of cyclical to irregular components vary among indicators, some of them are harder to date (e.g., current or constant gross domestic product) than others (e.g., the index of industrial production). The most cursory examination of the charts in Appendix A suggests that growth cycles have been as prominent in the postwar British economy as in that of the United States. Their number and timing, however, differ from those of their U.S. counterparts.<sup>7</sup>

Detailed examination of the behavior of roughly coincident indicators in postwar Britain reveals clearly the dangers in attempting to date business cycles on the basis of a single indicator, no matter how broad the coverage

or clear the turns may be. In particular, U.K. history suggests that in several cases (e.g., the peaks in 1960 and 1965), choosing the turning point in the index of industrial production to represent the growth cycle turning point would be misleading because of the emphasis it would place upon movements peculiar to that index.

The choice of appropriate turning points proved difficult in a few instances. Occasionally, special circumstances had to be taken into account. As a result, some choices appear to conflict with the evidence. An obvious example would be the selection of a trough in the monthly series on employees in employment in January 1959 rather than May 1959, although the latter represents the largest decline recorded in the series. The explanation here is to be found in a redefinition of the series in the latter month that produced the recorded decline, but obviously does not represent any significant change in the underlying employment situation. This is, of course, occasionally the case in choosing turning points—the definition of the series presents fewer problems than *changes* in the definition, since absolute levels of any of these measures are of less interest than their movements over time. Ideally, we should have a new series in which the measure, in this case employment, is defined consistently in either the old or the new way. As this cannot presently be done the turn must be adjusted to accord with economic rather than graphic fact to the extent possible.

A similar apparent anomaly occurs at the 1971 trough in gross domestic product in constant prices, because the choice of August 1971 is dictated by the behavior of the series on the new 1970 base, while the series on the 1963 base was used for the bulk of the period. Clearly the recently accelerated inflation rate has complicated the analysis of instability in the United Kingdom as elsewhere. The increased volatility of many measures of British economic activity in the period since 1967 and the resultant greater difficulty in dating cyclical turns is well exhibited by GDP in constant prices, which in fact shows six peaks of sorts in a four-year period.<sup>8</sup>

## THE EVIDENCE FOR INDIVIDUAL GROWTH CYCLE TURNS, 1950–1972<sup>9</sup>

### February 1951 Peak

There is considerable agreement in the behavior of the few time series that extend back to 1950 that 1951 represented a peak year. The turn selected, in February, conforms to the turn in both the index of industrial production

and in employment, though unemployment and vacancies turned somewhat later in the year.

### **October 1952 Trough**

Again, the evidence all points toward a trough during the year, though this time the index of industrial production turns four to five months before all the measures of employment. The selected turn, in October, gives some weight to this discrepancy in the measures of production and employment.

### **December 1955 Peak**

The 1955 peak, in contrast, exhibits almost identical timing in all the measures available except the two GDP series.<sup>10</sup> Two series lead slightly, but both production and employment conform to the month selected for the turn.

### **November 1958 Trough**

The month chosen conforms to the behavior of most of the employment series, but represents a compromise in some respects between GDP in constant prices, which turned up in May, and GDP in current prices, as well as the value index of retail sales, which did not turn up until early in the following year. In general, all of the measures turned up between May 1958 and March 1959. The month selected represents an effort to balance these factors, and is supported as well by the composite index of coincident indicators considered below.

### **November 1960 Peak**

The selection of a reference peak in 1960–1961 is a good example of the perils of relying on the index of industrial production alone. The peak, March 1960, clearly leads all the other measures of economic activity utilized, although there is a very slow and extremely volatile decline which does not accelerate sharply until the middle of 1961. All the employment measures decline in early 1961, and except for the monthly employment measure (which turns down in April 1961 but nevertheless stays quite high until it falls somewhat precipitously in 1962), the turns are far more sharply drawn than is the case with production. With two minor exceptions the other series represented among the coincident indicators (and by this period all twelve are included) also all turn in 1961. The placing of the turn in late 1960 is designed to give some weight to the preponderance of

evidence, but tempered by the important, albeit atypical, behavior of production.

### **February 1963 Trough**

The trough in February 1963 is one of the most clear-cut. Real disposable income turns nine months earlier, and production turns in January, but seven of the twelve measures turn precisely in February, and the rest within one month.

### **August 1965 Peak**

The choice is troublesome and, in the final analysis, the date selected is an effort to strike a suitably weighted balance with the evidence and the factors which have affected it. Once again the turn in the production index, January 1965, is quite clear-cut and well ahead of the turns in all except two of the other indicators. There is some evidence that the peaks observed in the first four months of 1966 in two of the employment series were affected by special factors in the economy. A decline in the normal hours of work may have artificially (and temporarily) stimulated the demand for labor, thereby postponing the peak. The introduction of the National Plan may have been responsible for a short-run optimism which maintained levels of employment as well as sales and income until late 1965 or early 1966, but it is difficult to explain why the sustained high levels in those areas were not reflected in production as well.<sup>11</sup>

In sum, there are a number of complicating factors, but the choice of August 1965 appears to be a reasonable compromise. It was the month in which adult vacancies and GNP in factor cost turned. While this occurred more than six months after the turn in the production index, it was well ahead of the other indicators, some of which did not turn until well into 1966 (real disposable income turned down in February; unemployment did not reach its turn until April). Selection of the turn well illustrates the problem of settling on a single month when turns in the coincident indicators themselves are scattered over a period of more than twenty months. The choice is justified, however, in part because the leaders and laggards, described below, exhibit the appropriate timing at the turn.

### **August 1967 Trough**

The choice of August 1967 as a trough date presents little difficulty. Real disposable income turned in February, and the monthly employment measure turned the following April, but all the other indicators turned within a few months of August.

### **December 1968 Peak**

Dating the peak in 1968 was extremely difficult, once more because of the wide dispersion in the turns in individual indicators. The employment measures do not turn until 1970, whereas both real disposable income and retail sales (value index) turn in early 1968. But the production index, the volume index of retail sales, and gross domestic product in both current and constant prices turn within a few months of December 1968. Again the choice represents a balancing of evidence pointing to both earlier and later dates as well as the date selected.

### **February 1972 Trough**

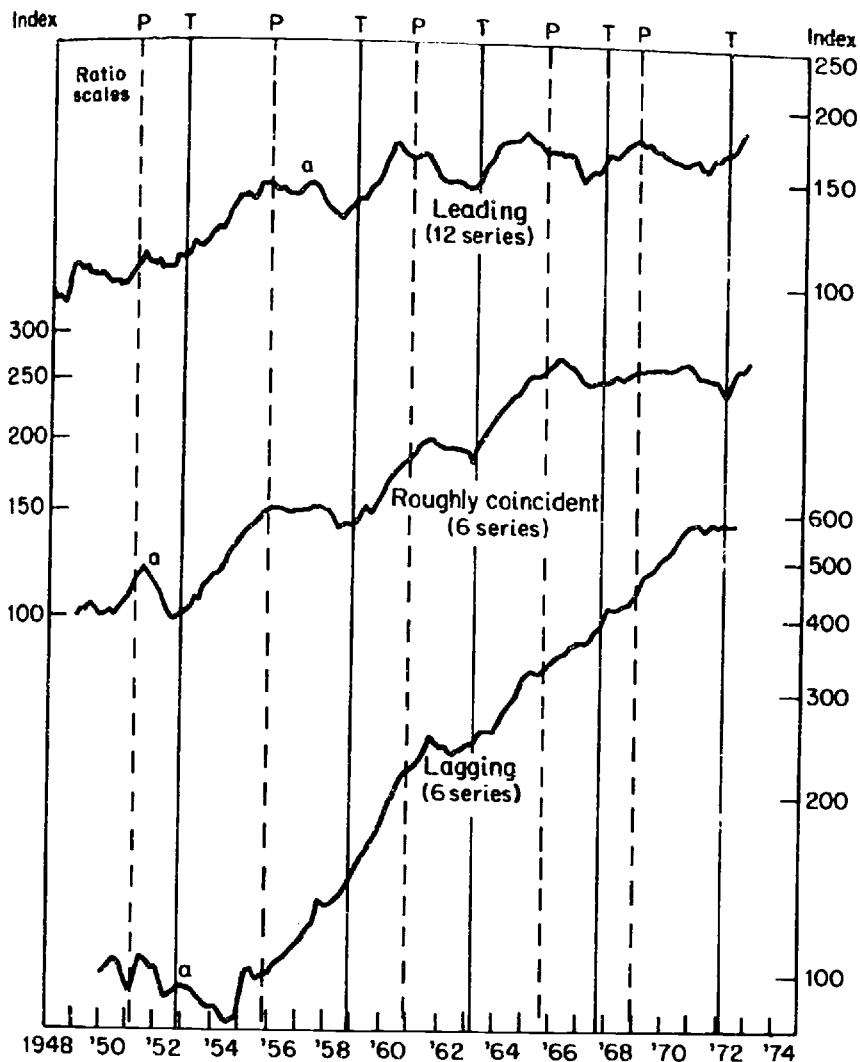
The final turn, in February 1972, must be regarded as an extremely tentative first choice, because I have not yet examined the data beyond 1972. Both the production index and two of the available employment series conform to the date chosen, although a good many other series turn earlier. It is clear that the British economy was weakening less rapidly if not yet recovering in 1971, and so the date finally chosen may be somewhat different. Although the leaders behaved appropriately at the selected date, there is as yet little information on the lagging indicators.

## **APPRAISING THE BRITISH REFERENCE TURNS**

I have attempted above to indicate briefly the basis for my choice of dates for postwar British growth cycles. The degree to which the choices made may be said to represent British growth cycles may be measured by consistency, dispersion of the turns in individual important series around the dates selected, etc. The evidence of representativeness, particularly if compared with similar evidence for the United States or other countries, will reflect not only the appropriateness of the choices made, but may also give some indication of possible structural differences between the British economy and those other industrialized, market-oriented economies.

A convenient way to summarize much of the evidence for appraising the adequacy of the U.K. growth cycle chronology is to examine the relationship between these dates and the turning points for composite indexes of the twelve leading, six roughly coincident, and six lagging indicators most closely approximating the indicators on the U.S. short list. A composite index of indicators is of course sensitive to the magnitude as well as the direction of changes in the component series.<sup>12</sup> Chart 1 shows the behavior of the composite indexes of U.K. leading, roughly coincident, and lagging indicators; and the essential timing relationships are summarized in Table 1. Since these indexes have not yet been adjusted for long-term growth,

**CHART 1 Composite Indexes of Leading, Coincident, and Lagging Indicators, United Kingdom, 1948-1972**



SOURCE: Appendix Table B-2, available on request to the National Bureau.  
<sup>a</sup>Prior to this point, index is based on fewer than half the series in the group.

whereas the growth cycle dates are based on trend-adjusted data, lags at peaks and leads at troughs are to be expected—and this is what we find in the coincident index. Nevertheless, the finding that the composite index of U.K. roughly coincident indicators has a median timing of zero at growth cycle peaks and troughs suggests that the U.K. turning points reasonably well represent the preponderance of evidence they are designed to summarize.<sup>13</sup> The mean is +3, largely because of the long lag at the December

**TABLE 1 Comparison of Turning Points of U.K. Composite Indexes of Twelve Leading and Six Roughly Coincident Series at U.K. Growth Cycle Turns, 1951-1972 (number of months)**

U.K. Growth Cycle Turn		Lead (-) or Lag (+) in Composite Index			
Peaks	Troughs	Leading Series	Roughly Coincident Series	Leading vs. Coincident Series	
2/51		+4 <sup>a</sup>	+4 <sup>b</sup>	0	0
12/55	10/52	-4 <sup>a</sup>	0	-3	-4
11/60	11/58	-8	+8	-1	-5
8/65	2/63	-9	+6	0	-4
12/68	8/67	0	+22	-6	-3
	2/72			0	-9
Median timing					
Peaks		-4	+6		-15
Troughs				-1	
Both	7		0		-5.5
Mean timing					
Peaks		-3.4	+8.0		-11.4
Troughs				-2.0	
Both	-5.4		+3.0		-8.4

SOURCE: Appendix B, available on request to the National Bureau.  
<sup>a</sup>Index prior to January 1957 is based on fewer than half the series in the group.  
<sup>b</sup>Index prior to January 1952 is based on fewer than half the series in the group.

1968 peak. The composite index of the leading indicators leads at all the turns except the 1951 and 1968 peaks and by about six months on the average (the 1951 peak is represented by very few series). The mean and median leads of the composite index of leaders over that of the roughly coincident indicators are 5.5 and 8.4 months respectively. In the lagging index a sharply rising trend obscures virtually all the cyclical movements. On the whole, however, it is fair to say that the composite indexes—at least the leading and coincident indexes—support the general representativeness of the growth cycle chronology selected. Each phase is reflected in the leading and coincident indexes, and no additional phases appear.

Table 2 provides a convenient summary of much of the relevant evidence for comparing the behavior of the roughly coincident indicators for the United States, West Germany, and the United Kingdom. In considering the comparisons, it is well to remember that the time periods covered are not identical. The U.S. data often cover long periods. The West German data mostly cover 1950–1967; the U.K. data, 1950–1972. But not all the U.K. and West German series were available even for the postwar periods.<sup>14</sup> (For the coverage of the U.K. series utilized here see Table 4 below.)

In addition to differences in coverage, there may be some discrepancies in behavior based on differences in the way the series are defined. Still other discrepancies may be the result of using measures selected for the United States rather than some other country, but this would be more likely to explain discrepancies in leading or lagging series rather than in the roughly coincident ones. In connection with the latter, there is less room for variation from country to country in what constitutes an adequate measure of "aggregate economic activity." Nevertheless, discrepancies among these series at turning points might be greater in other countries than in the United States if, as might well be argued, business fluctuations have been more pronounced in the United States than in other market economies. The charge has been considered thus far primarily for U.S. classical cycles, however.

In Table 2, the eight indicators currently included in the roughly coincident group for the United States have been supplemented by several other roughly coincident indicators available for one or the other of these countries and considered particularly useful. Median behavior is summarized by the arithmetic mean of the medians for the individual indicators and by the median of the medians. Measured either way, the results are similar. The single most important conclusion to be drawn from the evidence presented is clear in both measures: the average lead or lag for the roughly coincident U.K. indicators is no greater than that for West Germany and both are only marginally greater than those for the United States.



**TABLE 2 Timing Comparisons of Roughly Coincident Indicators in the United States, West Germany, and the United Kingdom, 1950-1974**

Series on U.S. Short List (U.S. title)	Median Timing (in months) <sup>a</sup>											
	U.S.			W. Germany			U.K.					
	P	T		P	T		P	T				
Personal income	+1	-2		+11.5	+2.0		+5.5					
GNP, current prices (Q)	0	-1		+2	0		-0.5					
GNP, constant prices (Q)	0	-3		+2	0		+1.0					
Index of industrial production	0	0		-0.5	0		0					
Manufacturing and trade sales	-4	0		0	0		n.a.					n.a.
Retail store sales, value	+1	0		n.a.	n.a.		+3.0					-0.5
Employees on nonagric. payrolls	-2	0		+2	0		+5.5					+2.0
Unemployment rate, % (inverted)	-4	+2		+2	+4.5		+6.0					+1.0
Additional series:												
Disposable income				+6.5	+3.0		-2.0					-7.5
Job vacancies	-8	0		0	-1.5		0					-1
Retail sales, volume index							+3.0					-2.5
Mean of medians (median of medians in parentheses)												
Available series from U.S. short list	-1.0 (0)	-0.5 (0)		+2.7 (+2.0)	+0.9 (0)		+2.9 (+3.0)					-0.4 (-0.5)

For 6 of 8 short-list series available  
in all 3 countries

For all available series in each  
country<sup>b</sup>

-0.8 (0)	-0.7 (-0.5)	+3.2 (+2.0)	+1.1 (0)	+2.9 (+3.2)	-0.4 (0.0)
-1.8 (0)	-0.4 (0)	+2.8 (+2.0)	+0.9 (0)	+2.2 (+2.0)	-1.4 (-1.0)

SOURCE: United States: Moore and Shiskin (1967, App. B, col. 10, pp. 96-97); West Germany: Mintz (1969, Table 3, pp. 30-35); United Kingdom: Table 4, below.  
NOTE: A roughly coincident indicator turn is one that occurs within three months on either side of the reference turn.  
<sup>a</sup>Timing is at U.S. classical cycle turning points and West German and U.K. growth cycle turning points.  
<sup>b</sup>For the United States and West Germany, nine series each; for the United Kingdom, ten.  
Q = quarterly data.  
n.a. = not available.

Restricting the analysis to the first eight indicators in Table 2 (the official "short list") we see that two U.S. indicators, two West German indicators, and three U.K. indicators have median leads or lags more than three months from the selected reference turns either at peaks or at troughs. No U.K. median departs by more than six months from the growth cycle turns selected, while one West German median lags behind its reference date by nearly twice that figure. In short, the measures in Table 2 suggest that the behavior of the U.K. indicators is only slightly more deviant than that of the indicators for the other two countries and, further, that the U.K. growth cycle dates are thus reasonably representative of the fluctuations in aggregate economic activity they are designed to reflect.<sup>15</sup>

This representativeness can be judged in another way by considering the average deviation from growth cycle turns for all the roughly coincident indicators available for the United Kingdom (Table 3). The average deviation of all the series at peaks and troughs (third column of Table 3) is 4.8 months, which may be compared with the average deviation of 3.4 months for the nine West German series used in Table 2 (Mintz 1970, pp. 36-40).

An interesting characteristic of Table 3, which was also observed by Mintz in her West German data, is that the deviations are almost invariably smaller at troughs than at peaks. It is also suggested in Table 2 that the variation in the average lead or lag of roughly coincident indicators is smaller for all three countries at troughs than at peaks. This indication of greater variability among the indicators at the onset of growth cycle recessions than of revivals suggests, of course, the presence of some factor making the forecasting of recessions slightly more difficult than that of recovery. Fuller consideration of this question, however, requires analysis of all the indicators.

### THE TIMING OF INDIVIDUAL INDICATORS AT POSTWAR GROWTH CYCLE TURNS

Table 4 contains the record of timing for all thirty-eight British indicators in the period since 1950—the essential information on which this analysis rests—and the results are summarized in Table 5. The story they tell is relatively simple. They echo once again Mintz's comment in connection with her counterparts to these tables for West Germany: "Perhaps the most important feature brought out in these tables is the regularity with which all the indicators turn near all business cycle turns" (Mintz 1970, p. 28). For the United Kingdom as for West Germany there are occasional exceptions to this generalization in the form of unrelated turns in either the indicators or in growth cycles. Mintz found 15 unrelated turns in the West German indicators out of 164 comparisons (9.1 percent of the cases) while I find 10

**TABLE 3 Average Deviation from Post-World War II  
Growth Cycle Turns of Roughly Coincident U.K.  
Indicators  
(number of months)**

Series	Peaks	Troughs	Peaks and Troughs
Employees in employment (index of production industries)	7.5	2.6	4.8
Total employees in employment (Q)	4.2	2.0	3.1
Total wholly unemployed (inverted)	8.2	0.6	4.4
Gross domestic product, 1970 prices (Q)	8.2	3.8	6.0
Gross domestic product, current prices (Q)	10.5	7.5	9.0
Gross national product at factor cost (Q)	1.5	1.5	1.5
Index of industrial production	3.0	1.0	2.0
Personal disposable income, 1963 prices (Q)	5.0	9.8	7.4
Total personal income before taxes (Q)	8.2	7.5	7.9
Retail sales, volume index	2.7	4.2	3.6
Retail sales, value index	5.3	5.2	5.3
Adult vacancies	3.6	2.4	3.0
Mean of 12 indicators	5.7	4.0	4.8
Median of 12 indicators	5.2	3.2	4.6

SOURCE: Based on Table 2.  
Q = quarterly data.

unrelated turns in U.K. indicators out of 273 comparisons (3.7 percent). It is worth noting that most of her indicators are roughly coincident. The U.K. set, however, includes a number of leaders and laggards, and the unrelated turns are largely to be found among the leaders (only two are in the coincident group; none in the lagging). The percentage of skipped turns in growth cycles is similar, with only 10 instances where a growth cycle turn was not matched with a turn in an indicator.

It is important to remember that the U.K. indicators duplicate essentially the *entire* short list of U.S. indicators. Mintz, as noted, concentrated on just the roughly coincident ones, around which the dating of growth cycles must necessarily revolve. However, leading and lagging indicators not only confirm or cast doubt on the correctness and reliability of the growth cycle turns selected, but also provide important information in their own right for both forecasting and policymaking. It is instructive, therefore, to note that for the fifteen leading U.K. indicators, fully 80 percent of the turns covered represented leads, either short or long, and only 5 percent lagged behind the reference turns by more than three months (Table 5). Moreover, not one of the fifteen U.K. series classified as leading according to U.S.

**TABLE 4 Leads (-) and Lags (+), in Months, of Turns in 38 U.K. Indicators at U.K. Growth Cycle Turns,<sup>a</sup> 1950-1972**

Leading indicators	P	T	P	T	P	T	P	T	P	T	P	T
	2/51	10/52	12/55	11/58	11/60	2/63	8/65	8/67	12/68	2/72		
1. Average hours worked, mfg.	n.a.	n.a.	n.a.	n.a.	n.a.	+1	-17	-9	0	-3		
2. Wholly unemployed under 2 weeks (inverted)	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	+8	-7	+4	-7		
3a. New companies registered	+2	-3	-13	-6	-6	-13	-11	-16	-	-		
3b. Business failures (inverted)	n.a.	n.a.	n.a.	n.a.	n.a.	-3	-17	-4	-5	-		
4. New orders, vol., engineering indus.	n.a.	n.a.	n.a.	-4	-8	-3	-8	-7	+1	+1		
5a. New orders, construction, pvt. ind. (Q)	n.a.	n.a.	n.a.	-3	-6	-3	-9	-3	+2	-9		
5b. New orders, construction, total, excl. housing (Q)	n.a.	n.a.	n.a.	-3	+3	-3	-9	-	-	-15		
6. Housing starts, private sector	-24	-11	-2	-9	-7	-1	-9	-9	-9	-		
7. Increase in stocks and work in progress, total	n.a.	n.a.	+14	0	-6	-3	-9	-9	+2	-		
8. Wholesale price index, basic materials, mfg.	n.a.	n.a.	n.a.	-2	-5	-5	-9	-1	-9	-14		
9. <i>Financial Times</i> index, industrial shares	+4	+9	-5	-8	-10	-7	-11	-9	-3	-11		
10a. Gross trading profits of cos. (Q)	n.a.	n.a.	n.a.	+3	-9	0	-21	-9	-4	-18		
10b. Cos. profits less U.K. tax payments (Q)	n.a.	n.a.	n.a.	+3	-9	0	-6	0	-4	-6		
11. Price per unit wage and salary cost	n.a.	n.a.	n.a.	n.a.	n.a.	-	-15	-9	-2	-19		

12.	Increase in hire purchase debt	n.a.	n.a.	-	-11	-11	-11	-9	-9	-7
Roughly coincident indicators										
1a.	Employees in employment production industries	n.a.	+2	0	+2	0	+6	+8	+19	+1
1b.	Employees in employment, total (Q)	0	+1	-1	0	0	+3	+3	+14	-6
2.	Total wholly unemployed (inverted)	+6	+1	0	0	+1	+8	+1	+23	0
3a.	GDP, 1970 prices (Q)	n.a.	n.a.	+14	+3	0	-15	+3	-1	-6
3b.	GNP, factor cost (Q)	-	-	-	+3	0	0	-	-	-
4.	GDP, current prices (Q)	n.a.	n.a.	+26	+3	0	-9	+3	-4	-24
5.	Industrial production index	0	-3	0	-1	-1	-7	0	0	0
6a.	Disposable income, 1963 prices	n.a.	n.a.	-4	0	0	+6	-6	-10	-24
6b.	Personal income before taxes (Q)	n.a.	n.a.	+5	0	+6	+6	-6	-16	-24
7a.	Retail sales, volume index	n.a.	n.a.	n.a.	-2	0	+3	-3	-1	-12
7b.	Retail sales, value index	-	-	-	+4	+2	+3	-3	-9	-12
8.	Adult vacancies	+5	+2	-4	-3 <sup>h</sup>	0	0	-1	-9	-5
Lagging indicators										
1.	Wholly unemployed (inverted)	n.a.	n.a.	n.a.	n.a.	n.a.	+7	+6	+24	+1
a.	Over 8 weeks	+3	+1	+2	0	+3	+9	-3	+23	0
b.	8-26 weeks (Q)	+6	+1	+5	+3	+3	+12	+3	+20	-
c.	26-52 weeks (Q)	+12	+10	+14	+12	+9	+15	+12	+26	-
d.	Over 52 weeks (Q)									
2.	Fixed capital expenditures, mfg., plant and machinery (Q)	n.a.	n.a.	n.a.	+9	+9	+6	+12	+23	-
3a.	Stocks and work in progress, total (Q)	n.a.	n.a.	+17	+12	+6	+6	+6	+26	-

**TABLE 4 (concluded)**

	P	T	P	T	P	T	P	T	P	T	P	T
	2/51	10/52	12/55	11/58	11/60	2/63	8/65	8/67	12/68	2/72		
3b. Stocks and work in progress, mfg. (Q)	n.a.	n.a.	n.a.	+12	+6	+6	+6	+6	+26	-		
3c. Stocks, mfg. (Q)	-	-	-	-	+12	+6	+12	+6	+26	-		
4. London clearing banks, advances	n.a.	+7	-6	-3	-1	-5	-8	-3	+21	-		
5. Treasury bills, aver. discount rate	-	+25	+22	+2	+9	+11	-8	+1	-8	-		
6. Wage and salary cost per unit, mfg.	n.a.	n.a.	n.a.	n.a.	n.a.	+21	+7	+14	+27	+1		

SOURCE: Based on data in Appendix B, available on request to the National Bureau.

\*Starting date for each series is given in Table B-2, available on request to the National Bureau. A dash means a turn was not selected either because it was too near the start or end of the series to be sure, or because the turn was skipped. The latter are indicated in Table 5 below.

†This series was revised, and both the old and revised series are available for this period. The older series shows a lead of four months, the newer a lead of two months. An average Q = quarterly data.

n.a. = not available.





TABLE 5 (continued)

	Number of Turns								Median Lead (-) or Lag (+) in Months (9)	
	Comparisons (1)		Leads (3)		Exact Coincidences (4)	Lags (6)		Unrelated Turns in Growth Cycle (8)		
	Long (2)	Short (3)	Short (5)	Long (6)						
9. <i>Financial Times</i> index, industrial shares										
10a. Gross trading profits of cos. (Q)	10	7	1	0	0	0	2	0	0	-7.5
10b. Cos. profits less U.K. tax payments (Q)	7	5	0	1	1	0	0	0	0	-9.0
11. Price per unit wage and salary cost	7	4	0	2	1	0	0	0	0	-4.0
12. Increase in hire purchase debt	4	3	1	0	0	0	0	0	0	-12.0
Total	6	6	0	0	0	0	0	0	0	-10.0
Percent distribution	97	62	16	5	9	5	9	5	5	
	100%	64%	16%	5%	9%	5%	9%	5%	5%	
		80%			14%					
Roughly coincident indicators										
1a. Employees in employment production industries	9	0	0	2	3	4	0	0	0	+2.0
1b. Employees in employment, total (Q)	10	1	1	3	4	1	0	0	0	+5.0
2. Total wholly unemployed (inverted)	10	0	0	3	3	4	0	0	0	+1.0

3a. GDP, 1970 prices (Q)	8	3	1	1	2	1	0	0	-0.5
3b. GNP, factor cost (Q)	4	0	0	2	2	0	2	3	+1.5
4. GDP, current prices (Q)	8	3	0	1	3	1	0	0	+1.5
5. Industrial production index	10	2	3	5	0	0	0	0	-0.5
6a. Disposable income, 1963 prices	8	5	0	2	0	1	0	0	-5.0
6b. Personal income before taxes (Q)	8	3	0	2	0	3	0	0	0
7a. Retail sales, volume index	7	1	3	1	1	1	0	0	-1.0
7b. Retail sales, value index	7	2	1	0	2	2	0	0	+2.0
8. Adult vacancies	10	2	3	2	1	2	0	0	-5.0
Total	99	22	12	24	21	20			
Percent distribution	100%	22%	12%	24%	21%	20%			

58%

#### Lagging indicators

1. Wholly unemployed (inverted)
  - a. Over 8 weeks
  - b. 8-26 weeks (Q)
  - c. 26-52 weeks (Q)
  - d. Over 52 weeks (Q)
2. Fixed capital expenditures, mfg., plant and equipment (Q)
- 3a. Stocks and work in progress, total (Q)
- 3b. Stocks and work in progress, mfg., (Q)
- 3c. Stocks, mfg. (Q)

4	0	0	0	0	1	3	0	0	+6.5
10	0	1	2	5	2	2	0	0	+2.5
9	0	0	0	4	5	5	0	0	+5.0
9	0	0	0	0	9	9	0	0	+12.0
6	0	0	0	0	6	6	0	0	+9.0
7	0	0	0	0	7	7	0	0	+6.0
6	0	0	0	0	6	6	0	0	+6.0
5	0	0	0	0	5	5	0	0	+12.0

**TABLE 5 (concluded)**

	Number of Turns								
	Comparisons (1)	Leads Long (2)	Leads Short (3)	Exact Coincidences (4)	Lags Short (5)	Lags Long (6)	Unrelated Indicator (7)	Turns in Growth Cycle (8)	Median Lead (-) or Lag (+) in Months (9)
4. London clearing banks, advances	8	3	3	0	0	2	0	0	-3.0
5. Treasury bills, aver. discount rate	8	1	0	0	2	5	0	0	+8.5
6. Wage and salary cost per unit, mfg.	5	0	0	0	1	4	0	0	+14.0
Total	77	4	4	2	13	54			
Percent distribution	100%	5%	5%	3%	17%	70%			
					87%				

SOURCE: Columns 1-8 based on Table 4; column 9 from Table 8, below.

NOTE: Long leads and lags are at least four months long. Short leads and lags are one to three months long. Comparisons involving the tentatively selected trough in 1972 are sometimes included and sometimes excluded depending on whether the behavior of the individual time series is sufficiently clear-cut to permit tentative selection of a turn in the series. That turn is not included as an unrelated turn in the growth cycle, however, unless there is no indication in the series of a cyclical response in the recent past. Thus, two series covering the same period may be treated somewhat differently in terms of the number of comparisons considered.

Q = quarterly data.

experience shows a preponderance of lags. Not only has the NBER approach worked with considerable reliability and validity in enabling us to date growth cycle turning points in an important industrial economy other than the United States, but in addition, U.S. classification of leading indicators has proved useful when applied to the other economy.

Among the roughly coincident indicators 58 percent turned within three months of the growth cycle turning point (with only 22 percent exhibiting long leads and 20 percent, long lags). The corresponding figure for the U.S. set of roughly coincident series at classical business cycle turning points is 53 percent.<sup>16</sup> Only three series, personal disposable income, total personal income before taxes, and the index of retail sales value fail to show a predominance of roughly coincident turns, and even in the latter two series, leads and lags are about equally numerous. Personal disposable income shows five long leads and only one long lag.

The behavior of the lagging indicators is even more suggestive; fully 87 percent of them lag behind comparable growth cycle turns, and only 10 percent lead. Only the series on London clearing bank advances shows more leads than lags, and only unemployed 8-26 weeks shows more rough coincidences than long lags.

The pattern of individual indicator behavior at individual growth cycle turns emerges clearly in the averages shown in Table 6. The time sequence of the turns in average leading, lagging, and roughly coincident indicators agrees with expectations at all except one of the reference turns covered, whether "typical" is viewed in terms of the mean or the median timing. (The single exception is minor.)

The pattern emerging in Table 6 is summarized in Table 7. (The table is confined to the 25 indicators most closely equivalent to the U.S. short list, but calculations based on all 38 available British indicators presented the same pattern.) However the figures are calculated and no matter what series are included, the conclusion is clear that leading indicators lead roughly coincident indicators and lagging indicators lag behind roughly coincident indicators with a very high degree of consistency. This is true at both peaks and troughs of the growth cycle, although the spread between leaders and laggards is greater at peaks than at troughs. In sum, the experience of the United Kingdom during the past quarter century confirms and extends Ilse Mintz's finding that the NBER method of measuring business cycles can be successfully applied not only to the United States but to other industrial, market-oriented economies. The relationships involved appear to be as widely applicable, on this evidence at least, as Burns and Mitchell originally assumed.

**TABLE 6 Median and Mean Timing Patterns at U.K. Growth Cycle Turns of 25 Indicators<sup>a</sup> Matching the U.S. Short List, 1951-1972 (number of months)**

	P	T	P	T	P	T	P	T	P	T	P	T	
	2/51	10/52	12/55	11/58	11/60	2/63	8/65	8/67	12/68	2/72			
12 leading indicators <sup>b</sup>	+2.0	-3.0	-3.5	-3.5	-7.0	-3.0	-10.0	-9.0	-2.5	-9.0			
7 roughly coincident indicators	0 <sup>c</sup>	+1.0	0	0	+3.0	0	+3.0	+1.0	-1.0	-6.0			
6 lagging indicators	+3.0	+7.0	+9.5	+2.0	+6.0	+7.5	+6.0	+3.5	+23.0	+0.5			
					Median Lead (-) or Lag (+)								
12 leading indicators <sup>b</sup>	-6.0	-1.7	-1.5	-3.6	-7.6	-4.0	-10.4	-7.6	-2.7	-9.7			
7 roughly coincident indicators	+2.0 <sup>c</sup>	0	+6.0	-0.6	+1.6	-1.3	-1.1	+0.6	+3.7	-9.3			
6 lagging indicators	+3.0	+11.0	+8.8	+4.0	+5.2	+7.5	+2.0	+4.5	+21.3	+0.5			
					Mean Lead (-) or Lag (+)								

SOURCE: Based on Table 4.

<sup>a</sup>There are only 25 series matching the 26 on the current U.S. short list because there is no U.K. equivalent for manufacturing and trade sales, a roughly coincident U.S. indicator. The details of my efforts to match the U.S. list with U.K. equivalents are given in Table B-3, available on request to the National Bureau.

<sup>b</sup>The timing of new companies registered and total business failures (inverted) was averaged at each turn to approximate the timing of net business formation, the U.S. leading indicator.

<sup>c</sup>Total employees in employment (series 1b) was used at 2/51 because employees in employment (series 1a) was not available.

**TABLE 7 Summary of Timing Patterns of 25 Indicators  
Matching U.S. Short List at 10 U.K. Growth  
Cycle Turns, 1953-1972  
(number of months)**

	At Peaks	At Troughs	At Peaks and Troughs
	Mean Lead (-) or Lag (+)		
12 leading indicators	-6.2	-6.7	-6.3
7 roughly coincident indicators	+3.2	-2.0	+0.5
6 lagging indicators	+10.1	+6.5	+8.3
	Median Lead (-) or Lag (+)		
12 leading indicators	-3.5	-3.5	-3.5
7 roughly coincident indicators	0	0	0
6 lagging indicators	+6.0	+3.5	+6.0

SOURCE: Medians were computed from Table 4; means are from Table B-2, available on request to the National Bureau.

### THE TIMING BEHAVIOR OF INDICATORS— A THREE-COUNTRY COMPARISON

Now finally a summary can be made of the behavior at cyclical turning points of the set of economic indicators for the United States, West Germany, and the United Kingdom (Table 8). It should be reiterated that the timing comparisons for the United States were developed for classical business cycles, whereas the comparisons for both West Germany and the United Kingdom are for growth cycles. Furthermore, Mintz's compilation for West Germany included only a few series that were not coincident, whereas for the United Kingdom virtually the entire U.S. short list was duplicated and analyzed. In addition, the results may be affected by differences in the way series are defined.

It is worth noting that there are more exact coincidences among the roughly coincident group for the United States than for either West Germany or Britain. It is possibly a reflection of more nearly synchronous behavior in the United States of the various measures of aggregate economic activity, but more probably, it is a reflection of the difference in cycle concepts. Were the U.K. (or the German) chronology restricted to classical cycles, there would be far fewer turns to analyze during the period covered; by comparison, the United States in the postwar period has had more absolute downturns in aggregate economic activity than have most other market-oriented economies.<sup>17</sup> But measured against classical cycles, the U.K. coincident indicators would no doubt more consistently exhibit exact coincidence. Growth cycles, reflecting fluctuations in

**TABLE 8 Comparison of Timing of United States, West German, and U.K. Indicators at Business Cycle or Growth Cycle Turns<sup>a</sup>**  
(number of months)

Series (U.S. title)	Median Lead (-) or Lag (+)		
	United States	West Germany	United Kingdom
<b>Leading indicators</b>			
Average hours worked, mfg.	-5.0		-3.0
Nonagricultural placements	-3.0		-1.5
Index of net business formation	-7.0		-8.5
New orders, durable goods	-4.0		-4.5
Contracts and orders, plant and equipment	-4.0		-4.0
New building permits, pvt. housing	-6.0		-3.0
	-6.0		-9.0
Chg. in book value, mfg. and trade inventories	-8.0		-3.0
Industrial materials prices	-2.0		-5.0
Stock prices, 500 common stocks	-4.0	-5.0	-7.5
Corporate profits after taxes (Q)	-2.0	-1.0	-4.0
Ratio: price to unit labor cost, mfg.	-3.0		-12.0
Chg. in consumer instal. debt	-10.0		-10.0
Mean	-5.0	-3.0	-5.7
<b>Roughly coincident indicators</b>			
Employees in nonagricultural establishments	0	+1.0	+2.0
Unemployment rate, total (inverted)	0	+2.0	+1.0
GNP in constant dollars, expend. est. (Q)	-2.0	0	-0.5
Industrial production	0	0	-0.5
Personal income	-1.0	+3.0	0
Mfg. and trade sales	0	0	-
Sales of retail stores	0	-	+2.0
GNP in current dollars (Q)	0	0	+1.5
Nonagricultural job openings	0	-1.0	-0.5
Mean	-0.3	+0.6	+0.6
<b>Lagging indicators</b>			
Unemployment rate, 15 wks. and over (inverted)	+2.0		+2.5
Business expenditures, plant and equipment (Q)	+1.0	-1.0	+9.0

Series (U.S. title)	Median Lead (-) or Lag (+)		
	United States	West Germany	United Kingdom
Book value, mfg. and trade inventories	+2.0		+6.0
Labor cost per unit of output, mfg.	+8.0		+14.0
Commer. and indus. loans outstanding	+2.0		-3.0
Bank rates, short-term business loans (Q)	+5.0		+8.5
Mean	+3.3	-1.0	+6.2

SOURCE: United States: Moore and Shiskin (1967, Table 6, col. 2); the figures used here cover various periods. West Germany: Mintz (1970, Table 5). United Kingdom: from Table 4, above.

\*West German and U.K. turning points used to determine leads and lags are for growth cycles, and the indicators are in trend-adjusted form; United States turning points are for classical business cycles, and the indicators are not trend adjusted. Comparisons are made utilizing the West German and the U.K. series most closely approximating each U.S. indicator.

Q = quarterly data.

economic activity around trends rather than absolute declines, are less severe in their impact and can therefore be expected to show somewhat greater variability in their onset in various measures of aggregate economic activity.

Among the U.S. leading indicators, it can be seen in Table 8 that two exhibit a median lead of under three months and two a lead of only three months. For the United Kingdom only one series has a lead of less than three months and four a lead of only three months. In several cases the median leads are far longer for the U.K. series than for the United States ones, a fact reflected in the average lead of 5.7 months for U.K. indicators against only 5.0 months for the United States. These differences are all relatively small, and the significant factor is that the U.K. series exhibit leading behavior remarkably similar to that of their U.S. counterparts.

The same conclusion is applicable to the lagging indicators except that the lags are mostly even longer for the United Kingdom than for the United States. This group includes the single exception to the timing similarity between indicator turns in both countries: advances by London clearing banks, a series that leads more often than it lags. It is the closest equivalent to the U.S. series for commercial and industrial loans outstanding, and the discrepancy may be due to differences in what the two series actually measure or to a real difference in the behavior of business lending in the two countries. In Mintz's study of West Germany, although it was confined



to coincident indicators, there is also one discrepancy between U.S. and German indicators, namely, in incomes, particularly wage incomes, which tended to lag behind in Germany but not in the United States (Moore and Shiskin 1967, p. 29).

Overall, the significance of Table 8 lies in the highly consistent typical behavior of the indicators it reveals for both the United States and the United Kingdom, as well as for such comparisons as presently are possible for Germany.

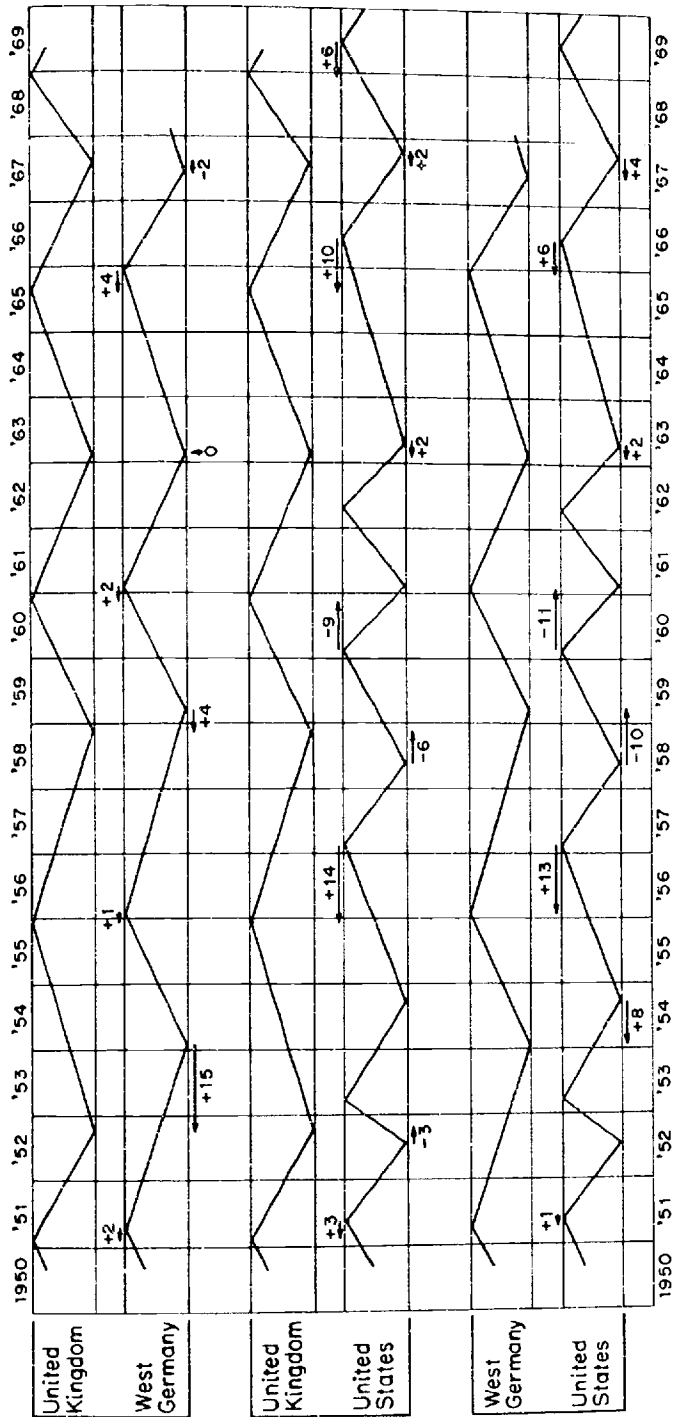
### THE TIMING BEHAVIOR OF GROWTH CYCLE TURNING POINTS—A THREE-COUNTRY COMPARISON

It is appropriate to conclude this interim report by suggesting some of the possibilities opened up by the development of the IEI and U.S. growth cycle chronologies. Although the NBER analysis of U.S. indicators at growth cycle turns is still under review, there is now a tentative U.S. growth cycle chronology devised by Ilse Mintz which may be considered along with that for the U.K. developed here and the earlier chronology developed by Mintz for West Germany.<sup>18</sup>

In Chart 2 a simple comparison is presented of the postwar growth cycle turning points in the United Kingdom, West Germany, and the United States. Despite the simplicity of the presentation, a number of interesting relationships are revealed. The top pair of curves shows a surprisingly close relationship between the growth cycles of the United Kingdom and West Germany. The next two pairs show that all the growth cycles in the United Kingdom and in West Germany can be matched with growth cycles in the United States. The major exception to the pattern is the presence of two extra cycles for the United States. The greater frequency (hence shorter duration) of U.S. cycles is not new and can be seen in earlier periods in comparisons of classical cycles. Incidentally, the 1960s, frequently referred to as the longest peacetime expansion in U.S. history, when viewed in terms of growth cycles is neither noteworthy for its undue length, nor very different from the growth cycle pattern of the 1950s, also shown in the chart.

Consideration of the leads and lags among the turning points in the three reference chronologies presents perhaps the most provocative set of questions for future study. The consistency with which the peaks and troughs in the U.K. chronology lead the matched turns in both West German and U.S. growth cycles is striking. In comparisons between the United Kingdom and West Germany (the top pair of curves), the former leads without exception at peaks, while at troughs there are two leads, one coincidence, and one

**CHART 2 Comparison of Growth Cycle Turning Points:  
United Kingdom, West Germany, and the  
United States, 1950-1969**



SOURCE: United Kingdom: Table 4, above; West Germany: Mintz (1969); United States: Mintz (1974).  
NOTE: Numbers with arrows are the leads (-) or lags (+) in months between matched turning points.

lag. In comparisons between the United Kingdom and the United States, the former leads with but one exception at peaks and two at troughs. In the U.S.-West Germany comparison (bottom pair of curves) the latter leads except at the 1958 trough and the 1960 peak.

One can never argue, of course, that timing relationships reflect causal sequences in any simplistic way. Nonetheless, the evidence of rather consistent lags in the turns in U.S. growth cycles behind corresponding turns in both West Germany and the United Kingdom at the very least does little to bolster the popular notion (in Europe, in any case) that economic difficulties in the United States have been the source of similar difficulties in European economies. All that can be said on the basis of the present evidence is that if that theory is correct it did not manifest itself in the postwar period by anything as simple and obvious as consistent U.S. leads at growth cycle turning points.

In the final analysis the major significance of the chart lies perhaps in the questions it raises and the future work it suggests for the International Economic Indicators project. Are the U.S. lags shown in Chart 2 to be found in the relationship between turns in U.S. growth cycles and those in other economies as well? Do all European growth cycles conform to each other as closely as do those of West Germany and the United Kingdom? Will subsequent analysis of leading indicators by country, including comparisons involving analytical devices such as composite indexes of groups of indicators, exhibit similar relationships? Will they enable us to point to particular types of economic activity by which instability might be transmitted from country to country? Will the addition of our data on international trade and other external economic relationships help us to explain the temporal relationships already revealed in Chart 2 for the three countries for which growth cycle chronologies have been developed, or will we have to look in greater detail or in new ways at interrelationships within each country viewed initially as a closed economy before the ways by which economic instability is exported can be more completely understood? In short, the patterns revealed in Chart 2 seem to point both to the potential usefulness of the IEI project and to the challenges which its successful completion must meet.

### UTILIZING GROWTH CHRONOLOGIES— AN ILLUSTRATION

We have already noted that the pattern of turning points revealed in Chart 2 does very little to bolster what might be called the "sneeze hypothesis" ("when the United States sneezes, Europe catches cold").<sup>19</sup> Here I will illustrate how the development of growth chronologies can be employed to

test the validity of that hypothesis in somewhat more specific form than was the case earlier when only the turning points were compared.

The meaning of the sneeze hypothesis is, presumably, that when the United States suffers a recession, the consequent reduction in its demand, including its demand for imports—relatively mild in U.S. terms—produces a relatively severe contraction in the exporting countries.

The sneeze hypothesis appears to represent a particular version of what might be called the traditional hypothesis, which was well stated long ago by Wesley Clair Mitchell: "Prosperity in any one country stimulates demand for the products of other countries, and so quickens the activities in the latter regions. . . . Further, prosperity . . . encourages investments abroad as well as at home, and the export of capital to other countries gives an impetus to their trade. A recession checks all these stimuli" (1927, p. 446).

Mitchell's notion would appear to make the chain of causation run from the country recovering or contracting earliest or most strongly to other economies. This generalization might, of course, be modified according to the degree of dependence on imports or foreign capital investment. This notion of Mitchell's, coupled with the recognition that the United States was relatively less dependent on exports than other economies, led to the assumption that the sneeze was invariably America's and the cold Europe's. It is therefore worth reassessing the traditional explanations of how international trade provides a conduit for the international transmission of cyclical disturbances. This is one of the possible by-products of the IEL project. At this point, clearly, only limited information is available, but it is worth presenting as a way of illustrating the uses of the new growth cycle chronologies. The data considered involve trade between the United States and the United Kingdom.

The traditional hypothesis, as advanced by Mitchell, would lead one to expect that:

1. U.S. exports to the United Kingdom would conform well to U.K. growth cycles, and
2. U.K. exports to the United States would conform well to U.S. growth cycles.

These expectations would reflect the direct effects of prosperity or recession in the importing country on the volume of its imports. (Clearly, the transmission of cyclical changes through such trade effects would be more pronounced under fixed exchange rates operating with full convertibility than under floating and rigid controls.) If, in addition, the United States exports its recessions, along the lines of the sneeze hypothesis, one might expect that:

3. U.K. exports would conform well to U.K. growth cycles.

On the other hand, if the sneeze hypothesis works in the opposite direction to the commonly held view:

**TABLE 9 Rates of Change in U.S.-U.K. Export Trade during Growth Cycles, 1952-1972**  
(exports in millions of dollars)

U.K. Growth Cycles	Annual Change in—		U.S. Growth Cycles	Annual Change in—	
	U.S. Exports to U.K. (1)	U.K. Exports to U.S. (2)		U.S. Exports to U.K. (3)	U.K. Exports to U.S. (4)
Upswings			Upswings		
Downswings			Downswings		
1952-55	+83	+35	1952-53	+110	+35
1958-60	+285	+75	1953-54	+138	+88
1960-63	+200	+215	1957-58	+285	+75
1965-67	+350	+420	1960-61	-10	+230
1968-72	+112	+232	1962-63	+170	+243
			1963-66	+250	+185
			1967-69	+50	+445
			1970-72		
Average during					
Upswings	+230	+186		+142	+185
Downswings	+29	+126		-14	-7
Conformity index <sup>a</sup>	+100	+43		+67	+83

SOURCE: 1952-1962: United Nations, *Statistical Yearbook* (1962), Table 153; 1963-1972, excluding 1964: *ibid.* (1973), Table 144; 1964: *ibid.* (1972), Table 144. Data are sometimes revised; latest data were used but may not have been entirely consistent.

<sup>a</sup>A slower rate of growth during a growth cycle downswing than an adjacent upswing is counted as an instance of positive conformity; the opposite, as negative conformity. The conformity index is the number of positive instances minus the number of negative instances, divided by the total number, and multiplied by 100. The index range is from 100 to -100.

4. U.S. exports would be expected to conform well to U.S. growth cycles.

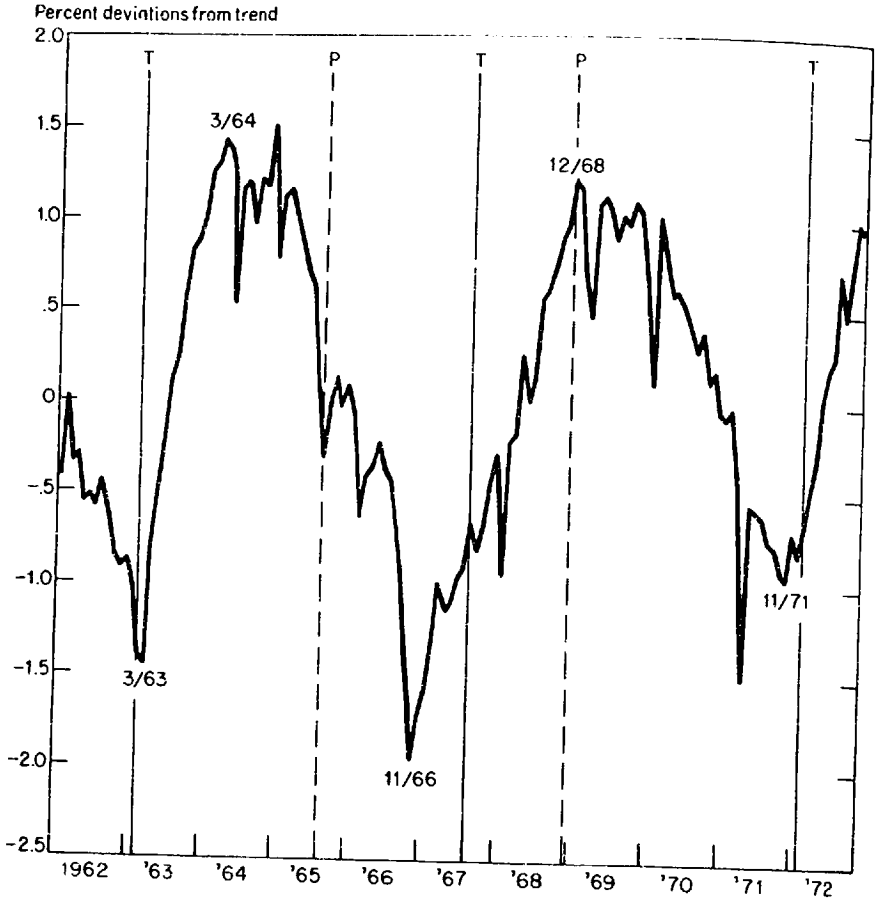
Calculations based on annual data for 1952–1972 show that hypotheses 1 and 2 are firmly supported (see Table 9). U.S. exports to the United Kingdom show faster rates of growth during U.K. upswings than downswings in every instance, i.e., seven times out of seven (column 1). The average annual rate of growth of U.S. exports during U.K. upswings, \$230 million per year, greatly exceeds the corresponding average during U.K. downswings, \$29 million per year. Similarly, U.K. exports to the United States grow faster during U.S. upswings than downswings in eleven instances out of twelve (column 4). Here the average growth during U.S. upswings, \$185 million, compares with an average decline during downswings of \$7 million. Thus, the traditional view that domestic conditions are a dominant factor in the control of the flow of imports in this two-way trade is clearly demonstrated by the new growth cycle chronologies.

Some support can also be found for the sneeze hypothesis, but it seems to work as well if not better in the opposite direction to the common view. U.K. exports to the United States grow faster during U.K. upswings than downswings five times out of seven, but the average rate during upswings, \$186 million, is only slightly larger than the average during downswings, \$126 million (column 2). If this represents the effect of U.S. sneezes, the result is hardly pneumonia. Indeed, the reverse effect is if anything stronger, for U.S. exports to the United Kingdom grow faster during U.K. upswings than downswings ten times out of twelve, and the average growth rate during upswings, \$142 million, differs quite sharply from the average decline during downswings, \$14 million (column 3). In neither case, however, do the differences seem large enough to represent an important influence on the growth cycle in either country.

Thus we are led to conclude that domestic growth cycles in both the United States and United Kingdom have significant effects on the other country's exports to them and that this represents one of the ways by which growth cycles spread internationally. But we have not found evidence that the contagion runs in a dominant way from the United States to the United Kingdom.

If this type of analysis were extended to a number of countries, using quarterly or monthly data, and including not only exports and imports but also investments, other capital movements, etc., it would no doubt be possible to trace with far greater precision the impact of international economic relations on the transmission of growth cycles from one country to another. Furthermore, the development of leading indicators of growth cycles would permit study of their value as forecasters of foreign trade trends.

**CHART A-1 United Kingdom: Average Hours Worked,<sup>a</sup>  
Manufacturing Industries, 1962-1972**

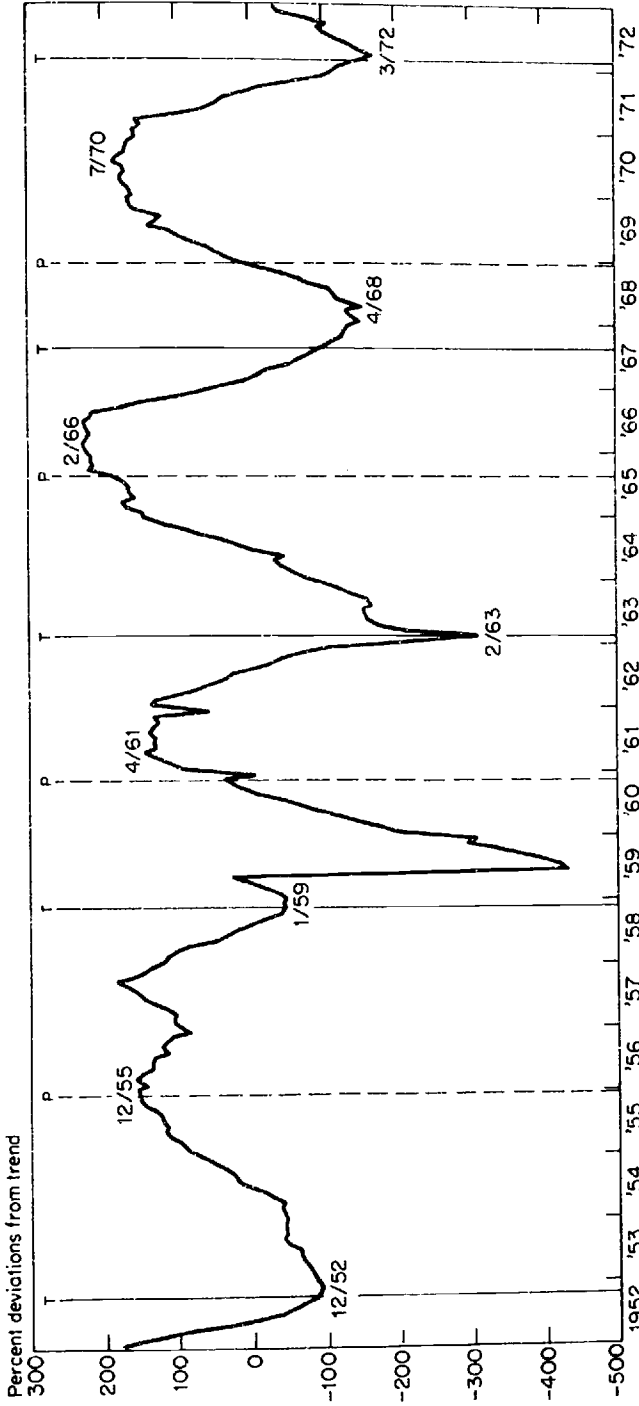


<sup>a</sup>Series 1 in set of U.K. leading indicators.

**APPENDIX A: SAMPLE CHARTS FOR SELECTED  
U.K. SERIES**

One series has been selected from each group of leading, roughly coincident, and lagging indicators. A full set of working charts similar to the samples shown here is available on request to the National Bureau of Economic Research.

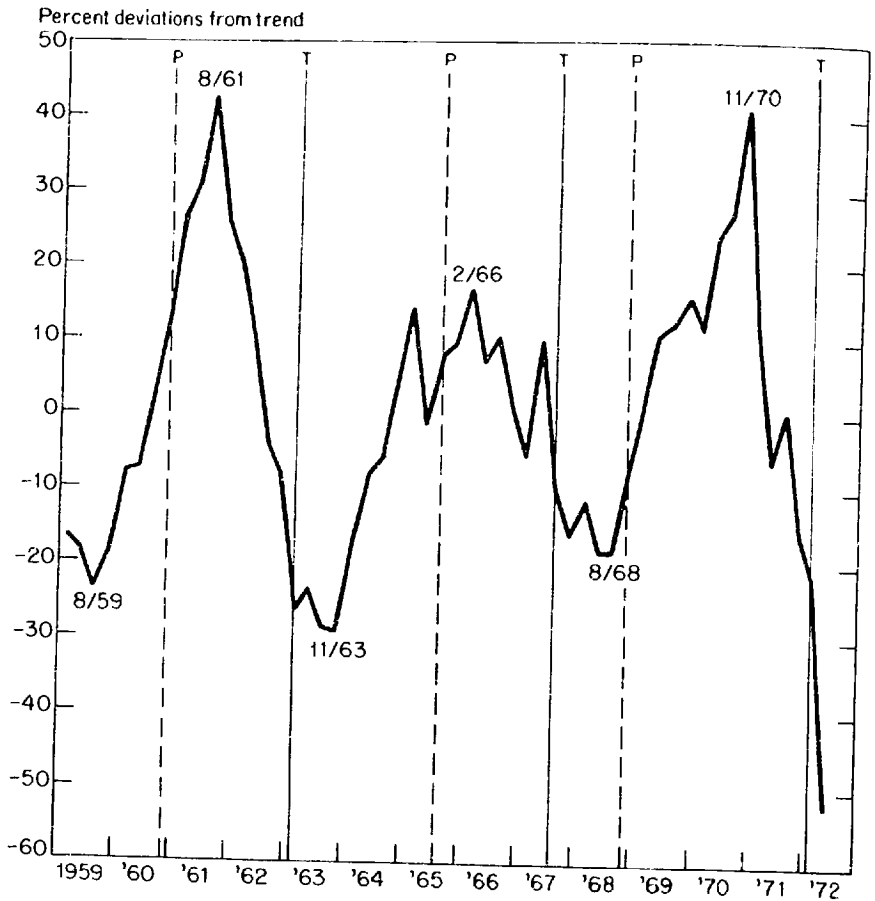
**CHART A-2 United Kingdom: Employees in Employment<sup>a</sup>  
(Index of Production Industries), 1952-1972**



<sup>a</sup>Series 1a in the set of U.K. roughly coincident indicators.



**CHART A-3 United Kingdom: Fixed Capital Expenditure, Manufacturing, Plant and Machinery,<sup>a</sup> 1963 Prices, 1959I-1972II**



<sup>a</sup>Series 2 in the set of U.K. lagging indicators.

## APPENDIX B: BASIC DATA

The following tables are available on request to the National Bureau of Economic Research:

- B-1 Median and Mean Timing Patterns of 38 U.K. Indicators at U.K. Growth Cycle Turns, 1951-1972
- B-2 Titles and Sources of 38 U.K. Indicators and Mean Lead (-) or Lag (+) at U.K. Growth Cycle Turns
- B-3 Comparative List of U.K., U.S., and West German Indicators

- B-4 Summary Measures for Composite Indexes of U.K. Leading and Roughly Coincident Indicators
- B-5 Composite Index of 12 Leading Indicators, United Kingdom, 1948-1973
- B-6 Composite Index of 6 Roughly Coincident Indicators, United Kingdom, 1949-1972
- B-7 Turning Points Selected in All U.K. Time Series
- B-8 Value of U.K. Exports to the United States and U.S. Exports to the United Kingdom, 1952-1972

## NOTES

1. This is, in fact, the method adopted by O'Dea (1975). Peaks and troughs in unemployment are used for the reference chronology. In the analysis of a single sector of the economy a reference chronology pertaining specifically to that sector has merit, although complications ensue when other sectors are brought into the analysis. As it turns out, O'Dea's chronology of unemployment cycles is in one-to-one correspondence with the growth cycle chronology developed in this paper. His dates lag behind the growth cycle dates in all but two instances, where they are coincident. His dates differ from mine for unemployment in four instances (1966-1972), because his series has no trend adjustment.
2. They analyzed data for Great Britain, France, and Germany, as well as the United States.
3. Current experience in the United States provides an example. Real GNP reached a peak in the fourth quarter of 1973, and the decline during the next two quarters was comparable in magnitude with earlier cyclical declines in real GNP in 1969-1970, 1960-1961, 1948-1949, and 1926-1927. But this has not been true, so far at any rate, of any other independently measured major aggregate such as industrial production or employment.
4. Quarterly data were handled on a comparable basis, employing a twenty-quarter moving average with straight-line fits similarly calculated for the first ten and last ten quarters in each series. Quarterly data were then analyzed in monthly terms, by using the midmonth of each peak or trough quarter to represent the turn.
5. Two chronologies were previously available for the United Kingdom. Drakatos (1963) had produced a chronology of "leading indicators for the British economy," with troughs in July 1952, November 1956, and September 1958, and peaks in April 1951, December 1955, and September 1957. Only the December 1955 trough appears on my list. His 1951 peak leads mine, and his trough dates lag behind mine in 1952 and 1958. He also includes an extra cycle in 1956-1957.

The other chronology I encountered was an annual one by Matthews (1969), with troughs in 1952, 1958, and 1962, and peaks in 1951, 1955, 1960, and 1964. Like mine, his was based on deviations from trends, and is otherwise roughly similar, but it is impossible to go far in comparing an annual with a monthly chronology.

More recently, while this article was in press, the Central Statistical Office of H.M. Treasury (1975) presented a chronology of its own in *Economic Trends* (March 1975). In addition, the National Bureau's IEI project completed development of a computer program for producing growth cycle turning points based on a common methodology

for all industrialized, market-oriented economies, and the United Kingdom was among the first countries to which it was applied. Finally, O'Dea (1975b) published a general chronology, although he ultimately relies on "indicators of target variables" for labor, production, investment, etc. The dates of the recently developed U.K. chronologies and their timing relative to the one developed in this study are shown in the accompanying Table A-1.

6. The U.S. series (*Business Conditions Digest*, BCD 50) was available from 1969 to 1973. Job vacancies are now estimated via an index of help-wanted advertising in newspapers (BCD 46).
7. Recent work suggests the United States has had six growth recessions since 1950 against only five in the United Kingdom.
8. There is some evidence of an extra cycle in 1969-1970, but the period is clouded primarily by the shortness of the movements. Were they all to be chosen as turning points, we would be breaking the NBER rule that intervals between peaks or between troughs must be at least fifteen months long to represent a genuine cycle.  
The volatility of recent years in the GDP in constant prices, just alluded to, is to some extent reflected as well in GDP in current prices, although the selection of turning points seems marginally less ambiguous.
9. Details concerning time periods covered and original sources of all U.K. series used are given in Appendix B, which is available from the National Bureau on request. The selections reported on in the text are ultimately my own, but were made in consultation with officials of the Central Statistical Office of the United Kingdom whose advice and facilities were placed at my disposal. They have my deep appreciation.
10. In her recently published study of U.S. growth cycles, Mintz (1975, p. 73) found differences between GNP in current and in constant prices as large as fifteen months (1957 peak) and twelve months (1969 peak). They are disquieting in any country because they suggest distortions caused either by the deflation techniques employed or by the impact of inflation itself on cyclical turns.
11. O'Dea (1975a) and others have suggested that turns in British production should be expected typically to lead turns in employment measures because entrepreneurs attempt to adjust to demand changes by increasing the average work week before they increase employment in the upswing and by decreasing the work week before they reduce the level of employment in the downswing. The lag is variously estimated at between one and three quarters. There is a similar lag in U.S. data.
12. For a discussion of the significant properties of composite indexes, see Shiskin (1961, App. A). Ifse Mintz used Shiskin's technique in her work on West German and U.S. growth cycles (see notes 5 and 10, above). The technique is currently used by the Department of Commerce in constructing the leading, coincident, and lagging indexes for *Business Conditions Digest*.
13. The behavior of the U.K. composite indexes summarized here may be compared with the behavior of comparable composite indicators for the United States reported regularly in *Business Conditions Digest*. The roughly coincident index (BCD 820) shows leads or lags at U.S. classical cycle turning points of as much as four months. The median at peaks is a lead of one month, at troughs a lead of one month, at both turns, zero. (Cf. *Business Conditions Digest*, Chart B7, each issue.) In general the leads and lags are shorter and less variable than those found for the United Kingdom; certainly discrepancies as long as our longest, the 22-month lag at the 1968 peak, are not found. The behavior of the U.K. composite index at that turn underscores the anomalous behavior of the underlying series in that period (cf. the discussion of that turn in the text above).
14. Appendix B, available on request to the National Bureau, contains a descriptive comparison of the U.K., U.S., and West German indicator series.

**TABLE A-1 Three Alternative Chronologies Versus Klein Chronology**

Peaks							Troughs						
		Lead (-) or Lag (+) vs. Klein, in Months							Lead (-) or Lag (+) vs. Klein, in Months				
Klein	NBER <sup>a</sup>	UK-CSO <sup>b</sup>	O'Dea <sup>c</sup>	NBER	CSO	O'Dea	Klein	NBER <sup>a</sup>	UK-CSO <sup>b</sup>	O'Dea <sup>c</sup>	NBER	CSO	O'Dea
2:51	5:51	-	2:51	+3	-	0	10:52	11:52	-	7:52	+1	-	-3
12:55	12:55	-	12:55	0	-	0	11:58	11:58	10:58	9:58	0	-1	-2
11:60	3:61	3:60	7:60	+4	-8	-4	2:63	2:63	10:62	1:63	0	-4	-1
8:65	2:66	12:64	1:65	+6	-8	-7	8:67	3:67	12:66	8:67	-5	-8	0
12:68	11:68	5:69	3:69	-1	+5	+3	2:72	2:72	3:71	2:72	0	-11	0
-	-	7:73	-	-	-	-	-	-	-	-	-	-	-
No. of comparisons				5	3	5					5	4	5
Leads				1	2	2					1	4	3
Coincidences				1	0	2					3	0	2
Lags				3	1	1					1	0	0
Mean lead (-) or lag (+)				+2.4	-3.7	-1.6					-0.8	-6.0	-1.2

<sup>a</sup>NBER International Indicators Project, March 6, 1975.

<sup>b</sup>"Cyclical Indicators for the United Kingdom Economy," *Economic Trends*, March 1975.

<sup>c</sup>O'Dea (1975b).

15. Ultimately, of course, it is the objective of the International Economic Indicators project to compare and analyze the behavior of indicators at turning points in growth cycles rather than classical cycles. As stated earlier, the bulk of my analysis here is in terms of classical cycles for the United States but of growth cycles for the United Kingdom and (here) West Germany (see Table 2, note a). The classification of indicators in the United States has been based on classical cycle analysis. In my initial effort, therefore, I implicitly assumed that the same classification would apply to growth cycles. While this will doubtless be true it need not (and probably will not) be true that the average timing of leads and lags will be the same at growth cycle turns as at classical cycle turns.

Since the text was completed, Mintz's study (1974) of U.S. growth cycles has become available, and it is interesting to suggest what may lie ahead for the larger project by comparing the timing at growth cycle peaks and troughs of as many of the coincident indicators included in Table 2 as she has included in her study. The results (from Mintz 1974, Table 11) are summarized below; the figures are for the median timing of each series (in months) at U.S. growth cycles:

	Peaks	Troughs
Personal income	0	0
GNP (current prices)	+1.0	0
GNP (constant prices)	-0.5	-1
Index of industrial production	-0.5	-1
Employees on nonag. payrolls	-0.5	-1
Unemployment rate (percent; inverted)	0	0
Mean of medians	-0.1	-0.2
Median of medians	-0.5	0

The average timing of these indicators appears to be closer to the turning points of growth cycles than of classical cycles and somewhat closer, therefore, than the timing, already considered in Table 2, of the comparable West German and U.K. indicators at growth cycle turns. The coinciders appear to be least close in West Germany, with the United Kingdom falling into an intermediate position. The results indisputably suggest the importance of continuing our work on indicators by carrying through comparable analyses around growth cycle turns. However, not too much significance should be

imputed to these tentative U.S. growth cycle findings, since the number of indicators in the table above is small and does not include some of those which showed the biggest deviations from classical cycles in Table 2; in addition, the medians obscure some turns at individual U.S. growth cycle turning points, e.g., +17 months for personal income and +18 months for nonagricultural employment—both at the April 1963 growth cycle peak. These are as long almost as any we have observed in the United Kingdom. Both means and medians obscure dispersion around them that is symmetrical, and growth cycles generally are more symmetrical than classical cycles because the former are trend adjusted. As the previous discussion in the text has indicated, one of the most troublesome problems in selecting cyclical turning points is the dispersion in turns in presumably coincident indicators.

16. Moore and Shiskin (1967, App. B). Calculations show that there are 374 comparisons possible for the 25 roughly coincident indicators, with 200 of them turning within three months of the reference dates (*ibid.*, pp. 97–98).
17. Mintz's recent work on U.S. growth cycles suggests that three additional recessions, in 1951–1952, 1962–1963, and 1966–1967, are added by the transition from classical to growth cycles.
18. The new U.S. growth cycle chronology is reported in Mintz (1974). This study is, roughly, an application of the techniques Mintz developed in her 1970 study on West Germany, and again does not go beyond the problem of dating cycle turns. Like her West Germany study, therefore, it opens the door to the kind of indicator analysis contemplated for the IEI study and which I attempt here to sketch in for the case of the United Kingdom.
19. Charles Kindleberger, for example, comments, "Sir Dennis Robertson once referred to the critical dependence of Europe on cycles originating in the United States, to say that 'when the United States sneezed, Europe caught pneumonia.'" Charles Kindleberger, *International Economics*, 4th Ed., Homewood, Illinois, Richard D. Irwin, 1968, p. 483.

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