Postwar Growth Cycles in the German Economy

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Introduction

The conventional definition of business cycles refers to this phenomenon as "recurring but not periodic" fluctuations found in the aggregate economic activity of all market oriented economies[1]. The National Bureau of Economic Research, which pioneered in the study of business cycles, quite naturally focussed on business cycles in the United States. In the earliest studies, it was clear that the phenomenon under consideration was common to all business enterprise economies, and chronologies were produced many years ago for a number of countries, including Germany. They covered the years prior to World War II. The first German chronology produced at the National Bureau is shown in *Table 1*, and shows that business cycle peaks and troughs can be discerned for the German economy well back into the nineteenth century.

In our most recent work at the National Bureau we have, in common with many other students of business cycles, shifted much of our attention from "classical cycles", of the type shown in *Table 1*, to "growth cycles", designed to measure recurring alterations in the rate of economic growth. Particularly after World War II, rapid growth rates oftentimes were so pronounced that absolute declines in the level of economic activity were quite rare if not altogether absent. In a pioneering study based on the postwar experience of the Federal Republic, Ilse Mintz showed that recurring alterations in growth rates, based on the examination of detrended time series, not only provided more cyclical episodes, but that these episodes had many of the characteristics of classical cycles. She demonstrated that National Bureau methods for dating cycles could be adapted to the dating of growth cycles. Mrs. Mintz found four growth cycles in Germany during the period 1950–1967, whereas only one classical cycle had occurred[2].

* The author wishes to thank Geoffrey H. Moore for many constructive suggestions on an earlier draft of this paper.

1 This perspective is central to the definition of cycles given by Arthur Burns and Wesley Clair Mitchel in *Measuring Business Cycles*, published by the National Bureau of Economic Research in 1946. See page 3.

2 Ilse Mintz, *Dating Postwar Business Cycles: Methods and Their Application to Western Germany*, NBER, New York 1969.

Table 1: Classical Cycle Chronology for Germany

Peak		Trough	
			1866
	1869		1870
	1872	Feb	1879
Jan.	1882	Aug.	1886
Jan.	1890	Feb.	1895
Mar.	1900	Mar.	1902
Aug.	1903	Feb.	1905
July	1907	Dec.	1908
Apr.	1913	Aug.	1914
June	1918	June	1919
May	1922	Nov.	1923
Mar.	1925	Mar.	1926
Apr.	1929	Aug.	1932

Arthur F. Burns and Wesley Clair Mitchell, Measuring Business Cycles, National Bureau of Economic Research New York, 1947. Table 16, p. 79.

Reprinted in The Business Cycle in a Changing World by Arthur F. Burns, National Bureau of Economic Research, New York, 1969, p. 79.

In 1973, Geoffrey H. Moore and I launched the International Economic Indicators (IEI) project at the National Bureau. It was designed to build on Mrs. Mintz's seminal work. In particular we wished to apply traditional National Bureau methods to dating growth cycles in market-oriented economies and determine whether series equivalent to the National Bureau's leading indicators of classical cycle turning points for the United States could be found for other economies and adapted to forecasting growth cycle turning points. We have thus far tested the system for the United States, Canada, United Kingdom, West Germany (in a revision and updating of Mrs. Mintz's study), Japan, and more recently France and Italy. Work to date strongly supports an affirmative conclusion to the underlying hypotheses from which we began.

Dating German Growth Cycles

We have noted that Ilse Mintz produced the first German growth cycle chronology. It dealt with the early postwar period, and the turning points she selected are shown in *columns 1* and *2* of *Table 2*. In *columns 3* and *4* we show the most recent and up-to-date growth cycle

Table 2: German Growth Cycle Turning Points: Two Assessments

Mintz[a]		IEI[b]		Lead (-) or Lag (+) in Months	
Peak (1)	Trough (2)	Peak (3)	Trough (4)	(3) vs. (1)	(4) vs. (2)
4/51		2/51		-2	
	1/54		2/54		+1
1/56		10/55		-3	
	3/59		4/59		+1
1/61		2/61		+1	
	2/63		2/63		0
12/65		5/65		-7	
	1/67		8/67		+7
		5/70			
			12/71		
		8/73			
			5/75		
Mean At Peaks:				-3	
At Troughs:					+2
At Both:				0	
Median At Peaks:				-2	
At Troughs:					+1
At Both:				0	

[a] Ilse Mintz, Dating Postwar Business Cycles, Methods and Their Applications to Western Germany, 1950–67, National Bureau of Economic Research, New York, 1969 p. 25.

[b] National Bureau of Economic Research, International Economic Indicators Project.

chronology for Germany produced by our ongoing International Economic Indicator project. There are discrepancies between Mrs. Mintz's original dates and our present dates covering the same period. Several reasons account for this. Mrs. Mintz's original data included a mixture of series in physical volume form and series expressed in current prices. We have concluded that inflation rates have been sufficiently high in many countries (if not in Germany) that we need to be able to distinguish fluctuations in real economic activity from the consequences of inflation[3]. Secondly the analysis of growth cycles requires that the underlying data be trend adjusted, and Mrs. Mintz's method of adjusting for trend differed slightly from our present method. Finally, the basic series she included in measuring aggregate economic activity differed somewhat from the series we use. None of these discrepancies should produce large differences in turning points and the analysis of the timing comparison included in *Table 2* shows that the revisions have not produced large

3 We analyze the latter later in the paper.

Table 3: Monitoring German Growth Cycles: Growth Turns vs. Production Index Turns, 1951–1978

IEI Growth Cycle Turns (1)	Index of Industrial Production, Trend-Adjusted Bundesbank Turns (2)	IEI Turns (3)	Lead (-) or Lag (+) In Months (2) vs. (1) (4)	(3) vs. (1) (5)	(2) vs. (3) (6)
At Peaks					
2/51		4/51			
10/55		12/55			
2/61	1/61	3/61	-1	+1	-2
5/65	3/65	1/65	-2	-4	+2
5/70	1/70	4/70	-4	-1	-3
8/73	4/73	8/73	-4	0	-4
		3/77			
		Mean Timing	-3	-1	-2
		Median Timing	-3	0	-2
At Troughs					
1/54		1/54			
4/59		3/59			
2/63	2/63	2/63	0	0	0
8/67	4/67	5/67	-4	-3	-1
12/71	11/71	12/71	-1	0	-1
5/75	5/75	7/75	0	0	-2
		5/78			
		Mean Timing	-1	-1	-1
		Median Timing	0	0	-1

Source: Col. 1 and 3 are the results of IEI calculations. Col. 2 - Statistiche Beihefte, Deutsches Bundesbank, Reihe 4, Feb. 1979. Estimated from char
on page 40.

differences. (The largest was a seven month difference which occurred twice.) Perhaps more importantly, there is perfect conformity in terms of the number of cycles which emerge.

Our present growth cycle chronology for Germany is, therefore, presented in *columns 3* and *4* of *Table 2*. It is useful before analyzing this chronology further, to compare it with the current assessment of growth cycles utilized in Germany. For some time the Deutsche Bundesbank has relied on the Index of Industrial Production (in trend adjusted form) to approximate the turning points in German growth cycles. At the National Bureau we have always avoided reliance on a single indicator, no matter how comprehensive, in determining business cycle turning points on the grounds that a better balanced chronology can be obtained by minimizing the possibility that abberations in a single series will unduly influence the analysis of aggregate economic activity. In *Table 3* we show our current Ger-

man chronology and compare it with both the German trend-adjusted production index as well as with the turning points produced by our own trend adjustment program for the production index. The comparisons shown in *column 6* suggest that the method of trend adjustment customarily makes little difference, but on several occasions the turning point in the production index varied by as much as four months depending on how the series was trend-adjusted. How closely do turns in the trend adjusted production index conform to our present growth cycle chronology? On average it turns out that our growth cycle troughs and troughs in the production index (both as adjusted by the IEI project and by the Bundesbank) are quite close. There was only one case (1967) when other factors intruded sufficiently to cause us to put the growth cycle trough several months after the turn in the production index. At peaks, there are more discrepancies. The discrepancies are somewhat greater between the adjusted Bundesbank production index and our growth peaks than they are between our adjusted production index and our growth cycle peaks. However, in neither case are the differences greater than four months. In the next section we shall assess the growth cycle chronology in the light of all the indicators, not just the production index.

The relevant data for assessing the performance of individual indicators at each of the turning points in the deflated German chronology is presented in *Table 4* as well as *Chart I.* It is considered in the next section. Here it is worth observing that there will usually be discrepancies where individual series exhibit widely separated turning points at the growth cycle turning points selected. *Chart I* shows, however, that there are remarkably few skipped or extra cycles in the seven series. Among the seven, only the disposable income series reveals a number of extra cycles. The employment series has one. Likewise there are virtually no skipped cycles, an exception to this being the volume of retail trade at the 1970–71 recession. In short, the conformity of all the series to the selected growth chronology is high, suggesting that the growth recessions measured were widely diffused through the German economy. Diffusion in this sense has always been a significant characteristic of classical recessions in an economy. The growth recessions are less severe in absolute terms, but is is apparent that in the case of Germany they were no less widespread in their manifestation than has historically been the case at classical recessions. Some idea of the variations in the depth of German recessions can be gotten by examining the composite index of coincident indicators shown in *Chart II.*

A word concerning our technique for selecting turning points in growth cycles is in order. We have a computer program for selecting turning points in the individual component series which was developed on the basis of the rules for turning point selection developed over the years at the National Bureau. That these rules are sufficiently standardized to enable their codification for the computer suggests that along with our reliance on judgemental elements, a good part of the process of selecting turning points is straightforward. However, the program still cannot assess the implications of all the anomalies or data inadequacies which might arise. We, therefore, make it a practice to review all computer-selected turns and modify some few when it seems appropriate. Next we compute the median turn for each cluster of turning points in individual series. The cluster of turning points is usually rather clear, but occasionally there is ambiguity because of the deviation of the turn in an individual series from the pattern emerging from most of the indicators.

Finally we compute a composite index of all the coincident indicators and the program produces a chronology of turns in this index. We then make a judgement about the consensus emerging from all the evidence – the revised turning points in individual indicators, the

Table 4: Leads and Lags of Individual Series at Growth Cycle Turning Points for Germany, 1951–1976 (in months)

A. Timing at Peaks-Lead (-) or Lag (+) in months

Series	Date Series Starts	2/51	10/55	2/61	5/65	5/70	8/73	Mean	Median
Real Disposable Income (Q)	1950	-6	-2	0	0	+19		+2	0
Real GNP(Q)	1950	0	+7	0	+9	0	-6	+2	0
Industrial Production	1950	+2	+2	+1	+7	-1	0	+2	+2
Mfg. Sales Volume	1957			-2	-4	-6	-7	-5	-5
Retail Trade Volume	1955		+18	+9	+4		-12	+5	+6
Employment	1951		+1	+1	+11	+5	+3	+4	+3
Unempl. (Inverted)	1950		+4	0	+10	+9	0	+5	+4
Coincident Index	1950	0	+2	+1	-1	+6	+1	+2	+1
Mean		-1	+5	+1	+4	+5	-3	+2	+2
Median		0	+2	0	+6	+5	-0	+2	+2

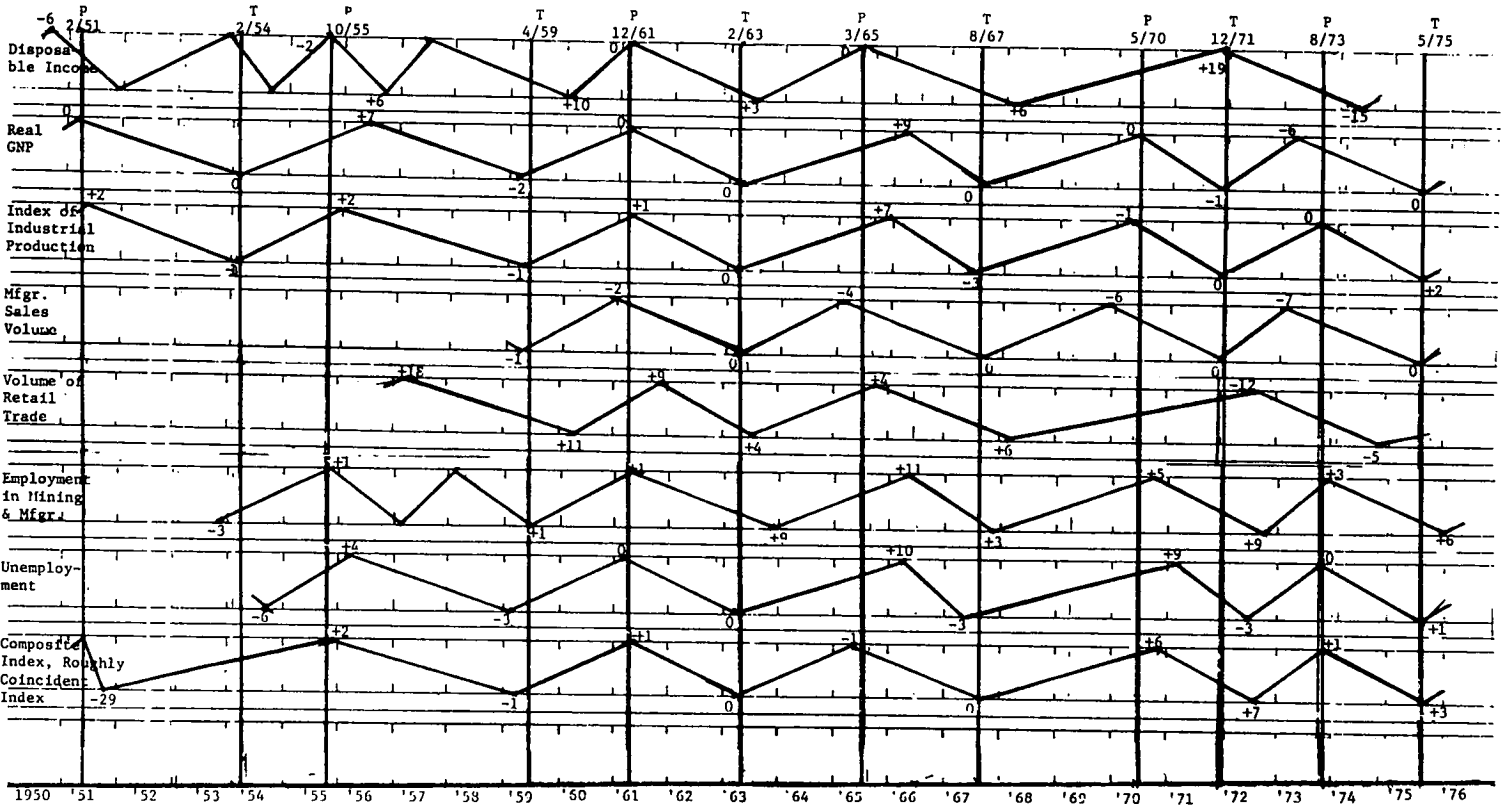
B. Timing at Troughs-Lead (-) or Lag (+) in months

Series	Date Series Starts	2/54	4/59	2/63	8/67	12/71	5/75	Mean	Median
Real Disposable Income (Q)	1950	+6	+10	+3	+6		-15	+2	+6
Real GNP(Q)	1950	0	-2	0	0	-1	0	0	0
Industrial Production	1950	-1	-1	0	-3	0	+2	0	0
Mfg. Sales Volume	1957		-1	0	0	0	0	0	0
Retail Trade Volume	1955		+11	+4	+6		-5	+4	+5
Employment	1951	-3	+1	+9	+3	+9	+6	+4	+4
Unempl. (Inverted)	1950	+6	-3	0	-3	+5	+1	+1	0
Coincident Index	1950	-29	-1	0	0	+7	+3	-3	0
Mean[1]		-4	+2	+2	+1	+3	-1	+2	+2
Median		-0	-1	0	0	0	0	+0	0

[1]Excluding the turn in 2/54 which has no comparable turn in the leading index.

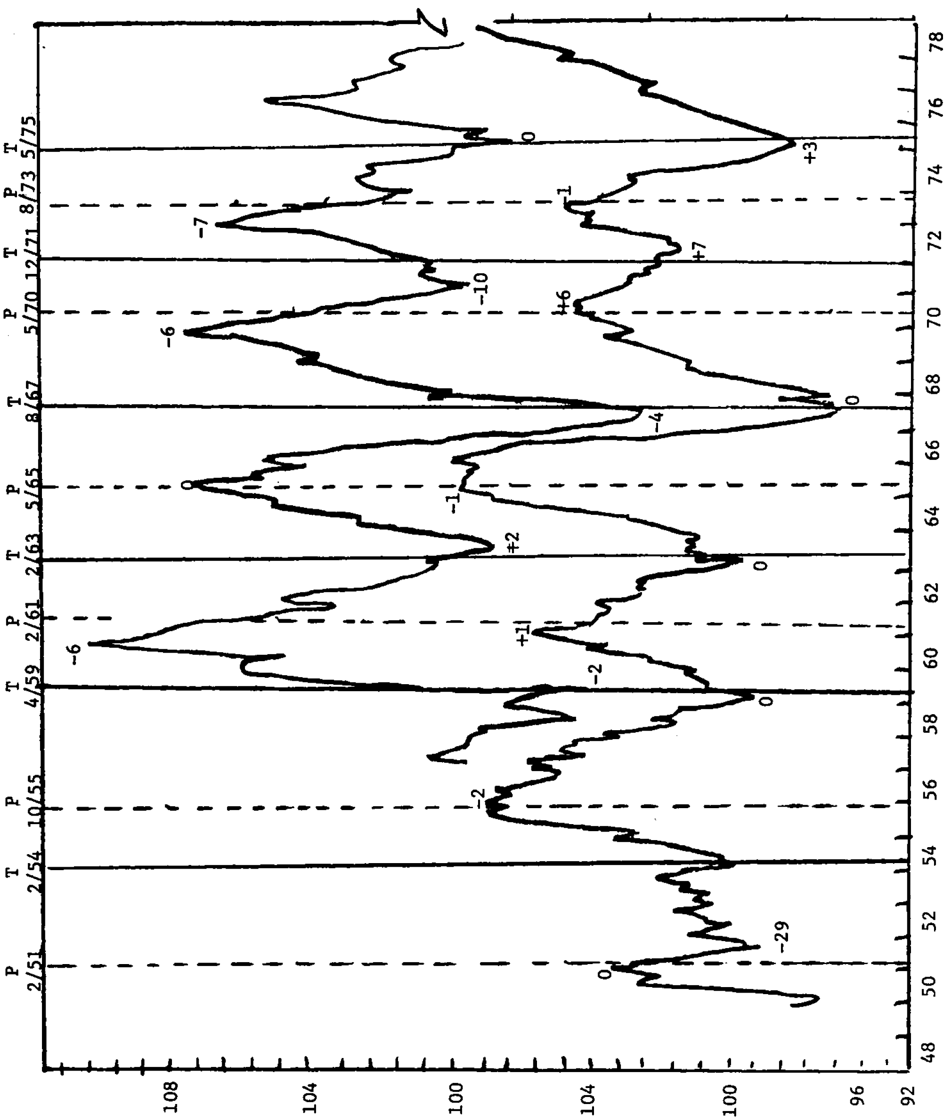
Source: Appendix Table 1

Chart I: West German Growth Cycles, Components of Roughly Coincident Indicator Index, 1950–1978



Source: Appendix Table 1.

Chart II: Germany, Leading vs. Coincident Composite Indexes, 1950–1978



Source: Table 8.

median of these turns, and the turns in the composite index. In this way we decide upon a growth cycle chronology. It is important to note that at no time is the leading indicator composite index or any of its component series consulted in the process of establishing the growth cycle chronology.

In assessing the twelve growth cycle turns for Germany which have been selected, it is instructive to consider the cases in which the evidence has suggested a change of more than a month or two from the computer selected turns in the composite index of coincident indicators. There are seven turns which coincide with the turns in the composite index or deviate by but one month – the peaks in 1951, 1961, 1965, and 1973; the troughs in 1959, 1963, and in 1967. The turns which deviate from the turns in the coincident index by two months or more include the peaks in 1955 and 1970, and the troughs in 1954, 1971, and 1975. It is useful to consider the behavior of the composite index at each of these turning points (see *Chart II*).

At the trough in 1954 the coincident index actually presents two troughs with a period of irregular growth in between. The first is in 1952, the second in 1954, with the latter only slightly less deep than the former. The 1971 trough is another in which the composite index of coincident indicators shows a double trough. A number of the components turn in the month selected (see *Chart I*) and there is, as noted, some support for this choice even in the composite index. The 1975 trough deviates from the trough in the coincident index by but three months. The coincident index does not reflect any ambiguity in this period, but there is considerable dispersion about the trough as is indicated in *Chart I*. The composite index subsumes but does not necessarily reflect such dispersion, and it is for this reason, among others, that choosing an appropriate growth cycle chronology has not been left entirely to the turning points reflected in the coincident index. As a rule, we try to select turning dates that correspond to a turn in at least one of the individual series used in the selection process, since that represents an actual estimate of activity. Moreover, although quarterly series are dated in the mid-month of the quarter, we recognize that that is an arbitrary convention and give more weight to the monthly series in choosing the monthly date.

There are two turns in which the selected peaks differ from peaks in the coincident index by more than one month – 1955 and 1970. In 1955, the discrepancy is minor – two months – and can be explained by the existence of a double peak, the earlier one conforming to our final selection. The difference is six months at the 1970 peak, with the selected turn leading the composite index. Again there is considerable weakening in the index prior to its peak, with a secondary peak coinciding with the reference peak. Once again the record among the indicators reflects dispersion.

In sum, the selection of an appropriate chronology involves balancing conflicting evidence, but the final growth cycle chronology for the Federal Republic, we feel, represents effectively the consensus of the data on production, employment, income and trade.

Assessing the Behavior of Individual Indicators

We have already commented on the overall conformity of the individual indicators utilized in determining the growth cycle chronology for West Germany. It is useful, however, to

consider the specific timing of the several indicators at the selected growth cycle turning points (see *Table 4*). Our original determination of what series to include in the "roughly coincident group" emanated from the National Bureau's perspective on business cycles as fluctuations in "aggregate economic activity". Customarily this is interpreted to mean income, output and employment, with additional attention paid to measures closely bound to these aggregates such as sales and trade.

As our work has progressed it has become increasingly apparent that employment, and less often, unemployment (inverted) tend to lag growth cycle turning points. This has been the case in our earlier work for all countries with only a few exceptions. Sometimes the lags are not long, and occasionally there is an average lead. But overwhelmingly at growth cycle turns one discovers that the employment series lag. The explanation offered in a number of countries – namely that entrepreneurs prefer marginal employment adjustments (e.g., changing the average work week) before making major aggregate adjustments in employment levels, would appear to be a reasonable explanation. *Table 4* suggests that this tendency to lag has persisted in this most recent study of West German growth cycles.

Real disposable income in the Federal Republic has been one of the most persistent series in tending to deviate (in both directions), sometimes by a long time, from the growth cycle consensus turn in most other roughly coincident indicators. Why this should be the case is not immediately clear but suggests itself as a useful topic for future research.

Manufacturing sales volume tends to lead at peaks, but not at troughs. Retail trade appears fairly consistently to have lagged at growth cycle turning points, suggesting, perhaps, that Germans in common with many others attempt to maintain purchasing levels for as long as seems feasible after a growth cycle peak. There is also some evidence that sales do not pick up until sometime after a trough. Most of the other series shown in *Table 4* conform reasonably to the selected growth cycle turning points.

Growth Cycle Chronologies – A Four Country Comparison

Using methods and data similar to those just described, the International Economic Indicators project has recently produced chronologies for four countries – the United States, West Germany, France, and Italy. There has, of course, long been much interest in whether one country consistently leads at peaks, both classical and growth. Similarly, whether economic revival occurs first in any one country with any consistency has attracted considerable speculation.

Table 5 presents the four chronologies and the results of turning point comparisons. In the case of Germany, there is a good deal of variation at individual growth cycle turns, vis-à-vis the United States, but on balance the leads offset the lags with the result that the average turn is close to the U.S. pattern. Both Italy and France present lags at most turning points, both at peaks and troughs. In general, the pattern of growth cycle chronologies for France and Italy are more closely parallel than either country is with Germany (see *Chart III, Part A*). In earlier work on the IEI project, we concluded that there was little consistent evidence to suggest that the United States led other countries down at peaks. The evidence

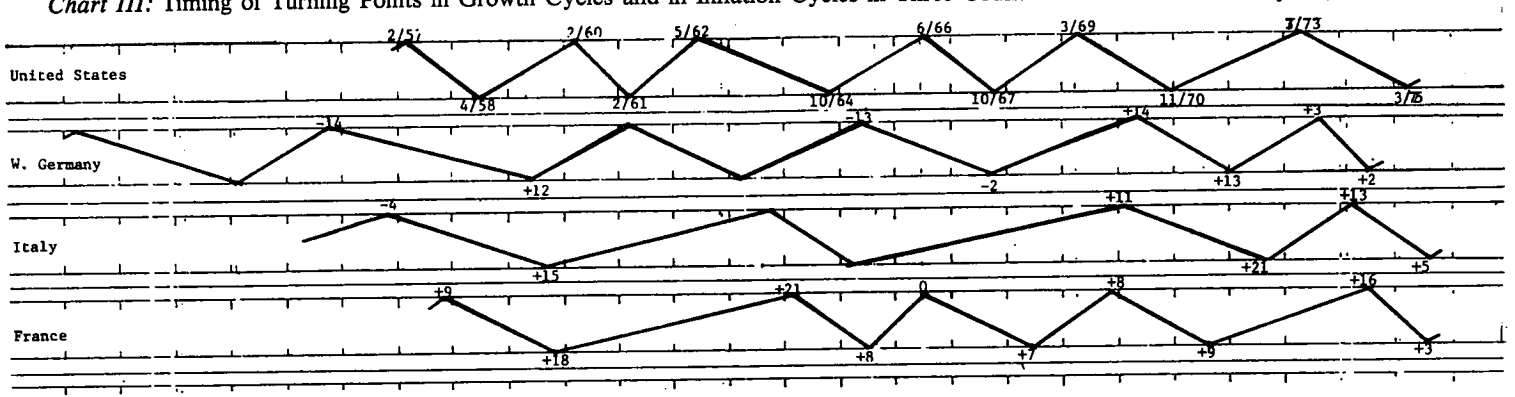
Table 5: Timing of Turns in Growth Cycles Chronologies in West Germany, Italy, and France at United States Turning Points, 1950–1971

Growth Cycle Chronologies								Lead (-) or Lag (+) (in months)					
United States (1)		West Germany (2)		Italy (3)		France (4)		West Germany vs. United States (5)		Italy vs. United States (6)		France vs. United States (7)	
Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough
3/51		2/51						-1					
	7/52								nm				
3/53								nm					
	8/54		2/54						-6				
2/57		10/55		10/56		11/57		-16		-4		+9	
	4/58		4/59		7/59		10/59		+12		+15		+18
2/60		nm		nm		nm		nm		nm		nm	
	2/61		nm		nm		nm		nm		nm		nm
5/62		2/61*		9/63		2/64		nm		+16		+21	
	10/64		2/63		3/65		6/65		-20		+5		+8
6/66		5/65		nm		6/66		-13		nm		0	
	10/67		8/67		nm		5/68		-2		nm		+7
3/69		5/70		2/70		11/69		+14		+11		+8	
	11/70		12/71		8/72		8/71		+13		+21		+9
3/73		8/73		4/74		7/74		+5		+13		+16	
	3/75		5/75		8/75		6/75		+2		+5		+3
				12/76		nm				nm		nm	
Mean Timing at Peaks								0		+9		+11	
at Troughs									0		+12		+9
at Both Turns								0		+10		+10	
Median Timing at Peaks								-1		+12		+9	
at Troughs									0		+10		+8
at Both Turns								-1		+12		+8	

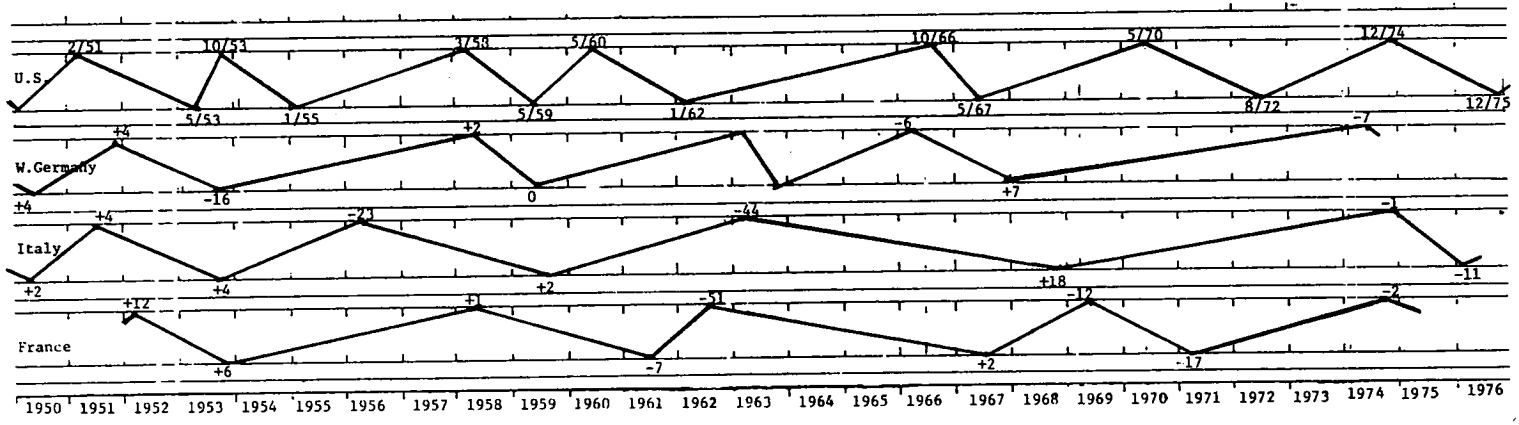
nm--No matching turn.

* Coincides with U.S. trough 2/61. Hence not matched with either U.S. peaks 2/60 or 5/62.

Chart III: Timing of Turning Points in Growth Cycles and in Inflation Cycles in Three Countries vs. Turns in U.S. Cycles, 1950–1970



Part B. Timing of Inflation Cycle Turns, Three Countries vs. U.S. Turns



Source: Tables 5 and 6.

was stronger that the United States leads other countries at troughs[4]. At that time we were working with a somewhat different list of countries.

In examining the chronologies of *Table 5*, there is little reason to argue on economic grounds that the United States would lead France and Italy at either growth peaks, or troughs, but not Germany. Nonetheless, this is the picture emerging from the Table.

In any case, attention is increasingly focussed on *both* real changes and on inflation rate changes. Both are involved in the international transmission of cyclical disturbance. It is useful, therefore, now that it is possible to do so, to examine the inflation rate cycles separately.

We have chosen to measure inflation rates by examining the movements in the consumer price index for each of the four countries. The results are shown in *Chart III, Part B*[5]. *Chart III* suggests that there have been a number of cycles in inflation rates as well as in real growth rates in all these countries. The United States has had more inflation cycles just as it has had more cycles in real rates during the comparable periods covered than is the case in any of the other countries. While there is usually a cycle in inflation rates corresponding to growth cycles this is not invariably the case. The United States skipped an inflation cycle during the growth cycle of 1962–64. France skipped an inflation cycle during the 1956–66 growth cycle. Italy skipped an inflation cycle corresponding to the 1965–72 growth cycle. West Germany skipped an inflation rate cycle in connection with the growth cycle in 1970–1971. Despite these exceptions, the correspondence between growth cycles and inflation rate cycles is pronounced in all four countries. Indeed, none of these countries experienced a cyclical decline in inflation without also experiencing, at about the same time, a slowdown in real growth.

We shall turn our attention to the relationship between real growth cycles and inflation rate cycles in each country shortly, but before doing so it is useful to compare the timing of the turns in the inflation rate cycles in the other countries to the turns in the U.S. inflation rate cycles. In this way we may compare the inflation rate changes among the four countries in parallel manner to the real comparisons shown in *Table 5*. The evidence is shown in *Table 6*. It is clear only that the relationships are ambiguous. If it is difficult to argue convincingly that any one country consistently leads other countries into or out of real growth cycles it is equally difficult to prove that inflation rates move earlier in one country than another. On economic grounds one might argue that the Common Market countries would influence each others' inflation rates more closely than any would be influenced by U.S. inflation rates. The evidence does not support this notion very strongly either.

4 See Philip A. Klein, *Business Cycles in the Postwar World: Some Reflections on Recent Research*, American Enterprise Institute, Washington, D.C., 1976.

5 Specifically, we have measured the percentage change in the consumer price index for the current month and the average monthly value of the CPI for a twelve month period ending six months earlier. The result is not unlike the well-known method of measuring the percent change from the same month a year ago, except that the technique used here places less weight on a single month in the past and hence the rate is much less affected by erratic factors in that month. The rates are dated according to the terminal month of the comparison. For some purposes (see below) they should be centered six months earlier.

Table 6: Inflation Rate Cycles in West Germany, Italy and France vs. The United States, 1950–1978

Inflation Rate Cycles[a]								Lead (-) or Lag (+) (in months)					
United States (1)		West Germany (2)		Italy (3)		France (4)		West Germany vs. United States (5)		Italy vs. United States (6)		France vs. United States (7)	
Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough
	1/50		5/50		3/50				+4		+2		
2/51		11/51		6/51		2/52		+9		+4		+12	
	5/53		9/53		9/53		11/53		+4		+4		+6
10/53													
	1/55												
3/58		5/58		4/56		4/58		+2		-23		+1	
	5/59		5/59		7/59				0		+2		
5/60													
	1/62						6/61						-7
		3/63	9/63					nm	nm				
10/66		4/66		2/63		7/62		-6		-44		-51	
	5/67		12/67		11/68		7/67		+7		+18		+2
5/70						5/69						-12	
	8/72						3/71						-17
12/74		5/74		11/74		10/74		-7		-1		-2	
	12/76				1/76						-11		
				12/76									
Mean at Peaks								-0		-16		-10	
at Troughs									+4		+3		-4
at Both Turns								-1		-5		-8	
Median at Peaks								-2		-12		-2	
at Troughs									+4		-2		-2
at Both Turns								+3		+2		-2	

nm--No matching turn.

[a]For the computation of the rates, see footnote in the text.

Inflation Rate Cycles Versus Real Growth Cycles in Four Countries

The relationship between inflation rate cycles and growth cycles in the United States, West Germany, France and Italy can be seen in *Chart III (A & B)*. *Table 7* shows the precise timing comparisons. In all four countries inflation rates have abated only during periods when real economic growth has slowed or turned negative, and likewise, during periods of rapid real growth one always finds associated acceleration in inflation rates. In order to avoid an arbitrary bias in measuring the leads and lags, in *Table 7* we date the inflation cycles according to the central month of the twelve month span covered by the rates. We find some tendency for the inflation rates to lag behind growth cycle turns in the United States, especially in recent cycles. In Germany lags predominate at peaks, while in France and Italy the inflation rate has rarely lagged behind the growth cycle turns. Taking all four countries together, there are virtually as many leads as lags. The implications of these findings for the complicated policy questions facing all these countries are of some importance. Is it possible to slow inflation rates without slowing real economic growth? The evidence of *Table 7* does not support an affirmative answer to this question, in any of the countries covered.

If this conclusion seems somewhat gloomy, it is nonetheless in line with a theory developed many years ago by Wesley Clair Mitchell[6].

Geoffrey H. Moore recently summarized the theory as follows:

"... a prolonged period of prosperity tends to generate inefficiencies in a private enterprise economy. They arise partly from the reactions of workers to the better employment opportunities, wages, and fringe benefits with which they are faced, and partly from the reactions of business enterprises to their own prospects and opportunities. The growth of these inefficiencies reduces productivity, raises costs, and the higher costs get reflected in prices. In the initial states of a cyclical expansion prices usually rise faster than costs, but after a time the rise in prices is not sufficient to cover the rise in costs in industry generally, and profit margins decline in many industries. This is an important factor reducing incentives to invest, and increasing the chances of recession, as firms seek to cut costs. Nevertheless, a recession, even a mild one, sets in motion forces that tend to eliminate the production inefficiencies that developed during prosperity, and to lower the rate of inflation. Some of these results begin to appear during the recession, others become evident only during the ensuing recovery"[7].

It is clear, therefore, that the Mitchell hypothesis would explain why a decline in inflation rates might occur only with an associated decline in real growth and why inflation rates can be expected to accelerate along with expansion in real growth. Because leading indicators are useful in forecasting growth cycle turns, they should also be useful in forecasting the turns in inflation rates. The next two sections turn to these important questions.

6 The theory was developed in his 1913 book, *Business Cycles*. A revised version was published as *Businesss Cycles and Their Causes*, Berkeley, California, University of California Press, 1959. The relevant discussion appears in Chapter 5.

7 Geoffrey H. Moore, *Productivity, Costs, and Prices: New Light from an Old Hypothesis*, National Bureau of Economic Research, *Explorations in Economic Research*, Vol. 2, No. 1, Winter 1975, pp. 1–2.

Table 7: Inflation Cycles vs. Growth Cycles in Four Countries, 1950–1978

Growth Cycle Chronologies								Lead (-) or Lag (+) (in months)					
United States (1)		West Germany (2)		Italy (3)		France (4)		West Germany vs. United States (5)		Italy vs. United States (6)		France vs. United States (7)	
Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough	Peak	Trough
3/51		2/51						-1					
	7/52								nm				
3/53								nm					
	8/54		2/54						-6				
2/57		10/55		10/56		11/57		-16		-4		+9	
	4/58		4/59		7/59		10/59		+12		+15		+18
2/60		nm		nm		nm		nm		nm		nm	
	2/61		nm		nm		nm		nm		nm		nm
5/62		2/61*		9/63		2/64		nm		+16		+21	
	10/64		2/63		3/65		6/65		-20		+5		+8
6/66		5/65		nm		6/66		-13		nm		0	
	10/67		8/67		nm		5/68		-2		nm		+7
3/69		5/70		2/70		11/69		+14		+11		+8	
	11/70		12/71		8/72		8/71		+13		+21		+9
3/73		8/73		4/74		7/74		+5		+13		+16	
	3/75		5/75		8/75		6/75		+2		+5		+3
				12/76		nm				nm		nm	
Mean Timing at Peaks								0		+9		+11	
at Troughs									0		+12		+9
at Both Turns								0		+10		+10	
Median Timing at Peaks								-1		+12		+9	
at Troughs									0		+10		+8
at Both Turns								-1		+12		+8	

nm--No matching turn.
* Coincides with U.S. trough 2/61. Hence not matched with either U.S. peaks 2/60 or 5/62.

Leading Indicators and Growth Cycles

We have previously noted that the growth cycle turning points can be forecast with some fidelity by means of a composite index of leading indicators (see *Chart II*). A graphic way to summarize the behavior of the leading indicators *vis à vis* the coincident indicators is to compare the two composite indexes as is possible in *Chart II*. The evidence is summarized in *Table 8*. There are four peaks which can be compared. The leading index turns one month after the coincident index at the 1965 peak. The leading index leads both the growth peak and the coincident index at each of the other three peaks. At the five troughs the leading index leads the growth cycle trough in every case except 1963 (a two month lag), and 1975 (when it is coincident). The leading index leads the coincident index in every case except the 1963 trough.

If we compare the behavior of individual coincident indicators with this pattern (see *Appendix Table 1*) we find very few cases in which at any turn a coincident indicator produces a turning point which precedes rather than follows the associated turn in the leading index. At peaks there are four exceptions (two small leads and two coincidences); at troughs there are nine (five in 1963). If we compare the average behavior at all turns of the leading and coincident index (*Table 8*), we see that for both groups of turns the leading index precedes the coincident index by about six months. It would seem, therefore, that the chronology performs reasonably well in terms of the expectations carried over from prior analyses with chronologies and indicators in the United States.

Forecasting Changes in Growth Cycles and in Inflation Rates

We have just seen that inflation rate cycles are associated with turns in real growth cycles in the countries we have covered. It ought, therefore to be possible to forecast turns in inflation rate cycles by using composite leading indexes to do so. We can test this hypothesis with the German data presented previously.

Table 9 presents the relevant data. Unfortunately, the composite index of leading indicators begins only in 1957, and therefore, we can make no study of the first three German growth cycles. For the three peaks there is no exception to the lead and the average lead is about a year. At troughs rough coincidence is the rule. It will be remembered (*Table 8*) that at troughs the average lead of the leading index was three months while the coincident index showed a two month lag. This means that the value of the leading index is even more pronounced in forecasting inflation rate cycles than it was in forecasting turns in growth cycles (*Table 8*). It is true that there are occasions when the turns in the leading index are not matched by inflation rate turns. In this connection the fact that as of this writing the last turn in the leading index was a trough nearly twelve months ago, suggests that a significant inflation rate increase in the Federal Republic has been avoided already for a longer time than at any other similar period covered by our evidence in the past twenty years.

Table 8: Timing of Leading and Coincident Composite Indexes of German Growth Cycle Turns, 1951–1976

Growth Cycle Turns	Lead (-) or Lag (+) At Growth Turns of Leading Index (Months)	Coincident Index (Months)	Leading Incex vs. Coincident Index Lead (-) or Lag (+) (Months)
At Peaks	(1)	(2)	(3)
2/51		0	
10/55		+2	
2/61	-6	+1	-7
5/65	0	-1	+1
5/70	-6	+6	-12
8/73	-7	+1	-8
Mean Timing	-5	+2	-6[1]
At Troughs			
2/54		-29	
4/59	-2	-1	-1
2/63	+2	0	+2
8/67	-4	0	-4
12/71	-10	+7	-17
5/75	0	+3	-3
Mean Timing	-3	+2	-5

1. Inconsistent with the difference between columns 1 and 2 because of rounding.

Table 9: Forecasting German Inflation Rate Cycles With Leading Indicators, 1950–1978

Chronology of West German Inflation Rate Cycles, Adjusted* (1)		Turning Points in Composite Leading Index (2)		Lead (-) or Lag (+) (in months) (2) vs. (1)	
Peak	Trough	Peak	Trough	Peak	Trough
	12/49		--		
5/51		--			
	3/53		--		
12/57		nm			
	12/59		2/59		+3
9/62		8/60		-25	
	3/63		4/63		+1
10/65		5/65		-5	
	12/67		4/67		-2
		11/69		nm	
			2/71		nm
12/3		1/73		-10	
			5/75		--
		7/76		--	
			4/78		
Mean Timing at Peaks				-13	
at Troughs					+1
at Both Turns				-6	
Median Timing at Peaks				-10	
at Troughs					+1
at Both Turns				-4	

nm--No matching inflation rate cycle turns to compare to turns in leading index.

*For purposes of this comparison, the inflation rates are centered in the middle of the twelve-month period they covered. That is, the peak and trough dates are placed six months earlier than the dates shown in Table 6 or Chart III.

Conclusions

This study of real growth cycles in postwar Germany and the related inflation experience confirms anew the usefulness of developing quantitative indicators for forecasting growth cycles, and suggests importantly that there are considerable gains in tracing both real and inflation changes. In the case of Germany, the usefulness of a leading index for growth cycle turning points is increased when it is seen that the leading index can also anticipate downturns in inflation rates. It is hoped that we will be able to make further progress in tracing the transmission of cyclical disturbances internationally by comparing growth cycles and inflation rate fluctuations in comparable fashion in other market-oriented economies. We can then study the transmission mechanisms for both types of disturbance individually as well as in combination. *Table 10* illustrates the possibilities of such research, by relating the average timing of real growth cycles in Germany, France, and Italy to those

Table 10: Growth Cycle Turns and Inflation Rate Turns: Average Timing in Three Countries vis-à-vis the United States, 1950–1978

	Lead (-) or Lag (+) (in months)			
	At U.S. Peaks in		At U.S. Troughs in	
Country	Growth Cycles	Inflation Rate Cycles	Growth Cycles	Inflation Rate Cycles
West Germany	-3	0	-1	-1
France	+11	-10	+9	-4
Italy	+9	-15	+12	+3

[a]Note: The Foreign turns in growth cycles are compared to the turns in the United States growth cycles. The foreign inflation rate cycles are compared to the turns in the United States, inflation rate cycles.

Source: Appendix Table 2 and 3.

in the U.S., and the average timing of inflation rate cycles in the other three countries to U.S. inflation rate turns. It is interesting to note that German peaks in real activity typically turn before U.S. peaks, but the inflation rates turn down virtually together. In the case of the other two countries real activity reaches both peaks and troughs after U.S. real activity but inflation rate cycles typically turn before U.S. inflation rate cycles. These findings are implicit in the findings of Tables 5 and 6, but as presented in *Table 10* the essential complexity of the relationships is underscored. As of our present knowledge, it is simply impossible to reach any simplistic conclusions concerning the international direction taken by either inflation rate cycles or fluctuations in real activity as they affect economic activity in modern market-oriented economies. But the questions for future research could appropriately begin with more detailed analysis of this sort of evidence.

Summary: Postwar Growth Cycles in the German Economy

The acceleration of inflation in many industrialized market-oriented economies in recent years has increased the importance of distinguishing between real and nominal changes when monitoring growth cycles. We have, accordingly, begun to date growth cycle turning points at the National Bureau after deflating any component series used to determine growth cycles which is expressed in nominal terms. While inflation rates in Germany have been less severe in recent years than in some other countries, we have found that deflation is nonetheless important in examining German growth cycles just as it is in economies with more rapid inflation rates. We have produced a new deflated growth cycle chronology for the German economy covering the past quarter of a century.

The paper considers the behavior of seven coincident indicators at the selected growth cycle peaks and troughs. Except for median lags at two of the peaks of five and six months, respectively, the selected reference turns reflect with considerable fidelity the behavior of the component measures of aggregate economic activity.

Because inflation rates appear themselves to be cyclically sensitive, we have related turns in the German inflation rate to growth cycle turns and have found corresponding turns at each growth recession save the 1970–1971 recession. We have found that the inflation rates turn down well after the growth peaks, and up well after the growth troughs. That is, inflation rates reflect real growth cycle phases in Germany, but with a lag. These turns in inflation rates, however, can be anticipated with considerable fidelity by associating them with the turns in a composite index of leading indicators for the Federal Republic.

Another possible use of the deflated chronology would be to apply it to studying the international transmission of cyclical instability. There has been much interest in this and it would be useful to try to distinguish the transmission of real disturbances from inflation rates. We have, in this connection compared the timing of the peaks and troughs in West German deflated growth cycles with those of the U.S., Italy, and France. In general, West German turns appear roughly coincident with those in the U.S., although there are both long leads and long lags, while those in Italy and France mostly lag those in the other two countries. If the comparison is to changes in inflation rates, West German inflation rates turn at about the same time as U.S. inflation rates, whereas France leads the U.S. inflation

rate changes at both peaks and troughs, and Italy leads at peaks but lags at troughs. The comparisons suggest that differentiating real from nominal changes in studying the international transmission of instability is a useful adjunct to other steps in our attempts to unravel this complex process.

Zusammenfassung: Wachstumszyklen in der Bundesrepublik Deutschland (BRD)

Die Beschleunigung inflationärer Entwicklungen in vielen marktwirtschaftlich orientierten Industrieländern während der letzten Jahre läßt es zunehmend wichtiger erscheinen, bei der Beobachtung von Wachstumszyklen reale von nominalen Veränderungen zu unterscheiden. Deshalb haben wir begonnen, die Wendepunkte von Wachstumszyklen erst nach einer Deflationierung nominaler (in Geldeinheiten ausgedrückter) Zeitreihen zu datieren. In der BRD waren die Inflationsraten in letzter Zeit niedriger als in einigen anderen Volkswirtschaften. Dennoch hat sich die Deflationierung bei der Analyse der bundesdeutschen Wachstumszyklen als ebenso bedeutsam erwiesen wie im Fall von Ländern mit höherer Inflationsrate. Wir haben eine neue Wendepunkt-Chronologie deflationierter Wachstumszyklen für die BRD erstellt, die das zurückliegende Vierteljahrhundert abdeckt.

Im vorliegenden Beitrag wird das Verhalten von sieben Indikatoren der durchschnittlichen Konjunkturbewegung („coincident indicators") an den oberen und unteren Wendepunkten der Wachstumszyklen untersucht. Abgesehen von fünf- bzw. sechsmonatigen Verzögerungen („lags") an zwei oberen Wendepunkten spiegelt die zyklische Bewegung der als Bezugsgrößen ausgewählten Reihen die dadurch indizierten Schwankungen der gesamtwirtschaftlichen Aktivität mit ausreichender Sicherheit.

Da die Inflationsraten ihrerseits konjunktursensibel zu sein scheinen, beobachten wir Zusammenhänge zwischen den Wendepunkten der deutschen Inflationsrate einerseits und denjenigen der Wachstumszyklen andererseits. Auch die Abschwungsphasen entsprechen sich – mit Ausnahme der gesamtwirtschaftlichen Rezession 1970/71. Die Inflationsrate nimmt stets einige Zeit nach dem Überschreiten des oberen konjunkturellen Wendepunkts ab und steigt nach dem unteren Wendepunkt wieder an. Das heißt, die Zyklen der Inflationsrate spiegeln die realen Wachstumszyklen der BRD, allerdings mit einer gewissen Verzögerung. Die Wendepunkte der Inflationsrate können insofern im deutschen Fall mit hinreichender Zuverlässigkeit prognostiziert werden, wenn man sich dazu eines komplexen Indexes bedient, der aus Frühindikatoren („leading indicators") der gesamtwirtschaftlichen (realen) Konjunktur gebildet wird.

Mit Hilfe der deflationierten Wendepunkt-Chronologie kann auch die internationale Übertragung von konjunktureller Instabilität untersucht werden. Dieser Punkt verdient großes Interesse, deshalb erschien es nützlich, zwischen der Übertragung realer Wachstumsstörungen und derjenigen inflationärer Impulse zu unterscheiden. Zu diesem Zweck haben wir die Datierung von oberen und unteren Wendepunkten deflationierter Wachstumszyklen in der BRD, in den USA, in Italien und Frankreich miteinander verglichen. Im allgemeinen stimmen die bundesdeutschen Wendepunkte grob mit denen der USA überein, wenn auch gelegentlich sowohl größere zeitliche Vorsprünge („leads") als auch Verzöge-

rungen („lags") auftreten. Dagegen sind die Wachstumszyklen in Italien und Frankreich zeitlich im Verhältnis zu denen der beiden anderen Länder meist verzögert.

Vergleicht man nun die Veränderungen der Inflationsraten, zeigt sich, daß diese in der BRD und in den USA annähernd gleichzeitig stattfinden, während die Inflationsrate Frankreichs früher als die der USA sowohl an den oberen wie an den unteren Wendepunkten reagiert, die Italiens nur an oberen Wendepunkten, dagegen mit einem Lag an den unteren. Die Vergleiche legen den Schluß nahe, daß die Unterscheidung von realen und nominalen Veränderungen bei der Untersuchung internationaler konjunktureller Übertragungsvorgänge einen fruchtbaren Beitrag zu weiteren Bemühungen darstellt, diesen komplexen Prozeß aufzuklären.

Appendix Table1: Growth Cycle Peaks and Troughs, West Germany, 1950–1978

	Real Disposable Income	Real GNP	Industrial Production	Manufacturing Sales Volume	Retail Trade Vol.	Employment in Mining and Manufacturing	Unemployment (Inverted)	Composite Coincident Index	Composite Leading Index	Composite Index Growth Rate 12 Month Smoothed
Series Start:	1950(Q)	1950(Q)	1950	1957	1955	1951	1950	1950	1957	June 1951
Turns at Peaks:	8/50	2/51	4/51					2/51		
	11/53					11/55		12/55		8/55
	8/55	5/56	12/55				2/56			
	5/57				4/57					
				12/60		1/58			8/60	8/60
	2/61	2/61	3/61		11/61	3/61	2/61	3/61		
	5/65		12/65	1/65	9/65			4/65	5/65	4/65
		2/66				4/66	3/66			
				11/69					11/69	8/69
		5/70	4/70			10/70		11/70		
	11/71						2/71			
					8/72					
		2/73	8/73	1/73		11/73	8/73	9/73	1/73	2/73
									7/76	
Turns at Troughs:	11/51									12/51
						11/53				
	8/54	2/54	1/54				8/54			
	8/56									
						1/57		9/57		5/58
		2/59	3/59	3/59		5/59	1/59	3/59	2/59	
	2/60				3/60					
	5/63	2/63	2/63	2/63	6/63	11/63	2/63	2/63	4/63	2/63
		8/67	5/67	8/67		11/67	5/67	8/67	4/67	5/67
	2/68				2/68					
		11/71	12/71	12/71					2/71	12/71
						9/72	5/72	7/72		
	2/74				12/74					
		5/75	5/75	5/75		11/75	6/75	8/75	5/75	5/75
									4/78	

Source: Geoffrey H. Moore and Philip A. Klein, International Economic Indicators Project

Appendix Table 2: Timing of Turns in Growth Cycle Chronologies for Three Countries at United States Peaks and Troughs (Lead (-) or Lag (+), in months)

	United States Growth Cycle Peaks					
	2/57	2/60	5/62	6/66	3/69	3/73
West Germany	-16	--	*	-13	+14	+5
France	+9	--	+21	0	+8	+16
Italy	-4	--	+16	--	+11	+13
Mean	-3		-7	-6	+11	+11

	United States Growth Cycle Troughs					
	4/58	2/61	10/64	10/67	11/70	3/75
West Germany	+12	--	-20	-2	+13	+2
France	+18	--	+8	+7	+9	+3
Italy	+15	--	+5	--	+21	+5
Mean	+15		-2	+2	+14	+3

*Crosses opposite turn.

Appendix Table 3: Timing of Turns in Inflation Rate Cycles for Three Countries at United States Peaks and Troughs (Lead (–) or Lag (+) in months)

	United States Inflation Rate Cycle Peaks						
	2/51	10/53	3/58	5/60	10/66	5/70	12/74
West Germany	+9	---	+2	---	-6	---	-7
France	+12	---	+1	---	-51	-12	-2
Italy	+4	---	-23	---	-39	---	-1
Mean	+8		-7		-32		-3

	United States Inflation Rate Cycle Troughs							
	1/50	5/53	1/55	5/59	1/62	5/67	8/62	12/76
West Germany	+4	---	-16	0	---	+7	---	---
France	---	+6	---	---	-7	+2	-17	---
Italy	+2	+4	---	+2	---	+18	---	-11
Mean	+2	+2	-16	+1		+9		