

BUSINESS CYCLES, LONG WAVES AND PHASES OF CAPITALIST DEVELOPMENT

by

Angus Maddison

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It is clear from the preceding analysis that the process of capitalist development has not been smooth. There have been distinct and important phases of development which are worthy of study, definition, and causal interpretation. I distinguish four phases, which I shall describe later, covering periods of unequal length; 1820-1913, 1913-50, 1950-73, and 1973 onwards. There have also been shorter-term fluctuations, usually called business cycles. My primary interest is not in these, but in major changes in trend which are distinguished from each other by changes in the institutional-policy mix and usually initiated by some sort of 'system shock' which upsets established patterns of international intercourse.

Before presenting my own diagnosis, it is useful to trace the history of cyclical or wave analysis, because my quantitative empirical approach is not the only one available. In the past there have been a number of theories concerning the nature of long waves in economic activity. These were revived and augmented in the 1970s after a period when even the business cycle was considered obsolete and the long-wave hypothesis was regarded as quaint.¹

The unfortunate thing about revivalist approaches to new problems is that the adherents are often single-minded enthusiasts, so that the analytical apparatus of the old theories is rehabilitated in toto in spite of remediable weaknesses.

Cycle Analysis

Cyclical analysis for the capitalist period started with Clement Juglar in 1856. He emphasized periodicity in economic activity whereas most earlier writers had tended to interpret interruptions to growth as random financial crises. Juglar also believed that cycles were roughly synchronous in France, the UK, and USA.² In his major work on cycles his attention was mainly concentrated on monetary phenomena - expansions or contractions in central bank activity, rates of interest, prices of key commodities, etc., plus narrative 'business annal' material. Although it is frequently asserted that Juglar found cycles of a characteristic length of nine years, this is not in fact true. His cycles for France average seven years with a range from three to eighteen years, and for the UK six years with a range from two to ten years.

For several decades the quantitative indicators available to cyclical analysts were similar to those used by Juglar, though they were later augmented to include price indices, and data on output and foreign trade. A more sophisticated causal analysis was also developed, such as one finds in the study by the Russian economist Tugan-Baranowsky on the nineteenth-century cycle in the UK.³

The ultimate refinement in statistical analysis of business cycles was the massive effort of the National Bureau of Economic Research (NBER) in the USA. The first phase was a comprehensive collection of narrative data stretching back to the beginning of the nineteenth century with a cyclical periodization for seventeen countries. The second phase was publication of a series of reference cycles for four countries (France, Germany, Great Britain, and the USA) based mainly on monthly quantitative data, which start in 1854 for the last two countries, in 1865 for France, and in 1879 for Germany.⁴ The number of monthly series for the USA was nineteen for 1860 rising to 811 in 1942 (plus 161 annual indicators). The NBER derived its 'reference' cycles by plotting most of this information in de-seasonalized form, and by iterative procedures of inspection, deriving a cluster of roughly concurrent fluctuations. Thus its central concept of economic activity was a somewhat fuzzy cocktail rather than a clearly defined measure of aggregate economic activity. Its main use was as a sensitive warning indicator of turning points in business activity, with indicators classified as leading, coincident, or lagging. The reference cycle has become part of the official statistical armoury of the USA for forecasting purposes, though it is of course supplemented by the more articulate short-term models on which other countries place main reliance. For the period 1857 to 1978 the NBER established twenty-eight successive peak-to-trough movements for the United States, giving a recession on average every four years, with a variation from two-and-a-half to nine-and-a-half years. For other countries the average duration was found to be longer: fifty-three months for France, sixty-two for the UK and sixty-four for Germany for prewar years. The NBER cycles are not adjusted to eliminate trend, so they are not measures of oscillation in economic activity, and register recessions only when there is an absolute fall in the relevant indicators.⁵ However, the NBER technique of using monthly and rather volatile series does pick up more cycles than would a GDP index based on annual data, and those reference cycles that do correspond with GDP movements do not always have exactly the same dates.⁶ The NBER approach is a useful tool in interpreting quantitative economic history, but a major problem is that it yields no satisfactory measure of the amplitude of fluctuations because of the difficulty of producing a meaningful summary measure from such heterogeneous data. Thus one cannot use the reference cycle itself to distinguish major and minor cycles, in the same way that one can with simpler measures of industrial output or GDP fluctuations.

Hence my preference is for rather simple measures of annual movements in aggregate activity, which reveal clearly the big changes in the severity of recessions that have appeared systematically across our sixteen countries in the past century, as illustrated in Table 1. This table shows that peacetime business cycle history has been much milder since the Second World War than before, and that the 1920-38 period was generally much worse than 1870-1913. Except in 1929-33, when the Depression hit every country, the weighted average of cyclical movements for the sixteen countries as a group is dampened by the fact that individual country cycles are not synchronized. Before 1870 data on annual changes in GDP are not available for most countries, but it would seem that average cyclical experience was not too different from that of 1870-1913.⁷ Table 2 shows the cyclical record for foreign trade. It confirms the pattern shown by GDP movements, with notably smaller cycles since the Second World War. Graphs 4.1 and 4.2 are intended to show both cyclical volatility and differences in growth trends in different phases of capitalist development. The striking thing in both graphs is the great volatility of the 1913-50 period, and the markedly faster growth since 1950.

Long-Wave Analysis

Although cyclical analysts had made distinctions between big and small recessions, and there had been some discussion of the Great Depression (in prices) in the last quarter of the nineteenth century, it is significant that the idea of recurrent long waves in capitalist development did not emerge until the First World War, i.e., about fifty years later than cycle analysis, and only after the rhythm of development had been very dramatically broken.

The main figures in long-wave analysis are N.D. Kondratieff, S. Kuznets, and J.A. Schumpeter. All of them drew heavily on cyclical-type indicators to test their ideas quantitatively.

TABLE 1
Amplitude of Recessions in Aggregate Output, 1870-1989:
Maximum Peak-Trough Fall in GDP or Lowest Rise
(annual data)

	1870-1913	1920-38	1950-73	1973-89
Australia	-17.1	-12.8	+0.9	+0.2
Austria	- 2.3	-22.4	+0.1	-0.4
Belgium	- 0.2	- 7.9	-0.8	-1.5
Canada	- 7.7	-29.6	-0.7	-3.2
Denmark	- 2.7	- 2.9	-0.7	-1.6
Finland	- 4.2	- 4.0	+0.5	+0.1
France	- 6.5	-14.7	+2.5	-0.3
Germany	- 3.2	-16.9	-0.1	-1.6
Italy	- 5.1	- 6.1	+1.6	-2.6
Japan	- 7.4 ^a	- 7.3	+4.3	-1.2
Netherlands	(n.a.)	- 9.5	-0.3	-2.1
Norway	- 3.0	- 8.3	-0.9	+0.3
Sweden	- 5.5	- 6.2	-0.2	-1.6
Switzerland	(n.a.)	- 8.0	-2.1	-8.6
UK	- 4.1	- 8.1	-0.2	-3.5
USA	- 8.2	-29.6	-1.4	-2.6
Arithmetic average	- 5.5	-12.1	+0.2	-1.8

a) 1885-1913.

Source: Appendix A of Maddison (1991).

Kondratieff

Kondratieff was a Russian economist, whose work on long waves was done in the 1920s as director of the Business Cycle Research Institute in Moscow. He distinguished three kinds of cycles: long ones of fifty years' duration, middle ones of seven to ten years', and short ones of three to four years'. He measured long waves by a double decomposition of time series - eliminating the trend and showing the deviations from it smoothed with a nine-year moving average. The nine-year average was enough to remove the influence of the two shorter types of cycle. His analysis covers the period 1770 to the 1920s and his long cycles fall into a range of forty to sixty years.⁸

TABLE 2
Amplitude of Recessions in Exports, 1870-1989

Maximum Peak-Trough Fall or Smallest Annual Rise
in Export Volume (Annual Data)

	1870-1913	1920-38	1950-73	1973-89
Australia	-32.2	-19.7	- 7.6	- 3.6
Austria	(n.a.)	-48.7	- 7.3	- 5.5
Belgium	-13.1	-31.8	- 9.6	- 6.8
Canada	-13.9	-40.6	- 6.1	-10.3
Denmark	-25.0	-20.3	- 6.7	- 4.1
Finland	-20.9	-15.7	-13.4	-17.4
France	-12.9	-47.3	-12.0	- 4.0
Germany	-14.2	-50.1	+ 2.3	-11.5
Italy	-30.6	-69.1	- 9.1	- 8.5
Japan	-23.7	-18.9	0.0	- 2.3
Netherlands	(n.a.)	-33.4	+ 2.6	- 3.8
Norway	- 7.7	-16.0	- 7.1	- 3.3
Sweden	-11.0	-37.0	-10.7	-11.6
Switzerland	(n.a.)	-50.2	- 4.2	- 8.2
UK	-12.5	-37.7	- 8.0	- 2.2
USA	-18.9	-47.8	-14.3	-18.8
Arithmetic average	-18.2	-36.5	- 7.0	- 7.6

Source: Appendix F of Maddison (1991).

Kondratieff's thesis was most clearly demonstrated by long-term movements in wholesale prices, where long waves were discernible without trend adjustment, though some of the long-term oscillation was obviously attributable to wars (e.g., the peaks in the Napoleonic wars and 1914-20). He analysed wholesale price developments for France, the UK, and the USA, and it is not surprising that in these relatively open economies he found that price trends were similar in the different countries, particularly as he adjusted the price indices to eliminate the effect of exchange rate changes which gives the series greater resemblance.⁹ On this basis Kondratieff claimed his waves to be an international phenomenon.

Most of Kondratieff's other indicators contain a strong price element, because they are expressed in current values: e.g., wages, interest rates, the value of foreign trade, and bank deposits. Not surprisingly, the price component of these value series moves in the same way as the general price indices, so this evidence for his wave theory is not in fact independent of his first offering.

The only physical series in Kondratieff's repertoire in his most famous article are those relating to per capita¹⁰ coal production in England (and coal consumption in France), and to pig iron and lead production in England. Here, as with his value indicators, he presents data from which the trend has been removed.

There are some distinct oddities about Kondratieff's presentation of the four physical indicators, which at first sight seem to contain long waves of large amplitude with a fair degree of synchronization. His charts for the physical indicators are shown as absolute deviations from trend. Thus he shows UK coal production 186 points above trend in 1869, 245 points below in 1894 and 164 points above in 1910. But in proportionate terms the deviations are much smaller: 5.4 per cent, -5.1 per cent, and 2.8 per cent respectively. He also follows the highly questionable practice of juxtaposing two series on the same graph to suggest that the amplitude of their movement is similar, this effect being secured by using quite different scales for each. From this graph it appears that UK coal output is more volatile than French coal consumption, whereas the proportionate swings in France were bigger than in the UK. Worse problems arise in his graph for British pig iron and lead production, because there is the further complication that he there compares two series with totally different trends. Pig iron output rose about four-fold over the period he covered, and lead output fell to less than a tenth of its original level.¹¹

Kondratieff concluded tentatively that there had been three long waves in economic 'life' (a rather vague term, but one that is clearly intended to include output as well as price movements). His chronology refers not to particular years but to spans, and he distinguishes only two phases, the rise and fall, in each wave. He does not discuss the amplitudes of these waves, which vary between series, but they are clearly considered large enough to exclude the need for discussion of growth trends. His dating is as in Table 3.

There are several problems with Kondratieff's approach. The first is his failure to establish that long waves exist as more than a monetary phenomenon. He fails to show the existence of broad movements in the volume of output that even remotely correspond to our present measures of aggregate economic activity. The second problem is that the trend is taken out and discarded as if it were irrelevant to the discussion.

TABLE 3
Kondratieff's Long-wave Chronology

	Rise	Decline
1. First long wave	1780s-90s to 1810-17	1810-17 to 1844-51
2. Second long wave	1844-51 to 1870-5	1870-5 to 1890-6
3. Third long wave	1890-6 to 1914-20	1914-20 to ?

. Thus, in comparing UK and US growth between 1820 and 1989, one finds British GDP has risen about twenty-seven-fold, and American by more than 450-fold. This fact is left out when the time series are decomposed for wave analysis, but such very different trends transform the nature and operational significance of any long waves that may be discerned. The third problem is that double decomposition of time series to eliminate trend and smooth out cycles blurs the impact of major historical events. Thus, Kondratieff's chronology pays no attention to the impact of the First World War, and later long-wave analysts tend to brush off the catastrophic 1929-33 recession and the Second World War as well. Finally, Kondratieff failed to offset these empirical shortcomings by giving plausible causal explanations as to why capitalist development should involve long waves as a systematic phenomenon. In the USSR this problem involved Kondratieff in ideological difficulties because his wave theory seemed to conflict with the more fundamental Marxist expectation of the ultimate breakdown of capitalism.¹²

There is no doubt that Kondratieff's contribution to long-wave analysis was fundamental in spite of its weakness,¹³ because he fully adumbrates the three-cycle schema later developed by Schumpeter, and his statistical technique was the same that Kuznets later used to distinguish 'secondary secular movements'. Furthermore, he pointed to the likelihood of poor terms of trade for agriculture in periods of decelerated development - a point given major stress later by Arthur Lewis.

Kuznets and Abramovitz

Chronologically, the next development in long-wave analysis was Kuznets's work on 'secondary secular movements', published in 1930.¹⁴ Kuznets's basic technique for identifying long waves was the same as Kondratieff's, i.e. to look at smoothed detrended series, though Kuznets made a special point of not eliminating population movements. His investigation was more detailed, involving careful analysis of fifty-nine series, most of which represented both physical output and the relevant price variance for particular commodities.¹⁵ Kuznets did not claim that these indicators could be added to provide a meaningful picture of aggregate economic activity, and he did not use aggregative indicators for sectors such as agricultural or industrial production, which were available when he wrote.

His major conclusions are: (1) that 'secondary secular variations in production are in most cases similar to those in prices, the latter following a rather general course in agreement with the well-known historical periods of the rise and fall in the general price level' (p. 197); (2) he found a much shorter periodicity than Kondratieff, 'about 22 years as the duration of a complete swing for production and 23 years for prices' (p. 206);

(3) most fundamentally, he did not think there was enough evidence to conclude that these secondary secular variations were major cycles. They were 'rather specific, historical occurrences' (p. 258). There is 'an absence of factors that would explain the periodicity' (p. 264).

Kuznets did not attempt to cluster his individual series to present a global chronology of long waves in economic life, nor did he analyse the synchronization of the series.¹⁶ However, it is clear from other evidence that in the period Kuznets covered there were rather large depressions in the USA at intervals of fifteen to twenty years. This is directly observable in indices of industrial production (including construction), which Arthur Lewis has prepared (see Table 4). It is also clear that the recession/depression sequence was different in France, Germany, and the UK, which is the major reason why the aggregate performance of these four countries (which Lewis calls 'the core', to distinguish them from 'the periphery' - the rest of the world) is more stable than they are individually. In comparing the cyclical performance of these countries, it is useful to keep in mind the differences in their long-run growth performance. A country like France or the UK, with slow growth, is likely to have more small recessions than Germany or the USA, which had much higher growth. A rough measure of how far recessions fell below the potential growth path is to combine the trend and the cyclical amplitude: e.g., the average French recession involved a fall of 6.7 per cent from trend (4.1 + 2.6 per cent), and the average German recession a fall of 7.5 per cent from trend (3.2 + 4.3 per cent).

After his early study of secondary secular movements, Kuznets moved on to fundamental definitional work on the rationale (scope, valuation, and net-ness) for GDP as an aggregate economic indicator within a system of national accounts, and produced historical estimates of US economic development which made it possible to analyse long-term movements in economic life on a much more satisfactory conceptual basis than the cocktail approach that virtually all economic analysts had previously been forced to use. Furthermore, Kuznets successfully stimulated and inspired replication of his work by scholars in many other countries. This accounting approach still has some drawbacks for cyclical analysis, because until recently data were available only on an annual basis, but it has revolutionized the study of growth and greatly facilitates testing of long-wave analysis.

From time to time after 1930 Kuznets returned to long-swing analysis in a rather tentative way. Unlike his disciples, he himself never called them 'cycles', as the word implies greater certainty about such phenomena and their periodicity than Kuznets concedes. In 1956 he did advance a tentative chronology of long swings in GDP, for eight countries,¹⁷ but the periodization looks very odd, because the logic of the analysis calls for a declining phase in the decades following 1946, and Kuznets later dropped this one attempt to suggest a general chronology for long swings.

TABLE 4

Amplitude and Duration of Cycles in Industrial Production
(including Construction), 1870-1913

	Peak year	Trough year	Percentage amplitude of peak trough movement	Duration of recession (years below peak)
France	1878	1879	- 0.7	1
	1882	1885	-10.6	6
	1892	1893	- 3.4	1
	1894	1895	- 4.4	1
	1899	1902	- 7.9	5
	1907	1908	- 1.4	1
	1909	1910	- 2.5	1
	1912	1913	- 2.1	1
	Average amplitude		-4.1	
	Percentage of years below peak			39.5
Trend growth rate		2.6		
Germany	1873	1874	- 0.5	1
	1876	1877	- 5.7	2
	Average amplitude		- 3.2	
	Percentage of years below peak		7.0	
	Trend growth rate		4.3	
UK	1876	1879	- 4.1	3
	1883	1886	- 9.7	4
	1891	1893	- 6.3	3
	1902	1903	- 2.1	2
	1907	1908	- 8.0	4
	Average amplitude		- 6.0	
	Percentage of years below peak			37.2
	Trend growth rate		2.1	

TABLE 4 (continued)

Amplitude and Duration of Cycles in Industrial Production
(including Construction), 1870-1913

	Peak year	Trough year	Percentage amplitude of peak trough movement	Duration of recession (years below peak)	
USA	1872	1876	-14.8	6	
	1883	1885	- 6.0	2	
	1890	1891	- 1.5	1	
	1892	1894	-15.9	2	
	1885	1896	- 7.1	1	
	1903	1904	- 6.3	1	
	1906	1908	-16.7	2	
	1910	1911	- 4.2	1	
	Average amplitude			9.1	
	Percentage of years below peak				37.2
Trend growth rate			4.7		
Four countries combined = core	1873	1874	- 1.2	2	
	1876	1877	- 0.4	1	
	1883	1885	- 5.0	2	
	1892	1893	- 5.2	2	
	1899	1900	- 0.3	1	
	1903	1904	- 2.1	1	
	1907	1908	- 9.5	1	
	Average amplitude			- 3.4	
	Percentage of years below peak				23.3
	Trend growth rate			3.6	

Source: Maddison (1991)

Kuznets's work on long swings was only a small part of his output and was concentrated on US experience. His most affirmative article was a 1958 study on population growth,¹⁸ which found the 'long-swing' hypothesis most plausible in relation to US population growth and to 'population-sensitive' components of capital formation such as housing and railway construction. It was applicable in weaker and sometimes inverse form in other national accounting aggregates.

Kuznets had several disciples in long-swing analysis whose work he generally endorsed. Abramovitz is the most interesting of these,¹⁹ because he has made the most ambitious attempt to discern long swings in aggregate US economic activity and has veered between more positive affirmation of long swings than Kuznets and outright recantation, in the sense that he did not find valid evidence for the phenomenon in the postwar period. His work in this field has been almost entirely in relation to the US economy.²⁰

Abramovitz distinguishes waves of acceleration and retardation in US growth with an average duration for the full swing of fourteen years and a variance from six to twenty-one years, using NBER reference cycle indicators back to the 1820s. He uses a cocktail of twenty-nine indicators including GNP. He smoothes his series by a rather complicated procedure, designed to eliminate NBER reference cycles, before removing the trend. He found that the turning points of his different series 'cluster in relatively narrow bands of years'. He therefore produced a general chronology with nine swings between 1814 and 1939.

Even at his most affirmative, Abramovitz was basically cautious about the nature of long swings. Thus in 1959 he wrote: 'It is not yet known whether they are the result of some stable mechanism inherent in the structure of the US economy, or whether they are set in motion by the episodic occurrence of wars, financial panics, or other unsystematic disturbances.' By 1968 he concluded that Kuznets cycles were 'a form of growth which belonged to a particular period in history' (1840-1914), which had disappeared thereafter.

Schumpeter

The most complex cycle system was propounded by Schumpeter. He had a basic Kondratieff long wave of fifty years, on each of which he superimposed six eight- to nine-year 'Juglars', each in turn being crowned by three forty-month 'Kitchin' cycles.²¹ Schumpeter insisted on the empirical regularity of his schema as if the basic facts about these three cycles had been well established, whereas there are great doubts about all three, as well as the legitimacy of his nomenclature. Kitchin's paltry contribution to the literature is lean meat indeed compared with that of the NBER, and Juglar never claimed to have demonstrated the existence of an eight- to nine-year rhythm. In fact, the NBER had already demonstrated rather wide variance in the length of cycles, so that there was little ground for distinguishing Juglars and Kitchins. Furthermore, Schumpeter distinguished only the length of his three types of cycle and said nothing about their amplitude.

Schumpeter's treatment of statistical material is illustrative rather than analytic and is at times rather cavalier. He uses business annual material of the type favoured by his former colleague Spiethoff, or by Tugan-Baranowsky, both of whom had an obvious influence on his views. He also uses NBER type of statistical 'cocktail' material in pulse charts of industrial production, prices, interest rates, deposits, and currency circulation (p. 465). He makes passing reference to national income analysis (p. 561), but elsewhere refers to the concept of total output as a 'meaningless heap' (p. 484), national income as a 'highly inconvenient composite' (p. 561).²²

Schumpeter's cycle analysis runs to 1,050 pages and is highly discursive. Judged on its statistical evidence alone, it would have been long discredited. Its power lies in the imaginative theory he supplies to explain long waves and the highly illuminating commentary on many aspects of German, British, and American economic history. He argues that each wave represented a major upsurge in innovation and entrepreneurial dynamism. Although writing in the later 1930s, he was remarkably sanguine about the long-run productive potential of capitalism. For him, depressions were a necessary part of the capitalist process. They were a period of creative destruction, during which old products, firms, and entrepreneurs were eliminated and new products were conceived. In fact, Schumpeter dismissed the 1929-33 recession much too lightly. He says: 'the depression that ran its course from the last quarter of 1929 to the third quarter of 1932 does not prove that a secular break has occurred in the propelling mechanism of capitalist production because depressions of such severity have repeatedly occurred - roughly once in every fifty-five years.'²³ He then quotes the 1873-77 period as if it were a precedent for 1929-33. Such a comparison is totally misleading. In the earlier period the peak-trough fall in US industrial production was 14.8 per cent; in the later one, 44.7 per cent! There is no earlier parallel to the 1929-33 fall either in its amplitude or international incidence.

Like most long-wave analysts, Schumpeter gives primary stress to autonomous features of the capitalist process and says very little about the role of government in economic life. Where he does mention government, it is usually to scorn its perversity, as in his attack on Roosevelt's New Deal - though he regards government as pretty impotent. For him the driving force in economic life is entrepreneurship, which he regarded as having been taken over more or less completely by large firms. The emphasis on entrepreneurship is present in Schumpeter's earliest work on capitalist development written in 1911, and is obviously influenced by the ideas of Max Weber and Werner Sombart, which were popular at that time.

Schumpeter's big-wave chronology was rather similar to that of Kondratieff, though he gave each of the big waves a name and divided each wave into four phases rather than two.²⁴

TABLE 5
Schumpeter's Long-wave Chronology

Prosperity	Recession	Depression	Revival
1. Industrial Revolution Kondratieff (cotton textiles, iron, and steam power)			
1787-1800	1801-13	1814-27	1828-42
2. Bourgeois Kondratieff (railroadization)			
1843-57	1858-69	1870-85	1886-97
3. Neomercantilist Kondratieff (electricity, automobiles, chemicals)			
1898-1911	1912-25	1925-39	?

The main weaknesses of Schumpeter's long-wave theory (ignoring his failure to demonstrate their existence in the real world) are three-fold: (1) he does not explain why innovation (and entrepreneurial drive) should come in regular waves rather than in a continuous but irregular stream, which seems a more plausible hypothesis for analysis concerned with the economy as a whole; (2) he makes no distinction between the lead country and the others, but argues as if they were all operating on a par as far as productivity level and technological opportunity is concerned. Thus his waves of innovation are expected to affect all countries simultaneously; (3) he greatly exaggerates the scarcity of entrepreneurial ability and its importance as a factor of production.

Schumpeter developed his ideas on capitalist development in another book published during the Second World War (Capitalism, Socialism and Democracy), which is not concerned with long waves but presents a breakdown theory for the capitalist system. This is rather paradoxical coming from an analyst who had such great faith in the robust character of capitalism, but his breakdown theory is sociopolitical rather than economic. He argues that there are four major forces destroying capitalism. In the first place, entrepreneurship is likely to be stifled by bureaucratization of management and decision-making in large firms. The second menace is the disincentive of progressive taxation and the increasing power of trade unions, which had already (he argues) retarded US recovery in the 1930s and was likely to become more stifling. The third threat came from the growing power of socialist ideas, and the fourth from the unpopularity of capitalism with intellectuals, who were continually engaged in denunciatory activities and harassments such as anti-trust suits.

Schumpeter's approach to long waves and the breakdown of capitalism has great fascination. It contains bold hypotheses and unsettling paradoxes, which gain in impact through his emotional detachment. His view of capitalist development is fatalistic, and he writes as if he were charting destiny. He dislikes most of what is happening in the real world, but does not advocate policies to remedy the predicted catastrophe. In fact, one is never sure with Schumpeter whether he is putting forward a specific hypothesis because he seriously believes it or because it is a stimulating illustration of his fundamentally dynamic and original conception of capitalist development.

Long-wave Revivalists

The significant change in the momentum of economic growth after 1973 revived the notion of long rhythms in economic life and a number of new long-wave pundits emerged. Some of these are vulgarizers of past long-wave theories, which they invoke uncritically in support of a fashionable gloom about the future;²⁵ others deserve critical inspection even though I have not found much in their work to shake my scepticism about long waves as a systematic phenomenon affecting output. The two revivalists examined here are W.W. Rostow and E. Mandel.²⁶

Rostow is concerned with 'Kondratieff' movements, essentially in the sense of swings in the terms of trade of primary producers against those selling industrial goods. Thus he refers to the 1951-73 period as the 'downswing' of a fourth Kondratieff, and the OPEC-inspired price increases as the upswing of a fifth Kondratieff, which poses particular problems because of demographic pressures in the developing world. Although I myself feel uncomfortable about calling the 1951-73 period a 'downswing', the Rostow thesis in itself appears fairly reasonable, and Arthur Lewis has shown the interest in explaining this facet of Kondratieff's work. Furthermore, Rostow produces 800 pages of empirical material to back his argument, in welcome contrast to some of his earlier work. However, he complicates his argument by embedding it in a loosely integrated framework that features neo-Schumpeterian surges of innovation in leading sectors, demand changes as economies work themselves through a hierarchy of stages, and a reiteration of his earlier erroneous belief that there was a short, sharp take-off in Western countries which was staggered in time. Like Schumpeter, Rostow has little time for broad aggregates such as GDP, which to my mind are the central indicators to be used in measuring acceleration or deceleration of growth.

Mandel approaches long waves from a rather different ideological position from Rostow - being an erudite Belgian Marxist of Trotskyite persuasion. He asserts that there are long swings, roughly fifty years in length, caused by surges of new technology. In each swing there are two phases.

In the first phase profit rise as new technology is developed, and in the second phase profit rates fall as technical possibilities are exhausted. The timing, like the causality, is similar to Schumpeter's. The first (Industrial Revolution) wave is from the 1780s to 1847; the second, from 1847 to the 1890s, is attributable to a technological revolution dominated by 'machine production of steam motors'; the third, from the 1890s to 1939, is associated with the 'machine production of electric and combustion motors'; and the fourth, from 1940 to a future unspecified date, is associated with machine production of electronic motors and atomic energy. He suggests that the first phase of the fourth wave ended in 1967 and that we are now in the second phase. Unlike other writers in this vein, he does not refer to the waves as 'Kondratieffs', as he considers Kondratieff unoriginal as compared with van Gelderen (for whose work he has an exaggerated respect).

Mandel is mainly interested in theory and the empirical underpinning is very weak. He claims (p. 137) that 'economic historians are practically unanimous' in distinguishing expansions and recessions in the periods he uses in his periodization, but the only justification he gives for this is an article by Hans Rosenberg published in 1943, which itself contained no empirical material and was written before quantitative economic history began. He also presents estimates of industrial production for the UK, Germany, and the USA and estimates of world trade to buttress his argument. These are not deviations from detrended moving averages, but compound rates of growth between the years specified (which vary by type of indicator).

Table 6 shows Mandel's indicators for the second-wave downswing, which he calls a period of 'pronounced depression', and for the third-wave upswing, which he calls a period of 'tempestuous increase in economic activity'. The figures do not bear out such a dramatic conclusion, particularly if one uses the alternative measures in the bottom half of the table, which are drawn from more recent sources but cover exactly the same periods and refer to the same concepts as those of Mandel.

TABLE 6
Mandel's Evidence Scrutinized
 (annual average compound growth rates)

		Second-wave downswing 'Pronounced depression'	Third-wave upswing 'Tempestuous increase in economic activity
Mandel's indicators	UK industrial output	1.2 (1876-93)	2.2 (1894-1913)
	Germany industrial output	2.5 (1875-92)	4.3 (1893-1913)
	USA industrial output	4.9 (1874-93)	5.9 (1894-1913)
	World trade	2.2 (1870-90)	3.7 (1891-1913)
	Average	2.7	4.0
Mandel replicated	UK	1.4	2.4
	Germany	4.0	4.2
	USA	4.9	5.0
	World	3.4	3.5
	Average	3.4	3.8

Source: First five rows from E. Mandel, Late Capitalism, New Left Books, London, 1975, pp. 141-2 (I have omitted his citation of Dupriez's 1947 estimates of world per capita output as these are much too shaky for serious use in this context). My indicators of industrial production including construction for the UK, Germany, and the USA are from W.A. Lewis, Growth and Fluctuations 1870-1913, Allen & Unwin, London, 1978; world trade volume from A. Maddison, "Growth and Fluctuation in the World Economy 1870-1960", Banca Nazionale del Lavoro Quarterly Review, June 1962.

Mandel considers that there have been stages as well as waves of development within the capitalist period; but, interestingly enough, although he calls his book 'late capitalism', he claims that this is not a new stage but merely a development within the second stage of imperialist monopoly-capitalism, which Lenin distinguished from the first phase of 'free competition'.

At first sight this restraint is puzzling, for Mandel frequently refers to features of 'late capitalism' that seem rather different from those that Lenin distinguished, e.g., the enhanced role of the state in the economy, the formal ending of colonialism, the importance of military spending, and the changed international power locus. The reason for Mandel's position is explained towards the end of his book, where he makes it clear that he wants to avoid being classified with the type of 'revisionist' who claims that there is a new era of state capitalism with a mixed economy that can 'suspend the internal economic contradictions of capitalism'.²⁷

Thus there is no real connection between Mandel's stages of growth and his long waves. The latter are the fruit of more or less exogenous technological development, and do not have the policy-institutional flavour that Schumpeter conferred on his by calling one 'bourgeois' and another 'neo-mercantilist'.

Although I disagree with Mandel's conclusion that he has found empirical evidence for long waves, his theoretical position has interesting elements of originality, and his discussion of the intellectual history of this field is also more stimulating than many other accounts.

Conclusions on Long-wave Theories

My basic conclusion is that the existence of regular long-term rhythmic movements in economic activity is not proven, although many fascinating hypotheses have been developed in looking for them. Nevertheless, it is clear that major changes in growth momentum have occurred since 1820, and some explanation is needed. In my view it can be sought not in systematic long waves, but in specific disturbances of an ad hoc character. Major system shocks change the momentum of capitalist development at certain points. Sometimes they are more or less accidental in origin; sometimes they occur because some inherently unstable situation can no longer be lived with but has finally broken down (e.g., the Bretton Woods fixed exchange rate system). I also feel that the institutional-policy mix plays a bigger role in capitalist development than do many of the long-wave theorists. A system shock will produce the need for new policy instruments, and these are not always selected on the most rational basis; or they may require a long period of experiment before they work properly. There may also be conflicts of interest within and between countries which prevent the emergence of efficient policies. Hence there may well be prolonged periods in which supply potential is not fully exploited. Some of these problems are faced in Schumpeter's analysis but usually as if their solution was a matter of destiny rather than choice.

It is also important to keep in mind that capitalist development since 1820, though it has a certain unity because the growth momentum has lain within distinctly higher limits than earlier epochs, has nevertheless seen big changes in the character of economic life which were bound to influence the type of fluctuations that were experienced. These changes have to be kept in mind in constructing any general theory of fluctuations or phases. One of these is the change in the structure of production and employment that has resulted from increased levels of income and changed patterns of demand and productivity. In 1820, agriculture characteristically employed well over half of the labour force in these countries, whereas the average has now fallen to 6 per cent. Agriculture was and still is subject to erratic fluctuations in output owing to weather, and its products are generally sold in flexprice markets in which prices go down as well

as up. This erratic element in economic life is now much smaller than it used to be. Industrial employment was probably around a quarter of total employment around 1820 and rose towards a peak of somewhere round 50 per cent in most countries. Hence the process of capitalist development is often referred to as industrialization, with its first phase as the 'Industrial Revolution', and particular weight is often placed on industrial production as an index of growth. However, the industrial share in employment has been on the decline for the past thirty years, and has now regressed closer to the 1820 proportion than to its peak level. The big long-run gains have been in services, which had perhaps a fifth of total employment in 1820 against two thirds now. It was in the industrial sector that the business cycle was most marked in terms of stock-output supply adjustments and fluctuations in demand, but in the service sector both demand and supply are more stable, and this has dampened the amplitude of fluctuations in GDP.

A second major change in economic life has been the growing role of the government. In 1820 government consumption was typically less than 10 per cent of GDP, but the proportion has now doubled. In addition, government intervenes on a massive scale to operate a vast network of social transfers, which change the distribution of income and the pattern of private spending. Total government spending is now nearly half of GDP. Finally, the government regulatory role in the economy has greatly increased. One result of the latter is that the stability of financial institutions has improved. Before the Second World War, depressions were often reinforced by major bank failures, but these are now rarer and their impact is cushioned, though the potential for such disturbances still exists. As a result of these changes, government exercises both a propulsive and a compensatory role in economic life, which generally operates to stabilize the expenditure and income flow, and the aspirations of governments to act as managers of economic destiny have greatly increased.

There are also other changes to keep in mind when developing hypotheses intended to cover the whole capitalist period. One important one is the change in the average size of firms, and the growth of trade unions to represent the interests of workers. Hence, the atomized market paradigm is no longer very relevant in wage and price fixing, which explains some of the changes that have occurred in price behaviour. Another is the character of the international linkages between countries, which have varied a good deal over time and which have been the most exposed to system shock. One fundamental aspect of this is the nature of the international monetary system, which has a major impact on the type of policy weapons used domestically. Others are the level of trade, migration, and capital movements, and the scope for international transfers of technology.

Phases of Growth

Although I find no convincing evidence in the work of Kondratieff, Kuznets, and Schumpeter to support the notion of regular or systematic long waves in economic life, there have nevertheless been significant changes in the momentum of capitalist development. In the 170 years since 1820 one can identify separate phases which have meaningful internal coherence in spite of wide variations in individual country performance within each of them. Phases are identified, in the first instance, by inductive analysis and iterative inspection of empirically measured characteristics. In order to illustrate trends, cycles, and phases, estimates are presented for as many individual years as possible, including war years. I have also aggregated movements for the sixteen countries as a whole, showing both weighted and unweighted averages. For many purposes the unweighted average is the most relevant indicator of the characteristic experience of these countries, because countries are our basic unit of analysis. For some purposes a weighted average is a useful supplement, but it should not be forgotten that the USA has a very large weight in such averages, particularly for the twentieth century. For many indicators, information is poor before 1870. Hence our systematic presentation of data is restricted to the period following 1870, but the available evidence suggests that in most respects the 1820-70 experience was similar to that in 1870-1913.

Table 7 gives a summary view of the amplitude of annual changes in GDP, which is our preferred measure of aggregate output for the sixteen countries taken together. Table 8 gives a synoptic view of the incidence of recession by year, and by country. The biggest interruptions to growth occurred in the 1930-2 depression, and in the 1945-6 period of demobilization, dismemberment, defeat, and victory. All other disturbances had a much milder impact on output, including those of the First World War and its aftermath. The aggregate stability in the collective output of the group in peacetime has been quite impressive. In the forty-three years from 1870 to 1913, there were only three years of recession in aggregate output, in the twenty-five years 1947-73 none and in 1974-89 two. However, it is clear from Table 8 that individual countries have been much more unstable than the group as a whole (particularly before 1913). The cyclical experience of individual countries has not normally been synchronized, but rather compensatory. Cyclical experience has been synchronized only when they have been subjected to 'system-shocks' such as wars, or the collapse of longstanding international payments mechanisms.

My method of distinguishing phases of development is quite simple. It involves collecting annual time series for major indicators of economic activity for the sixteen countries in as complete and comparable a form as possible, and by inspection of these and graphs derived from them, identifying fundamental turning points in growth momentum, and trying to establish growth and cyclical behaviour patterns that differ significantly between phases. The technique is

not unlike that of the NBER in its attempt to identify reference cycles, and in particular does not involve elaborate decomposition of time series into different kinds of oscillatory movement. Simple techniques such as this are almost inevitable in handling information for sixteen countries, where each series, if it were available for the full 170 years would involve more than 2,700 readings. Furthermore, it is necessary in this kind of comparative historical work to be very careful in making adjustment to enhance the comparability of the basic data. There is some danger in overprocessing results drawn too mechanically from such data.

In analysing the sequence of phases, the first problem is one of periodicity. Table 7 suggests that the period 1870-1913 has a certain unity in that growth was moderate and interrupted by recession, but not subject to the extreme shocks which struck three times between 1914 and the 1940s. There was also something special about the unprecedented secular boom which started in 1947 and ended in 1973. Evidence of various kinds suggests that the nature of the growth process changed after 1973. I have therefore distinguished four phases: 1870-1913, 1913-50, 1950-73, and 1973 onwards. However, my hunch, based on partial indicators for a few of the countries, is that the first phase can be extended to include 1820-1913 as a whole.

TABLE 7
Year-to-Year Percentage Change in Aggregate GDP of the Sixteen Countries, 1871-1989

1871	2.8	1914	-5.9	1950	7.9
1872	4.1	1915	3.1	1951	8.5
1873	1.9	1916	8.7	1952	4.1
1874	3.5	1917	-2.4	1953	4.7
1875	3.0	1918	1.7	1954	1.7
1876	-0.7	1919	-1.4	1955	6.1
1877	1.8	1920	0.0	1956	3.5
1878	1.9	1921	-1.0	1957	3.1
1879	2.7	1922	6.7	1958	1.1
1880	6.8	1923	6.3	1959	5.7
1881	2.8	1924	4.9	1960	4.8
1882	4.4	1925	3.8	1961	4.4
1883	1.7	1926	3.6	1962	5.4
1884	1.0	1927	2.5	1963	4.8
1885	0.3	1928	3.2	1964	6.5
1886	2.4	1929	4.3	1965	5.1
1887	3.8	1930	-5.7	1966	5.0
1888	1.2	1931	-6.4	1967	3.6
1889	3.8	1932	-6.6	1968	5.6
1890	2.4	1933	1.5	1969	5.2
1891	1.8	1934	5.1	1970	3.1
1892	3.4	1935	5.6	1971	3.4
1893	-1.1	1936	8.6	1972	5.0
1894	1.9	1937	5.4	1973	5.7
1895	5.0	1938	-0.1		
1896	1.0	1939	7.1	1974	0.5
1897	3.7	1940	3.2	1975	-0.4
1898	4.9	1941	8.5	1976	4.7
1899	5.0	1942	9.1	1977	3.8
1900	2.4	1943	9.4	1978	4.3
1901	4.2	1944	2.4	1979	3.3
1902	0.8	1945	-8.1	1980	1.3
1903	3.6	1946	-11.1	1981	1.8
1904	0.5	1947	1.6	1982	-0.4
1905	4.5	1948	5.5	1983	2.9
1906	7.0	1949	3.6	1984	5.0
1907	3.1			1985	3.5
1908	-3.6			1986	2.7
1909	6.6			1987	3.4
1910	1.2			1988	4.4
1911	3.9			1989	3.5
1912	4.1				
1913	3.3				

Source: Weighted estimates derived from Appendix A. 1871-1913 excludes Netherlands and Switzerland. 1871-85 movement for Japan was estimated by extrapolation assuming steady growth. For the First World War there were some gaps in data for Austria, Belgium, and Switzerland for which rough estimates were made; this is also true for Belgium, 1939-47, Switzerland, 1944-6, and Japan, 1945-6, see Appendix A for the interpolations.

Kuznets postulates five minimum requirements for acceptable stages of growth:28 (1) they must be identified by characteristics that can be verified or quantified; (2) the magnitude of these characteristics must vary in some recognizable pattern from one phase to another ('stages are presumably something more than successive ordinates in the steadily climbing curve of growth. They are segments of that curve with properties so distinct that separate study of each segment seems warranted'); (3) there should be some indication of when stages terminate and begin and why; (4) it is necessary to identify the universe to which the stage classification applies; (5) finally, Kuznets requires that there be an analytic relation between successive stages, which, optimally, would enable us to predict how long each stage has to run. This seems to me too deterministic. It suggests that movements between successive stages are more or less ineluctable. As I cannot meet Kuznets's fifth requirement, my periods are 'phases' rather than 'stages'.

My growth phases fulfil the first four Kuznets's requirements as explained below.

1. The phases are identified by eight simple indicators showing both growth and cyclical characteristics: rate of growth of output, output per head, capital stock and export volume, cyclical variations in output and exports, levels of unemployment, and rate of price increase. These are the conventional macroeconomic indicators one might use for growth accounting or conjunctural monitoring. The results are shown in very aggregative form in Tables 9 and 10. Each phase also has five non-quantifiable 'system characteristics', by which I mean the basic policy approaches and institutional environment that condition growth performance. These include the government approach to demand management (i.e., the kind of trade-off that is made between unemployment and inflation), the bargaining power of labour, the degree of freedom for trade and international factor movements, and the character of the international payments mechanism. Changes in these between periods are summarised in Table 11.

2. Most of the characteristics are systematically different in the four phases identified. Generally, they are most favourable in phase III, second-best in phase IV, third-best in phase I and worst in phase II. The exceptions to the second-best rating are the pace of price increase, where phase IV is worst; and unemployment, where it is second-worst.

3. There is room for argument as to which years are terminal for demarcation purposes, particularly as the use of annual data means that the periodicity has to be rather precise

TABLE 8
Incidence of Recessions, 1870-1989
(years and countries in which GDP fell)

Year	No. of Falls	Countries affected	Year	No. of falls	Countries affected	Year	No. of falls	Countries affected
1871	3	AGI	1914	12	ATBCLFGIJNSE	1950	0	
1872	2	CI	1915	8	ATBDLFGS	1951	1	D
1873	3	TDF	1916	2	TS	1952	2	BK
1874	1	E	1917	9	TDLFNWSZE	1953	0	
1875	3	BCS	1918	10	TBCDLFNWSZ	1954	2	CE
1876	5	ACFGI	1919	6	ATCGIK	1955	1	D
1877	5	DLGIS	1920	5	CIJKE	1956	0	
1878	5	CLFWS	1921	9	CDFIWSZKE	1957	0	
1879	5	TFGSK	1922	1	J	1958	5	BNWZE
1880	1	G	1923	2	TG	1959	0	
1881	1	I	1924	1	W	1960	0	
1882	4	ACLW	1925	1	D	1961	0	
1883	3	FIW	1926	2	AK	1962	0	
1884	1	F	1927	3	AFI	1963	0	
1885	5	TCFSK	1928	1	A	1964	0	
1886	1	S	1929	5	ABCLG	1965	0	
1887	0		1930	13	ATBCLFGIJNZKE	1966	0	
1888	5	TFIJE	1931	14	ATBCLFGINWSZKE	1967	1	G
1889	4	TCFI	1932	10	TBCDFGNSZE	1968	0	
1890	1	A	1933	4	TCNE	1969	0	
1891	3	LGJ	1934	3	BFN	1970	1	E
1892	5	ACLIK	1935	2	FZ	1971	0	
1893	3	ACE	1936	0		1972	1	S
1894	2	IE	1937	0		1973	0	
1895	3	ACF	1938	4	BFNE			
1896	2	JE	1939	2	LZ			
1897	3	AFI	1940	8	TBDLFNWS	1974	4	DJKE
1898	0		1941	6	BDFINZ	1975	10	TBDFGINZKE
1899	2	LJ	1942	8	TBFIJNWZ	1976	1	Z
1900	1	K	1943	6	BFINWZ	1977	1	S
1901	6	ALFGNS	1944	8	ALFIJNWK	1978	0	
1902	4	LFJS	1945	10	ATCDLGIJKE	1979	0	
1903	2	WK	1946	5	ACGKE	1980	3	DKE
1904	3	NWE	1947	2	KE	1981	6	TBDNSK
1905	1	J	1948	0		1982	4	CGZE
1906	0		1949	1	Z	1983	0	
1907	0					1984	0	
1908	6	CINSKE				1985	0	
1909	3	TJS				1986	0	
1910	2	FI				1987	1	D
1911	0					1988	1	D
1912	0					1989	0	
1913	0							

Country code:

A Australia D Denmark I Italy S Sweden
 T Austria L Finland J Japan Z Switzerland
 B Belgium F France N Netherlands K UK
 C Canada G Germany W Norway E USA

Source: Appendix A of Maddison (1991).

TABLE 9

Growth Characteristics of Different Phases, 1870-1989
 (Arithmetic average of figures for the individual countries:
 annual average compound growth rates)

Phases	GDP	GDP per capita	Gross non-res. fixed capital stock*	Volume of exports
I 1870-1913	2.5	1.4	3.4	3.9
II 1913-50	2.0	1.1	1.9	1.0
III 1950-73	4.8	3.8	5.9	8.6
IV 1973-89	2.6	2.1	4.3	4.7

*) refers to six countries, first period is 1890-1913, last one is 1973-87.

Source: Maddison (1991)

TABLE 10

Cyclical Characteristics of Different Phases, 1870-1989
 (Arithmetic average of figures for the individual countries)

Phases	Maximum peak/trough GDP movement	Maximum peak/trough export volume movement	Average unemployment rate	Average annual change in consumer prices
I 1870-1913	-5.5	-18.2	4.5 ^a	0.4
II 1920-38	-12.1	-36.5	7.3	-0.7 ^b
III 1950-73	0.2	- 7.0	2.6	4.1
IV 1973-89	-1.8	- 7.6	5.6	7.5

a) UK and USA 1900-13.

b) 1924-38 for Austria and Germany, 1921-38 for Belgium.

Source: Maddison (1991)

TABLE 11
System Characteristics of Different Phases

Governmental policy stance on unemployment/ price stability trade-off	Nature of international payments system	Labour market behaviour	Degree of freedom for international trade	Degree of freedom for international factor movements
<u>I: 1870-1913 'Liberal Phase'</u>				
No concern with unemployment	Gold (sterling) standard with rigid exchange rates	Weak unions; wages had some downward flexibility	Very free. No QRs or exchange restrictions. Tariffs the only barrier	More or less complete freedom
<u>II: 1913-50 'Beggars-Your-Neighbour' Phase</u>				
Concern with price and exchange stability leads to conscious acceptance of large scale unemployment	Gold standard restored at nostalgic parities, quarrels over government debt, 1931 system collapse followed by moveable peg	Governments enforce downward wage flexibility	QRs and exchange restrictions widespread. Tariffs raised substantially	Severe controls on both capital and labour
<u>III: 1950-73 'Golden Age'</u>				
Priority given to full employment	Fixed (but not rigid) exchange rates with large international credit facilities	Strong unions, no downward wage flexibility	Very strong move towards freer trade and customs unions	Gradual and substantial freeing of both labour and capital movements
<u>IV: 1973 onwards 'Phase of Cautious Objectives'</u>				
Priority given to price stability	System collapse followed by floating rates and growing area of stability in EMS	Weakened unions	Free trade maintained	Freedom for capital movements augmented, labour movement restricted

I explained earlier why I picked 1820 as the starting point for capitalist development; 1913 is clearly the last year of phase I, which ended with the outbreak of the First World War; and 1950 was chosen as a point where recovery from the Second World War was more or less completed in terms of recovery of the previous peak in output for the sixteen countries as a whole. However, five countries did not pass their wartime output peaks until 1953 (Austria, Germany, Japan, UK, and USA), respectively, so one might well argue that 1953 rather than 1950 should mark the beginning of the postwar golden age. On the other hand, there is a case for starting in 1948, which is when the ground rules for international co-operation within the capitalist group were set up by the Marshall Plan; so 1950 seems a reasonable compromise. It should be noted that use of 1948-73 or 1953-73 instead of 1950-73 would not affect the analysis seriously - the third phase would still be a period of secular boom on an unparalleled scale, and the second would still have the worst performance.

4. The emergence of a fourth phase after 1973 is rather clear. The 1974-5 and 1980-2 recessions affected virtually all sixteen countries. They were by far the biggest breaks in the postwar growth momentum. The grounds for treating the post-1973 period as a new phase include price, unemployment and output behaviour, changes in the international monetary system, in government policy concerning the level of demand, in expectations in the labour market, and greater openness of capital markets. The economic system behaves in a different way, which has created major new tasks for economic policy, and makes it more difficult to reconcile different policy objectives.

Recognition of the phase phenomenon forces consideration of factors operating for these countries as a whole. The interrelatedness of their economies limits the options which each is able or willing to pursue. Hence each phase has demonstrated a distinctive orbit, which puts some constraints on feasible national trajectories of growth and change. These constraints must be part of the explanation for surprising generality of the phase phenomenon.

The main conclusions I would draw about major fluctuations in the momentum of capitalist development are as follows.

1. There are distinct phases of economic performance, each with its own momentum.
2. Phases of growth are not ineluctable, and within each there is considerable scope for variation in country performance; but the policy-institutional framework and policy attitudes characteristic of each phase have had a striking distinctiveness and generality of acceptance. The expectations of economic agents about growth and inflation have also had distinctive characteristics which differ between phases.
3. The move from one phase to another has been caused by system-shocks. These may well be due to a predictable breakdown of some basic characteristic of a previous phase, but the timing of the change is usually governed by exogenous or accidental events which are not

predictable.

4. A more specific conclusion is that developments since 1973 represent a new phase and not just a temporary interruption of phase III.
5. The present phase generally ranks as second-best. Performance is well below that in phase III in almost all important respects, but the economy has been a good deal more stable in real terms than before 1950, and the growth of output per capita is significantly better than in the first two phases.

Notes

- 1) See M. Bronfenbrenner (ed.), Is the Business Cycle Obsolete?, John Wiley, New York, 1969, and the comments of R.M. Solow, Economic History Review, December 1970: 'The old notion of a fairly regular self-sustaining "business cycle" is not very interesting anymore. Today's graduate students have never heard of Schumpeter's apparatus of Kondratieffs, Juglars, and Kitchins, and they would find it quaint if they had.'
- 2) See C. Juglar, Des crises commerciales et de leur retour pe'riodique en France, en Angleterre et aux Etats Unis, Kelley (reprint), New York, 1967, p. 256.
- 3) See M. von Tugan-Baranowsky, Studien zur Theorie und Geschichte der Handelskrisen in England, Fischer, Jena, 1901, which develops under-consumptionist explanations of the business cycle.
- 4) See W.L. Thorp, Business Annals, NBER, New York, 1926; A.F. Burns and W.C. Mitchell, Measuring Business Cycles, NBER, New York, 1947, pp. 78-9. See also W.C. Mitchell, Business Cycles: The Problem and Its Setting, NBER, New York, 1930, for an excellent history of cyclical analysis.
- 5) See Burns and Mitchell, op. cit., p. 270, who state the reasons for not eliminating trend, with which I entirely agree: 'cyclical fluctuations are so closely interwoven with these secular changes in economic life that important clues to the understanding of the former may be lost by mechanically eliminating the latter. It is primarily for this reason that we take as our basic unit of analysis a business cycle that includes that portion of secular trend falling within its boundaries.'
- 6) In the period 1889-1978, the NBER recorded twenty-one reference cycles, the industrial production index showed fifteen recessions, and GDP thirteen. The average amplitude of GDP recessions was a 6.5 per cent fall, and of industrial production, 13.3 per cent. Before 1889 the GDP index for the USA contains too heavy an element of interpolation to be used for cyclical analysis.
- 7) Estimates are available for Denmark, France, and Sweden for 1820-70, and UK for 1830-70. During these periods these countries showed maximum peak-trough GDP falls of 5.6, 11.5, 9.7 and 7.0 per cent respectively, i.e. and average of 8.5 per cent.
- 8) See N.D. Kondratieff, 'Die langen Wellen der Konjunktur', Archiv für Sozialwissenschaft und Sozialpolitik, December 1926, pp. 573-609.
- 9) The most sophisticated discussion of the Kondratieff wave in prices for the 1870-1913 period is contained in W.A. Lewis, Growth and Fluctuations 1870-1913, Allen & Unwin, London, 1978, which examines whether prices influenced output movements or output influenced prices. Lewis also discusses the role of gold production. His conclusion is that the global price movement in this period was most strongly influenced by US agricultural production. Although Lewis uses personalized nomenclature for various cycles and waves, as Schumpeter also did, he does not in fact endorse the idea of Kondratieff waves as a non-monetary phenomenon on an international scale.
- 10) It is rather odd that Kondratieff eliminated the population component in which the Kuznetsians have found the best evidence for their own long-wave analysis.
- 11) See Kondratieff, op. cit., pp. 586 (graphs) and 607-9 for the data and trend formulae. Kondratieff's graph for coal should be compared with the minor ripples shown in that of S.S. Kuznets, Secular Movements in Production and Prices, Houghton Mifflin, Boston, 1930, p. 124, which shows proportionate deviations from a trend calculated from a different formulae. In fact, the end-points in Kondratieff's UK coal graph are wrongly drawn. They are accurately

represented in the abridged English translation by Wolfgang Stolper 'Long Waves in Economic Life', Lloyds Bank Review, July 1978. This recent reprint contains an error in its graph 3, where the long waves in UK cotton textile workers wages are overstated by a factor of 10, because the scale is incorrect.

12) See G. Garvy, 'Kondratieff's Theory of Long Cycles', Review of Economic Statistics, November 1943, for an excellent review of Kondratieff's work and account of his Soviet critics.

13) It is sometimes suggested that Kondratieff's approach was no advance on ideas put forward by van Gelderen under the pseudonym J. Fedder, 'Springvloed', De Nieuwe Tijd, Fortuyn, Amsterdam, 1913. In fact, he may not have proved much more than van Gelderen - i.e., that there are long swings in the general price level - but in terms of analytic framework and statistical technique, what Kondratieff offered was distinctly novel.

14) See S.S. Kuznets, Secular Movements in Production and Prices, Kelley (reprint), New York, 1967.

15) Kuznets presented twenty-three indicators for the USA, of which sixteen were commodities with both price and quantity data and six were financial indicators (including the general price index). For the UK he had nine indicators, France and Germany eight each, Belgium five, Canada and Japan two each, Australia and Argentina one each.

16) See Burns and Mitchell, op. cit., p. 428: 'Kuznets did not draw up a list of dates showing the peaks and troughs of his "secondary secular variations". In attempting to determine such a chronology from his American series, we found their turning points so widely dispersed that we could have little confidence in any list we ourselves might extract.'

17) See S. Kuznets, Economic Development and Cultural Change, October 1956, p. 50. This article was rewritten and published as Chapter 1 of Economic Growth of Nations, Harvard, 1971, where Kuznets dropped his aggregate chronology.

18) 'Long Swings in Population Growth and Related Economic Variables', reprinted in S. Kuznets, Economic Growth and Structure, Heinemann, London, 1965. See also S. Kuznets, Capital in the American Economy, Princeton, 1961, Chapters 2, 7, 8 and 9.

19) The others include B. Thomas, Migration and Economic Growth, Cambridge, 1954; J.G. Williamson, American Growth and The Balance of Payments: A Study of the Long Swing, Chapel Hill, 1964; R.A. Easterlin, Population, Labor Force, and Long Swings in Economic Growth, NBER, New York, 1968.

20) See Historical and Comparative Rates of Production, Productivity and Prices, Part 2 of Hearings on Employment, Growth, and Price Levels, Joint Economic Committee, US Congress, April 1959, pp. 411-66; 'The Nature and Significance of Kuznets' Cycles', Economic Development and Cultural Change, April 1961; and 'The Passing of the Kuznets' Cycle', Economica, November 1968.

21) See J. Kitchin, 'Cycles and Trends in Economic Factors', Review of Economic Statistics, January 1923, pp. 10-16.

22) Page references are to J.A. Schumpeter, Business Cycles, Mc Graw-Hill, New York, 1939.

23) See J.A. Schumpeter, Capitalism, Socialism and Democracy, Allen & Unwin, London, 1943, p. 64.

24) In fact, Schumpeter was not too explicit on his chronology, which we owe to Kuznets' exegesis after consultation with Schumpeter; see S. Kuznets, 'Schumpeter's Business Cycles', American Economic Review, June 1940, for a highly sceptical assessment.

25) See J.J. van Duin, De lange golf in de economie, Van Gorcum, Assen, 1979, who is an eclectic revivalist, rather cavalier with the few empirical facts he presents; or J.W. Forrester,

'Growth Cycles', De Economist, 1977, pp. 525-43, who produces long waves with no data. Well documented scepticism about long waves can be found in W.H. Schröder and R. Spree (eds.), Historische Konjunkturforschung, Klett Cotta, Stuttgart, 1981, and J.P.G. Reijnders, The Enigma of the Long Wave, Ph.D. thesis, Groningen, 1988.

26) See W.W. Rostow, 'Kondratieff, Schumpeter and Kuznets: Trend Periods Revisited', Journal of Economic History, December 1975, which contains the essentials of the approach in his The World Economy, Macmillan, London, 1978. See E. Mandel, Late Capitalism, New Left Books, London, 1975. In addition to these two authors, there are elements of originality in G. Mensch, Das technologische Patt, Frankfurt, 1975, who has a Schumpeterian type approach with a detailed catalogue of different types of innovation. He considers that the clustering of innovations determines the tempo of capitalist performance, and that the 1970s slowdown is due to a shortage of exploitable innovations. Mensch has some interesting ideas about lags in application of inventions, but lapses frequently into apocalyptic sermonizing. He presents almost no evidence on the variations in the pace of macroeconomic performance which he is presumably trying to explain, and nowhere makes the leader-follower dichotomy, which is fundamental in analysis of the diffusion of innovation.

27) Mandel cites several examples of this type of Marxist revisionism, of which the best example in my view is John Strachey, Contemporary Capitalism, Gollancz, London, 1956.

28) See S. Kuznets in W.W. Rostow (ed.), The Economics of Take-Off into Sustained Growth, Macmillan, London, 1963.