

Phases of Capitalist Development¹

Until the eighteenth century, most of the world was caught in a Malthusian trap. Population rose about 0.04 per cent a year over the two millenia preceding 1700, and world income no faster. Since then, population has grown by 0.7 per cent a year and per capita income is a multiple of previous levels. Understandably, this transition has had a hypnotic fascination for economic historians. However, within the period of modern economic growth, there have also been distinct and important phases of development, less dramatic than the great transition, but equally worthy of study, definition and causal interpretation. These phases have characteristics which put constraints on the performance of individual countries, whether they be fast or slow growing. This paper deals with developments since 1870 in 16 of the more advanced capitalist countries, and divides the past century's experience into four phases.

The adjective "capitalist" is used here in a descriptive sense and is not intended to be either pejorative or apologetic. It seems an appropriate term for economies whose growth performance depends so heavily on capital formation, and where the rate of capital formation has depended and still depends largely on decisions taken by the private sector. These characteristics are basically the same in spite of major changes in the role of government, the organisation of private business and the strength of organised

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labour which have occurred in the past century. Alternative classifications of this group such as "Western", "developed", "industrialised", or "non-communist" all seem inferior. "Western" has geographic connotations that are not appropriate for Japan or Australia, "developed" is rather terminal in connotation, "industrial" is too narrow, "non-communist" is too negative for today and meaningless for the pre-1917 period².

Long-Term Performance Record

In the past century, the economic performance of these countries has been impressive. Between 1870 and 1976, their total output multiplied by a factor of 19 and there was a sixfold increase in output per head. Growth and welfare are not synonymous, but the increase in real income was accompanied by a fall in average work hours from 3200 to 1800 a year, a rise in life expectation of around 30 years, and some improvement in income distribution, so we cannot be far wrong in saying that people in these countries are several times better off now than they were in 1870.³

There have been some major changes in geopolitical ranking (see Table 1). In terms of G.D.P., the U.S.A. was the lead country in 1870 as it was in 1976, but in 1870, with 20 per cent of

²A. LINDBECK, *Swedish Economic Policy*, Macmillan, London, 1975 p. 247 argues that "capitalism" is an anachronistic ideological term, and the same view was advanced by C.A.R. CROSLAND, *The Future of Socialism*, Cape, London, 1956, chapter III. However these writers have not produced any reasonable alternative, and the term seems to be acceptable to a wide range of non-Marxists including Schumpeter, Galbraith and Friedman. It is perhaps worth recalling Tawney's view. In the 1937 preface to *Religion and the Rise of Capitalism* (originally published in 1926), he writes "When this book first appeared, it was possible for a friendly reviewer, writing in a serious journal, to deprecate in all gravity the employment of the term "Capitalism" in an historical work, as a political catch-word betraying a sinister intention on the part of the misguided author. An innocent solecism of this kind would not, it is probable, occur so readily today — the time has come when it is more important to determine the different species of capitalism, and the successive phases of its growth, than to continue to labour the existence of the genus".

³ See M. Moss, ed. *The Measurement of Economic and Social Performance*, N.B.E.R., 1973, p. 520 for a comparison of trends in output GDP and welfare (MEW) made by NORDHAUS and TOBIN. For 1929-65, they show GDP rising 3.1 per cent a year in the U.S.A. and MEW (measurement of economic welfare) rising by 2.3 per cent a year. They do not take account of improvements in life expectation (see Usher's paper in the same volume) or of changes in distribution of income.

the output of the group, its lead was marginal, whereas in 1976 it accounted for 40 per cent of the output of the sixteen. Japan has also grown greatly in relative importance from sixth to second place, and in 1976 accounted for 16 per cent of the output of the group compared with 6.2 per cent in 1870. The share of the six big countries as a whole is the same in 1976 as in 1870 (86 per cent), but the four big European countries all carry less weight than a century earlier. In 1870 the U.K., France, Germany and Italy accounted for 60 per cent of the output of the group, whereas in 1976 their share was only 30 per cent. The importance of the 10 small countries taken together was the same in 1976 as in 1970 — most of them having grown in size relative to the big European countries. The biggest increase in this group occurred in Canada.

TABLE 1
RELATIVE SIZE OF THE 16 ECONOMIES 1870-1976
(Total GDP^a in dollars at 1970 U.S. prices)

	1870 \$ million	1976 \$ million	Coefficient of multiplication	Annual average compound growth rate
U.S.A.	30.9	1,158.2	38	3.5
U.K.	29.9	200.9	7	1.8
France	25.8	249.4	10	2.2
Germany	20.5	268.2	13	2.5
Italy	14.2	160.1	11	2.3
Japan	9.4	465.0	49	3.8
Belgium	4.8	44.4	9	2.1
Netherlands	3.4	59.2	17	2.7
Canada	2.3	113.0	50	3.8
Australia	2.2	58.3	27	3.2
Switzerland	2.1	26.9	13	2.4
Austria	1.9	27.9	15	2.6
Sweden	1.7	39.0	23	3.0
Denmark	1.0	20.8	22	2.9
Norway	0.8	18.3	22	2.9
Finland	0.7	18.0	26	3.1
Total	151.6	2,927.6	19	2.8

a) with the exception of Austria, these figures are not adjusted to offset the impact of territorial change.

Sources: See Appendix.

Table 2 indicates the divergence of demographic experience over the past century, Australia, Canada, and the U.S.A. have been countries of settlement. Their large natural resources have attracted large-scale migration. Their respective populations have grown eight, six, and fivefold. The bulk of these migrants came from European countries and the population growth of the latter has been much more modest. Japan's population growth experience falls within the European range, with little net emigration over the period as a whole.

TABLE 2

POPULATION OF THE 16 COUNTRIES 1870-1976 (000s)

	1870 (000s)	1976 (000s)	Coefficient of multiplication	Annual average compound growth rate
Australia	1,620	13,614	8.4	2.03
Austria	4,520 ^a	7,525	1.7	0.48
Belgium	5,056	9,830	1.9	0.63
Canada	3,641	23,138	6.4	1.76
Denmark	1,793	5,084	2.8	0.99
Finland	1,754	4,722	2.7	0.94
France	38,440	53,100	1.4	0.31
Germany	39,231	61,523	1.6	0.43
Italy	26,526	55,820	2.1	0.70
Japan	34,437	111,914	3.2	1.12
Netherlands	3,607	13,761	3.8	1.27
Norway	1,735	4,017	2.3	0.80
Sweden	4,164	8,222	2.0	0.64
Switzerland	2,664	6,399	2.4	0.83
U.K.	31,257	56,076	1.8	0.55
U.S.A.	39,905	215,074	5.4	1.60
Total	240,350	649,819	2.7	0.94

a) refers to population within area of present day Austria, all other 1870 figures refer to population in the territory of the year cited.

A fundamental criterion of economic performance is the rate of growth of output per head. In this respect, the countries fall into three groups. Japan has had supergrowth with a fifteenfold increase in per capita income. Next come a group of nine countries (Canada, U.S.A., France, Germany, Austria and all Scandi-

navia) whose performance ranges from seven to elevenfold growth. The six slow-growth countries are Australia, Belgium, Italy, the Netherlands, Switzerland and the U.K.

TABLE 3

RELATIVE PROSPERITY OF THE 16 COUNTRIES 1870-1976
(GDP per head in dollars at 1970 U.S. prices)

	1870 \$ per person	1976 \$ per person	Coefficient of multiplication	Annual average compound growth rate
Australia	1341	4280	3	1.1
U.K.	956	3583	4	1.3
Netherlands	954	4304	5	1.4
Belgium	951	4515	5	1.5
Switzerland	806	4199	5	1.6
U.S.A.	774	5385	7	1.9
France	670	4697	7	1.9
Canada	619	4882	8	2.0
Italy	537	2869	5	1.6
Denmark	536	4082	8	1.9
Germany	523	4359	8	2.0
Norway	489	4549	9	2.1
Sweden	416	4748	11	2.3
Austria	412	3713	9	2.1
Finland	399	3814	10	2.2
Japan	273	4155	15	2.6
Arithmetic Average	666	4258	6	1.8

Marked convergence in income levels has occurred. The high income countries of 1870 have all grown relatively slowly, the poorer countries much more rapidly; as a result the income spread is now less than 2:1 whereas it was initially nearly 5:1.

Measurement of output trends over a century means comparing the present situation with that of dead ancestors who had had no experience of air and motor transport, radio, television, cinema, or household electrical appliances. Such an assessment requires robust evidence and strong faith in the logic of index numbers

and national accounts. My own conclusion is that such comparisons can be made with much greater confidence now than was the case a couple of decades ago but that they should still be regarded as rough orders of magnitude. The detailed source notes provided in the appendix show there is still scope for further research and that the figures for some countries such as Austria, Belgium, Finland, the Netherlands and Switzerland may well be subject to substantial revision. However, it seems unlikely that further evidence is likely to change the ranking of the countries with extreme positions in terms of per capita growth, i.e. Australia and the U.K. at the bottom end, and Japan at the top.

There has been considerable controversy about Japanese growth, but estimates for the Meiji period to 1950 have been worked over considerably and now seem reasonably firmly established. There has naturally been scepticism about the plausibility of the very high growth rate for the postwar years. Nevertheless, the probing which has taken place seems to confirm the estimates used with the important proviso that net domestic product (excluding capital consumption) has risen more slowly than gross domestic product. Over the whole period 1870-1976 net product may have increased only 13 times as compared with the 15 fold increase for gross product, but Japan remains the extreme case of rapid development whether a net or a gross measure is used.

Australia's slow rate of per capita growth has been rather fully documented by Butlin, and the very high initial level — due to an abundance of agricultural land, a relatively large output of gold and an immigrant labour force with an abnormally high proportion of males of working age — was clearly remarked by contemporary observers a century ago. Since then policy has given greater weight to expanding population than to raising per capita income.

The U.K. has suffered by far the biggest decline in relative position. With the second lowest per capita growth and the third lowest population growth, its total output has risen least. In 1870 it produced a fifth of the output of the group and occupied second place in per capita income. In 1976, it accounted for less than 7 per cent of the group's output and was thirteenth in level of per capita income. There seems to be no likelihood that the U.K.'s poor performance is a statistical artifact. The U.K. growth estimates are better than those for all the other countries. There are two

respects in which per capita growth may possibly be considered to be understated but they are of small magnitude.⁴

Although there has been great variation in country performance, and analysis of reasons for such differences is one of the major tasks of economic history, this is not our purpose here. The concern is rather with the similarities in the pattern of growth experience. Recognition of these similarities in growth patterns and identification of their nature can be of major value in explaining why growth rates differ.

Interruptions to Growth

The growth process has not been smooth. There have been major temporary interruptions because of business recessions and system shocks such as wars or the collapse of payments mechanisms, and the underlying long-run trend of growth has changed its slope over time. In order to illustrate the trend, the cycle and the phases, I have made estimates for as many individual years as possible, including war years. I have also aggregated movements for the group as a whole wherever possible.

Table 4 gives a summary view of the amplitude of annual changes in aggregate output. Table 5 gives a synoptic view of the incidence of recession, by year and by country. The biggest interruptions to growth occurred in the 1930-32 recession, and in the 1945-46 period of demobilisation, dismemberment, defeat, and victory. All other disturbances have 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 43 years 1870-1913

⁴ The U.K. estimates are an average of separate estimates of the growth of output, expenditure and income. For 1870-1950, taking 1870 = 100, the results are: output index 348.0, expenditure 352.9, income 380.1, and the "compromise" estimate (which we adopted) was 360.6. Thus the highest variant, income, would show growth 5.4 per cent higher than the compromise figure. The second point is that the U.K. included Southern Ireland until 1920, and output per head may have grown slower there from 1870 to 1920 than in the rest of the U.K., so that performance in the present area of the U.K. may have been slightly faster. Against these two factors it should be recalled that U.K. net income from abroad added 3.5 per cent to G.D.P. in 1870, but its relative importance is now much smaller.

there were only two years of recession in aggregate output⁵ and in the 30 years 1947-76, only one year. However it is clear from Table 5 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 synchronised but compensatory. This point has already been made by Arthur Lewis and Brinley Thomas in connection with the pre-1914 experience.⁶ Cyclical experience has been synchronised only when these economies have been subjected to system-shock.

Phases of Growth

Apart from interruptions due to recession and system-shocks such as the two world wars, there have been changes in the underlying pace of growth which make it useful to divide these 107 years into separate phases which have meaningful internal coherence in spite of the wide variation in country performance within each of them.

What is the appropriate periodicity? Table 4 suggests that there is a certain unity in the period up to the first world war in which growth was moderate and interrupted by recession, but not subject to the extreme shocks which struck three times between 1914 and the 1940s. There is 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 in the 1970s. I have therefore distinguished four phases — 1870-1913, 1913-50, 1950-70 and 1970 onwards.

Kuznets postulates five minimum requirements for acceptable

⁵ It should be noted that the annual output estimates for 1870-90 are rather rough for several of the countries and the estimating technique in the estimates which I myself made tends to smooth the series for these years, but I feel it unlikely that improvement in the quality of the estimates would change the aggregate cyclical picture. The "Great Depression" which is alleged to have plagued the 1870s and 1880s was really a price rather than an output phenomenon.

⁶ See W. A. LEWIS and P. J. O'LEARY, "Secular Swings in Production and Trade, 1870-1913", *Manchester School of Economic and Social Studies*, May 1955, p. 143 who examined evidence on France, Germany, the U.K. and U.S.A. See also B. THOMAS, *Migration and Economic Growth*, Cambridge, 1954, p. 109 in reference to the U.K. and U.S.A.

TABLE 4

YEAR TO YEAR PERCENTAGE CHANGE IN AGGREGATE GDP OF THE 16 COUNTRIES

1871	2.2	1898	5.1	1925	4.0	1952	4.0
1872	4.2	1899	4.5	1926	3.4	1953	5.2
1873	1.6	1900	2.6	1927	2.9	1954	1.3
1874	4.7	1901	3.7	1928	3.0	1955	6.8
1875	2.2	1902	1.1	1929	4.5	1956	3.7
1876	0.0	1903	3.6	1930	-5.6	1957	3.2
1877	2.0	1904	1.1	1931	-5.7	1958	1.2
1878	2.0	1905	3.7	1932	-7.1	1959	5.8
1879	0.8	1906	6.7	1933	1.2	1960	4.8
1880	4.1	1907	2.7	1934	6.6	1961	4.7
1881	3.4	1908	-3.2	1935	5.8	1962	5.2
1882	3.1	1909	6.1	1936	7.8	1963	4.8
1883	2.1	1910	1.6	1937	7.5	1964	6.3
1884	1.0	1911	3.7	1938	0.4	1965	5.1
1885	1.7	1912	4.2	1939	5.6	1966	5.5
1886	3.0	1913	3.6	1940	2.0	1967	4.0
1887	3.4	1914	-6.3	1941	7.6	1968	5.9
1888	2.6	1915	2.0	1942	7.1	1969	5.0
1889	3.4	1916	7.6	1943	7.7	1970	3.6
1890	3.9	1917	-1.0	1944	2.0	1971	3.8
1891	1.8	1918	3.0	1945	-6.3	1972	5.4
1892	3.4	1919	-2.5	1946	-14.4	1973	6.2
1893	-1.0	1920	-0.9	1947	1.9	1974	0.1
1894	2.2	1921	-0.3	1948	6.2	1975	-1.0
1895	5.2	1922	6.3	1949	3.4	1976	5.2
1896	1.4	1923	5.2	1950	8.2		
1897	3.1	1924	5.2	1951	7.1		

1871-1913 includes Australia, Belgium, Canada, Denmark, France, Germany, Italy, Japan^a, Norway, Sweden, U.K., U.S.A.

1914-1950 as for 1890-1913 plus Finland and the Netherlands, but excluding Belgium.

1950-1976 includes all 16 countries.

a) The 1871-85 movement for Japan was estimated by extrapolation assuming steady growth.

TABLE 5

INCIDENCE OF RECESSIONS 1870-1976
(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	1907	0		1942	5	FINWZ
1872	2	CI	1908	4	DIKE	1943	6	FIJNWZ
1873	2	DF	1909	2	GJ	1944	8	ALFIJNWK
1874	1	G	1910	1	I	1945	9	ACDLGIJKE
1875	4	BCDS	1911	0		1946	5	CGJKE
1876	3	FGI	1912	0		1947	2	KE
1877	5	DFGI	1913	0		1948	0	
1878	4	CFWS	1914	10	ACDLFGIJNE	1949	1	Z
1879	3	FGK	1915	6	ADLFGS	1950	0	
1880	1	G	1916	1	F	1951	1	D
1881	1	I	1917	7	DLFNWSE	1952	2	BK
1882	3	ACW	1918	7	DLFJNWS	1953	0	
1883	4	CFIW	1919	4	AFGK	1954	2	CE
1884	1	F	1920	6	CDIJE	1955	1	D
1885	2	FK	1921	7	CDFIWKE	1956	0	
1886	1	C	1922	2	JS	1957	0	
1887	1	S	1923	2	TG	1958	5	BLNZE
1888	3	AIJ	1924	2	CW	1959	0	
1889	2	CI	1925	1	D	1960	0	
1890	1	A	1926	2	AK	1961	0	
1891	2	GJ	1927	2	FI	1962	0	
1892	4	ACIK	1928	1	A	1963	0	
1893	4	ACFE	1929	4	ABLG	1964	0	
1894	3	CIE	1930	12	ATBCLFGIJZKE	1965	0	
1895	2	AF	1931	14	ATBCLFGINWSZKE	1966	0	
1896	2	JE	1932	10	TBCDFGNSZE	1967	1	G
1897	4	ACFI	1933	4	TCNE	1968	0	
1898	0		1934	1	B	1969	0	
1899	2	CJ	1935	2	FZ	1970	1	E
1900	1	K	1936	1	A	1971	0	
1901	4	AFGS	1937	0		1972	0	
1902	1	J	1938	2	BE	1973	0	
1903	2	WK	1939	2	LZ	1974	2	JE
1904	2	WE	1940	7	DLFJNWS	1975	10	TBDFGINZKE
1905	2	FJ	1941	5	DFISZ	1976	1	Z
1906	0							

Country Code

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

stages of growth:⁷ (a) they must be identified by characteristics which can be verified or quantified; (b) the magnitude of these characteristics must vary in some recognisable 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"); (c) there should be some indication of when stages terminate and begin and why; (d) it is necessary to identify the universe to which the stage classification applies; (e) 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' fifth requirement, my periods are "phases" rather than "stages".

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

a) the phases are identified by eight simple indicators showing both growth and cyclical characteristics, i.e. 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 macro-economic indicators one might use for growth accounting or conjunctural monitoring. The results are shown in very aggregative form in Tables 6 and 7. Each phase also has five non-quantifiable "system characteristics", by which I mean the basic policy approaches and institutional environment which condition growth performance. These include the government approach to demand management (i.e. the kind of trade-off which is made between unemployment and inflation), the bargaining power and expectations 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 8. Finally there is a set of more fundamental and even more intangible conditions which determine economic performance, i.e. the incentive to invest, the degree of technological dynamism,

⁷ See S. KUZNETS in W. W. Rostow, ed. *The Economics of Take-Off into Sustained Growth*, Macmillan, London 1963.

factors affecting resource allocation, whose phasing is described in Table 9.

b) Most of the characteristics have been recognisably 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. This is true for six of the eight aggregative indicators in Tables 6 and 7. The exceptions are in the behaviour of prices where phase IV performance is the worst, and capital stock where growth was fastest in phase IV. Even though there is a wide range of country performance within each phase, the pattern of change is broadly similar between phases in each country. Thus Japanese growth has been generally a good deal faster than that in the U.K. but in both these countries performance was best in 1950-70, second best in 1970-76, third best in 1870-1913 and worst in 1913-50. Striking differences between phases can also be discerned in the non-quantifiable system-characteristics of Table 8, which shows significant changes between phases in policy, behaviour and institutions which affected most of the countries in spite of considerable variation between countries within each phase.

c) I have already indicated my choice of terminal points for phases. Here there is obviously room for argument as to which years to use for demarcation purposes, particularly as the use of annual data means that the periodicity has to be rather precise. My aim was not to provide a complete analysis of all phases of

TABLE 6

GROWTH CHARACTERISTICS OF DIFFERENT PHASES:
ARITHMETIC AVERAGE OF FIGURES
FOR THE INDIVIDUAL COUNTRIES
(annual average compound growth rates)

Phases	Output	Output per Head of population	Tangible Reproducible Non-Residential Capital Stock	Volume of Exports
I (1870-1913)	2.5	1.5	2.8	3.7
II (1913-50)	1.9	1.1	1.6	1.1
III (1950-70)	4.9	3.8	5.6	8.6
IV (1970-1976)	3.0	2.4	6.3	6.0

TABLE 7

CYCLICAL CHARACTERISTICS OF DIFFERENT PHASES:
ARITHMETIC AVERAGE OF FIGURES
FOR INDIVIDUAL COUNTRIES

Phases	Maximum Peak to Trough Fall in GDP (or smallest rise) annual data	Maximum Peak to Trough Fall in Export Volume	Average Unemployment Rate (percent of Labour Force)	Average Annual Rise in Consumer Prices
I (1870-1913)	- 6.7	- 14.9	5.7	0.4
II (1920-38)	- 13.1	- 34.2	7.3	-0.7 ^a
III (1950-70)	+ 0.3	- 6.0	3.1	3.8
IV (1970-1976)	- 1.7	- 7.9	3.3	9.2

a) 1924-38 for Germany and Austria.

Source: These tables are based on several thousand annual observations. The sources for the output data and figures for individual years are shown in the appendix, but there is not enough space in this article to document the source material for the other data, which will be published later.

capitalist development, but only of that part of it which can be quantitatively documented. 1870 is therefore a starting point of pragmatic convenience. By 1870 most of these countries were already well embarked on what Kuznets calls "modern economic growth" (in which per capita income moves in a sustained upward direction with only temporary interruptions). For Japan, it seems clear that 1870 is approximately the beginning of this process, for Italy it may only have started in the 1890s, but in several cases growth in per capita income was substantial before this. 1913 is clearly the last year of phase I which ended with the outbreak of the first world war. 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 16 countries as a whole. However, four countries, Japan, Germany, the U.K. and U.S.A. did not pass their wartime output peaks until 1954, 1953 and 1951 respectively, so one might well argue that 1953 rather than 1950 should mark the beginning of the postwar golden age. On the other hand, one might also argue for starting in 1948, which is when the ground rules for international cooperation within the capitalist group were set up by General Marshall, so 1950 seems a reasonable compromise. It should be noted that use

TABLE 8

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	
1870-1913 No concern with unemployment	gold (sterling) standard with rigid exchange rates exerts somewhat deflationary influence cushioned by wage flexibility	weak unions, wages have some downward flexibility	very free. No QRs but tariffs rise in second half of period	more or less complete freedom	
1920-1938 concern with price and exchange stability leads to conscious acceptance of large scale unemployment	gold standard restored at nostalgic parties, and quarrels over government debt exert extreme deflationary influence and induce 1931 system collapse followed by move to moveable peg	governments enforce downward flexibility involving a good deal of social conflict	QRs and tariffs raise very substantial barriers	severe controls on both capital and labour	
1950-70 priority given to full employment	fixed (but not rigid) exchange rate (dollar based) system, international credit arrangements soften potential deflationary effects	strong unions, no downward wage flexibility, social climate relaxed for most of period	very strong move towards freer trade and customs unions	gradual and substantial freeing of both labour and capital movement	
1970-76 lessened concern with full employment, more with price stability	1971 system collapse followed by floating rates, snake and ad hoc arrangements	strong unions, strong upward bias in wage price expectations	free trade maintained	free capital movements remain, labour movement restricted	

TABLE 9

UNDERLYING DYNAMICS OF DIFFERENT PHASES			
	Investment Incentives	Pace of Technological Advance	Efficiency of Resource Allocation
1870-1913	basic long-term stability of system fosters investment short-term instability inhibits it	mainly process innovation. Aggregate scale of capital formation in group as a whole determines technological pace. Slow growth in lead country, is a sluggish influence for system as a whole	international allocation greatly helped by free trade and factor movements
1920-1938	investment inhibited by short and long-term uncertainty	dynamism hindered by low rate of capital growth, but process innovation reinforced by product innovation	resource allocation harmed by restrictions on trade and factor movements and wartime autarchy
1950-70	investment greatly fostered by favourable long term growth prospects and short term stability, low real interest rates and financial stability	dynamism reinforced by backlogs and high current rate of capital formation. Product and process innovation. R and D reaches substantial proportions	efficiency greatly helped by increased freedom of trade and factor movements
1970-76	investment inhibited by long and short-term uncertainty, but maintains some of momentum of phase III	pace checked by falling rate of investment	efficiency somewhat inhibited by lowered level of capacity utilisation

of 1948-70, or 1953-70, instead of 1950-70 would not affect the analysis seriously — the third phase would still appear as a period of secular boom on an unparalleled scale, and the second phase would still be the one with worst performance.

The dating of the fourth phase, from 1970 onwards, is perhaps the most controversial. There is always the danger of over-reacting to a recession and assuming that a new phase has begun when we are in fact faced with a temporary disturbance. One could argue (on the basis of output evidence) that the first three years of the 1970s were simply a continuation of the output and productivity trends of years of the fifties and sixties, and that it is too early to conclude that there has been a fundamental break in trend. However, the 1974-5 recession affected virtually all 16 countries, the recovery has been rather slow and halting, and it was by far the biggest break in the postwar growth momentum. Although the recession in output was the most dramatic herald of change, there have been deeper causes which probably mean that we live in a different epoch from that of the 1950s and 60s. The grounds for treating the seventies as a new phase include observation of price as well as output behaviour, consideration of changes in the international monetary system, changes in government policy concerning the level of demand, changes in expectations in the labour market, and changes in the international economic power balance. The economic system behaves in a different way which creates major new tasks for economic policy, not all of which have been properly diagnosed. It is also more difficult now to reconcile different policy objectives.

d) Finally it should be noted that although the universe under consideration is limited to the advanced capitalist group, the phaseology is valid for the world economy as a whole. This is to be expected given the dominant role of these countries in terms of technology, trade, and investment.⁸

⁸ These sixteen countries have a population of 650 million — a sixth of the world total. There is room for argument about their share in world output. The estimates of H. BLOCK, *The Planetary Product in the Year of the Oil Crunch*, 1974, Bureau of Intelligence and Research, U.S. Department of State, suggest that they produce 60 per cent of world output, but he uses IMF estimates of exchange rates to obtain the world aggregate which may overstate the role of these countries. In 1870 their share in world population was about the same as it is now, but their share in world output was smaller as the available evidence strongly suggests that their per capita income has risen faster than the world average.

Explanations of Differences in Momentum Between Phases

Recognition of the phase phenomenon is important for growth analysis, because it forces consideration of factors operating for the group as a whole. Each phase is an orbit within which the countries are constrained to move.

This does not prevent them from following different trajectories but it means that their options are different from those they had in earlier orbits. Each phase has its own momentum which it is difficult to break, except by some collective happening. The breaks in trend between phases have in fact been caused mainly by system-shocks rather than by collective planning and foresight.

Growth analysis is an area of major controversy and can be carried out at several levels. One can subject the proximate causes to elaborate growth accounting as Denison has done. This approach is illuminating but inadequate. It concentrates entirely on supply factors and does not look at reasons for long run variations in the buoyancy of demand or expectations, nor at interactions between countries.

In my view a good deal of the variation in growth performance between periods and countries can be proximately explained by differences in growth of capital stock and foreign trade, but growth in these areas depends on buoyancy of investment and export incentives which depend on the level and stability of demand which in turn are affected by the policy — institutional setting. The chain of causation is complex enough to make it difficult to separate symptoms from causes, but it is clear that there can be self-reinforcing interaction of different causes. Similarly there are mutual interactions between countries which help create the phase patterns. There is obvious interaction between countries with regard to the aggregate momentum of foreign trade, and this is also true of capital formation. Investment incentives are powerfully affected by the rate of technical progress, and the pace of technical progress will depend to a large extent on the rate of investment in this group of countries as a whole.

Conclusions

The main conclusions I would draw are:

a) that there are distinct phases of capitalist economic performance, each with its own momentum;

b) that phases of growth are not ineluctable, and that within each phase, there is considerable scope for variation in country performance, but that the policy-institutional framework is determined by rather simple basic rules and expectations which have an inertia of their own;

c) that the move from one phase to another is caused by system-shocks. These shocks 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;

d) a more specific conclusion is that the 1970s are a new phase IV and not just a temporary interruption of phase III;

e) the present phase ranks as second-best. In terms of growth and stability, performance is well below that in phase III, but a good deal better than in the other phases. The main exception is the price record which is worse than in any of the other phases, and has become a major preoccupation of policy;

f) it is not easy to predict whether phase IV will continue to be second best. Policy problems are particularly difficult in a new phase in which the ground rules are changed, and where there is uncertainty about the permanency of novel characteristics. The system changes from phase III to phase IV have been pretty fundamental, i.e. the move from a fixed to a floating exchange system, the change in expectations in labour markets, and the reduced importance given by governments to the goal of full employment. The huge rise in energy prices has created payments disequilibria on a very large scale. Freedom for trade and capital movements has been preserved but is under challenge, and freedom for migration has been seriously curtailed. The momentum of growth in capital stock has not yet slackened in the group as a whole but the continuance of substantial slack in capital utilisation will lower investment incentives, the future growth of capital stock, and the rate of technical progress. All this means that a return to phase III standards of performance is unlikely, and that a wide range of new policy issues will have to be solved if phase IV is to remain second best.

Paris

ANGUS MADDISON

APPENDIX

Sources and Methods used to Measure Output Levels and Growth

The output figures refer, wherever possible, to gross domestic product. This broad aggregate covers the output of the whole economy, and excludes income received from or paid for foreign investment. For 1950 onwards, the figures are nearly all derived from currently collected official estimates based on almost identical concepts, as published by OECD. Most of them conform closely to the OECD/UN standardised system.¹

For years before 1950, the estimates have nearly all been made retrospectively and the underlying data are less complete, particularly for years before 1913. Nevertheless, most of the historical estimates are based on substantial statistical research by distinguished scholars and in some cases emanate from the government statistical service responsible for making the more recent official estimates. The long term measures are obviously not as comparable as those for 1950 onwards, and in some cases may well be substantially revised when further research is done. The weakest figures for the pre-1913 period are those for Austria, Belgium, Finland, France, Netherlands and Switzerland, so the results for these countries should be regarded as tentative.

Many studies of long term growth simply ignore developments in war years

¹ The new standardised system is described in *A System of National Accounts*, U.N., New York, 1968. The previous system is described in *A Standardised System of National Accounts*, OEEC, Paris 1959. For our purposes, the two systems are virtually identical. Confidence in the comparability of OECD national accounts statistics for the purpose of measuring growth rates was strongly stated in the mid 1960s by Beckerman and McGibbon who were successive heads of its national accounts division, see J. McGibbon, "The Statistical Comparability of Rates of Growth of Gross National Product," *Productivity Measurement Review*, OECD, Paris, February 1964 and W. Beckerman and Associates, *The British Economy in 1975*, Cambridge, 1965, p. 14. However, the OECD national accounts division has since been disbanded and the OECD estimates may now be less comparable than was previously the case. T.P. Hill, *The Measurement of Real Product*, OECD, Paris, 1971, took a somewhat sceptical view of the comparability of the OECD statistics.

so there are usually gaps in the series for 1913 to the early twenties and from 1938 to the late 1940s. However, wartime experience is of considerable relevance to subsequent developments as well as being interesting in itself. These wartime gaps have therefore been filled by rough estimates wherever possible.²

The figures on GDP are presented as indices, corrected where necessary to eliminate the effect of territorial change. These changes have generally not been large, but it seemed worthwhile to eliminate them to improve the comparability of the figures. Ignoring the case of Austria after World War I, which mainly involved the dismantlement of an empire rather than changes in national boundaries, the biggest changes have occurred in Germany. All the adjustments are described in detail in the country notes.

The sources used to derive the indices for individual countries are shown below. Except as noted for Australia and Japan, all the figures from 1950 onwards are from OECD national accounts publications except the figures for 1976 which are based on the May 1977 issue of OECD *Main Economic Indicators*:

The aggregate estimate of GDP in the sixteen countries combined is derived by weighting the national indices shown in table A-5 (ii)-(iv) by the 1970 value of output in terms of 1970 dollars at United States prices. This weighting system is preferable to one based on national prices and official exchange rates, as the official rates do not reflect the purchasing power of currencies very accurately.

Estimates at 1970 U.S. prices for France, Germany, Italy, Japan, the U.K. and the U.S.A. are available in I.B. Kravis, Z. Kenessey, A. Heston and R. Summers, *A System of International Comparisons of Gross Product and Purchasing Power*, Johns Hopkins, 1975, pp. 171-8; for Belgium and the Netherlands, 1970 figures are available at European prices in an EEC study, see J. Mayer, "Comparaison Réelle du Produit Intérieur Brut des Pays de la Communauté Européenne", *Analyse et Prévision*, June 1974, p. 725, these were then transformed into U.S. prices by linking them via the figures for France. Figures for 1960 for Canada were taken from D. Walters, *Canadian Growth Revisited, 1950-1967*, Economic Council of Canada, 1970, p. 46, these were adjusted from a GNP to a GDP basis and extrapolated to 1970. Estimates for Denmark, and Norway for 1955 were taken from M. Gilbert and Associates, *Comparative National Products and Price Levels*, OEEC, Paris, 1958, p. 23 adjusted from a GNP to a GDP basis and extrapolated to 1970 (a 3.5 per cent downward adjustment was made to Norway to exclude repairs and maintenance). Purchasing power ratios for Australia and Finland were derived from I.B. Kravis, "A Survey of International Comparisons of Productivity", *Economic Journal*, March 1976, pp. 19-20. Australia was linked via the U.K., Finland via Denmark. The purchasing power ratio for Austria was a private estimate supplied by dr. Anton Kausel of the Austrian Statistical Office. Switzerland was adjusted by the German purchasing power ratio, Sweden by the Canadian purchasing power ratio.

The results of the calculation are shown in table A-1. It should be noted that in all the countries the purchasing power of the currency was higher than

² I have done this for Australia, France and Germany, and in a few other countries I have welded different sources together to provide a continuous series including the wars.

the exchange rate relative to the U.S.A., and all the countries had lower real GDP per head than the U.S.A.

A major problem in long term comparisons is the correction for price changes. The choice of different periods as a weighting base can affect quantitative developments significantly. Generally, the prices of an earlier year will give a higher increase in output than those of a later year, because of the tendency to consume more of those items whose relative price falls. Thus, if one of the countries had used 1870 weights for the whole period 1870-1970 and another country used 1970 weights, the growth rate in the former would have a very large upward bias relative to the latter. Similarly one might expect growth to be faster when measured in the prices of a country where growth has been fastest in items which were initially relatively expensive. However, these problems may not be important in practice if the weighting systems are changed every so often so that each series is made up of a number of separate links.

Fortunately, it is possible to crosscheck our measure of trends in output with estimates of the level of output made at different points of time. The Kravis estimates cited above for 1970 serve this purpose because they replicate those of OEEC for 1950 in the case of France, Germany, Italy, the U.K. and U.S.A. The 1950-70 increase in output derived from the Kravis/OEEC level estimates compare as follows with the estimates we use:

	Implicit Movement in GDP 1950-70 (1950=100) at U.S. prices (Kravis/OEEC) 1970	Movement in GDP 1950-70 (1950=100) at own country prices 1970
France	279.5	271.3
Germany	336.1	347.4
Italy	305.9	299.6
U.K.	177.1	172.9
U.S.A.	200.3	200.3

The results from the two methods of measurement are remarkably close — much closer than might have been expected.³

³ E. F. Denison, writing before the 1970 estimates cited in table A-1 were available, assumed that downward revisions were required to growth in all European countries as measured in their own prices in order to be comparable with that in the U.S.A. at U.S. prices because growth has tended to be fast for goods which were relatively expensive in Europe in the early 1950s, e.g. automobiles. His basic hypothesis is correct but the weighting systems which countries use have been continuously revised and this seems to have offset the effect which Denison hypothesised. See E. F. DENISON, *Why Growth Rates Differ*, Brookings 1967 p. 244 ff. Denison also suggested a smaller downward revision of Belgian and French growth rates (by .17 and .23 percentage points a year respectively) because he felt that techniques for measuring output growth in

In theory, it would be preferable to measure growth of output after deduction of provision for replacement of capital, i.e. net national product instead of gross. However, the capital consumption allowances used to differentiate NDP and GDP are based on depreciation rather than replacement, and the difference in growth of NDP and GDP is not significant for most countries. However a check for the period 1950-70 did reveal that in Japan and Norway the growth of NDP was significantly slower than GDP. The results are as follows:

GROWTH OF GDP AND NDP 1950-70
(annual average compound growth rate)

	GDP	NDP
Austria	5.4	5.3
Canada	4.9	4.9
Denmark	4.0	3.9
France	5.2	5.1
Germany	6.4	6.4
Italy	5.6	5.7
Japan	9.8	9.3
Netherlands	4.9	5.0
Norway	4.2	3.9
U.K.	2.7	2.7
U.S.A.	3.5	3.3

Tables A-2 and A-3 show the level of output and output per head for the main benchmark years 1870-1976. These estimates were derived by combining the results of the 1970 level calculations in table A-1 with the growth figures in tables A5(ii)-A5(iv). Table A-2 refers to output of each country in the year specified without modification for changes in boundaries, whereas tables A5(ii)-A5(v) are corrected to eliminate the effect of boundary changes.

Table A-4 gives estimates for a few benchmark years prior to 1870 (derived from tables A-1 and A-5(i)). These estimates are much rougher than those for the period subsequent to 1870.

the service sector exaggerated growth in these two countries. The results suggest that Denison's caution on this score may also have been overstated although we cannot assume that the evidence for four countries is conclusive for all sixteen countries, see A. MADDISON, "Productivity Trends and Prospects in Continental Western Europe 1950-1990" in *The Future of Productivity*, National Center for Productivity and Quality of Working Life, Washington, 1977, for further elucidation of this point.

TABLE A-1

A COMPARISON NOMINAL AND REAL LEVELS OF GDP,
THE PURCHASING POWER OF CURRENCIES
AND REAL GDP PER HEAD IN 1970

	1970 GDP at 1970 Purchaser's values in National Currencies Converted at official exchange rates \$ million	1970 GDP at 1970 U.S. prices \$ million	1970 Ratio of Purchasing Power of Currency to Exchange Rate relative to situation in U.S.A. U.S.A. = 1.0000	1970 GDP at U.S. prices per head of population U.S.A. = 100.0
Australia	34,800	47,702	1.3707	79.6
Austria	14,350	22,278	1.5525	62.6
Belgium	25,800	36,232	1.4043	78.5
Canada	82,800	86,192	1.0410	84.4
Denmark	15,570	17,951	1.1529	76.0
Finland	10,350	14,744	1.4246	66.8
France	141,540	198,881	1.4051	81.8
Germany	188,390	233,243	1.2381	80.3
Italy	92,380	137,488	1.4883	53.8
Japan	197,870	337,687	1.7066	68.1
Netherlands	31,680	48,995	1.5466	78.5
Norway	10,780	13,887	1.2882	74.8
Sweden	32,950	34,301	1.0410	89.0
Switzerland	21,030	26,037	1.2381	86.8
U.K.	121,490	179,486	1.4774	67.5
U.S.A.	981,200	981,200	1.0000	100.0
Total	2,002,980	2,415,607	1.2060	

Source: Column 1 is from *National Accounts of OECD Countries 1975*, Vol. 1 p. 132 with Norway adjusted downwards by 3.5 per cent to eliminate repairs and maintenance; column 2 derived as described above; column 3 is the ratio of column 2 to column 1; column 4 is column 2 divided by population and shown relative to the U.S. level.

TABLE A-2

GROSS DOMESTIC PRODUCT AT U.S. 1970 PRICES, BENCHMARK YEARS 1870-1976
(\$'000s)

	Australia	Austria	Belgium	Canada	Denmark	Finland	France	Germany	Italy	Japan	Netherlands	Norway	Sweden	Switzerland	U.K.	U.S.A.
1870	2172	1865	4806	2255	961	700	25769	20525	14238	9409	3441	849	1734	2146	29889	30883
1890	5224	n.a.	7306	4264	1680	1139	31794	34197	16287	15129	4585	1212	2659	3014	44834	73236
1913	9363	7166	11309	11221	3725	2250	48467	70220	26613	26729	7732	2090	5610	5197	67017	176472
1929	11235	7531	14308	16517	5275	3177	63776	78455	35814	47819	12873	8780	8029	72246	287649	
1950	19334	7854	16634	32986	8210	5468	73507	67141	45892	51727	18788	6094	15669	10971	103818	488827
1960	28780	14038	22346	51786	11200	8856	114371	144500	80231	121219	29287	8634	21874	16864	136551	672110
1970	47702	22778	36232	86192	17951	14744	198881	233243	137488	337687	48995	13887	34301	26037	179486	981200
1976	58272	27939	44384	112960	20752	18009	249425	268190	160136	465004	59224	18275	39042	26868	209921	1158201

N.B. Except for Austria, this table refers to countries within the boundaries as they were in the year cited. In table A-5, by contrast, the figures are corrected to eliminate the impact of boundary changes.

TABLE A-3

GROSS DOMESTIC PRODUCT PER HEAD AT U.S. PRICES BENCHMARK YEARS 1870-76
\$

1870	1341	412	951	619	536	399	670	523	537	273	954	489	416	806	956	774
1890	1681	n.a.	1208	890	771	482	828	694	538	377	1009	607	556	1021	1196	1161
1913	1942	1059	1487	1466	1315	743	1219	1048	756	517	1254	854	998	1345	1468	1815
1929	1757	1130	1781	1644	1499	928	1547	1212	883	756	1654	1186	1436	1996	1582	2362
1950	2364	1133	1925	2401	1923	1364	1752	1343	981	1300	1858	1866	2234	2337	2061	3223
1960	2801	1992	2441	2892	2445	1999	2504	2607	1616	1300	2550	2408	2924	3145	2598	3720
1970	3814	3000	3759	4042	3642	3201	3917	3846	2575	3261	3760	3582	4263	4155	3233	4789
1976	4280	3713	4515	4882	4082	3814	4697	4359	2869	4155	4304	4549	4748	4199	3583	5385

TABLE A-4

G.D.P. PER HEAD AT U.S. 1970 PRICES

	Belgium	France	Germany	Netherlands	U.K.	U.S.A.
1700		296 ^a		450 ^c	285	
1800		325 ^b			392	417
1840		532			600	526
1850	637	601	406		686	584

a) 1701-10 (population taken as 19.5 million)

b) 1788 (population taken as 28.7 million)

c) 1688 (see country note on Netherlands. I do not attach much credence to this figure which Bos derives very crudely from Gregory King. King's estimates compared levels in France, the Netherlands and U.K. in 1688. He showed the Netherlands per capita income as 31.2 per cent higher than in France, but only 2.1 per cent higher than the U.K. In any case, as King was substantially wrong about French and Dutch population, his income estimates for these two countries were probably very rough indeed, see G.E. Barnett, ed. *Two Tracts by Gregory King*, Johns Hopkins, Baltimore, 1936, p. 55.

Sources for Estimates of Output in Individual Countries

Australia: 1861-1938, G.D.P. from N.G. Butlin, *Australian Domestic Product, Investment and Foreign Borrowing 1861-1938/39*, Cambridge 1962, p. 33-4. For 1938/9 to 1948/9 neither Butlin nor the Australian authorities give figures at constant prices, so the G.D.P. current value figures (Butlin, p. 468 G.N.P. adjusted to G.D.P. by adding income payments to abroad) were deflated by the wholesale price index (derived from U.N. *Statistical Yearbook 1949-50*). Estimates of gross national product in constant prices for 1938/9 and 1948/9 are presented by B.D. Haig, "1938/9 National Income Estimates", *Australian Economic History Review*, September 1967, p. 180. He estimates an increase in real terms of 33.3 per cent. This agrees with my figure. I have used my rough procedure as Haig does not present annual estimates for either his deflator or his estimate of current value G.N.P. (which is slightly different from the official one presented by Butlin). Figures for 1948/49 to 1950/51 at constant prices from *Australian National Accounts*, 1973-74, Canberra, p. 110. All figures adjusted to calendar year basis.

Austria: Estimates of GNP for 1860, 1870 and 1900 were kindly supplied by Dr. Anton Kausel of the Austrian statistical office (20,26 and 59 per cent of 1913 respectively). 1913-50 gross national product from A. Kausel, N. Nemeth and

TABLE A-5 (C)

MOVEMENT IN VOLUME OF TOTAL OUTPUT 1700-1869
1913 = 100

	Australia	Austria	Belgium	Canada	Finland	France	Germany	Italy	Netherlands	Norway	Sweden	U.K.	U.S.A.
1700						11.66 ^a						3.43	17.5
1800						18.81 ^b						8.01	18.2
1840						36.7						23.7	19.4
1850			24.75			43.2	20.3					28.2	20.5
1860					22.8	48.6	24.9		39.2			36.4	21.1
1861	15.2	20.0				46.8	24.3	48.7			24.1	37.4	21.8
1862	15.0					49.2	25.5	49.7			24.9	37.7	22.8
1863	15.5					50.6	27.4	48.9			25.6	38.0	23.8
1864	17.2					51.5	28.2	50.2		37.6	26.1	39.0	25.1
1865	17.1					52.5	28.3	52.5		38.3	26.7	40.2	26.6
1866	18.2					51.8	28.5	54.7		39.3	27.7	40.8	27.8
1867	20.4				18.7	49.0	28.6	50.1		39.1	27.9	40.4	28.8
1868	21.4					54.6	30.3	51.9		40.7	26.4	41.7	29.8
1869	21.6					56.6	30.5	52.9			27.7	42.0	30.8

a) 1701-10

b) 1788

MOVEMENT IN VOLUME OF TOTAL OUTPUT ANNUAL DATA 1870-1913
1913 = 100

	Australia	Austria	Belgium	Canada	Denmark	Finland	France	Germany	Italy	Japan (35.2)	Netherlands	Norway	Sweden	Switzerland (41.3)	U.K.	U.S.A.
1870	23.2	26.0	42.5	20.1	25.8	31.1	51.0	30.4			44.5	40.6	30.9		44.6	17.5
1871	22.3		42.6	20.7	26.7		52.2	30.2				41.2	32.0		47.0	18.2
1872	24.7		45.2	17.4	28.5		56.6	32.3				43.8	34.0		47.1	19.4
1873	27.3		45.5	19.1	28.4		53.6	33.7				44.7	35.9		48.2	19.9
1874	28.2		47.0	21.3	29.1		59.6	36.2				46.2	36.3		49.0	20.5
1875	31.2		46.9	23.1	28.7		61.4	36.4				47.6	35.6		50.2	21.1
1876	31.2		47.5	22.5	29.8		57.7	36.2				49.0	37.8		50.7	21.8
1877	32.4		48.1	23.1	28.7		59.8	36.0				49.2	37.8		51.2	22.8
1878	35.5		49.5	22.7	30.2		59.1	37.7				47.7	37.7		51.4	23.8
1879	36.1		50.0	26.6	31.0		56.6	36.8	49.7			48.3	40.0		51.2	25.1
1880	38.0		52.5	29.6	33.4	35.2	60.1	36.5				49.8	40.3		53.6	26.6
1881	40.7		53.2	31.6	34.2		63.0	37.4				50.2	40.9		55.5	28.0
1882	38.4		55.0	33.4	35.8		65.1	38.0				50.0	41.0		57.1	29.3
1883	44.1		55.8	32.8	37.3		64.1	40.1				49.8	43.2		57.5	30.4
1884	44.4		56.3	36.1	37.7		62.5	41.1				50.8	43.2		57.6	31.0
1885	47.8		57.0	40.0	37.8		62.0	42.1		45.6		51.4	43.8		57.3	32.1
1886	47.8		57.7	36.1	38.4		62.5	42.4		49.4		51.7	44.3		58.2	34.3
1887	54.7		59.9	36.1	39.3		62.7	44.1		51.7		52.3	43.7		60.5	35.8
1888	53.3		60.3	38.0	40.2		63.7	45.9		49.4		54.6	45.5		63.2	37.2
1889	57.8		63.2	37.1	42.3		65.3	47.2		52.0		56.5	46.0		66.6	38.7
1890	55.8		64.6	38.0	45.1	50.6	65.6	48.7		56.6		58.0	47.4	58.0	66.9	41.5
1891	60.2	59.0	64.7	44.3	46.8		66.6	48.6		54.0		58.5	49.3		66.9	43.3
1892	52.7		66.3	43.3	47.1		68.1	50.6		57.6		59.8	50.0		66.9	47.5
1893	49.8		67.3	41.9	47.6		66.6	53.1		57.8		61.4	51.4		65.3	45.2
1894	51.6		68.3	41.9	48.6		70.4	54.4		64.6		61.6	52.8		69.7	43.9
1895	48.6		69.9	44.1	52.2		69.1	57.0		65.6		62.2	55.9		71.9	49.2
1896	52.3		71.3	48.4	54.4		72.4	63.0		62.0		64.1	62.0		74.9	48.2
1897	49.4		72.6	42.0	56.2		71.1	60.7		63.2		67.3	60.2		75.9	52.8
1898	57.1		73.8	49.8	59.6		75.0	63.3		75.2		67.5	61.8		79.6	53.9
1899	57.2		75.3	47.7	61.7		78.9	65.6		69.7		68.4	65.0		82.9	58.8
1900	60.5		77.5	49.9	62.7	70.1	80.3	68.4		72.7		70.6	64.6		83.5	60.4
1901	58.8		78.2	54.8	64.5		77.6	66.8		75.2		72.5	63.9		82.3	67.2
1902	59.3		79.8	56.8	65.1		77.6	68.4		77.1		74.0	66.3		84.4	67.9
1903	62.7		81.6	60.5	70.1		80.3	72.2		78.8		75.7	69.7		83.5	71.2
1904	66.9		83.7	61.6	72.1		84.2	75.1		79.4		73.6	71.9		84.0	70.3
1905	68.9		86.1	66.3	74.7		82.9	76.7		75.7		74.5	73.3		86.5	75.5
1906	73.9		87.9	70.1	76.1		84.2	79.0		85.5		77.2	79.8		89.4	84.2
1907	77.3		89.2	73.4	79.5		85.5	81.1		88.2		80.1	83.1		91.1	85.5
1908	79.5		90.1	73.4	79.5		86.8	83.9		88.8		82.7	83.4		87.4	78.5
1909	85.6		91.8	81.7	80.3		88.2	85.6		88.7		84.9	83.6		89.4	88.1
1910	91.4		94.2	83.3	84.0		88.2	88.7		90.2		87.9	88.8		92.9	89.0
1911	92.1		96.4	90.5	89.3		92.1	91.7		95.0		90.6	92.6		94.7	91.9
1912	94.7		98.7	92.2	95.5	100.0	95.7	95.7		98.6		94.7	96.1		96.3	96.2

TABLE A-5 (III)

MOVEMENT IN VOLUME OF TOTAL OUTPUT ANNUAL DATA 1913-1949
1913 = 100

	Australia	Austria	Belgium	Canada	Denmark	Finland	France	Germany	Italy	Japan	Netherlands	Norway	Sweden	Switzerland	U.K.	U.S.A.
1914	92.1			93.9	95.1	92.9	94.4	85.2	99.0	97.0	99.1	102.2	100.2		101.0	92.3
1915	86.0			96.8	88.8	91.0	86.9	80.9	110.8	106.1	100.8	106.6	98.5		109.1	94.9
1916	91.2			101.1	99.5	95.6	83.2	81.7	122.5	122.4	105.3	110.0	104.0		111.5	108.0
1917	92.6			103.3	90.2	81.0	80.7	81.8	126.5	126.7	97.7	100.0	92.5		113.2	105.3
1918	92.6			104.2	89.3	63.9	76.4	82.0	127.5	124.0	92.5	96.3	92.0		113.2	114.8
1919	90.9			109.1	117.8	75.3	75.2	72.3	107.8	140.9	115.7	96.5	96.5		100.9	115.8
1920	98.0	66.4	92.5	103.7	111.7	88.7	81.8	78.6	100.0	132.2	118.3	119.7	102.8	94.8	94.8	114.7
1921	108.6	73.5	94.1	94.3	97.0	92.0	80.5	87.5	98.0	146.9	122.7	109.8	105.9	87.1	87.1	112.1
1922	109.6	80.1	103.3	101.9	103.7	103.0	93.1	95.2	103.9	146.3	127.5	122.6	111.8	91.6	91.6	118.3
1923	111.8	79.3	107.0	108.3	117.4	109.1	98.1	79.1	109.8	146.3	131.9	125.3	116.9	94.5	94.5	133.9
1924	119.5	88.5	110.5	108.1	120.3	115.2	108.2	92.6	111.8	151.2	136.3	124.7	119.3	98.4	98.4	138.0
1925	127.5	94.5	112.2	112.8	117.1	122.2	109.4	103.0	119.6	156.7	142.8	132.4	130.4	119.2	103.2	141.2
1926	120.8	96.1	116.0	122.7	120.7	126.7	110.7	105.9	120.6	158.1	146.2	135.3	138.7	127.8	102.8	150.4
1927	121.2	99.0	120.3	134.3	125.0	137.4	109.4	116.5	117.6	160.6	154.2	140.5	144.9	141.5	107.4	151.9
1928	120.1	103.6	126.6	146.6	130.1	142.0	115.7	121.6	172.8	172.8	158.5	145.1	145.3	149.3	108.7	153.6
1929	120.0	105.1	125.5	147.2	134.1	141.2	125.8	121.1	130.4	178.9	166.5	158.6	156.5	154.5	111.9	163.0
1930	115.1	102.2	124.3	140.9	140.2	139.3	122.0	119.4	123.5	166.1	168.2	170.3	165.5	153.6	111.1	147.5
1931	110.1	94.0	122.1	123.0	142.4	132.8	117.0	110.3	122.5	171.6	162.6	157.1	153.9	147.2	105.4	136.2
1932	113.3	84.3	116.6	110.2	139.4	135.2	112.0	102.0	125.5	175.2	157.0	167.6	150.2	142.2	106.2	117.5
1933	118.7	81.5	119.1	102.9	141.5	144.7	117.0	108.4	125.5	180.5	152.9	171.6	153.7	149.2	109.3	114.9
1934	122.1	82.2	118.1	115.4	147.0	162.9	113.2	127.2	137.3	204.7	158.3	184.7	183.7	149.5	116.5	124.1
1935	126.3	83.8	125.4	124.4	150.7	166.8	114.5	138.4	137.3	211.2	161.3	196.0	186.6	149.4	126.5	133.7
1936	120.4	86.3	126.3	129.9	154.9	178.5	120.8	135.4	146.1	261.2	170.0	203.0	186.6	156.5	130.9	160.9
1937	139.0	90.9	128.0	142.9	160.3	196.1	120.8	169.1	148.0	270.0	171.6	208.1	192.7	162.6	154.1	154.1
1938	140.7	100.0	128.1	144.1	160.7	197.5	120.8	169.1	148.0	270.0	171.6	208.1	192.7	162.6	154.1	154.1
1939	141.1			154.8	170.5	192.1	125.8	162.7	158.8	272.3	178.2	218.0	199.4	162.3	133.8	166.0
1940	142.8			176.6	145.3	169.2	103.8	184.0	189.8	256.0	160.0	198.6	190.7	164.0	147.2	178.4
1941	146.1			202.0	131.6	179.5	82.3	195.7	157.8	260.1	162.8	203.4	190.6	162.9	160.6	206.0
1942	154.4			239.5	134.1	187.7	73.6	198.4	155.9	263.5	148.7	195.5	196.6	158.8	164.6	236.3
1943	158.1			249.2	148.1	200.6	69.8	202.3	141.2	262.8	144.6	191.6	195.6	157.4	168.2	274.3
1944	155.2			259.0	162.3	204.8	61.0	207.5	114.7	254.0	97.7	181.6	202.2	161.2	161.6	294.9
1945	154.4			253.2	150.3	171.1	66.2	145.3	89.8		99.1	203.5	220.6	154.5	154.5	290.8
1946	159.4	58.4		246.4	170.4	193.3	100.6	83.0	117.6		173.2	225.3	232.1	147.8	147.8	248.3
1947	171.9	64.4		256.9	178.3	206.1	109.5	101.9	138.2	152.8	200.0	251.1	241.6	145.6	145.6	245.2
1948	182.9	82.0	132.9	263.3	183.9	219.5	123.8	120.8	146.1	171.0	201.4	271.1	251.5	150.2	150.2	253.2
1949	193.2	97.5	138.5	269.8	194.8	228.8	134.5	140.7	156.9	179.0	235.5	276.4	264.9	196.9	155.8	254.7

TABLE A-5 (IV)

MOVEMENT IN VOLUME OF TOTAL OUTPUT ANNUAL DATA 1950-1976
1913 = 100

	Australia	Austria	Belgium	Canada	Denmark	Finland	France	Germany	Italy	Japan	Netherlands	Norway	Sweden	Switzerland	U.K.	U.S.A.
1950	206.5	109.6	145.9	290.2	208.7	243.0	144.6	161.0	169.6	194.8	243.0	291.5	279.3	211.1	168.8	277.0
1951	215.4	117.1	154.2	303.2	207.2	265.6	153.0	177.8	182.5	219.1	247.3	305.0	287.7	228.8	166.6	298.5
1952	217.5	117.2	153.0	329.6	210.8	274.8	158.2	193.5	190.6	244.5	251.1	315.9	292.6	231.0	166.2	309.6
1953	223.5	122.3	157.9	345.9	223.0	275.1	162.1	209.5	204.9	262.5	272.8	331.7	302.1	240.7	173.9	324.9
1954	237.3	134.8	164.4	342.1	230.7	300.0	168.9	225.6	212.4	279.0	291.1	344.5	320.1	255.5	180.4	317.9
1955	250.3	149.7	172.2	374.7	229.9	322.7	176.8	252.8	226.5	302.9	311.5	351.8	329.8	267.5	186.7	339.7
1956	258.9	160.0	177.2	406.9	234.5	329.1	187.3	270.9	257.1	325.7	325.4	369.8	340.7	283.4	189.7	347.1
1957	264.2	169.8	180.5	417.3	244.7	334.1	198.5	286.1	249.7	349.5	335.1	378.3	348.8	292.4	193.4	353.6
1958	277.0	176.0	180.3	426.2	251.5	333.8	204.3	296.3	261.8	369.9	331.8	383.3	357.0	286.9	193.9	351.9
1959	294.5	181.0	186.0	443.1	268.8	358.0	210.8	318.2	278.9	403.6	347.4	394.4	375.6	306.9	201.6	373.0
1960	307.4	195.9	196.0	455.6	284.7	393.6	225.6	346.5	296.5	456.5	378.8	413.0	389.9	324.5	211.5	380.1
1961	314.4	206.8	205.9	469.5	302.9	423.3	240.6	366.0	320.8	523.0	389.9	433.9	412.2	348.4	218.5	388.9
1962	326.5	212.2	216.8	501.3	320.1	443.5	256.3	380.7	340.5	559.9	406.7	454.3	429.9	365.8	220.4	410.8
1963	348.6	221.0	226.3	529.1	322.1	454.5	268.2	393.8	359.4	618.7	420.2	478.8	453.3	382.8	229.1	427.5
1964	373.0	234.7	242.1	562.9	352.0	484.4	284.1	420.5	368.9	700.5	456.2	504.4	483.1	402.1	242.5	449.3
1965	388.8	242.7	251.1	601.0	368.0	509.3	295.9	444.1	380.6	736.4	480.3	530.6	503.4	417.4	247.5	476.3
1966	404.7	254.9	258.7	643.3	378.1	521.4	315.0	456.9	402.5	808.4	493.9	554.7	515.4	427.7	252.4	505.1
1967	425.1	260.9	269.0	665.4	394.1	535.2	326.2	455.8	430.8	913.0	520.3	586.6	532.8	434.7	259.1	518.5
1968	452.0	272.5	280.4	702.6	409.1	548.0	341.2	488.1	458.0	1035.0	555.2	607.0	554.3	450.2	268.1	541.7
1969	484.8	288.5	298.9	739.2	444.2	605.2	366.4	527.9	484.0	1146.8	592.9	637.7	582.4	474.3	271.7	555.7
1970	509.5	310.9	317.8	758.3	456.3	653.3	393.3	559.3	508.1	1271.7	633.7	664.3	611.4	501.0	278.0	554.9
1971	532.2	327.3	330.6	808.3	473.0	671.0	413.1	575.6	516.0	1364.6	661.3	694.3	615.8	521.4	285.0	571.0
1972	555.5	348.1	348.7	853.6	493.4	718.1	436.9	594.9	532.3	1485.9	687.3	729.1	631.5	538.1	292.4	603.8
1973	583.6	368.2	370.8	914.8	507.9	764.7	460.2	625.1	568.5	1616.6	727.8	758.0	653.8	554.5	309.8	636.6
1974	599.6	383.4	385.6	943.7	509.2	797.2	473.4	629.4	588.1	1599.0	745.5	798.5	680.1	562.6	310.6	626.5
1975	603.7	375.8	377.8	948.8	505.5	798.0	468.6	609.5	566.1	1636.7	737.2	824.8	685.5	521.0	306.6	616.5
1976	622.4	389.9	389.3	993.8	527.5	800.4	492.0	643.1	591.8	1735.2	766.0	874.2	695.9	517.0	311.2	655.0

H. Seidel, "Osterreichs Volkseinkommen, 1913-63", *Monatsberichte des Osterreichischen Institutes für Wirtschaftsforschung*, 14th Sonderheft, Vienna, August, 1965. All the figures refer to the product generated within the present boundaries of Austria (in 1911-13 present day Austria represented only 33.8 per cent of the total output of the Austrian part of the Austro-Hungarian Empire - see Kausel p. 31).

Belgium: 1850-1913 gross domestic product derived from movements in agricultural and industrial output from J. Gadisseur, "Contribution à l'Etude de la Production Agricole en Belgique de 1846 à 1913", *Revue Belge d'Histoire Contemporaine*, IV, 1973, 1-2, and service output which was assumed to move with employment in services (derived for census years from P. Bairoch, *La Population Active et sa Structure*, Brussels, 1968, pp. 87-88). 1913 weights derived from Carbonnelle. 1913-50 gross domestic product estimates derived from C. Carbonnelle, "Recherches Sur L'Evolution de la Production en Belgique de 1900 à 1957", *Cahiers Economiques de Bruxelles*, No. 3, April 1959, p. 353. Carbonnelle gives G.D.P. figures for only a few benchmark years but gives a commodity production series for many more years. Interpolations were made for the service sector to arrive at a figure for G.D.P. for all the years for which Carbonnelle shows total commodity production. The figures were corrected to exclude the effect of the cession by Germany of Eupen and Malmedy in 1925, which added 0.81 per cent to population and was assumed to have added the same proportion to output.

Canada: Gross national product (expenditure) from O. J. Firestone, *Canada's Economic Development 1867-1953*, London, 1958, p. 276 for 1867-1926; from 1926 to 1950 from *National Income and Expenditure Accounts 1926-1968*, Dominion Bureau of Statistics, August 1969, pp. 32-35, modified from 1947 onwards by data supplied by Statistics Canada in December 1974. The figures are adjusted to exclude the impact of the acquisition of Newfoundland in 1949 which added 1.3 per cent to G.N.P. and 2.6 to population.

Denmark: 1870-1913 and 1921-50 G.D.P. at factor cost (1929 prices) from K. Bjerke and N. Ussing, *Studier over Danmarks Nationalprodukt, 1870-1950*, Copenhagen, 1958, p. 146-7. 1913-21 movement at 1929 prices taken from K. Bjerke, "The National Product of Denmark 1870-1952" in S. Kuznets, ed., *Income and Wealth*, Series V, Bowes and Bowes, London 1955, p. 148 and adjusted to mesh with Bjerke and Ussing at 1913 and 1921. The figures from 1920 onwards were adjusted to eliminate the effect of the cession of North Schleswig to Denmark in 1920 which added 5.6 per cent to the population.

Finland: Figures for 1860-1913 at current prices supplied by Riitta Hjerppe of the University of Helsinki, Department of Economic and Social History. These were then divided by the wholesale price index. 1913-1950 figures for GDP supplied by O.E. Niitamo, 1913-26 based on estimates of material product; 1926-48 from E.H. Laurila, "Suomen Kansantulo Vuosina 1926-1949", *Tilastokatsaus* 11-12, Helsinki, 1950; 1948-50 official estimates of the Central Statistical Office.

France: 1839-96 gross domestic product derived from separate indicators of industrial, agricultural, building, and service output. Industrial production from F. Crouzet "Essai de Construction d'un Indice Annuel de la Production Industrielle Française au XIXe siècle", *Annales*, January-February 1970, table 8a, p. 96. Agriculture and building from M. Lévy-Leboyer, "La Croissance Economique en France au XIXe Siècle", *Annales*, July-August 1968, p. 802 bis. Service output interpolated from J. Marczewski, "The Take-Off Hypothesis and French Experience", in W.W. Rostow, ed., *The Economics of the Take-Off into Sustained Growth*, Macmillan, New York, 1965, p. 136. Sector weights for 1839-1896 backcast from 1896 shares of output as shown in J.J. Carré, P. Dubois and E. Malinvaud, *La Croissance Française*, Seuil, Paris, 1972, p. 637. 1788-1839 from J. Marczewski, *Op. cit.* 1701-10 to 1788 movement in agriculture and industry from J. Marczewski, "Some Aspects of the Economic Growth of France, 1660-1958", *Economic Development and Cultural Change*, April 1961, p. 375. 1701-10-1788 growth in service output assumed to be the same as 1788-1839 (population grew by roughly same amount in the two periods). 1896-1950 gross domestic product from Carré, Dubois and Malinvaud, *Op. cit.* p. 35. Interpolation between 1913 and 1920 based on figures for industrial and agricultural output shown in J. Dessirier, "Indices Comparés de la Production Industrielle et Production Agricole en Divers Pays de 1870 à 1928", *Bulletin de la Statistique Générale de la France, Etudes Spéciales*, October-December 1928; service output was assumed stable in this period, and weights for the three sectors were derived from Carré, Dubois and Malinvaud, *Op. cit.* Interpolation between 1939 and 1946 was based on A. Sauvy's report on national income to the Conseil Economique, *Journal Officiel* 7th April, 1954.⁴ The figures from 1918 onwards were adjusted downwards by 4.6 per cent to offset the impact of the return of Alsace Lorraine, figures for 1861-70 multiplied by 95.92 to offset for inclusion of Alsace Lorraine, and 1860 and earlier by 97.65 to offset both the impact of acquisition of Nice and Savoy in 1861 and the Alsace-Lorraine component.

Germany: 1850-1913, net domestic product (value added by industry) at factor cost from W.G. Hoffman, F. Grumbach and H. Hesse, *Das Wachstum der deutschen Wirtschaft seit der Mitte des 19 Jahrhunderts*, Springer, Berlin, 1965, pp. 454-5.⁵ 1870 and earlier years adjusted upwards by 4 per cent to offset impact of acquisition of Alsace and Lorraine in that year (4 per cent being the ratio of the Alsace Lorraine population to that of the old Reich in 1870). Hoffmann and Associates indicate that 1925 output in truncated Germany (excluding Memel, Danzig, the Saar and territories lost to Belgium, Czechoslova-

⁴ Sauvy's estimates seem reasonable when checked against estimates of wartime agricultural and industrial output. See M. CÉPEDE, *Agriculture et Alimentation en France Durant la IIe Guerre Mondiale*, Génin, Paris, 1961 and *Annuaire de Statistique Industrielle 1938-1947*, Ministère de l'Industrie et du Commerce, Paris, 1948.

⁵ Hoffmann and Associates also present an estimate of net domestic product by type of expenditure for 1880 onwards pp. 827-8 which shows slightly slower growth for 1880-1913 than the output series we used (2.9 per cent a year instead of 3.0 per cent). The cyclical movement is also somewhat different.

kia, Denmark, France and Poland between 1918 and 1922) was 93.9 per cent of that in 1913. We have adjusted this figure upward by 9.7 per cent to offset the impact of the territorial change. (This represents a 12.3 per cent population adjustment partly offset by the fact that per capita product was 2.4 per cent higher⁶ in the truncated area than in the old Germany). For 1914-24 the pattern of movement in individual years was derived from annual indices of industrial and agricultural output in Dessirier, *Op. cit.*, using Hoffmann's weights for these sectors and adjusting them to fit Hoffman's sectoral growth figures for 1913-25. Service output was interpolated between 1913-25 using Hoffmann's figures for these two years. 1925-39 gross domestic product (Bruttosozialprodukt) in constant prices from *Bevölkerung und Wirtschaft 1872-1972*, Statistical Office, Wiesbaden, 1972, p. 260. These data refer to the Reich without the Saar from 1925-34 inclusive, but we have adjusted the 1925-34 figures upwards to include the Saar throughout. The adjustment factor was the population ratio which was 1.2 per cent for 1925-33 and 1.8 per cent in 1933. 1939-44 movement in gross national product for Germany including Austria and Sudetenland was taken from E.F. Denison and W.C. Haraldson, "The Gross National Product of Germany 1936-1944", Special Paper No. 1 (mimeographed), in J.K. Galbraith, ed., *The Effects of Strategic Bombing on the German War Economy*, U.S. Strategic Bombing Survey, 1945. Hoffmann and Associates indicate that 1950 product in the post war Federal Republic excluding the Saar and West Berlin was 58.9 per cent of that in 1938. On the basis of information on the geographic distribution of German product in 1936 (see *Statistisches Handbuch von Deutschland 1928-1944*, Länderrat des Amerikanischen Besatzungsgebiets Ehrenwirth, Munich, 1949 pp. 600-601), the 1938 figure would need to be adjusted downwards by 43 per cent to allow for all territorial changes from the Reich to the Federal Republic (excluding the Saar and West Berlin). However, as our postwar figures refer to the Federal Republic including the Saar and West Berlin we have adjusted the Hoffmann figure for 1938 downwards by only 35.6 per cent and his 1950 figure upwards by 4 per cent to derive the correction factor for income loss due to the change from the Reich (1937 boundaries) to Federal Republic including Saar and West Berlin. The movement for 1947-50 is from *Statistics of National Product and Expenditure, No. 2, 1938 and 1947 to 1955*, OEEC, Paris, 1957, p. 63 and the 1946 figure is derived from *Wirtschaftsproblemen der Besatzungszonen*, D.I.W., Duncker and Humblot, Berlin, 1948, p. 135. 1945 was assumed to be midway between 1944 and 1946. Movement from 1950 onwards is from OECD national accounts statistics. The impact of territorial change on output can be summarised in simplified form as follows (in terms of ratio of old to new territory: 1870 96.15; 1918 108.39; 1946 155.35. In terms of population the ratios were: 1870 96.15; 1918 110.98; 1946 147.83. These figures correct for all the changes which took place, but minor ones are consolidated to avoid excessive complication. Thus the figures for 1918-46 refer to the Reich as it existed in 1937, and from 1946 onwards to the Federal Republic including the Saar and West Berlin.

⁶ See F. GRUNIG, "Die Anfänge der Volkswirtschaftlichen Gesamtrechnungen in Deutschland", *Beiträge zur empirischen Konjunkturforschung*, Berlin, 1950, p. 76.

Italy: 1861-1950 gross domestic product at 1938 prices from P. Ercolani, "Documentazione statistica di base", in G. Fuà, ed., *Lo Sviluppo Economico in Italia*, vol. III, pp. 401-3, Angeli, Milan, 1969. The figures refer to output in the present territory of Italy ("confini attuali", see p. 380). Figures in an earlier official study, *Annali di Statistica*, Serie VIII, vol. 9, Istituto Centrale di Statistica, Rome, 1957 show a gain in output due to territorial change of 3.2 per cent after the first world war and a loss of 1.5 per cent after the second world war (corresponding population changes were a gain of 4.1 per cent and a loss of 1.4 per cent respectively).

Japan: 1885-1930, gross domestic product at 1934-36 prices from K. Ohkawa, N. Takamatsu, and Y. Yamamoto, *National Income*, Vol. I of *Estimates of Long-Term Economic Statistics of Japan Since 1868*, Toyo Keizai Shinposha, Tokyo, 1974, p. 227. Rough estimate for 1870 was derived by assuming that per capita product rose by 1 per cent a year from 1870 to 1885. This is smaller than the later period, but 1870-85 was a period of major upheaval in which population growth and economic growth were probably slower. 1930-52, gross national product at 1934-36 prices from *National Income White Paper* (in Japanese), 1963 edition, p. 178 adjusted (from 1946) to a calendar year basis. 1952 onwards from *National Accounts of OECD Countries 1974*, Vol. I p. 10. In the above sources, Okinawa is included up to 1945, and excluded from 1946 to 1972. An upward adjustment of 0.66 per cent was therefore made to the figure for 1946 to offset the impact of territorial change, and the 1973 figure was adjusted down by 0.92 per cent to offset the impact of Okinawa's return. For the period 1952-71, Denison and Chung find a growth in net national income at factor cost which is lower using U.S. deflation procedures than those used in Japan (with 1952 = 100, they get an index of 489 for 1971 compared with 526.6 by Japanese methods which overstate growth in the government sector). See E.F. Denison and W.K. Chung, *How Japan's Economy Grew so Fast*, Brookings, Washington, D.C., 1976, pp. 19 and 152. However, using their estimate of national income growth and adding capital consumption allowances to get growth of GDP, their index for 1952-1971 would be 550.4 which is virtually the same as that which we have for this period (549.5). What does emerge from this is that the growth of net domestic product has been slower than gross domestic product and this difference is bigger in Japan than in other countries as already mentioned in the introduction to the country notes.

Netherlands: 1860-1900, real national income, unpublished private estimates supplied by J.B.D. Derksen. 1900-17, 1921-39, and 1948-50 net domestic product at constant market prices derived from *1899-1959 Zestig Jaren Statistiek in Tijdsrekenen*, Centraal Bureau voor de Statistiek, Zeist, 1959 p. 102. 1917-20 national income from *Op. cit.*; 1939-47 real product in international units interpolated from C. Clark, *Conditions of Economic Progress*, 3rd ed. Macmillan, London, 1957, p. 166-7. H.C. Bos, "Economic Growth of the Netherlands", IARIW, Portoroz, 1959 (mimeographed) presented a rough estimate of Dutch per capita income in 1688 compared with 1910 (using Gregory King's estimate for 1688. This showed 1688 income per head as 38.5 per cent of 1910, but as King was wrong about Dutch population, his estimates are not documented and

Bos simply doubles his figure for assumed price change, we cannot attach much credence to it.

Norway: Gross domestic product at market prices. 1865-1950 from *National Accounts 1865-1960*, Central Bureau of Statistics, Oslo, 1965, pp. 348-59. The original figures of gross fixed investment were adjusted downwards by a third to eliminate repairs and maintenance. 1939-44 movement in national income (excluding shipping and whaling operations carried out from Allied bases 1940-44) from O. Aukrust and P.J. Bjerve, *Hva Krigen Kostet Norge*, Dreyers, Oslo, 1945, p. 45. 1945 assumed to be midway between 1944 and 1946.

Sweden: 1861-1950 gross domestic product from O. Krantz and C.A. Nilsson, *Swedish National Product 1861-1970: New Aspects on Methods and Measurement*, CWK Gleerup, Kristianstad, 1975, p. 171.

Switzerland: 1890-1944 real product in international units from C. Clark, *Conditions of Economic Progress*, 3rd edition, Macmillan, London 1957, pp. 188-9. The link 1938-48 is from *Europe and the World Economy*, O.E.E.C., Paris 1960. 1948-50 from *La Vie Economique*, September 1965. The rough estimate for 1870 was derived by backward extrapolation of the 1890-1913 movement in output per head. There is a graphical indication of the growth of Swiss real product in F. Kneschaurek, "Problemen der langfristigen Marktprognose", *Aussenwirtschaft*, December 1959, p. 336 for 1900-65. This shows faster growth than C. Clark to 1938. U. Zwingli and E. Ducret, "Das Sozialprodukt als Wertmesser des langfristigen Wirtschaftswachstums", *Schweizerische Zeitschrift für Volkswirtschaft und Statistik*, March-June 1964, shows slower growth for 1910-38 than C. Clark.

U.K.: 1700-1800 England and Wales from P. Deane and W. A. Cole, *British Economic Growth 1688-1959*, Cambridge, 1964 p. 78 (excluding government) and 1801-1831 for Great Britain from p. 282. The Deane and Cole estimates were adjusted to a U.K. basis, assuming Irish output per head in 1830 to be half of that in Great Britain (as Deane herself hypothesises in the source mentioned below) and to have been stagnant from 1800-1830, and assuming that Scottish and Irish output per head in 1800 were threequarters of that in England and Wales in 1800, and that output per head increased by a quarter in these two areas from 1700 to 1800 (as compared with a growth of 47 per cent in England and Wales). 1830-1855 gross national product at factor cost from P. Deane, "New Estimates of Gross National Product for the United Kingdom 1830-1914" *The Review of Income and Wealth*, June 1968, p. 106, linked to 1855-1950 gross domestic product at factor cost (compromise estimate) from C.H. Feinstein, *National Income Expenditure and Output of the United Kingdom 1855-1965*, Cambridge, 1972, pp. T 18-20. Figures from 1920 onwards are increased by 3.8 per cent to offset the exclusion of output in the area which became the Irish Republic.

U.S.A.: 1800-40 derived from P. A. David, "The Growth of Real Product in the United States before 1840: New Evidence, Controlled Conjectures", *Journal of*

Economic History, June 1967. I use David's methodology and his adjustment to Lebergott's 1800 labour force level, but have retained Lebergott's ratio of agricultural to non-agricultural population for 1800 because I find David's 1800 ratio implausibly high and his argument in favour of it unconvincing. The method assumes that 1800-1840 agricultural output moved parallel with total population, derives agricultural productivity from this and further assumes that agricultural and non-agricultural productivity grew at the same pace. Because I have used Lebergott's 73.7 per cent of the labour force in agriculture instead of David's 82.7 per cent, I get an increase of per capita product of 26 per cent, whereas David gets an increase of 55 per cent from 1800-40. 1840-1889 movement of GNP in 1960 prices from R.E. Gallman, "Gross National Product in the United States 1834-1909", *Output, Employment and Productivity in the United States After 1800*, N.B.E.R., New York, 1966, p. 26. Gallman does not actually give figures for 1840, 1850, 1870 and 1889. These were extrapolated from neighbouring years.

The movement in individual years 1870-1889 was derived by using the Frickey index of manufacturing output, and interpolating the residual product linearly. Manufacturing was given a weight of 19.7 per cent of G.D.P. in 1889. The Frickey index was from *Historical Statistics of the United States, Colonial Times to 1970*, Washington D.C. 1975, p. 667. The 1889 weights at 1929 prices were derived from *National Income and Product Accounts of the United States 1929-1965*, U.S. Dept. of Commerce 1966, and the 1889-1929 product movement by sector as shown in Kendrick, pp. 302-3 as cited below. 1889-1929, gross domestic product from J.W. Kendrick, *Productivity Trends in the United States*, National Bureau of Economic Research, Princeton, 1961, p. 298-9. 1929-45 figures on GDP supplied by the U.S. Department of Commerce, 1946-50 from *Survey of Current Business*, January 1976, vol. 56, No. 1 Part II, pp. 6-7. Figures corrected to exclude the impact of the accession of Alaska and Hawaii in 1960. These two states added 0.5 per cent to total product, but part was already included and the explicit addition was only 0.2 per cent, see *Survey of Current Business*, July 1962, p. 5.

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