

ECONOMIC AND BUSINESS HISTORY 22/23

LECTURE 9 – KONDRATIEFF VS MADDISON



1

PLAN



1. MEG



2. Kondratiev's
Waves



3. Maddison's
Phases

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2

1. Modern Economic Growth



3

3

Features of MEG, 1820-2020


- High increase in output level
 - world annual income world rose from less than 1 trillion euros around 1800 to more than 50 trillion euros (in 2020 prices)
- Significant increase in the average standards of living ...
 - average annual per capita income rose from <1, 000 euros to >7,000 thousand euros (in 2020 prices)
- Without sacrificing population growth!
 - the number of existing human beings rose from less than 1 billion to more than 7 billion today

4

4

What underlies MEG?

$$\frac{\text{Output}}{\text{Population}} = \frac{\text{Output}}{\text{Workforce}} \times \frac{\text{Workforce}}{\text{Population}}$$



Measure of productivity and living standards Labour productivity Employment rates


Increasing Labour Productivity or growing Employment rates?

5

5

What underlies the rise in Labour Productivity ?

$$\frac{\text{Output}}{\text{Labour force}} = \frac{\text{Output}}{\text{Capital}} \times \frac{\text{Capital}}{\text{Labour force}}$$



Measure of productivity and living standards Capital productivity Capital per worker or Capital intensity

Increasing Capital Productivity or growing Capital intensity?

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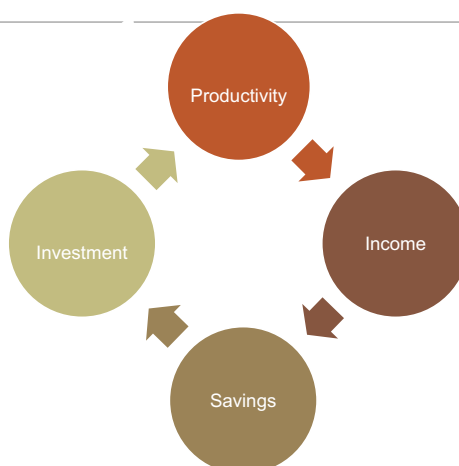
MEG Mechanism

- Increasing labour productivity, rather than intensification of labour (more days, more hours, more workers) explains rise in pc output. Industriousness, not so much,
- Increasing capital intensity, rather than productivity of capital (productivity decreased on the long-run, as K becomes abundant and returns decrease)
- Increasing capital intensity is the result of :
 - a) growing physical capital allocation per worker
 - b) increase in training education and skills (or human capital), which is demanded by the growing K allocation per worker

7

7

MEG is a Self-sustaining Process



8

8

The transformation brought by MEG

Sources: For 1820: Maddison 1991; For 2018: OCDE (2016); OCDE 2016); OCDE (2016); OCDE (2017); World Bank (2018) * incomplete data; ** countries missing

Indicator	1820	2018
Hours worked per person per year	3000*	1589
Average schooling (in years)	2	12.7
Foodstuff and clothing/private consumption	75%	20%**
Private Consumption/GDP	>85%	54%
Farm employment/Total employment	49%*	3,6%

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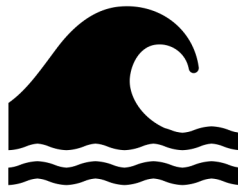
MEG: from 1820 to the present

- Since 1820, the main capitalist economies underwent MEG)
- MEG was sustained and substantial (i.e., higher than their previous record and than their contemporary counterparts)
- But **Constant**, it was not. It underwent fluctuations:
 - Recessions
 - Depressions
 - More and less favourable periods
- How to understand these fluctuations?
 - Do recessions and higher/lower growth periods occur regularly?

10

10

2. K's waves



11

11

Cyclical Theories

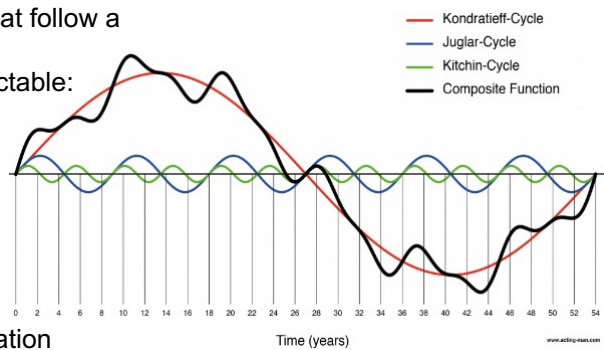
- One explanation for fluctuations is that economic activity is intrinsically cyclical
- Cycles are fluctuations that follow a regular pattern
- Ultimately, they are predictable:

Kitchin (3-5 yrs)

Juglar (6-11 yrs)

Konratieff (45-60 yrs)

Schumpeter waves of innovation



12

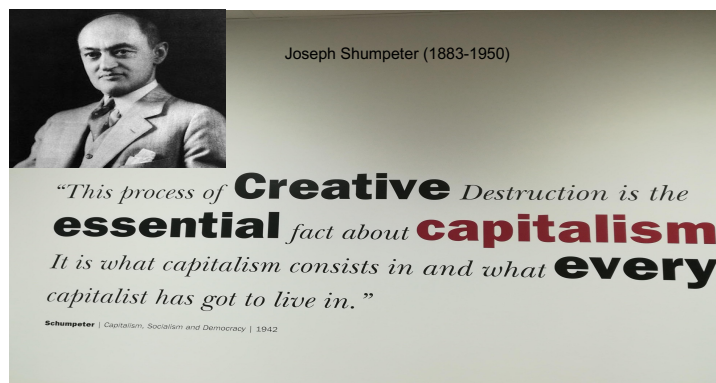
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MEG and Innovations

- Kondratieff's cycles were later combined with the innovation theory and became 'waves' (to emphasize that there was growth)
- For a time, a set of innovations are exploited, allowing for high returns and rapid productivity (A)
- At some point, the potentials of innovation are exhausted and businesses face the "law" of diminishing returns (B)
- This was the 'creative destruction' moment

13

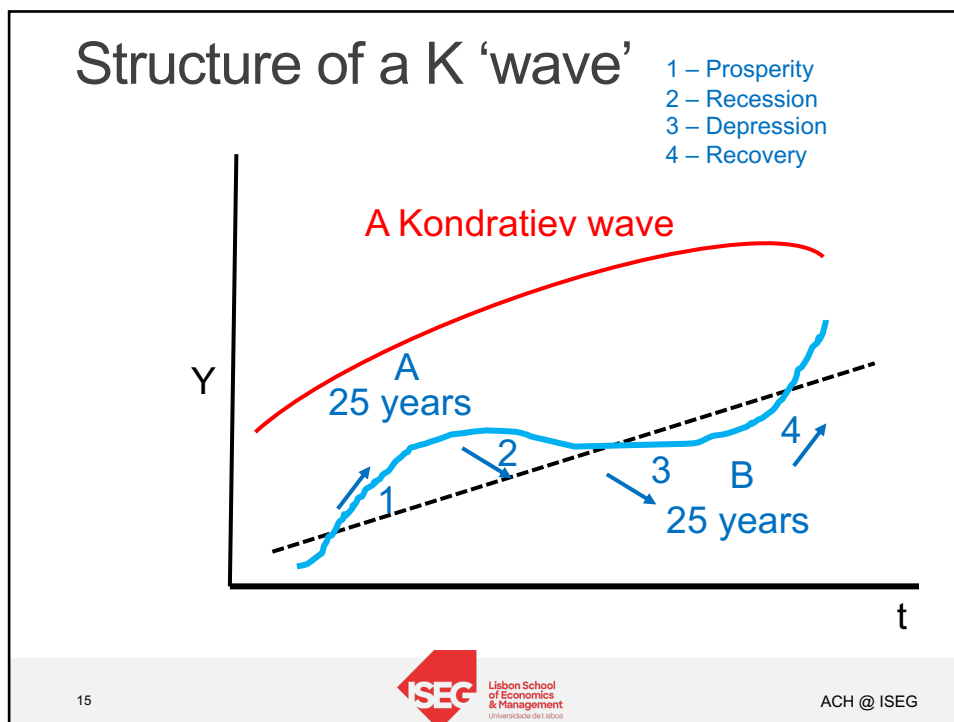
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Source: ISEG, F1 A3

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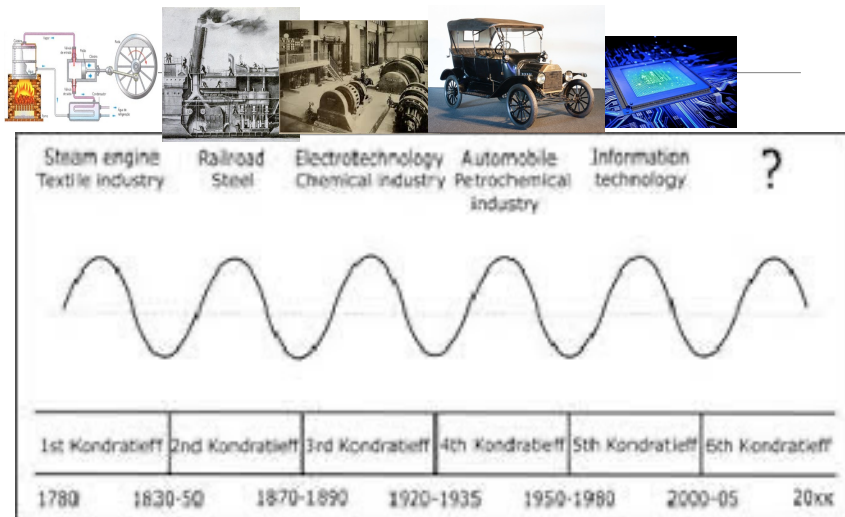
K waves and Innovations

- Thus the Kondratieff's 'waves' imply that MEG depends on the emergence of useful knowledge and on finding within the firm the organizational arrangements that permit the highest efficiency (output per unit of input)
- Thus, Kondratieff waves are successions of technological 'revolutions', starting with steam engines in the mid 18th century and continuing up to the present days.
- Each of this revolutions starts with a 'general purpose technology' (like steam, computing or electricity)
- Implicit in this theory is that innovation is the outcome of firm involved into market competition (an irony, since Kondratieff worked in the URSS) and decisions made by investors in the capital markets

16

16

Kondratieff, 'stylized'



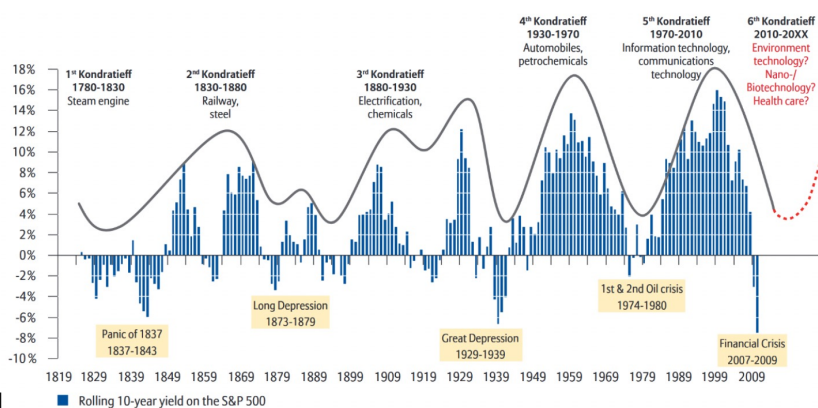
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Kondratieff, empirical perspective



Source: Allianz Global Investors "The sixth Kondratieff – long waves of prosperity" (January 2010)

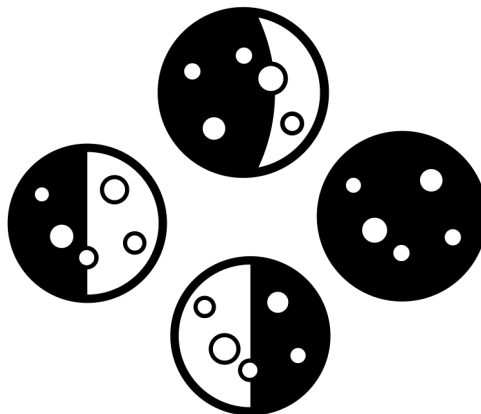
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18

3. Maddison's Phases



19

19

Cycles - Maddison's Criticism

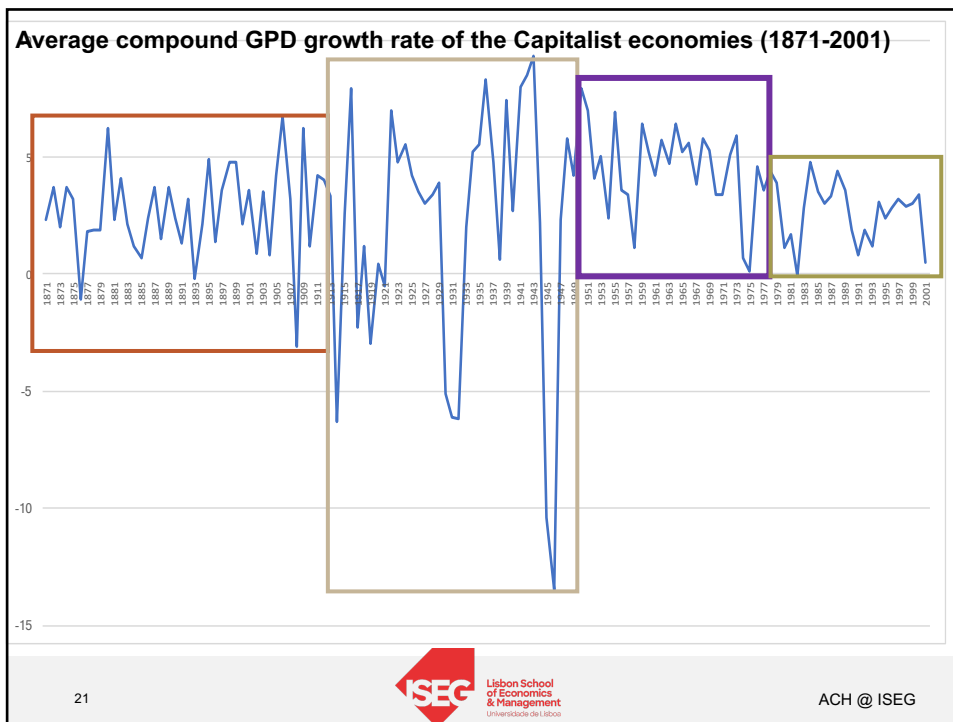
Maddison argues that the fluctuations of the major Capitalist Economies (BigCaps) are neither cycles nor “wave”-like movements.

Cyclical movements are observed with inadequate methodology:

- Cycle theories are based in the observation of [simple indicators](#), but only [aggregate indicators](#) capture the whole of the economy
- Cycle theories are deterministic and fail to incorporate the effects of [institutional and policy changes](#) (“History happens”)

20

20



21

Maddison's Phases (1)

Table 7 Growth characteristics of five phases of capitalist development, 1820–2001 (arithmetic average of figures for the individual countries: annual average compound growth rates)

Phases	GDP	GDP per capita	Volume of exports
1820–1870	2.32	1.09	4.2
1870–1913	2.56	1.42	3.9
1913–50	1.99	1.23	1.1
1950–73	4.83	3.80	8.6
1973–2001	2.38	1.87	5.0

Source Maddison (1991) and (2003), and Tables 4, 5, 6, 7, 8, 9, 10, 11, 12 and 13

22

Maddison's Phases (2)

- Maddison presents four phases of uneven duration, each displaying a distinct "pattern"
 - 1820-1913 (incomplete data until 1870-1913) : irregular growth, but no serious recessions
 - 1913-50 irregular growth and frequent, serious recessions
 - 1950-73 Continuous growth
 - 1973-... Nearly continuous growth

Table 5 Growth of GDP at constant 1990 prices, 1500-2001 (annual average compound growth rate)

	1500-1820	1820-1870	1870-1913	1913-1950	1950-1973	1973-2001	1820-2001
Australia	-0.01	7.28	3.44	2.47	4.60	3.26	4.41
Austria	0.33	1.45	2.41	0.25	5.35	2.38	2.06
Belgium	0.41	2.24	2.02	1.03	4.08	2.14	2.15
Canada	0.62	4.42	4.02	2.94	4.98	2.95	3.86
Denmark	0.38	1.91	2.66	2.55	3.81	2.06	2.48
Finland	0.60	1.58	2.74	2.69	4.94	4.94	2.66
France	0.37	1.43	1.63	1.15	5.05	2.20	1.99
Germany	0.37	2.00	2.81	0.30	5.68	1.75	2.26
Italy	0.21	1.24	1.94	1.49	5.64	2.30	2.17
Japan	0.31	0.41	2.44	2.21	9.29	2.71	2.71
Netherlands	0.56	1.70	2.16	2.43	4.74	2.46	2.46
Norway	0.54	1.70	2.12	2.93	4.06	3.30	2.60
Sweden	0.66	1.62	2.17	2.74	3.73	1.83	2.28
Switzerland	0.52	1.91	2.55	2.60	4.51	1.16	2.41
UK	0.80	2.05	1.90	1.19	2.93	2.08	1.95
USA	0.86	4.20	3.94	2.84	3.93	2.94	3.63
Arithmetic average	0.47	2.32	2.56	1.99	4.83	2.38	2.63
Weighted average	0.41	2.00	2.69	1.97	4.75	2.58	2.59

23



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23

1871	2,3	1914	-6,3	1950	7,9	1974	0,7
1872	3,7	1915	2,6	1951	7	1975	0,1
1873	2	1916	7,9	1952	4,1	1976	4,6
1874	3,7	1917	-2,3	1953	5	1977	3,6
1875	3,2	1918	1,7	1954	2,4	1978	4,4
1876	-1,1	1919	-3	1955	6,9	1979	3,9
1877	1,8	1920	0,4	1956	3,6	1980	1,1
1878	1,9	1921	-0,5	1957	3,4	1981	1,7
1879	1,9	1922	7	1958	1,1	1982	-0,1
1880	6,2	1923	4,8	1959	6,4	1983	2,8
1881	2,3	1924	5,5	1960	5,2	1984	4,8
1882	4,1	1925	4,2	1961	4,2	1985	3,5
1883	2,1	1926	3,5	1962	5,7	1986	3
1884	1,2	1927	3	1963	4,7	1987	3,3
1885	0,7	1928	3,4	1964	6,4	1988	4,4
1886	2,4	1929	3,9	1965	5,2	1989	3,6
1887	3,7	1930	-1,1	1966	5,6	1990	1,9
1888	1,5	1931	-5,1	1967	3,8	1991	0,8
1889	3,7	1932	-5,2	1968	5,8	1992	1,9
1890	2,4	1933	2	1969	5,3	1993	1,2
1891	1,3	1934	5,2	1970	3,4	1994	3,1
1892	3,2	1935	5,5	1971	3,4	1995	2,4
1893	-0,2	1936	8,3	1972	5,1	1996	2,8
1894	2,1	1937	4,8	1973	5,9	1997	3,2
1895	4,9	1938	0,6			1998	2,9
1896	1,4	1939	7,4			1999	3,0
1897	3,6	1940	2,7			2000	3,4
1898	4,8	1941	8			2001	0,5
1899	4,8	1942	8,5				
1900	2,1	1943	9,3				
1901	3,6	1944	2,2				
1902	0,9	1945	-10,4				
1903	3,5	1946	-13,5				
1904	0,8	1947	2,3				
1905	4,2	1948	5,8				
1906	6,7	1949	4,2				
1907	3,7						
1908	-3,1						
1909	6,2						
1910	1,2						
1911	4,2						
1912	4						
1913	3,3						

Average GDP growth rates (BigCaps)

Maddison 2007: tab. 10

24

Table 11 Incidence of recessions in GDP, by country, 1871–2001 (number of falls in GDP and countries in which GDP fell)

Year	Falls	Countries	Year	Falls	Countries	Year	Falls	Countries
1871	4	AFGN	1914	12	ATBCLFGIUNSE	1957	0	
1872	3	CIZ	1915	7	ATBDLFG	1958	6	BNWZKE
1873	3	TDF	1916	4	ATSZ	1959	0	
1874	2	NE	1917	11	ATBDLFNWSZE	1960	0	
1875	4	BCSE	1918	11	ATBCDLFNWSZ	1961	0	
1876	7	ACFGLJZ	1919	3	TCGIK	1962	0	
1877	5	DLGSZ	1920	5	CLJKE	1963	0	
1878	6	CLFJWS	1921	9	CDFIWSZKE	1964	0	
1879	7	TFGNSZK	1922	1	J	1965	0	
1880	1	G	1923	2	TG	1966	0	
1881	3	LJ	1924	1	W	1967	0	
1882	3	AWZ	1925	1	D	1968	0	
1883	2	IW	1926	1	K	1969	0	
1884	1	F	1927	2	FI	1970	0	
1885	5	TCFSK	1928	0		1971	0	
1886	1	S	1929	2		1972	0	
1887	1	Z	1930	13	ABCG	1973	0	
1888	3	TJE	1931	14	ATBCLFGIUNZKE	1974	4	DJKE
1889	2	TI	1932	11	ATBCLFGIUNWSZKE	1975	10	TBDFGNZKE
1890	2	AN	1933	5	TBCDLFGNSZE	1976	7	LZ
1891	5	LGJNZ	1934	3	TCINE	1977	1	S
1892	5	ACLIK	1935	2	BFN	1978	1	T
1893	3	ACE	1936	0	FZ	1979	0	
1894	3	IZE	1937	0		1980	2	DK
1895	3	ACF	1938	4	BFNE	1981	5	TBDNK
1896	4	CJNE	1939	2	LZ	1982	6	ACGNZE
1897	3	AFI	1940	8	TBDLFNWS	1983	0	
1898	0		1941	6	BDFINZ	1984	0	
1899	2	LJ	1942	8	TBFJNWZ	1985	0	
1900	2	EK	1943	6	BFJNWZ	1986	0	
1901	6	ALFGSZ	1944	7	AFIJNWK	1987	0	
1902	5	LFJIS	1945	10	ATCDLGIJKE	1988	1	W
1903	3	WZK	1946	5	ACGKE	1989	0	
1904	2	WE	1947	2	KE	1990	1	G
1905	1	J	1948	0	Z	1991	7	ACLSZKE
1906	0		1949	0		1992	3	LSZ
1907	0		1950	1	K	1993	7	BLFGISZ
1908	0		1951	0		1994	0	
1909	3	CFSZKE	1952	2	BK	1995	0	
1910	2	FI	1953	0		1996	0	
1911	0		1954	0	CE	1997	0	
1912	0		1955	0		1998	1	J
1913	1	Z	1956	0		1999	0	
						2000	0	
						2001	1	J

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

25

Maddison's Phases (3)

- “Capitalist development has not been smooth. There have been important changes of momentum (...). My primary interest is (...) in major changes in the dynamics of growth which involved basic changes in the institutional-policy mix and were usually initiated by some sort of ‘system shock’ which upset the international economic order”” Maddison 2007, p. 146
- Hence, each phase is the result of deliberate institutional and policy options made in face of accidental events
- “History happens” and, as such, the intrinsic trends manifest in cycles are ‘interrupted, accelerated or prolonged

26

26

Maddison's Phases (4)

- Each phase is characterised by a different set of institutions (ruling international currency, trade and factor movements) and policy choices (on unemployment and labour regulation)
- The four phases display a distinct "institutional policy-mix"
 - Liberal Phase** : Globalization, gold standard and little labour regulation
 - Beggar-thy-neighbour**: weak international trade and factor movements with control of wages
 - Golden Age**: some int'l liberalization and labour-friendly policies
 - Neoliberal: Globalization (except in labour)** and capital-friendly policies

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