Phillip Anthony O'Hara [3 June 2012] [7-paper] [Final Version for LPE]

Short, Long and Secular Wave Growth in the World Political Economy: Periodicity, Amplitude and Phases for 8 Regions, 108 Nations, 1940-2010

Abstract: This paper examines the complex evolution and metamorphosis of the global, continental and national political economies over the period 1940 to 2010.[1] The data used is Maddison's mostly for 1940-60 and the World Bank online WDI database mainly for 1961-2010. Emphasis is given to changes in the rate of per capita economic growth over time, arranged by decades, including the periodicity, amplitude and phases of short, long and secular waves. The paper starts by summarising the stylized long wave pattern for the 1940s-2000s, which is then compared with that for the World, seven continents/regions and 108 nations. Stylized facts about short, long and secular wave patterns are scrutinized in relation to amplitude, periodicity, deviations from the stylized model and the World wave, plus multiple and erratic waves and patterns.

Key words: short, long & secular waves; periodicity, amplitude & phases; 1940-2010

Economic analysts who concentrate on short-term trends and processes are unlikely to understand the historical evolution and metamorphosis of complex systems, such as the world economy, it various regions, nations and localities. Historical evolution and metamorphosis is really the structural foundation for the successes and failures of whole economies. For instance, taking a short-term view of the 'Great International Crisis' of 2008-12 would likely lead to problematical conclusions, such as the dire need for austerity to help solve the problems. In fact, the crisis has mainly affected the Core areas such as North America and Europe (see O'Hara 2012), though a number of other nations and regions have been somewhat negatively affected as well.

In this context, the current paper seeks to scrutinise long-term trends in the World political economy, as well as the major regions or continents, and most nations of the World. Long wave theory will be the starting point for our analysis. We wish to study in detail the unstable movement of growth of the system and its constituents, through a long wave perspective. Doing this should help in the gaining of knowledge about these long-term changes in the political economy. While we briefly outline some aspects of the theory of long waves, the primary concern of this study is to try out some new empirical methods and flexible perspectives of long-term growth. There are of course many different types of waves, and this research as a whole is investigating economic, political, social and ecological waves; whereas this paper concentrates on one important part of the 'economic waves' (so to speak), specifically the rate of growth of GDP per capita over time. We are broadly interested in waves of growth of material welfare of areas, and the distribution of such waves throughout the World. As the empirical material of this study indicates, the Core nations or regions of the World have been in a long wave downswing phase for several decades now, especially as

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mentioned North America and Europe; plus of course several other areas and nations. These Core areas have very low levels of decadal average growth during the long wave downswing of the 1970s to the 2010s. During downswings growth tends to be lower, recessions deeper, and financial crises and instabilities more intense; periodically every decade or so. Recognising these growth anomalies in the Core is a crucial part of the process of understanding the current structural Great International Crises affecting numerous areas of the World. Long, short and secular wave empirics can help *situate* the current crisis.

For this purpose, this paper examines the long-term movement of economic growth for the World, continents and nations over the period 1940 to 2010. The data used is mostly Angus Maddison's (2001, 2006) statistics for 1940-60 and the World Bank WDI (2011) material for 1961-2010. The data is scrutinised over successive decades, as these decadal figures are used to examine the stylized facts of periodicity, amplitude and phases of short, long and secular waves through historical time. But note that these *waves are not simplistic cycles* in the sense that they involve *complex dynamics* of a *holistic nature* associated with institutions, technological systems and organisational arrangements; as well as classes, genders, ethnic and other groups. Mechanical change is not likely, although some *recurring* or *structurally evolving* processes are certainly at play, which do tend to produce more *patterned trends and stylized facts* of long-term change. But abrupt changes also occur along with revolutions and rapid upswings and equally destructive downswings.

The first section of the paper compares the stylized model with the World pattern of long wave for the period 1940-2010; plus the wave for various continents, including Asia (south and east), the Middle East and North Africa (MENA), Latin America and the Caribbean (LACA), sub-Saharan Africa (SSA), Western Europe (WE), Central and Eastern Europe (CEE), plus North America (NA). The pattern of decadal change is scrutinised in terms of amplitude, periodicity and phases of evolution of short, long and secular waves. The objective is to evaluate the evolutionary changes of the world and its continents for the period examined. Several specific periods of rapid change in growth dynamics are isolated for the World and several of its regions, including the 1940s-50s, 1980s, 2000s and possibly 2010s/2020s.

The sections that follow explore the details of the regions, in terms of how the nations are variously similar and different from the general trend or pattern for the continent, World and stylized model. Sometimes the continental averages give a good indication of the trends for the nations, and sometimes the average hides major differentials for the individual nations. We also isolate specific patterns of growth at the national level, including those nations that variously outperform or underperform relative to the region as a whole; while several nations exhibit highly interesting and complex patterns in themselves that are of considerable interest to political economists and historians.

We also explore the significance of the results in terms of the potential for short, long and secular wave upswing, downswing and borderline phases into the future. Attention is given to changes in the power structure of the global economy and how some continents and areas are likely to improve while others show little signs of development into the future. We follow the analysis of O'Hara (2001:677) who concluded his survey of long wave theory/empirics by suggesting that future studies be more *flexible, creative and complex* in dealing with the historical data, rather than making rigid preconceptions of wave periodicity, amplitude and metamorphosis. We also follow Wesley Mitchell (1951) and Howard Sherman (1991), who both studied *short cycles*, in bringing to *long wave* research issues of periodicity, amplitude and phases in short, long and secular waves.

Phases, Full Waves, Stylized Model and Hypotheses

We are interested in long waves in the broad tradition of Sam de Wolff (1924), Nikolai Kondratieff (1928), Joseph Schumpeter (1939), Ernest Mandel (1975, 1995) Michel Aglietta (1976), and David Gordon (1980, 1994).[1] In terms of "drivers" of long waves, Wolff and Kondratieff concentrated on the life and lags associated with very durable fixed capital.

Schumpeter centred on innovation in five core technological and institutional areas, and modern Schumpeterians (e.g., Freeman and Louca 2001) have extended this line of inquiry. Mandel placed emphasis on the rate of profit endogenously generating downswing but requiring various exogenous forces for upswing. Aglietta and fellow regulationists scrutinised the mode of regulation, requiring a regime of accumulation as well as several institutional forms. Gordon and his followers studied social structures of accumulation (SSA), depending on the rise and fall of several institutional spheres, which condition long term accumulation and rate of profit.

Historically, we have followed a hybrid wave theory linking regulationist and SSA drivers, comprising the rise and fall of institutional regimes affecting accumulation and growth (see O'Hara 2006, 2010). For instance, in the post-war era (1945-2012), we saw the rise and fall of the postwar corporate system, comprising Fordism, the Keynesian welfare state, capital-labor accord, balance between monopoly and competition, regulated financial system, and domestic family/community structures. More latterly these spheres have evolved in several nations and regions into the dominance of neoliberalism, deregulation, flexible/Taylorist production/distribution systems, and the emphasis on individual/corporate rather than social incentives. Following the *principle of uneven development*, we are less interested in the process of convergence than the complex differences, similarities and asymmetric wave trends and processes operating at the global, regional and national levels.

However, this study seeks to innovate and change the tradition of wave analysis by being more interested in the aggregated empirical regularities that may emerge from a wave investigation. Our concern is with changes in real GDP *per capita* since the concern is with changes in the aggregate output per person, rather than changes in population. We are concerned with growth levels of *per capita* income (material standard of living) emanating from market-based (equivalent) production. Differences between GDP *per capita* growth waves and GDP growth waves are the subject of future research. The empirical data indicates the realistic operation of short waves, long waves and secular waves (periodicity); plus very high waves, ordinary waves and low waves (amplitude); plus wave upswing, downswing and borderline (phases). The borderline phase—including movements *through* borderline—is the fulcrum around which much of the analysis depends. But peaks (e.g., the mid-1970s in the West) and troughs (e.g., the 2000s in the West) in the wave are important in delineating the start of downswings and the depth of downswings (which *may* be followed by the tentative movement to recovery), respectively. We also find the existence of a multiplicity of regular and irregular short waves in some nations, especially in the periphery. Waves do certainly differ in different regions, and this empirical research seeks to ascertain the aggregated stylized facts about waves over the period 1940-2010 in all the continents of the world, most of the nations, in the context of Core–Periphery–Semi-Periphery (CPSP) analysis.

The established wave model, drawing from a long traditional of scholarship, tends to study capitalism as a series of phases of evolution, often divided into waves of change. Long waves are usually studied from the inception of capitalism, with the first phase of evolution being that of the competitive phase during 1780s—1840s (especially in the Core nations). Long wave upswing often empirically accords with the period of the 1780s to the 1810s, while downswing emerged for the major nations during the 1820s—1840s. Several other waves have been argued to have emerged, with the next phase being from the time of the gold rushes in California and Australia during the 1850s, through a couple of decades of long wave upswing into the early 1870s, changing into downswing during the mid-1870s to the mid-1890s (Freeman & Louca 2001).[2]

The next long boom is said to have emerged during the late 1890s into the first decade and a half of the twentieth century; with the First World War stunting growth (van Duijn 1983) and precipitating downswing and instability during the mid-1910s through to the Great Depression of the 1930s (with the roaring twenties bubble in between). After World War II was the long boom of the Keynesian welfare state and Fordism through the 1940s—1970s, followed by the periodic deep recessions and crises during 1980—2010, especially in the Core. We delimit the scope of the research to the 1940-2010 period, since the data is quite

good for this period, and it fits the general idea among wave scholars for one full wave (or nearly so) during this period.

The established wave model upon which this empirical study will be compared includes five main theses, which will be critically scrutinised and modified accordingly. We agree with Schumpeter (1939) that long waves can be '*useful'* tools of historical analysis; and we concentrate here on the empirical regularities or stylized facts (Kaldor 1965) of the most recent wave. Figure 1, below, illustrates the primary thesis of the *hypothetical* Stylized Full Long Wave Model, from the late 1940s through to the end of the wave possibly in the 2000s:

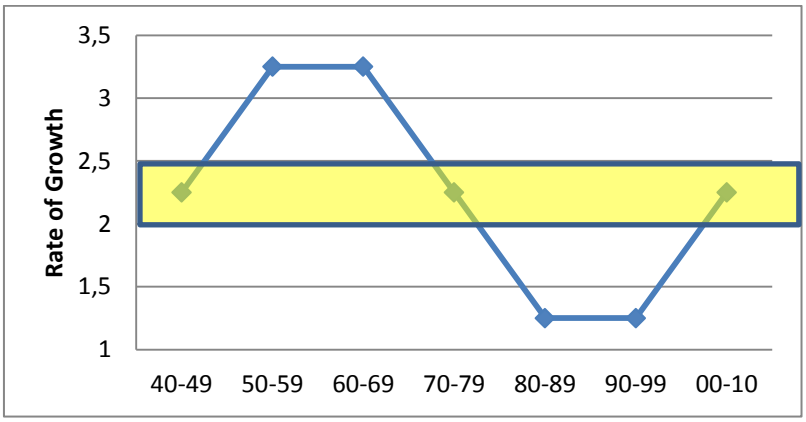

Figure 1. **Stylized (Hypothetical) Full Long Wave Model, 1940-2010: GDP Per Capita AAGR (Decadal Averages)**

Note: The yellow bar represents "borderline" performance in-between upswing and downswing

The *first hypothesis* is that there are 40-80 year waves, divided roughly between 20-40 years of upswing followed by 20-40 years of downswing. Specifically for this study we will be testing the usual assumptions behind most long wave scholars concerning the latest phase of capitalism: the movement from the Fordist-Keynesian movement of the 1940s-1970s to neoliberal capitalism into the 1980s-2010s. There is some controversy about periodicity and amplitude (see O'Hara 2006:ch 1). We will be testing a specific form of this periodicity and amplitude through use of the Stylized Full Long Wave Model, shown above. Figure 1 illustrates idealized decadal per capita GDP growth rates of 2.25% [(1940s) borderline-up], 3.25% (1950s), 3.25% (1960s) [long wave upswing 1950s-60s], 2.25% [(1970s) borderline-down] 1.25% (1980s), 1.25% (1990s) [long wave downswing 1980s-90s], 2.25% [(2000s) borderline-up]. The yellow bar represents borderline positions in between downswing and upswing; usually borderline performance is needed before variously undergoing upswing as well as downswing and possible upswing again. This stylized model is empirically scrutinised to ascertain the stylized facts of the waves, from which modifications to established theory can be made.

The *second hypothesis*, following Jacob van Duijn (1983), is that the established long wave pattern tends to emerge for the World economy as a whole, but not necessarily for the individual nations or regions. The world capitalist system is subject to uneven developments due to the complex way in which knowledge, institutions and production-distribution networks are shaped and formed (see Marshall 1987). Nevertheless, some nations and regions will tend to be closely associated with global trends, and these are likely to be the Core economies of North America, Western Europe and some nations elsewhere (such as Japan), given their importance since the 1940s. Other areas are likely to have greater volatility than average, usually from the Periphery and Semi-periphery, because they tend to be impacted by problematic issues associated with authoritarian regimes, wars, low/unstable primary product prices and debt crises. The study seeks to establish the validity of this idea for SSA, MENA and LACA. Other regions may establish wave patterns impacted by high or

low ceilings or floors in the wave. Core Asian nations and the Periphery and Semi-Periphery in general may operate along these lines.

The *third hypothesis* is that the long wave may be usefully defined relative to the mid-point of recovery to the next mid-point of recovery (Schumpeter 1939:213).[3] The "mid-points in recovery"—*borderline-up* to *borderline-up*—method of long wave periodicity potentially includes all the phases of long wave motion. It includes, in this context, the postwar re-establishment of regime of accumulation during the 1930s through to the 1950s (when the institutions were mostly set in place); the boom of the 1950s through to the early 1970s; the onset of periodic deep recession and financial crises during the mid-1970s—1990s; and the possible restoration of some modest regime of accumulation for the old Core and elements of the Semi-Periphery and Periphery which may occur during the 2000s (or possibly later). The borderline method of long wave analysis is the core of the study, and the hypothesis states that this is a useful way of examining waves.

The *fourth hypothesis* is introduced to engender more complexity and realism into the analysis (beyond the Stylized Model), namely, that it is useful to include three types of *wave phases* and three types of *Full Waves*, both defined in terms of periodicity and amplitude. There may be *short wave phases* of about one decade (upswing *or* downswing *or* borderline), *long wave phases* of two or three decades (upswing *or* downswing *or* borderline), and *secular wave phases* of four or more decades (upswing *or* downswing *or* borderline). These *phases* of the wave combine to generate *full waves*, which always include an upswing and a downswing, and possibly also various borderline decades.

Full short waves are usually of two decades each, including upswing and downswing; but possibly also one or two decades of other phases (such as borderline), making it a total of possibly 3-4 decades maximum). *Full short long waves* are of 50-60 years in length, with at least two decades of upswing and two decades of downswing, and possibly up to two decades of borderline performance in between these upswings and downswings. *Full medium long waves* are of 70-80 years in length, including at least 2-3 decades each of upswing and downswing, along with possibly a borderline phase in between. *Full secular waves* are of 90-100 years in duration from borderline-up to borderline-up, including at least two decades each of long upswing and long downswing phases. Ideally for the short, long and secular Full Waves there would be a borderline-up, followed by an upswing; then a borderline-down, followed by a downswing; and lastly a borderline-up which represents a recovery. However, sometimes the downswings *pass through* borderline to upswing, and similarly upswings pass through borderline to downswings. The core thing about these Full Waves is that there is a movement from lower to higher growth (usually into 'upswing'), then from higher to lower growth (usually into 'downswing'), and then into higher growth again (usually into 'borderline').

We seek to broaden wave analysis through a modified view of periodicity to the stylized model. The stylized model may be useful for general purposes, but ultimately these waves have to be scrutinised empirically with the emphasis on establishing the nature of wave processes in reality rather than deterministic assertions of periodicity, amplitude and phases. Opening the discourse up to flexibility will likely add several dimensions to the research program of wave analysis. We especially seek to ascertain whether several areas and nations undergo short waves or secular waves in both the upswing and the downswing; in addition to the normal borderline short waves and long waves of upswing and downswing. We seek to modify wave theory when deemed necessary by the empirical evidence, along these lines.

World, Stylized Model and Continents/Regions: Periodicity, Amplitude and Phases

In this section, we estimate periodicity and amplitude of the phases and full waves, paying special attention to the World and its continents/regions, based on the following taxonomy:

Table 1.

Decadal AAGR, Growth Wave Phases Taxonomy: Periodicity and Amplitude

Amplitude	Growth Rate GDP Per Capita	Short Wave (SW) Phase	Long Wave (LW) Phase	Secular WU, B or WD (SECW) Phase
Very High Upswing	4.51% & >	10 years	20-30 years	40 years or >
High Upswing	3.51%–4.50			
Upswing	2.51%–3.50%			
Borderline (B)	2.01%–2.50%	10 years	20-30 years	40 years or >
Downswing	1.01 – 2.00%	10 years	20-30 years	40 years or >
Deep Downswing	0.01%–1.00%			
Very Deep Downswing	< 0.01%			

Source: Adapted from O'Hara (2007, 2008, 2012)

The mostly Maddison and World Bank WDI growth estimates, re-arranged decadally, are shown below in Table 2 for the period 1940 to 2010:[4]

Table 2

Real GDP Growth Per Capita (Decadal AAGR),
Stylized Model, World, Continents/Regions: 1940–2010, 8 Areas[5]

	Stylized Model	World	MENA	LACA	SSA	Asia	WE	CEE	NA
40-49#	2.25	1.96	n.a.	2.06	n.a.	-3.33	-0.65	1.24	3.55
50-59	3.25	2.68	3.49	2.03	1.82	3.82	4.03	3.68	2.09
60-69	3.25	3.09	3.9	2.59	2.09	3.77	4.03	3.68	3.21
70-79	2.25	2.01	5.77	3.19	1.32	3.39	2.94	3.26	2.62
80-89	1.25	1.36	-1.63	0.19	–0.68	2.96	2.00	0.22	2.06
90-99	1.25	1.22	2.07	1.18	–0.60	2.87	1.88	-3.71	1.91
00-10	2.25	1.49	2.42	2.35	2.34	4.32	1.18	4.46*	1.08

Source: Adapted from raw data of World Bank (2011), Maddison (2001, 2006), De Long (1998:6)

* Growth of CEE5 (Russia, Hungary, Romania, Poland, Czechoslovakia; population weighted)
# World data from De Long 1998:6; other areas from Maddison 2006. n.a. = not available.

Table 2 examines decadal-average annual growth per capita for the Stylized Model, World and the various continents/regions–MENA, LACA, SSA, Asia, WE, CEE and NA. There is inadequate data for MENA and SSA during the 1940s. Now we transform this annual average decadal growth data into Figure 2, showing the evolutionary movements of growth from decade to decade, below, starting with the record for the World, compared with the stylized model:

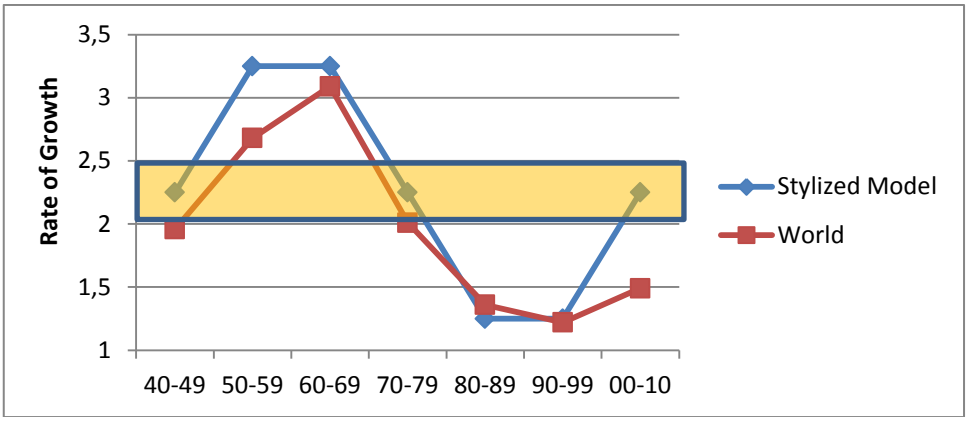

Figure 2. **World and Stylized Model, GDP Per Capita Decadal AAGR, 1940-2910**

Source: World data based on Table 2.

This World Wave is a fairly easy one to interpret, comprising as it does, (a) one decade of 'barely'-borderline results for the 1940s, (a) 2 decades of long wave upswing (1950s-1960s); (b) 1 decade of borderline conditions (1970s); and (c) 3 decades of downswing (1980s-2000s). This 70 year long wave for the World economy for the 1940-2010 period comprises less than one full long wave. What is missing, if we periodise it from borderline-up to borderline-up, is the borderline of the next possible upswing (2010s or 2020s). Hence the World wave for 1940-2010 is almost exactly the same as the Stylized wave, except that the World has failed to undergo borderline recovery into the 2000s; and indeed, recently much of the World has been embroiled in the worst recession and financial crisis since the Great Depression of the 1930s.

What this implies is a good fit between the World and stylized model, but it also indicates that recoveries in the wave are not necessarily endogenous to the system, and may require special conditions, institutions, governance, sectors, effective demand and technologies to restart the growth spurt; or modifying the objectives and dynamics towards a more communitarian system. While the downswing in the wave appears to emerge endogenously on the basis of institutional and technological contradictions in the system, the corresponding long wave upswing seems to require effective institutional, interventional and innovative structures and dynamics for change.

Now we compare the stylized facts for the continents/regions, shown descriptively in Figure 3 and then interpreted analytically in Table 3, below:

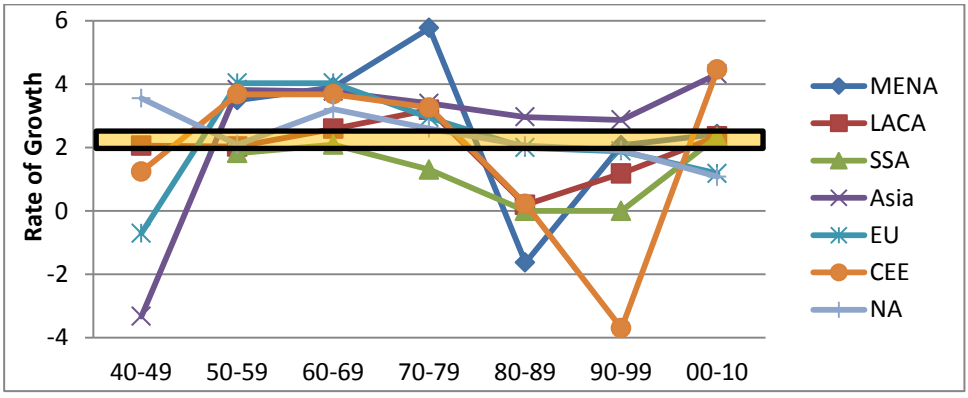

Figure 3. **Decadal AAGR GDP Per Capita, 1940 to 2010, Continents/Regions**

Source: Adapted from Table 2

This data shows that growth for most areas was generally slightly below borderline in the 1940s, at or mostly higher than borderline during the 1950s and 1960s, in between upswing and borderline in the 1970s, mostly below borderline in the 1980s and 1990s, and at or mostly somewhat below borderline in the 2000s. Table 3, below, presents an evolutionary view of the wave phase patterns through time over the 70 year period, including 8 regions and the World, with short (SWU, SWD), long (LWU, LWD) and secular (SECWU, SECWD) upswing and downswing as well as borderline (B) phases included:

Table 3

Evolutionary Pattern of Wave Upswing, Borderline, Downswing: World and Continents/Regions, 1950-2010. 6, 8 Areas.

	1940-49		1950-59		1960-69		1970-79		1980-89		1990-99		2000-10	
SECWU	0		0		0		1		1		1		1	
LWU	0	1	0	5	5	7	5	6	0	1	0	1	0	2
SWU	1		5		2		0		0		0		1	
B		2		2		1		1		1		1		3
SWD	3		1		0		1		5		1		0	
LWD	0	3	0	1	0	0	0	1	1	6	5	6	3	3
SECWD	0		0		0		0		0		0		0	
Number		6		8		8		8		8		8		8

Source: Adapted from Table 2. Note: SECWU=secular wave upswing; LWU=long wave upswing; SWU=short wave upswing; B=borderline; SWD=short wave downswing; LWD=long wave downswing; SECWD=secular wave downswing.

This shows, firstly, that the 1940s World War and its immediate aftermath was mostly an era of downswing, likely continuing the bad results from the Great Depression. It was especially troublesome for Europe and Asia, the two main areas involved in the war (likely also for MENA). Borderline results did not emerge since the normally good results for the late 1940s did not adequately negate the contractionary effects of the war during the earlier years of the 1940s. For the main Core area whose civilian population was not directly involved in the war, the North American mainland, the 1940s was a short wave upswing from the Depression, but the war spending was not sustainable; while the 1950s was a borderline result until robust long wave upswing emerged into the 1960s and 1970s. All this reinforces the results of van Duijn (1983) that world wars *tend* to have a depressing effects on growth, at least in the short-run, especially for the peoples whose territory the wars are engaged (but perhaps not for those stimulated by war investment whose mainland civilians are not seriously attacked), and may require substantial institutional readjustment for progress to re-emerge.[6]

With the exception of low growth in SSA, all areas underwent wave upswing—the World, MENA, LACA, Asia, WE, EE and NA—for at least 20 and usually 30 years, during the 1950s-70s. This was the greatest long boom in the history of humanity. The capitalist Core led the way through Fordism, the Keynesian-Welfare state, along with US hegemony, regulated finance and the stable family environment (O'Hara 2000). These institutional spheres provided the basis for high profit, investment and growth for 2-3 decades. A similar growth process occurred in Central and Eastern Europe, as the system of production, distribution and governance led to a successful period of accumulation and growth. MENA, Asia and Latin America benefited from the postwar corporate system institutional dynamics and growth. While SSA did undergo borderline results in the 1950s, it was the only area to completely evade long wave upswing for the whole period of 1940-2010.

All areas underwent wave downswing into the 1970s, 1980s and/or 1990s, except Asia. The decades of the 1980s-2000s/1990s-2000s were mostly characterised by *long wave downswing* for the World as well as WE, NA and CEE, the 'Core' nations of the World. Fordism, the KWS, US hegemony, regulated finance and the stable family all became subject

to contradictions that adversely affected investment and growth (O'Hara 2000). While the core was continuing through regime deterioration during this 20/30 year period, LACA and SSA underwent debt crises and very severe economic deterioration. CEE was also undergoing downswing during the 1980s and 1990s. Robust institutions and effective demand were lacking through the World-system as the environment was not conducive to stable accumulation and growth.

But in the final decade, the 2000s, some degree of optimism emerged as SSA and LACA recovered a little to undergo borderline performance, CEE underwent short wave upswing, while MENA had been going through borderline in the 1990s and continued in this vein into the 2000s. Meanwhile Asia continued its upward trajectory from very long wave upswing in the 1960s-80s into *secular long wave upswing* into the 1990s and 2000s as China and then India (especially) became established players in the world economy.

Thus, while the World and most areas underwent varied conditions during the 1940s, long wave upswing tended to emerge during the 1950s–1970s and long wave downswing in the 1980s–1990s; and while this downswing continued for the World and the Core into the 2000s, culminating in the greatest crisis and recession since the 1930s, several optimistic developments emerged during the 2000s in several continents. Explaining this in terms of the Core–Periphery–Semi-Periphery (CPSP) model, transformations may be ongoing through the 2000s onwards as the critical areas of SSA (P) and LACA (P, SP) join with MENA (SP) to undergo borderline performance; while CEE (C, SP) reacted to the 1990s short downswing by undergoing short wave upswing in the 2000s. When considered in relation to the continuing critically high performance of Asia (SP, P), these improvements for SSA, LACA and CEE represent important changes in the distribution of potential power in the global political economy. Western Europe and North America are in the worst long-term economic position they have been since the 1930s. Could the periphery and semi-periphery be gaining critical momentum to collectively challenge the power of the West (and Japan)?

Next we *map* the Wave Phases and Full Waves in very broad terms for the World and its Continents or major areas, including B, SWU, SWD, LWU, LWD and SECWU, in Table 4, below:

Table 4

'Map' of Wave Phases and Full Waves: 8 Regions Plus Stylized Model; 1940-2010

<table>
<tr><th></th><th>Stylized</th><th>LACA</th><th>CEE</th><th>SSA</th><th></th><th>World</th><th>WE</th><th>NA</th><th>MENA</th><th>Asia</th></tr>
<tr><td></td><td>Perfect Full Long Wave (1940-2010)</td><td>'Full' Long Wave (1950-2010)</td><td>'Full' Long Wave (1940-2010)</td><td>'Full' Long Wave (1960-2010)</td><td></td><td>B-Up Needed (1940-2020/30?)</td><td>B-Up Needed (1940-2020/30?)</td><td>B-Up Needed (1950-2020/30?)</td><td>Missing 1940s Data (1940-2010?)</td><td>Secular Wave Upswing (1950-2010)</td></tr>
<tr><td>1940-49</td><td>B</td><td rowspan="2">B</td><td>SWD</td><td>n.a.</td><td></td><td>B#</td><td>SWD</td><td>SWU</td><td>n.a.</td><td>SWD</td></tr>
<tr><td>1951-59</td><td rowspan="2">LWU</td><td rowspan="3">LWU</td><td>SWD</td><td></td><td rowspan="2">LWU</td><td rowspan="3">LWU</td><td>B</td><td rowspan="3">LWU</td><td rowspan="6">SEC WU</td></tr>
<tr><td>1960-69</td><td rowspan="2">LWU</td><td>B</td><td></td><td>LWU</td></tr>
<tr><td>1970-79</td><td>B</td><td rowspan="3">LWD</td><td></td><td>B</td><td>B</td><td>SWD</td></tr>
<tr><td>1980-89</td><td rowspan="2">LWD</td><td rowspan="2">LWD</td><td rowspan="2">LWD</td><td></td><td rowspan="2">LWD</td><td rowspan="2">LWD*</td><td rowspan="2">LWD*</td><td rowspan="2">BLW</td></tr>
<tr><td>1990-99</td><td></td></tr>
<tr><td>2000-10</td><td>B</td><td>B</td><td>SWU</td><td>B</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

Source: Based on Tables 1 & 2; * 2008-12 Great Crisis; B#=Barely' Borderline

One can see from Table 4 that, during the 1940s-2000s, (a) SSA, CEE and LACA all exhibited 'full' long wave dynamics; whereas (b) the World, WE and NA require a borderline performance—or higher—into the 2000s or 2010s for full long wave motion; while (c) the availability of some good statistics for MENA in the 1940s would possibly give the region a Full Wave over 1940-1999. The Asian wave pattern is complex, but possibly explicable as shown further below. These results are quite good for Wave Empirics because it shows that it

is possible to scrutinise short, long and secular waves with a broad longer-term wave pattern. Three of the areas/continents of the World have demonstrated a fully-patterned short, long or secular wave motion of one complete up-down longer term movement with robust results; while another three areas/continents may complete the long-term wave motion into the next decade or two. One continent underwent secular long wave upswing motion, which may be explicable in terms of a Fully-Formed Wave, see further below. All continents and areas appear to be historically and conceptually explained in the long or secular wave context as having impressive wave motion. We now examine the nature of this motion in more detail through scrutinising periodicity and amplitude of the *Full Wave* and also the various *Wave Phases*.

Wave Amplitude is the difference between the highest and lowest decadal growth rates during the 70-year period, measured in basis points (BP).[7] Periodicity relates to the extent that the 70 year period is one full long wave; or the length of the wave so far examined empirically. Table 5, below, outlines the key findings for *amplitude*:

Table 5.

Amplitude of Long Waves: World & Continents, 1940—2010

	Amplitude (BP) 1940-2010 [Order from Highest (1) to Lowest (9)]	**Amplitude Intensity 1940-2010 (BP) Very High 751-1000 High 501-750 Medium 251-500 Low 0-250**		**Amplitude (BP) (1950-2010) [From Highest (1) to Lowest (9)]**	**Amplitude Intensity 1950-2010 Very High 751-1000 High 501-750 Medium 251-500 Low 0-250**
CEE	817(1)	Very High		817(1)	Very High
ASIA	765 (2)	Very High		145(9)	Lowest
MENA	n.a.	n.a.		740(2)	High
EU	468(3)	Medium		285(5)	Medium
SSA	n.a.	n.a.		302(3)	Medium
LACA	300(4)	Medium		300(4)	Medium
NA	248(5)	Low		213(6)	Low
STYLIZED	200(6)	Low		200(7)	Low
WORLD	187(7)	Low		187(8)	Low

Source: Adapted from Table 2.

Table 6, below, illustrates the *periodicity* of the waves during the 1940-2010 period, assessing possible chronology and degree of full wave over the period:

Table 6.

Periodicity of Long and Secular Full Waves: World, Stylized Model, Continents/Regions; Length, Chronology, 1940-2010

		Likely Full Wave Periodicity (*B to B* Years)	**Likely Full Wave Chronology (*B to B* decades)**	**1940s-2010: (70 Years) Percent of Full Wave**
SSA	*Full Short Long Wave (50-60 yrs)*	50 yrs	1960–2010	140%
MENA		60 yrs	1940–1999	117%
LACA		60 yrs	1950–2010	117%
STYLIZED	*Full Medium Long Wave (70-80 yrs)*	70 yrs	1940-2010	100%
CEE		70 yrs	1940–2010	100%
ASIA		70 yrs	1940–2010	100%
NA		70-80 yrs	1950-2020/30	87.5-100%
WE	*Full Secular Wave (90-100 yrs)*	80-90 yrs	1940-2020/30	77.7–87.57%
WORLD		80-90 yrs	1940-2020/30	77.7-87.5%

Combining Tables 5 and 6 we get Table 7, which summarises amplitude and periodicity, and indicates the degree of regularity or completeness of the wave.

Table 7.

Periodicity, Amplitude & Full Wave for World, Stylized Model, and Continents/Regions; 1940-2010, 1950-2010, 1960-2010 or 1950-1990s

	Periodicity	**Amplitude 1950-2010 [1940-2010]**	**Full Wave**
SSA	Short	Medium [n.a.]	Yes
MENA	Short	High [n.a.]	Almost (1940s Data Needed)
LACA	Short	Medium [low-Medium]	Yes
STYLIZED	Medium	Low [Low]	Yes
CEE	Medium	Very High [Very High]	Yes
ASIA	Medium	Low [Very High]	Complex/SECWU
NA	Medium	Low [Low]	Not Yet
EU	Secular	Medium [Medium]	Not Yet
WORLD	Secular	Low [Low]	Not Yet

What we can say from the evidence is that three of the continents/areas seem to have experienced full long waves: SSA, LACA and CEE. MENA requires data for the 1940s to be sure. For Asia, we cannot say for certain; this is discussed in some detail in the next section. Of the areas that have experienced full long waves, all had shortish long waves of about 50-60 years; or in the case of CEE medium length of 70 years. Also, the areas having a full long wave generally were in the periphery or semi-periphery (Note: CEE is *partly* in the SP), and characterized by medium-to-high amplitude.

The areas with a likely longish long wave but low amplitude, including NA, WE and World, all have yet to experience borderline growth of recovery—or higher—into the 2000s. Low amplitude thus seems to be linked to longer periodicities and less than one full wave to date. This indicates that the longer the long wave the lower the amplitude of the wave and the smaller the likelihood of recovery to date. The Core thus tends to have the greatest periodicities and the lowest amplitudes, along with no recovery yet on the horizon, plus the greatest crisis and recession since the Great Depression recently being experienced.

We can thus conclude fairly straightforwardly that the periphery and semi-periphery have a tendency, in the period examined, to have shortish long waves and fairly high amplitude; while the situation in the Core is the direct opposite of this, with NA, WE and the World having longish long waves and lower amplitude. The combination of higher and lower amplitudes for the areas averaged out for 'the World', resulting in low amplitude for the World; but an inability of the World to exhibit full wave motion at this point in history. The relevance of this for van Duijn's thesis of fully-formed long waves for the World as a system is that the World results (in both periodicity and amplitude) are similar to the Stylized model. The World as a whole, however, failed to achieve a recovery to the 'borderline-up' position by the 2000s, mainly because main areas of the Core—EU and NA—have not yet achieved even a tentative new regime of accumulation for sustainable long-term growth.

None of the continents followed the World pattern exactly—borderline 1940s, long wave upswing 1950s-1960s, borderline 1970s, and long wave downswing 1980s-2000s. However, the pattern for the West—Western Europe, North America, Eastern Europe (and Japan)—mostly followed the global pattern. WE and EE were the closest to the global pattern since they both experienced 30 years of long wave upswing (1950s-1970s) followed by 30 years of long wave downswing (1980s-2000s); having *not* undergone borderline performance during the 1970s. The North American experience was also fairly similar, though a little different to global performance. North America experienced borderline performance during the 1950s, long wave upswing during the 1960s and 1970s, followed by borderline during the 1980s, and then 20 years of long wave downswing during the 1990s and 2000s.

LACA was *slightly* deviant from the global pattern, having undergone borderline performance during the 1940s *as well as* the 1950s; followed by 20 years of long wave

upswing during the 1960s and 1970s; then experiencing a long wave downswing in the 1980s and 1990s, following by a decade of borderline performance into the 2000s. This borderline result for the 2000s is a quite major difference to the global pattern; although on track with the Stylized model. It shared this borderline result for the 2000s with MENA (and SSA), which had long wave upswing during the three decades of the 1950s–1970s; very deep *short* downswing during the 1980s; followed by twenty years of borderline during the 1990s and 2000s. Having a deep but short wave downswing into the 1980s and a long wave (20 year) borderline into the 1990s and 2000s situates MENA as an unusual case in the global economy; although with impressive wave dynamics moderately similar to the Stylized Model.

The most unusual pattern for any continent is that undergone by SSA and Asia. SSA started in the 1950s with a short wave downswing; followed this with borderline conditions suggesting a possible upswing emerging; but then experienced 30 years of long wave downswing, including the major debt crisis of the 1980s which continued into the 1990s; followed by borderline conditions into the 2000s, which indicates the possibility of an upswing into the 2010s. Asia saw a short downswing during the 1940s but then a secular wave upswing for six decades during the 1950s-2000s, the most remarkable performance of all the regions.

These short waves, borderlines and secular waves are major developments in wave research since beforehand such processes had been outside of 'long wave' scrutiny. The empirical evidence supports a complex, evolutionary and pragmatic analysis of waves. Looking at the state of the World it seems to follow from the evidence that wave motion in the modern political economy is indeed an interesting and powerful tool of economic analysis. Now we turn to the details of the continents/regions, including numerous nations, to scrutinise further the complex patterns of waves through the past seven decades.

Asian Wave Patterns

First we examine the specific amplitude and periodicity of the 1940-2010 Asian Wave, compared with the World and the stylized model, shown in Figure 4, below, but modified slightly to abstract from the early-mid 1940s negatives to illustrate the wave form better:

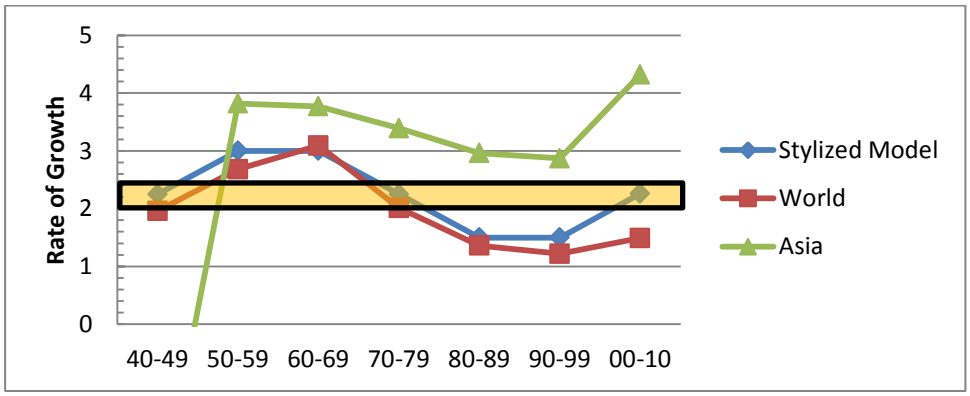

Figure 4. **Asian Wave Compared to World, 1950s-2000s, GDP Growth Per Capita, Decadal AAGR**

Source: Adapted from Table 2.

The Asian wave tends to follow the pattern of the World but at a higher level, with a higher ceiling and floor for the wave. The Asian region was severely impacted by the second-World war (also the struggles for independence), as was Europe; and since the 1950s has been undergoing secular wave upswing (SECWU). This adds considerable complexity to long wave analysis to suggest a 60 year wave of upswing with no downswing forthcoming. However, there are some evolutionary wave elements in the sense that growth was negative in

the 1940s, fairly high in the 1950s and 1960s, declining somewhat over the course of the 1960s to the 1990s as some economies underwent declining growth. For instance, there was declining growth in the 1960s in China, in the 1970s in India, in the 1980s in Myanmar and the Philippines, plus in the 1990s in Japan (also in the 2000s) and Mongolia. Asian growth grew in the 2000s partly due to the large expansion in India and continuing higher growth in numerous other nations (such as China[8]).

There are at least three possible interpretations of the Asian data. One interpretation is that the 70 year wave may represent a whole wave, as Asia emerged *through* borderline from the 1940s into upswing into the 1950s and 1960s; followed by a growth transition to progressively lower growth through the 1970s, 1980s and 1990s; and then a higher growth upswing into the 2000s. In this instance, areas such as Asia could experience whole secular upwaves without growth deteriorating to downswing levels for the core periods. The floor and ceiling of the wave is simply higher in Asia than elsewhere, while wave motion is in process but at a higher level. The world war tended to upset growth dynamics for areas seriously involved, and with that decade abstracted from Asian amplitude changes from the highest to the lowest for the continents: the periodicity of the wave being approximately 70 years while the amplitude is quite small: 136 basis points (compared to 765BP if the 1940s are included). This is possibly the best explanation of the Asian secular upwave.

A second (complementary) option is provided by van Duijn (1983), that long waves tend to emerge mostly for the World as a whole. He argues that long waves (as traditionally observed) are best seen as operating for the World-system, but not necessarily for its parts. In this context, the World started its long wave borderline to upswing in the 1940s through to the 1970s and then downswing from the 1980s through to the 2000s, with the possibility of borderline into the 2010s. Asia could therefore quite consistently undergo a secular wave upswing for 60 years as it contributed to the dynamics of the World-system. Here the Asian experience is not necessarily a whole wave (of upbeat performance) nor part of a longer wave, because it does not experience global system-dynamics.

Another (complementary) interpretation is simply that waves can often be a *highly complex* phenomenon, with any number of performance outcomes, subject to the historical, institutional, technological and conflictual forces at play in any specific conjuncture. In this interpretation, there may well be a series of short, long and secular waves throughout the World, including here during the time of the Fordist-Keynesian system evolving into neoliberal-flexible structures over the 1940-2000s period. While this pattern does tend to operate, there may be regional uneven developments that impinge on the system, not affecting the validity of the general results but simply providing greater complexity to the historical narrative. In this context, secular wave upswing for Asia may well be simply that, a 60 year upswing, after the transition from the war to recovery from the 1940s to the 1950s, with the possibility that there may be a downswing sometime in the future. There is in this interpretation no reason why there should not be waves longer than 90 or perhaps 100 years in duration. Were Asia to undergo long wave downswing in this way it would in a sense be a simpler explanation suggesting Full Secular Waves of perhaps 100 years through secular upswing and (short, long or secular) downswing over the period of, say, the 1940s-2030s.

Table 8, below, summarises the *evolutionary wave phase pattern* for the 6/24 East and South Asia nations over the 1940-2010 period, including short, long and secular phases (including borderline):

Table 8.

Asian Evolutionary Wave Phase Pattern, 1940 to 2010; 6/20 Nations

	1940-49		1950-59		1960-69		1970-79		1980-89		1990-99		2000-10	
SECWU	0		0		0		0		4		4		6	
LWU	0	0	0	8	4	9	7	10	5	12	4	13	7	18
SWU	0		8		5		3		3		5		5	
BL	0		4		1		1		1		2		0	
SWD	6		8		7		2		1		3		1	
LWD	0	6	0	8	3	10	7	9	3	7	1	5	1	2
SECWD	0		0		0		0		3		1		0	
No Nations	6		20		20		20		20		20		20	

This table illustrates the importance of differentiating between short, long and secular wave phases (upswings, downswings and 'borderlines'). Downswings were the norm during the dislocative world war of the 1940s; while short upswings *and* downswings were the most common form of dynamics in the 1950s and 1960s because nations were gradually gaining the institutional and human resources in a post-independence and post-war environment to stimulate economic performance. During the 1970s and 1980s the most common dynamics were long wave upswings followed in importance by long downswings as numerous nations achieved sustained growth (especially in East Asia) while fewer durably moved into long wave downswing (especially in South Asia). It was during the 1980s that the first secular wave upswings emerged, with 4 nations experiencing such dynamics, while 8 nations were in long wave upswing. The activity increased in the 1990s with 5 nations in SECWU and 8 in LWU; and further in the 2000s as 7 countries had SECWU conditions and 11 LWU. By the 2000s, 18 of the 20 nations were undergoing short (5 nations), long (7 nations) or secular (6 nations) wave upswings; with none in borderline; and only two in downswing, either short or long (not secular); as the regime of accumulation developed further.

While the world economy has been undergoing long wave downswing over the past three decades, several positive developments are in motion, such as the six decades of SECWU in Asia. Examining Asia in more detail reveals some complex issues. This section deals with the 14 East Asian nations of Cambodia, China, Hong Kong, Indonesia, Japan, Korea, Laos, Malaysia, Mongolia, Myanmar, Philippines, Singapore, Thailand and Vietnam; as well as 6 nations of South Asia, including Afghanistan, Bangladesh, India, Napal, Pakistan and Sri Lanka. The pattern of growth for a crucial subgroup of these Asian nations is shown in Table 9, below:

Table 9.

Decadal Averaged, Annual Average GDP Growth Rate, Per Capita, Asia, 11 Nations, 1940s to 2000s

	China	Indonesia	Japan	South Korea	Malaysia	Myanmar	Thailand	Vietnam	India	Pakistan	Philippines
40-49	n.a.	−3.18	-3.61	-4.31	-0.48	n.a.	n.a.	n.a.	-7.74	n.a.	-3.62
50-59	6.53	2.05	9.40	5.05	−0.66	4.46	2.38	2.26	1.74	−0.17	4.45
60-69	0.89	1.15	9.11	5.64	3.45	0.79	4.61	−0.67	4.24	4.09	1.83
70-79	5.34	5.21	3.44	6.32	5.19	2.00	4.75	0.76	0.61	1.76	2.83
80-89	8.19	4.20	3.74	6.39	3.05	0.09	5.57	2.14	3.45	3.36	-0.73
90-99	8.75	3.26	1.18	5.24	4.54	4.64	4.20	5.63	3.72	1.28	0.41
00-10	9.63	3.95	0.98	4.10	2.96	12.24	3.44	5.99	5.90	2.68	2.77
Amplitude	774BP	839BP	1301BP	1070BP	5.85BP	1215BP	219BP	666BP	1364BP	426BP	8.07
Long Wave	Complex	Incomplete	Incomplete	Incomplete SLWU	Incomplete SLWU	> 1 Wave	Incomplete SECLWU	Incomplete	1.33W	None	None
Missing/Exces	B^, LWD,	B˅	B˅, B^	B^, B˅,	B^, B˅,	(Upward	B˅	B˅	(Upswing	3 SW	2.5 SW

s	B^			LWD	LWD	Decade)			Decade)		
Short Waves	SWU, SWD	SWD	None	None	SWD	None	None	None	2SWD, SWU	3SWD, 3SWU	2SWD 3SWU 1LWD

Source: Adapted from the raw data of Maddison (2006), World Bank (2011)

Several key trends and patterns emerge. For instance, while Asia as a whole experienced downswing in the 1940s and secular wave upswing for the 6 decades of the 1950s-2000s, this was *not* the case for 19 out of the 20 nations. South Korea is the only nation to have been in a downswing followed by SECWU, and only six of the 20 nations experienced exactly 5 decades of SECWU: China, Hong Kong, Malaysia, Mongolia, Singapore and Thailand. These six nations along with South Korea have been the most consistent performers over the past 6 decades.

Other notable achievements for the region are that Indonesia has been in secular wave upswing for the past 4 decades, while several nations that have been previously involved in major wars and/or military governments have been undergoing long wave upswing for the past 2 decades: including Cambodia, Laos, Myanmar, and Vietnam. It is a considerable achievement for these troubling areas to have reached *very high* long wave upswing.

In South Asia, the most notable event is the emergence of India, Sri Lanka (during civil war) and Bhutan into long wave upswing through the past 3 decades, while Bangladesh underwent long wave upswing over the past 2 decades. The major achievement is India, with a population of over 1 billion people, getting into very high long wave upswing by the 2000s. In India, the 1940s-1950s saw two decades of long wave downswing, followed by short upswing (1960s) and short downswing (1970s); with 3 decades of long wave upswing during the 1980s-2000s being a major achievement for the nation.

The chief downside development for Asia is the movement of Japan from very high long wave upswing in the 1950s and 1960s (over 9 percent growth), to two decades of merely upswing into the 1970s and 1980s (near 3.5 percent growth), to progressively worse downswing into the 1990s and 2000s (around 1 percent growth). In this, Japan is close to the pattern of development characteristic of the West, notably Europe and North America, though Japan's demise happened a decade or more after the West because their upswing continued for longer. It appears that the West along with Japan require the emergence of a new regime of accumulation for any future growth to emerge.

The strangest pattern was for Pakistan and the Philippines, both experiencing a *recurring multiplicity of short waves* of upswing and downswing; an enormous amount of instability during the 6 decades. Pakistan went through the "DUDU" (down, up, down, up etc) process of recurring short waves, where each decade successively moved in the opposite direction to the previous one. Starting with negative growth in the 1950s, Pakistan then changed to high short wave upswing in the 1960s, followed by downswing into the 1970s, upswing in the 1980s, downswing in the 1990s, and finally short wave upswing into the 2000s. The Philippines underwent a similar type of recurring multiplicity of short waves, starting with deep downswing during the 1940s; high short wave upswing into the 1950s; downswing during the 1960s; short upswing in the 1970s (then *two* decades of negative or low growth in the 1980s-90s; and finishing with short wave upswing in the 2000s). One hypothesis worth exploring is whether these recurring, Multiple Full Short Waves are due to some combination of colonial heritage, authoritarian governments, political instability, corruption, primary product specialisation, and/or problematical levels of human/innovative capital with the associated stunted regimes of accumulation. Thus the Full Waves of some nations are decidedly recurringly *short and multiple*, a key empirical insight for wave analysis.

Sub-Saharan African Wave Patterns

While the quality of data for SSA may be subject to question, the quantity of the data is the best for all continents, except for the complete absence of good data for the 1940s. We have

34 SSA nations with full data for the whole 1950-2010 period. Any limitations of the WDI data can usually be rectified through further data from Maddison (especially for the 1950s). Firstly we scrutinise the specifically Sub-Saharan long wave periodicity and amplitude, compared to the World and stylized model, in Figure 5, below.

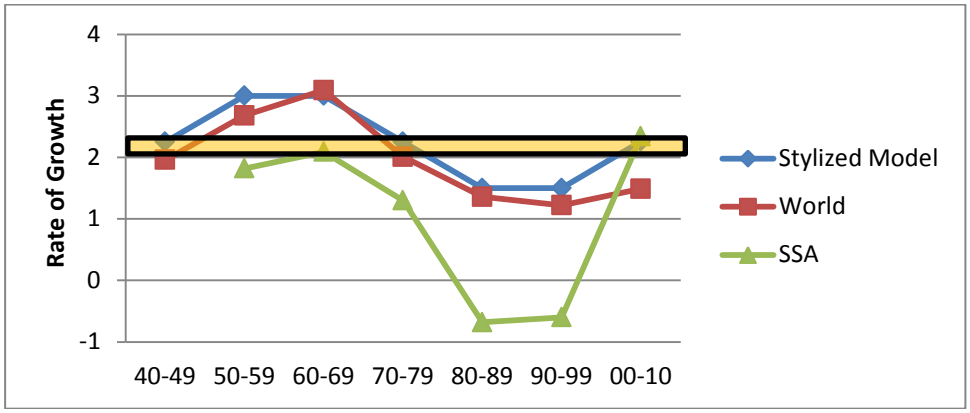

Figure 5. **SSA Wave Compared to World & Stylized Model, 1950s-2000s**

Source: Adapted from Table 2.

The SSA long wave shows a distinct wave pattern, even though there has been no long wave upswing throughout the continent. This wave pattern is conditioned by a *very low floor* and *also low ceiling* in the wave due to problematic governance, institutions and technology. A very clear Full Wave form is displayed of *relatively* upwards growth during the 1950s and 1960s, deteriorating growth during the 1970s, continued negative performance during the 1980s and 1990s, followed by recovery into borderline during the 2000s. Interpreted in this fashion, the Sub-Saharan long wave was a subdued full-wave of impressive dynamics (at a low level) through classic wave motion. The periodicity was in the order of 50 years from 1960 to 2010 (B to B) while the amplitude was 277BP.

Decomposing the data for the 34 SSA nations into *evolutionary wave phase patterns* over 1950-2010, see Table 10, below:

Table 10

Sub-Saharan African Evolutionary Wave Phase Pattern, 1950-2010

	1950-59		1960-69		1970-79		1980-89		1990-99		2000-10	
SECWU	0	7	0	15	0	10	0	6	2	6	2	14
LWU	0		2		5		3		1		3	
SWU	7		13		5		3		3		9	
BL	6		2		1		0		0		3	
SWD	21	21	8	17	12	23	7	28	3	28	1	17
LWD	0		9		11		17		15		5	
SECWD	0		0		0		4		10		11	
No Nations	34		34		34		34		34		34	

During the 1950s short wave downswing dominated the area, but this moved quickly into borderline conditions as the upswings were balanced by the downswings in the 1950s. Then into the 1970s, 1980s and 1990s short and then long wave downswings dominated, including a few secular waves as well into the 1980s and many seculars in the 1990s. Then into the 2000s a balance existed yet again as average borderline conditions re-emerged in the area. The reemergence of borderline is indeed an optimistic development, with potential upswing

emerging in the 2010s if institutional, governance and technological progress continue over the next decade.

We turn now to the details of a sample of SSA nations, see Table 11, below.

Table 11

Decadal AAGR GDP Per Capita, 1951-2010, 12 Sub-Saharan Nations

	Benin	Chad	Botswana	Mozambique	Congo	South Africa	Senegal	Niger		Central African Republic	Cote D'Ilvoire	Togo	Zimbabwe
1950s	−1.17	2.23	1.59	1.86	1.89	2.02	1.67	1.28		2.33	1.60	1.59	3.55
1960s	1.51	−1.16	4.80	2.80	1.16	3.56	−1.66	−0.12		−0.04	4.50	6.12	1.31
1970s	0.04	−3.20	11.65	−2.80	2.37	1.00	0.12	−0.82		−0.12	2.90	0.65	0.71
1980s	0.34	2.59	7.79	−0.57	3.80	−0.26	−0.50	−2.73		−1.65	−4.12	−0.61	1.41
1990s	1.32	−0.91	3.20	2.61	−1.98	−0.80	−0.08	−1.47		−1.07	−0.35	−0.06	0.60
2000s	7.09	4.61	2.90	4.65	2.31	2.15	1.23	0.43		−0.64	−1.06	−0.07	−4.30
Amplitude	826BP	781BP	1006BP	745BP	578BP	435BP	333BP	401BP		398BP	862BP	673BP	785BP
Wave?	SECWD	Two Shortish Waves	SECWU	1 LW 1950s-90s	2 Erratic Waves	One Subdued Wave	1 Wave, Subdued SECWD	1 Wave Subdued SECWD		SECWD	1 LW	SECWD	SECWD
Missing/ Extra	subdued/ D	LWU/	/High Floor	LWU/ LWU	/B^	No LWU	B, Upswing	B/LWU		B^, LWU	B^/D	LWU, B^/D	LWU, B/D
Short Waves	SWU	2+ SW	SWD	SWD, SWU	SWD	SWU, SWU	None	None		SWU	SWD	SWU	SWU

Source: Adapted from the raw data of Maddison (2006) & World Bank (2011)

While the continent as a whole moved from deep long wave downswing in the 1990s to borderline growth in the 2000s, very few nations of SSA followed this pattern. Only 3 SSA nations moved into borderline conditions in the 2000s, including the Congo (Republic), Mali and South Africa. Most improved greater than average, into short wave upswing, such as Chad, Namibia, Nigeria, Rwanda, Sierra Leone, Sudan, Tanzania and Zambia; while a few underwent a new era of long wave upswing, including Cape Verdi, Mauritius, Mozambique and Uganda. To obtain the SSA average of borderline for the 2000s a few nations were subject to a severely negative deterioration of performance, as shown above for negative performing Cote D'Ilvoire, Togo and Zimbabwe.

In terms of the relative growth rates of nations within the SSA region, only one nation stands out as a high performer through secular wave upswing over the past 50 years: Botswana. Botswana was the only SSA nation to clearly perform outstandingly in GDP growth per capita over the past 50 years. Botswana represents an outstanding case of how to achieve economic and social progress in the region, through good governance, workable institutions and political democracy for others to perhaps emulate, although the particular history of Botswana established some unique characteristics which advantaged the nation (Hope 1997). Further critical analyses of the Botswanian system of business, government and society are necessary to understand why progress has been ongoing (despite high rates of AIDS in the region, and dampened growth during the 1970s-90s).[9]

The worse performer in SSA was the Central African Republic (CAR), which has undergone *Very Deep* Secular Wave Downswing over the past fifty years. This is a serious situation and much more assistance and advancement are needed for the CAR. Other countries in SSA that have been going through *secular* wave downswing over past decades include Comeros, Gambia, Ghana, Liberia, Madagasca, Muritania, Niger, Senegal, Togo, and Zimbabwe—with Cameroon, Cote D'Ilvoire, Gabon, Kenya, Swaziland undergoing *long* wave downswing— although most of these nations have improved performance during the 2000s while still operating in (more moderate) downswing.

American Wave Patterns

The Americas include four areas, North America, Central America, the Caribbean and South America. Table 12 starts the analysis through an examination of the evolutionary wave phase pattern for the 21/23 American nations collectively considered over the 1940-2010 period:

Table 12

Americas, 1940-2010, Evolutionary Wave Phase Pattern, 21-23 Nations

	1940-49		1950-59		1960-69		1970-79		1980-89		1990-99		2000-10	
SECWU	0	8	0	7	0	12	0	15	0	4	0	6	0	9
LWU	0		2		4		8		2		1		4	
SWU	8		5		8		7		2		5		5	
BL	3		2		3		1		2		1		3	
SWD	10	10	7	14	3	9	6	8	11	17	4	17	1	12
LWD	0		7		6		2		6		12		8	
SECWD	0		0		0		0		0		1		3	
No Nations	21		23		23		23		23		23		23	

The second-world war does not seem to be part of the Full Wave, as this table illustrates a very clearly defined wave with short wave downswing dominating in the 1950s, especially in Central and South America, to short wave upswing dominating in the 1960s and long wave upswing in the 1960s and 1970s. Then in the 1980s a sudden short wave downswing emerged for the Americas which deepened into long wave downswing into the 1990s. Into the 2000s conditions have moderated in many nations of America, especially South America. In short, the wave rose into the 1960s and 1970s, declined into the 1980s and 1990s, and some degree of *very modest* recovery has emerged in the 2000s (not quite enough for borderline phase). However, there were *no secular wave upswings* in the Americas for the whole period; but *one secular wave downswing nation* in the 1990s and *three* in the 2000s: a major negative wave result for the region.

We comparatively scrutinise the American waves for North America vis-à-vis Latin America (Central and South) and the Caribbean, below in Figure 6:

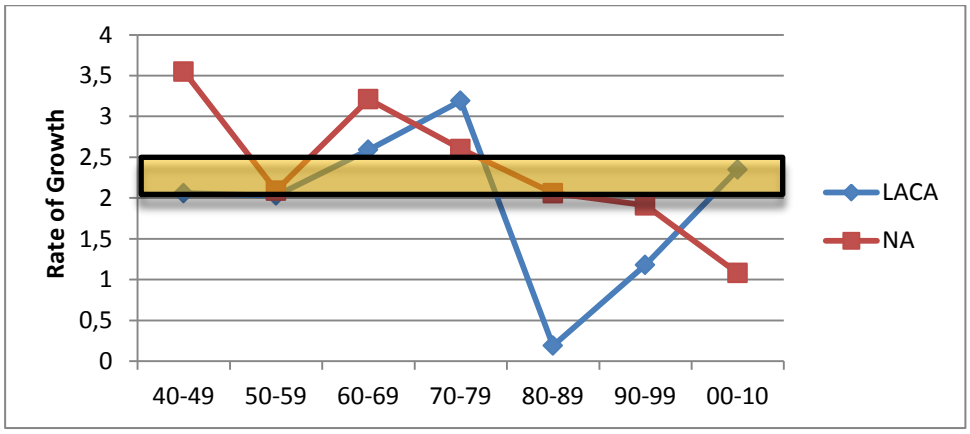

Figure 6. **American Waves of Decadal GDP Growth Per Capita, 1940s-2000s, North America, Latin America and Caribbean**

Source: Adapted from Table 2

The NA (USA, Canada, Mexico and Greenland) wave seems to be upset by war spending during 1940-45, which boosted growth from the Depression, but couldn't be sustained into the 1950s. Therefore, the NA Full Wave seems to start in the 1950s with borderline performance, followed by two decades of long wave upswing in the 1960s and 1970s, then going into borderline in the 1980s, followed by two decades of long wave downswing into the 1990s and 2000s. In this it follows the World Full Wave, but always with a lag of one decade

behind the World motion. During the 2000s NA continued the decline along with the World which picked up slightly.

The North American wave of the 1950s-2000s, also like the World, fails to achieve a complete wave from borderline to borderline, primarily missing a borderline-up result which may come in the 2010s or 2020s; in this sense, it may currently be 1-2 decades less than a complete wave. If this is the case, the complete North American wave from borderline to borderline has a periodicity of 70-80 years (1950s-2010s/2020s); and amplitude (so far) of 213 basis points.

From the 1950s, the LACA wave is fundamentally similar to the North American wave inasmuch as it was in borderline during the 1950s, rose into long wave upswing into the 1960s and 1970s, then went into long wave downswing. LACA differs from the North since in the 1980s the debt crisis in LACA brought growth to a standstill; while the North slowly went into borderline into the 1980s, followed by downswing in the 1990s and almost deep downswing into the 2000s. LACA went from the lower limits of very deep downswing into the 1980s to downswing in the 1990s and then borderline recovery into the 2000s. At present North America is in a deep long wave downswing while LACA has recovered to borderline performance, one of the optimistic stylized facts of recent years.

Examining the nations of America reveals even more differences, when Latin America is broken up into Central America, the Caribbean and South America. Data for North America and Central American nations is shown in Table 13, below.

Table 13

GDP Growth Per Capita, Annual Average Rates
North America, Central America, 1940-2010

	North America				**Central America**				
	USA	**Canada**	**Mexico**		**Costa Rica**	**El Salvador**	**Guatemala**	**Honduras**	**Nicaragua**
1940-49	3.63	4.82	2.40		1.37	4.73	1.41	1.76	1.49
1950-59	1.96	2.02	2.78		3.59	1.96	1.01	0.40	2.77
1960-69	3.07	3.56	3.72		2.64	2.83	2.69	1.83	4.25
1970-79	2.60	2.62	3.42		3.72	1.53	3.16	2.69	−2.35
1980-89	2.09	1.81	0.19		−0.46	−3.29	−1.41	−0.53	−3.20
1990-99	1.95	1.34	1.58		2.91	3.67	1.70	0.24	0.82
2000-10	0.97	1.28	0.99		2.12	1.58	0.84	2.10	1.67
Amplitude	210 BP	228 BP	353 BP		418 BP	696 BP	458 BP	322 BP	750 BP
Wave?	<1LW (1950-2010)	<1LW (1950-2010)	<1LW		>1 Wave	>2 Short *Whole* Waves	<LW (1950-99)	1Whole Wave (Imperfect)	<1LW (1940-90s) SECLWD
Missing/ Extra	B^/D	B^/D	B^/D		B^ˇ, LWD/B	LWU/	B^, Bˇ, B^/U	/U	B^, Bˇ, B^/LWD
Short Waves?	SWU	B	None		2SW	5SW	SWD	SWU	None

Source: Adapted from the raw data of Maddison (2006) & World Bank (2011)

US and Canadian waves are rather similar inasmuch as in the 1950s there was borderline performance, followed by long wave upswing for two decades in the 1960s-70s, then borderline in the US (downswing in Canada) during the 1980s, and finally twenty years of long wave downswing during the 1990s and 2000s. Mexico is slightly different since their wave started in the 1940s with borderline, subsequently undergoing thirty years of long wave upswing and then a deeper long wave downswing for thirty years (mainly due to very low growth in the 1980s). The amplitude and periodicity is higher/longer in Mexico as it has so far undergone a 70 years wave with 353 BP differentials, compared with 60 years and 210/228 BP variations for the US/Canada. All 3 nations have yet to complete a full long wave since borderline upswing has not yet emerged into the 2000s as it has with LACA and the stylized model.

The waves of Central American nations are somewhat different from those of North America, since two nations (Costa Rica and Honduras) have recovered to borderline performance into the 2000s whereas North America is still deeply into long wave downswing. On the other hand, Central American nations invariably have higher wave amplitude, usually very much higher, as is the case for Nicaragua which in addition to the debt crisis of the 1980s-90s had to endure a 'civil war' during the 1970s-80s. Also, while North American waves were generally well formed, if incomplete, those of Central America tended to be more erratic. For instance, Costa Rica went through a thirty year upswing, followed by a short downswing, then a short upswing and then borderline conditions into the 2000s. El Salvador's waves were very similar to those of the Philippines and Pakistan, having a multiplicity of short upswings and downswings, 2.5 *Full Short Waves* to be precise; as it underwent recurring upswings and downswings through the period. Central American waves thus tend to be more erratic, subdued, and shorter, with some nicely patterned whole short waves for some nations.

Table 14 compares waves in the Caribbean with those in South America over the standard period:

Table 14

Waves of GDP Growth Per Capita, 1940-2010
Caribbean and South America, Annual Average Decadal Growth

	Caribbean						**South America**									
	Cuba	**Dominican Republic**	**Haiti**	**Jamaica**	**Trinidad & Tobago**		**Argentina**	**Bolivia**	**Brazil**	**Chile**	**Columbia**	**Equador**	**Paraguay**	**Peru**	**Uruguay**	**Venezuela**
1940-49	3.88	n.a.	0.00	5.56	n.a.		2.17	0.78	3.14	1.70	1.06	4.30	-0.81	1.67	2.20	7.52
1950-59	-0.82	2.82	-0.42	10.16	6.26		0.57	-1.99	0.57	0.97	1.65	1.87	-0.01	2.48	0.48	3.78
1960-69	-0.54	1.60	-1.26	3.70	3.50		2.56	0.88	2.97	2.01	2.07	1.54	1.54	2.30	0.23	1.24
1970-79	4.13	5.46	3.81	-0.11	3.54		1.30	1.56	5.92	0.87	3.36	5.25	5.25	1.14	2.36	0.46
1980-89	3.35	1.54	-1.27	0.52	-2.54		-2.20	-2.58	0.82	2.72	1.21	1.09	1.09	-1.95	0.06	-2.93
1990-99	-2.53	3.10	-1.67	1.34	2.10		3.20	1.69	0.13	4.67	0.99	0.07	0.07	1.39	3.05	0.30
2000-10	5.90	3.86	-1.24	0.78	5.36		3.09	1.88	2.49	2.72	2.55	1.49	1.49	4.21	2.63	1.57
Amplitude	843BP	392BP	548BP	1027BP	882BP		540BP	446BP	579BP	380BP	337BP	518BP	526BP	616BP	299BP	671BP
Wave?	1LW (1940-90),	2 Whole SWs	>1W 1SWU DLWD	<1W DLWD	>1 Wave SWU HLWU		>1W	SECWD	>1 LW (1950-2010)	1 Reverse Wave (1940-2010)	>1W (1950-2010) Subdued	1Wave (1960-2010) Subdued,	>1Wave, Subdued, SWU, VDLWD	>1W Subdued, LWB	>1W LWD, LWU Erratic	<1W Subdued, SECWD
Missing/ Extra	3B/2SWU	LWD/	B^, B˘, LWU/ LWD	B^, B˘, B^	B^, B˘, LWD/ SWU		B^, B˘ /1SW	B^, B˘, B^, LWU/	B^, B˘ /SWU	B˘, B^ /D, U	LWU, B˘/ LWD	B^, LWU, B˘/SWU	LWU (LWD)	LWU, B^/B	B˘, B^/B, SWD	B^, B˘, B^/
Short Waves?	2SWU	2 Whole SWs (50y)	1SWU	None	1 SWD		1 SWD	None	SWU	None	SWD, SWU	SWU	SWU	SWU, SWD	SWD	None

Source: Adapted from raw data in Maddison (2006), World Bank (2011)

The main features distinguishing Caribbean and South American (CASA) waves from North American waves is that in CASA there are numerous short waves; many of the nations have undergone more than one wave in the 60 years; and a fairly large proportion of them have been dominated by long wave downswing for many years. For instance, the Dominican Republic had a similar pattern to Pakistan, the Philippines and El Salvador in having a multiplicity of Full Short Cycles over 1950-1999. In the region there was a pattern of erratic and subdued performance for the waves, where often numerous short waves emerge and just as often the economies get stuck in long wave downswing. It is likely that this erratic behaviour is due to a combination of political instability and primary product specialisation. As a result, for the areas as a whole, the investment share of GDP has long been below UNCTAD's (2003) minimum 25 percent required for long-term growth and development.

More recently, in the 1990s/2000s, economic performance has taken a positive turn in many nations, including long wave upswing in the Dominican Republic, Argentina, Chile (over 3 decades; a 'reverse wave') and Uruguay; short wave upswing during the 2000s in Cuba, Trinidad/Tobago, Columbia, and Peru; and borderline conditions for Brazil. However, the whole period, and especially more recent years, has been dominated by long wave downswing in Haiti, Bolivia, Ecuador, Paraguay and Venezuela. These varied conditions combine to indicate borderline performance during the 2000s for LACA as a whole, as the region recovered from the debt crisis, war and revolution, providing optimistic prospects for the 2010s.

European Wave Patterns

European waves are based on good data for Western Europe, but limited data for Central and Eastern Europe. The area includes three main regions, including core Western Europe (12 nations), Scandinavia (4 nations), and Central/Eastern Europe (5 nations). Analysed together these regions give a broad view of the continent of Europe, called Europe 21 (E21). We scrutinise the evolutionary wave phase pattern for E21 over the 1940s-2000s below in Table 15:

Table 15

Europe 21, Evolutionary Wave Phase Pattern, 1940-2010
(WE12, SC4, CEE5)

	1940-49		1950-59		1960-69		1970-79		1980-89		1990-99		2000-10	
SECWU	0		0		0		0		4		3		0	
LWU	0	2	2	19	19	20	16	16	1	5	0	5	1	4
SWU	2		17		1		0		0		2		3	
BL	1		1		1		4		6		3		2	
SWD	18		0		0		1		9		7		7	
LWD	0	18	1	1	0	0	0	1	1	10	6	13	7	15
SECWD	0		0		0		0		0		0		1	
No Nations	21		21		21		21		21		21		21	

The trends here are fairly self-evident. The 1940s was a period of downswing as the war devastated numerous nations of Europe, especially Germany, France, Italy, Hungary, Austria, Netherlands, and the UK. While rapid reconstruction and recovery occurred in the late 1940s in many nations, because of the earlier destruction it took until the 1950s to be seen to be substantial (Maddison 2006: 440-41). The recovery (borderline) really occurred in the late 1940s and early 1950s, and then during the 1950s short wave upswing quickly emerged, turning into mostly long wave upswing into the 1960s and 1970s. By the time a few secular wave upswings came into being in a few nations by the 1980s, most nations had already turned to short wave downswing while a few had borderline conditions; and into the 1990s and 2000s short and long downswings were equally pronounced, while very few were in upswing.

Looking into the trends in Western Europe versus Central and Eastern Europe, Figure 7, below shows the differences in the respective waves:

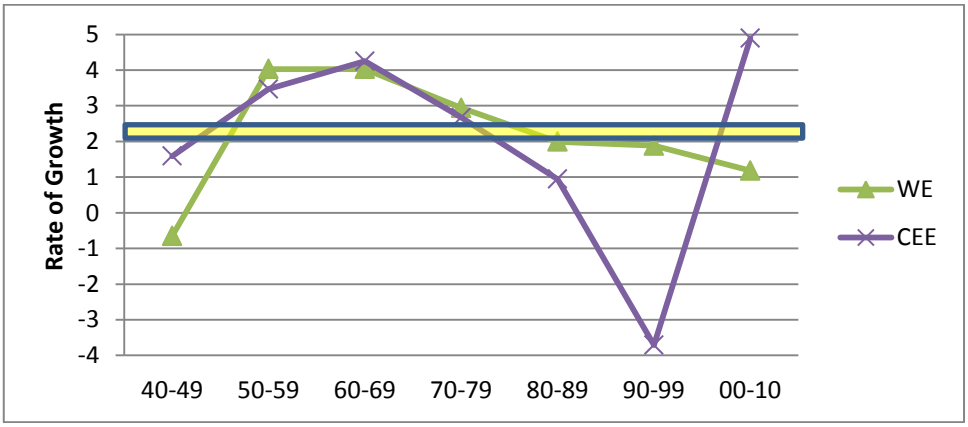

Figure 7. **European Wave, 1940-2010, GDP Growth Per Capita Decadal AAGR**

Source: Adapted from raw data of Maddison (2006) and World Bank (2011)

This figure shows a clearly identifiable Full Long Wave for CEE, starting from near-borderline in the 1940s through to long wave upswing into the 1950s-1970s, moving to long wave downswing into the 1980s-1990s, and recently recovering past borderline into the short upswing of the 2000s. This impressive Full Long Wave is in the order of 70 years periodicity and 817 basis points amplitude, compared with 70 years-plus-possibly-one/two-decades (1940s-2010s/20s) and 468 BP (285BP for 1950-2010) for Western Europe. Western Europe has failed to undergo borderline upswing as yet while CEE was the most volatile of the two because of the crash of the 1990s and the high short wave upswing of the 2000s.

There was a broadly similar pattern of growth between WE and CEE. They were both involved in the second-world war, although WE was more adversely affected than CEE. In both areas long wave upswing was in motion during the 1950s—1970s. Conditions deteriorated in both areas during the 1980s, with WE and CEE both undergoing long wave downswing during the 1980s and 1990s; the decline was steeper and deeper in CEE, as conditions in the 'communist' nations dropped during the 1980s and then virtually collapsed in the 1990s as the market/privatisation system was suddenly imposed by policy-makers and business interests. During the 2000s the decline deepened in WE while in EE collapse turned to short wave upswing quite suddenly. During the 2000s the rate of growth was very much higher in EE than in the WE (for the first time since the 1970s), as CEE rebounded from the most devastating decade of short wave downswing in living memory. While WE growth was higher than World growth during all the decades of the 1950s—1990s, for the first time it became less than the World rate in the 2000s.

At this point in history—the early years of the 2010s—Western Europe is in a contradictory—long wave downswing—phase of an unworkable or unsuccessful regime of accumulation; it will possibly undergo a Secular Full Wave of about 90 years as recovery is not yet on the horizon. This is also the pattern for North America, Japan and the World.

Next we turn to the amplitude, periodicity and short/long/secular wave comparison of the individual nations in a regional European context. Taking a sample of 9 Western European nations, Table 16 below shows the changing waves from the 1940s to the 2000s:

Table 16

Amplitude, Periodicity, Long & Short Waves, 'Western' European Nations, 1940-2010, Annual Average Growth Rates, GDP Per Capita (Decadal)

	UK	France	Germany	Italy	N'lands	Greece	Portugal	Spain	Ireland
1940-49	1.11	0.32	-3.93	-0.73	0.61	-2.92	1.76	1.25	1.15
1950-59	2.09	3.89	9.43	6.82	3.22	6.52	4.10	4.62	1.90
1960-69	2.25	4.47	4.55	5.01	4.06	7.00	5.84	6.67	4.02
1970-79	2.27	3.50	3.02	3.50	2.49	4.54	5.06	2.79	3.17
1980-89	2.30	1.74	1.87	2.49	1.58	2.25	3.72	2.35	2.70
1990-99	1.95	1.45	1.89	1.38	2.55	1.14	2.74	2.38	6.35
2000-10	1.12	1.18	1.14	0.03	1.14	2.46	0.55	1.03	1.59
Amplitude	118BP	329BP	829BP	679BP	292BP	586BP	529BP	564BP	476BP
Long Wave	SECBW 1 Subdued Long Wave	<1LW	HLWU›LWD	HLWU›LWD	LWU›LWD	HLWU›B^	HLWU›SWD	HLWU›SWD, LWB	SWD›SWD
Missing	LWU, B^	B^	B^, B^	B^, B^	B^, B^	B^, LWD	B^, LWD, B^	B^, B^	B^, B˅, LWD
Short Waves (Ignore B, 1940s)	None	None	None	None	[SWU]	SWD	SWD	SWD	SWD

Source: Adapted from the raw data of Maddison (2006) & World Bank (2011)

This table reveals some fascinating results. Four of the key economies of Europe (UK, France, Germany, Italy) experienced no *short* wave upswings/downswing phases at all. This picture broadly fits the WE result as a whole as well as the World; somewhat longer than the stylized long wave model. The UK underwent a secular wave borderline phase of 40 years (1950s-

1980s), while Spain managed a long wave borderline phase of 20 years (1970s-80s). Portugal and Ireland's results were more impressive, with a *secular wave upswing phase* of 50 years in Portugal (1950s-90s), and a secular wave upswing of 40 years for Ireland (1960s-90s). The more peripheral economies of Greece, Portugal, Spain and Ireland, respectively, underwent the *longest* long wave upswings and *shortest* wave downswings for the area as a result. The smallest amplitude was for the UK, since they underwent no long wave upswing; while the largest amplitude was for Germany, which evolved from the highest rates of growth of all European economies (in the 1960s) to one of the lowest (2000s). Compared with the stylized long wave model, most of Western Europe lacked at least one phase of the long wave, mostly an upwards borderline into the 2010s and 2020s; with a likely average wave of 80-90 years in periodicity.

Table 17, below, scrutinises the long and short wave phases for Scandinavian and Central/Eastern nations over 1940-2000s:

Table 17.

Scandinavia, Central & Eastern Europe,
GDP Growth Per Capita, Decadal AAGR, 1940-2010

	Scandinavia 4 (S4)					**Central & Eastern Europe 5 (CEE5)**				
	Denmark	**Finland**	**Norway**	**Sweden**		**Russia**	**Hungary**	**Poland**	**Czech**	**Bulgaria**
1940-49	0.84	2.16	1.58	2.84		1.73	-1.71	1.21	1.09	0.66
1950-59	2.58	3.92	2.85	2.54		3.24	4.80	2.95	4.67	6.26
1960-69	4.02	4.04	3.60	3.72		4.26	5.07	3.70	3.29	6.93
1970-79	2.06	3.50	3.85	2.00		2.42	5.03	4.01	2.28	3.74
1980-89	1.85	3.14	2.41	2.05		0.92	1.82	-0.43	1.23	3.82
1990-99	2.05	1.25	3.03	1.35		-4.81	0.17	3.67	0.08	-1.80
2000-10	0.58	1.84	0.90	1.76		5.29	2.43	4.05	3.06	5.08
Amplitude	344BP	279BP	295BP	237BP		1010BP	390BP	448BP	459BP	806BP
Long Wave	<1LW	<1LW LWU›LWD	LWU	<1LW LWU›LWD		1LW	1LW	<1LW	1LW	SECWU
Missing	B^, B^	Bˇ, B^	B^, LWD	B^, B^		B^, B^	B^, Bˇ	LWD, B^	B^, B^	LWD, B^, Bˇ, B^
Short Waves	None	None	SWU	None		SWU	None	SWU	SWU	SWU
Odd Waves	BSW in b't 2SWU	SECWU	SWU, SWD	BLW		VDLWD	None	LWU (90-10)	None	VDSWD SECWU

Source: Adapted from the raw data of Maddison (2006) & World Bank (2011)

Both of these sets of nations mostly underwent downswing in the 1940s; borderline into the late 1940s-early 1950s; long wave upswing in the 2-3 decades after the second-world war (1950s-70s); and mostly long wave downswing in the 2 or 3 decades thereafter (1980s-2000s). The upswings were generally of a similar amplitude and periodicity, but the downswings were especially deep in the 1990s for CEE nations. The major changes involved in the destruction of state institutions and the cold-turkey approach to privatisation and market relations led to both the 1990s collapse and likely also the 2000s short wave upswing. As a result, the amplitude of the wave in CEE was generally much higher than Scandinavia. Apart from this variation in amplitude, there was a well formed long wave upswing and downswing in most nations, but in several nations it was a *secular wave upswing* (especially in Finland, Norway and Bulgaria), which resulted often in only short wave downswings.

Middle East and North African Wave Patterns

Figure 8, below, compares MENA with the conditions for the World during the 1950s-2000s:

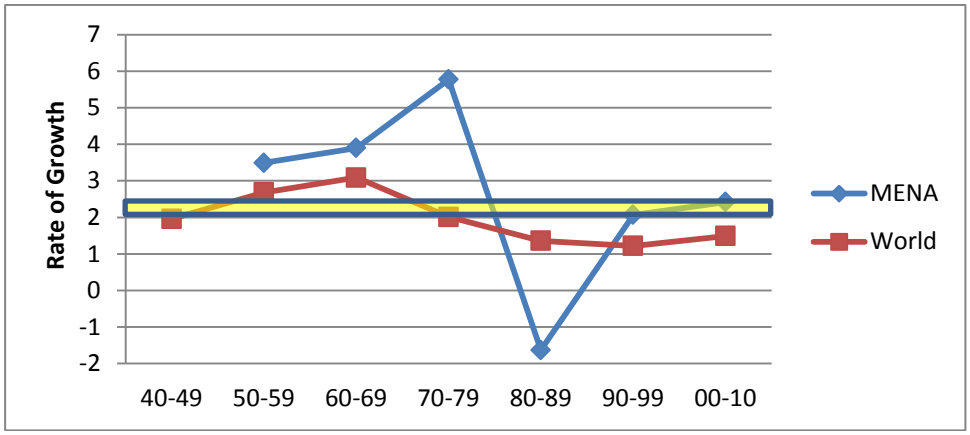

Figure 8. **MENA, GDP Growth Per Capita, Decadal AAGR, 1950-2010**

Source: Adapted from the raw data of Maddison (2006) & World Bank (2011)

The MENA wave is missing only a borderline—or downswing—result for the 1940s, giving a likely wave of 60 years for the period 1940-1999. MENA parallels the World upswing in the 1950s-1960s, but at a slightly higher level, followed by a major divergence in the 1970s as oil producing nations expanded dramatically, while the World went into borderline conditions. Then while the World continued to deteriorate during the 1980s and 1990s, MENA collapsed in the 1980s and then suddenly jumped to borderline conditions during the 1990s, which continued into the 2000s. MENA's performance paralleled the World in the 1990s-2000s but at a borderline level rather than the downswing of the World. As the new millennium emerged the World continued into downswing (with a *very* slight improvement) while MENA looks potentially set to undergo upswing into the 2010s.

Table 18, below, summarises the evolutionary wave phase pattern for the MENA12 nations over the 1950-2010 period:

Table 18

Middle East and North Africa, 12 Nations, 1950-2010,
Evolutionary Wave Phase Pattern

	1950-59		1960-69		1970-79		1980-89		1990-99		2000-10	
SECWU	0	8	0	7	0	12	1	2	1	6	0	6
LWU	0		5		7		1		0		4	
SWU	8		2		5		0		5		2	
BL	0		2		0		0		2		2	
SWD	4	4	2	3	0	0	10	10	0	4	2	4
LWD	0		1		0		0		4		2	
SECWD	0		0		0		0		0		0	
No Nations	12		12		12		12		12		12	

This data shows that two-thirds of MENA nations were in a short wave upswing during the 1950s, while one third were in downswing; then during the 1960s conditions improved as most were in an upswing (especially long wave upswing), while a few were in borderline and a further few in downswing. Conditions improved further through OPEC during the 1970s, when all MENA nations were in an upswing phase; 7 in long and 5 in short upswing. This was probably the most buoyant period for the Middle East and North Africa in modern times.

However, the situation reversed during the 1980s as declining oil prices and debt crises variously pushed most of the periphery and semi-periphery into a downswing for one or two decades (linked to the downswing in the Core). MENA was seriously affected for the decade

with almost all of the nations moving into a deep short wave downswing phase. Things improved considerably, though, into the 1990s and 2000s as long wave upswing emerged during the 2000s for a third of the area, with half going through some kind of upswing, and another third undergoing downswing during the 1990s and 2000s. Overall, as noted, a long wave borderline performance has occurred for the area over the past 2 decades, a better performance than the World and the Stylized model. For the whole period, there was only one nation that experienced secular long wave upswing (the West Bank during 1960-99) and no nations undergoing secular wave downswing at all.

Now we come to a specific analysis of 12 MENA nations during the 1950s-2000s, as shown below in Table 19:

Table 20

Average Annual Decadal GDP Growth Per Capita,
Middle East & North Africa, 1950-2010

	Algeria	Egypt	Iran	Iraq	Israel	Jordan	Lebanon	Morocco	Syria	Tunisia	West Bank/ Gaza	Yemen
1950-59	5.12	0.73	1.96	9.44	6.44	4.15	-0.16	-0.74	3.02	1.02	4.42	0.58
1960-69	1.68	2.78	8.65	4.28	5.43	2.12	1.73	2.10	3.33	2.91	4.51	0.85
1970-79	3.88	3.89	3.16	8.74	2.94	11.05	2.52	2.75	5.24	4.95	4.52	12.50
1980-89	-2.79	3.44	-3.84	-6.19	1.84	0.14	-4.38	1.41	0.50	1.03	4.51	0.05
1990-99	-0.42	2.50	2.71	-6.22	2.37	5.54	7.07	1.17	2.91	3.29	4.43	1.36
2000-10	2.03	3.24	3.75	-2.04	1.67	3.54	3.56	3.47	2.02	3.54	-5.83	0.83
Amplitude	791BP	316BP	1249BP	1566BP	477BP	1091BP	1145BP	451BP	474BP	393BP	1031BP	1245BP
Long Wave	LWU›B^	SWD› VLWU	2LWU	LWU› LWD	LWU› SWD	SWU› LWU	LWD› LWU	1.5 Waves	LWU› B	1.5 Waves	VLWU› SWD	LWD› LWD
Missing	B^	LWD, Bˇ,	LWD, B^, Bˇ	B^, Bˇ, B^	B^, B^	B^, Bˇ, LWD		B^, LWU	LWD	LWD, Bˇ, B^	B^, B^, LWD, B^	B^, LWU, Bˇ, B^
Short Waves	SWD	SWD	2SWD	None	2SWD	SWD	SWD	SWD, 2SWU	SWD	2SWD	SWD	SWU
Odd Waves	SWD	VLWU	No LWD	Deep LWD	BL	B, SWD	SWD	SWD, SWU	SWD	2SWD	SWD	SWU

Source: Adapted from the raw data of Maddison (2006) & World Bank (2011)

Two patterns stand out for this region. First is the dichotomous results for various nations over the past 20 years; with 5 nations having been through long wave upswings (Egypt, Iran, Jordan, Lebanon and Tunisia), 3 nations through downswing (*long* downswing in Iraq and Yemen, *short* downswing in Israel); with borderline results in 2 nations in the 2000s (Algeria, Syria).

MENA has the second highest degree of instability for all continents during the 1950s-2000s, with 6 nations having amplitudes of over 1000BP (Iran, Iraq, Jordan, Lebanon, West Bank/Gaza and Yemen). This instability is mainly caused by the dynamics of oil prices and wars. Large deposits and prices of oil for many areas led to high growth rates in the 1960s and 1970s, but this was countered by declining oil prices in the 1980s which led to downswings in most nations. Wars also contributed to the downswing trend of the 1980s, including the Iran-Iraq War of 1980-88, the civil war in Lebanon over 1975-1990, plus conflict in Yemen and Algeria. We are yet to see the outcome of the revolutions against authoritarian regimes currently ongoing in numerous nations of the region, such as, for instance, in Libya, Syria, Egypt and Lebanon.

These instabilities caused a degree of erratic nature in the Full Waves, as two nations experienced 1.5 Full Waves over the 60 year period (Morocco, Tunisia), while many nations were affected by these instabilities in the downward direction for often only a decade at a time. Thus note the *odd short wave downswings* for Algeria (1960s), Iran (1980s), Israel (1980s), Jordon (1980s), Lebanon (1980s), Tunisia (1980s) and the West Bank/Gaza (2000s). In this context, numerous nations were able to experience very long wave upswings, including

50 year secular (Jumbo) wave upswings in Egypt and the West Bank/Gaza, two long wave upswings for Iran, and the very high rates of growth in alternating decades for Jordon giving it one long wave upswing and 2 short wave upswings. As noted, the area was odd from a stylized wave perspective due to the high number of *short* wave downswings, the absence of long wave downswing in many areas, and the *long wave* borderline phase for the 1990s-2000s.

Conclusion

Relative to the stylized long wave model some core similarities and differences emerge from this study. Firstly, the World as a whole did seem to undergo something close to a long wave upswing and downswing over the 1940s-2000s. The World was close to borderline in the 1940s, and certainly did undergo long wave upswing in the 1950s and 1960s; followed by borderline performance in the 1970s as it evolved into long wave downswing into the 1980s to 2000s. Currently as part of this downswing we are undergoing a great crisis, especially in the Core, but in several other economies as well. If the World does go into borderline conditions in the 2010s or 2100s then this will be a Full Long Wave of 80-90 years. A long wave periodicity of 80-90 years is longer than the stylized model, but not excessively so, and it does have the advantage of introducing somewhat more complexity into the analysis.

Van Duijn's thesis that long waves are primarily experienced by the World (and not necessarily individual nations and continents) is not really true. In the first instance, the World has not yet undergone the borderline-up phase required for a Full Long Wave. But in the second instance, numerous types of waves have been found at the continental/regional and national levels, some that fit the Stylized Model moderately well and some that are (multiple) Full Short Waves and others that have a low or high ceiling and floor. Some regions broadly followed the World record, especially the core nations of North America, Europe and Japan. Latin America's record was close to this World pattern, except that it experienced borderline recovery into the 2000s (as with the stylized model) but the World did not. Eastern Europe fit the wave upswing of the World but it had greater amplitude than the World as it experienced the major slump of the 1990s and the subsequent rebound in the 2000s.

The three areas that were moderately different to the World were sub-Saharan Africa, Asia and to some degree the Middle East and North Africa. MENA experienced a stronger long wave upswing in the 1950s-1970s than the World, while MENA only had one decade of downswing (1980s) and since then two decades of borderline performance, which the World is yet to experience. SSA experienced a robust Full Long Wave pattern with a low floor and ceiling; but with no upswing (either long or short) for the whole 60 years; but it is now undergoing a borderline phase (as with the stylized model). Asia had the most buoyant performance of all regions through 60 years of secular long wave upswing, being the most upbeat result for the whole world over the period; it possibly experienced one Full Long Wave with a high ceiling and floor.

The areas with the highest amplitude (during the 1950s-2000s) were CEE and MENA; CEE due to a major slump in the 1990s and sudden reversal in the 2000s; and MENA due to high long wave upswing during the 1950s-70s and subsequent negative growth as oil prices dropped during the 1980s. The lowest amplitude (during the 1950s-2000s) was in Asia, as it had consistently high growth over the 1950-2010 period with no downswing; plus the World and North America, the latter having modest upswing and not-too-deep downswings. Fluctuations *from successive decade to decade* were highest in the Periphery, likely a result of wars, problematic governance, primary product specialisation, and natural disasters.

A major result of this paper is the evidence for short, long and secular waves. This is the first time short and secular waves have been specifically investigated in the literature, as well as the evolutionary changes from upswing through to downswing via borderline conditions. The greatest complexity emerged when nations especially of the periphery were analysed, as some nations underwent great volatility, sometimes through well-formed and multiple Full Short Waves with alternating periods of short upswing followed by downswing back to

upswing and then downswing again, as with Pakistan, the Philippines, El Salvador and the Dominican Republic. In one continent, SSA, only one nation experienced consistent (secular) wave upswing (Botswana), while also one nation stood out through deep secular wave downswing (Central African Republic). Further research should study the governance dynamics of these alternating short cycles and secular wave upswings and downswings to elicit the causes of their exceptional performance.

Overall, this paper has sought to both understand recent decades of performance for the world economy, its regions and nations and also to advance the state of wave research on the basis of empirical analysis. The world economy is currently still in the throws of a severe financial and economic crisis, mainly affecting the Core, but also impacting on the World as a whole. Recent dynamics do not indicate the emergence of (short wave) upswing or even borderline for the World or the Core; rather these areas seem to be undergoing continuing regime of accumulation decline. However, a few optimistic results emerge, the most notable being the continuing vibrancy of Asia, borderline performance in SSA, MENA and LACA, and rebounding high growth in CEE. Wave research helps in the pursuit of general and detailed knowledge of World trends and patterns, its various regions and nations. This should stimulate wave scholars to continue to innovate in their research methods for gaining greater understanding of the evolution and transformation of the World-system through historical time.

Endnotes

1. Some authors study waves of a longer duration than we have in this paper (see, e.g., Frank & Gill 1993). These are well beyond the scope of this current paper.

2. Of course, in the literature of economic history there is the famous research program associated with the thesis that the Great Depression of 1873-1896 was a myth. S. B. Saul (1969) very lucidly advances the major arguments against the idea of this period being a Depressionary era. However, Saul did not investigate this period as a wave scholar or someone interesting in analysing the periodicity, amplitude and phases of short, long and secular waves. Indeed, if anything he argues against long waves, for instance he critiques Rostow's investigations into long swings, saying it is too ambitious a thesis. The current investigator is in the early phases of studying this whole question.

3. Of course, Schumpeter (1939) looked at these borderline regions as "neighbourhoods of equilibrium", where the long wave tends to revolve around. This current study certainly does not look at these borderline areas in this way; rather, it is distinctively against the notion of equilibrium, favouring instead circular and cumulative causation, a la Myrdal and Kaldor. Waves do not necessarily revolve around these areas, but rather the whole wave is concerned with the rise and demise of institutions, changing contradictory relationships through time, and evolutionary metamorphosis. Nonetheless, the borderline areas are extremely useful simply to see how the institutions do rise and fall, giving rise to varying rates of growth through historical time.

4. Wendy Carlin (2006) specifies three main methods of calculating growth. These include (a) the natural log of GDP growth, the (b) rate of growth for every year added together and divided by the number of years, and (c) the difference between real levels of GDP per capita between two periods divided by the GDP level for the first year, which in turn is divided by the number of years. Carlin found that the second of these methods is a very good approximation for the natural log method, and that even the third method is all right so long as we are not dealing with high rates of growth (such as over 6%). We mostly use the second of these, namely, annual GDP growth rates per capita (AAGR) added up and divided by the

number of years, usually a decade of 10 years of data, for the World and continents, plus the third method for the individual nations.

5. The above decadal averages are based on the second method of summing individual annual average growth rates for each year & then dividing by decadal number of years (AAGR; mostly 10 years; sometimes 11 years, e.g., 2000-10; sometimes other groups of years).

6. The study of *wars and long waves* has been a long one, including the work of van Duijn (1983), who showed that the first-world war stunted the long wave upswing of the 1997-1914 period. A major piece of research on this theme has been that undertaken by Joshua S. Goldstein (1988); and various other related analyses of waves of hegemonic rise and fall have emerged, including that of Immanuel Wallerstein (1983) and the World-systems schools, with inputs also by the realist and other schools of international political economy. Social structure of accumulation (SSA) school has inculcated this work on hegemony into their analysis of long waves, closely following that of Wallerstein. In this theoretical and empirical work, US hegemony into the 1940s-early 1970s provided one of the institutional buffers for long wave upswing, and declining hegemony contributed to the long wave downswing (see Bowles, Gordon and Weisskopf 1990).

7. Note: 100 BP = 1 full percentage change = the difference between lowest and highest decadal growth in BP over the 1940-2010 period = growth change from e.g., 1.0% to 2.0%.

8. For an critical analysis of Chinese GDP figures see Takahashi (2006), who claims that China is slowly adapting their statistics to international standards, but that statistics prior to 1987 are especially somewhat dubious.

9. Domestic (national) factors and long wave analysis are not contrary. Indeed, one social structure of accumulation scholar, Victor Lippit (2010), argues that long wave can *only* reasonably be explained in various *national* contexts. Some scholars would agree with him. O'Hara (2000, 2006), however, has consistently argued that long waves can be fruitfully investigated at the national, regional and global dimensions (work on the local level has commenced); his main innovation being to include global institutions and household/community relationships in the analysis. Hence in this paper I have *not* assumed that national factors are counter to long waves.

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