Review Essay

Clarity in the Face of Immense World-System Complexity and Crisis

Antony Harper
New Trier College
Benedictine University

A Review of 'Economic Crises, Cycles and the Global Periphery' by Leonid Grinin, Andrey Korotayev, and Arno Tausch. – Springer, 2016.

'It is interesting to contemplate a tangled bank, clothed with many plants of many kinds, with birds singing on the bushes, with various insects flitting about, and with worms crawling through the damp earth, and to reflect that these elaborately constructed forms, so different from each other, and dependent upon each other in so complex a manner, have all been produced by laws acting around us' (Darwin 1958). This famous statement of Darwin's could just as easily apply to the complexity of human society as represented by the world-system with its interlacing of economic, political, cultural, and social processes and phenomena within the context of its Core-Periphery structure (see*, e.g.,* Grinin and Korotayev 2014a). It is particularly representative of the state of the world-system at the beginning of the twenty-first century, a state that is overwhelmingly complex to the point of perceived randomness, a morass of complexity that seemingly stands in denial of any explanation by generality or to use Darwin's phrasing, '…by laws acting around us.' Be this as it may, the book, *Economic Crises, Cycles and the Global Periphery*, authored by Leonid Grinin, Andrey Korotayev, and Arno Tausch (2016) not only offers a lucid explanation of current world-system complexity but does so by the application of

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laws or more appropriately, models, which represent cyclic economic behavior. Using these various cyclical models, the authors disentangle world-system complexity into perceptible patterns which present not only reasonable explanations of the state of the system but also, as should be expected of good science, permits prediction of future states of this system.

Like its predecessor, *Great Divergence and Great Convergence*, written by the first two authors, Grinin and Korotayev (2015), the focus of this book is based on world-system theory and is in fact an extension of the thesis of that book, that the world-system is now in a process of convergence, so the periphery of the system is catching up with the leading core, the West. And also like good science, hypothetical prediction is amenable to being tested with available evidence. The book is organized into six focused chapters; the first introduces the concept of economic cycles and describes the various extant cyclical models used to analyze economic change, chief among these are Kondratieff long waves, Juglar cycles, and the models of Akamatsu and Arrighi. The second chapter provides a detailed historical analysis of Kondratieff cycles and also at length discusses obstinate data, data that do not completely fit the expectations of the model. This chapter also addresses the significance of understanding Core-Periphery interaction within the context of Kondratieff cycles. Chapter 3 treats Juglar cycles and their relationship with and motivation of Kondratieff cycles. Chapter 4 introduces the Flying Geese model of Akamatsu and focuses on the current process of world-system convergence. Reference is also made of the commonality between Akamatsu's work and that of Giovanni Arrighi and of Robert J. Barro. The analysis in Chapter 5 centers on the relationship between technological paradigm shifts and Kondratieff waves, and a very sobering Chapter 6 addresses the impact of global population aging on the future structure of the world-system.

An aside here, an evolutionary connection, is necessary to give appropriate perspective to the remainder of this review. The world-system is a self-organizing and therefore evolving system. Evolving systems as they persist through time tend to increase in complexity (McShea and Brandon 2010). Further, the process of evolution requires three necessary and sufficient conditions, a source of variability, a mechanism of selection, and a means of maintaining (or sustaining) what has been selected (Dennett 1996). The tenden-

cy toward increasing world-system complexity over time will require simplifying models; Kondratieff and company as referenced by the authors supply those models. The necessary and sufficient conditions for evolution to occur were first developed for biological systems, and while the world-system is a biological system, the evidence and sources of variation, the mechanism of selection and other attendant mechanisms, that is drift, and the means of sustaining what has been selected are not on the surface obvious for a system as complex and the world-system. Variation within the world-system, specifically the variation of economic mechanisms, is created by the recombination of extant mechanisms with the invention of new ones, a process that is intimately tied to Kondratieff long waves (see, *e.g.,* Grinin and Korotayev 2014b). Selection occurs as a result of competition within and between various economic mechanisms. (It should be kept in mind that cooperation as an economic strategy can also be selected for.) Penultimate, the maintenance of what has been selected depends on the appropriate functioning of economic, social, and political institutions, entities which are themselves subject to selection. Finally, it should be kept clearly in mind that evolving systems may and in fact do exhibit punctuated change, thus, the pace of change is certainly not constant and may exhibit stasis, escape from which can be abrupt. This transcription of evolutionary mechanisms to the world-system stage should be kept in mind throughout the rest of this review and certainly while directly digesting the book being reviewed.

There are two broad conceptual aspects of these treatises that underlie all of the assertions made, that economic change is cyclical and at several different temporal scales and that the structure of the world-system implies interaction between the core and periphery, interaction that ultimately manifests itself as either divergence between these two levels or as convergence. The motivation for core-periphery interaction is, however, none other than cyclic economic behavior. Further, it is suggested that there is also reciprocity of interaction between the interaction of world-system components and these economic cycles. In general, cyclical economic behavior is caused by the non-linear interactions that occur within and between economic systems. This non-linearity can create a lack of synchronicity, possibly leading to time lags between various segments of the system, perhaps even overshoot as described by Catton (1982), but certainly resulting in oscillatory behavior and

is the basis for the cyclical behavior referred to by the authors. In general, cycles exhibit the following stages or phases, recovery-expansion-crisis-depression followed by a new recovery phase. A number of different economic cycles have been identified and researched, six are mentioned here, however, there are three of prime importance to this current research, Kondratieff long waves, Juglar waves, and Akamatsu waves, a.k.a. Flying Geese, and chief among these three according to the authors are Kondratieff long waves.

The use of historical analysis here lays the foundation for both the recognition of cyclical patterns and the identification of unique motivating events associated with each cycle. In Chapter 2 significant time is spent delving into an historical description and analysis of Kondratieff waves; five have been identified since the late 1780s. Each wave is further divided into an A-Phase and a B-Phase, the former associated with economic upswing and the latter with economic downswing, and each wave is associated with significant world-system events, the first wave with immigration, the second with increased trade, the third with the advent and expansion of steel production, electricity, and heavy engineering, the fourth with oil, the automobile, and mass production, the fifth with the information revolution, and a proposed sixth – with nano- and biotechnology. In turn, it is shown that the structure of K-waves can be associated with Core-Periphery interactions, specifically that during downswings or B-phases the Core subjugates, integrates, and elevates the Periphery, while during K-wave A-phases the Core functions within itself, and resources are funneled from the Periphery to the Core, often in the mode of plunder, commodities are cheap, unfair pricing occurs, and monopolies are established.

However, it would be misleading to suggest that this work is primarily descriptive; it is not. Mechanism is key to any model in science, and the focus turns from description to interaction and therefore mechanism in the remainder of the book. It is the authors' contention that K-waves are tied to and motivated by Juglar waves, J-waves, waves that have a shorter period, 7–11 years, and that there are then multiple J-waves per K-wave and therefore obviously per K-wave phase. In fact, it is suggested that there will be two to four J-waves per K-wave A-phase and two to three J-waves per B-phase. Further, qualitative changes, that is inventions or paradigm shifts will occur during B-phases, while the spread and modification of paradigm shifts, variations on a theme if you will and

what are termed, quantitative changes, occur during A-phases. During an A-phase the shorter J-waves then ratchet themselves on economic development that exhibits cyclicity but in which downswings do not completely mirror upswings. This ratcheting however has systemic limits, and the process reverses itself in a self-limiting pattern to produce downswings, again with systemic limits. A very clear relationship is revealed between K-waves and J-waves, however, to use the language of the book, the evidence does not completely agree with the *stylized* facts. Even so, the motivating interaction between J-waves, that is clusters of J-waves, and K-waves is established, and the synchronicity of the two types of economic waves is supported with ample data, in particular with the fact that the character of J-wave clusters coincides with the character of K-wave phases.

The text of *Economic Crisis, Cycles, and the Global Periphery* makes quite clear the complexity of the world-system, the intricate interactions between Core and Periphery, and the influence on those interactions with respect to economic cycles, particularly K-waves and J-waves. Implicit here is the non-linearity associated with much of world-system metabolism. Enter Akamatsu waves, a phenomenon that is well adapted to revealing Core-Periphery interactions, and Akamatsu's ultimate model and metaphor of Flying Geese to describe the differences in rates of change between Core and Periphery and the stimulation of less well developed economies by a lead economy. The Flying Geese model suggests that the process of catching up in peripheral countries will be one in which a lead country in a given region, and the initial region for study by Akamatsu was Japan, would produce goods which would be exported to other countries in the region. Because of the success of an initial production economy, restructuring of the lead country's economy due to labor costs will cause that country to shift away from a production economy to a capital economy. In turn, those countries initially receiving exports from the lead country would then develop their own production economies and export their goods to even less developed countries in the region. This repeats the process, and this repetition is likened by Akamatsu to a flying chevron of geese. Key to this process is the sequence of innovation-production with attendant investment-export-development of production in the importing countries-reduction of production efficiency in the lead country-and so forth. It is this model that the authors use to explain and predict the catch-up economic behavior of the peripheral countries.

Grinin, Korotayev, and Tausch (2016) suggest a three step sequence with respect to understanding the current trend of global convergence. Imports followed by production followed by exports represents the initial step in the Flying Geese leader. In turn, this brings about an economic change in that country from consumer goods production to capital goods production. This is followed by a final step in which convergence of the developing countries with the developed occurs. There are broad trends associated with these three steps, that of richer countries having shorter cycle times that poorer ones and also that Akamatsu waves predominate over K-waves in the richer countries, while the reverse is true in the poorer nations. It should also be noted that two other models are used to analyze the same data, the Center-Periphery model of Arrighi *et al*. and Barro's Disaster-Convergence model. Further, there is abundant evidentiary support for their reasoning, the ultimate focus of which is the fact that the Core-Periphery gap is closing with its attendant consequences.

Historically there have been three very significant changes in the way in which our species accesses energy to survive and sustain itself, the change from hunting and gathering to farming, the Neolithic Revolution, the change from agrarian based societies to those as a consequence of the Industrial Revolution, and the change from the conditions created by that revolution to the scientific and cybernetic revolution. The authors build a strong case that these changes, more appropriately termed phase changes in energy access, are associated with cyclical economic changes and in economic parlance are noted in the text as production principles. It is their contention, and a unique contribution, that each production principle is composed of three further phases, and initial period of innovation followed by a period of modernization which is then capped with a further phase of innovation, this last representing the zenith of any given production principle. Focusing on this last revolution, the one the world-system is experiencing at present, the Cybernetic Revolution, it is suggested that the final phase, not yet realized, will be one of the evolution of self-regulating systems, certainly a note of hope against the background of the current morass that the world-system is in.

The development of a given production principle is a multistep process, six in fact, and with the Industrial Revolution and Cybernetic Revolution as the points of concentration, the authors note

that the development of these production principles is associated with K-waves, an association previously noted in which qualitative and quantitative innovation are intimately associated with the upswing and downswing of a particular K-wave. Also, succeeding production principles are affected by their predecessors in that the Core cannot continue to accelerate through a production principle unimpeded by a lagging Periphery, but in fact, and specifically with respect to the current Fifth Kondratieff Wave, this phenomenon has had and is having a lagging effect currently. The modernization of developing countries is occurring more slowly than expected due to the lack of synchrony between the Core and Periphery as a result of the asynchrony between political, social, and economic factors. This asynchrony is and will continue to manifest itself in international tensions, the aforementioned morass of the current world-system which is likely to continue for some time.

A potential solution, which is the dissolution of this morass, to the current world-system asynchrony is the evolution of self-regulating systems, the mechanisms of which will (or should) have minimum human interaction. It is suggested that the technological context for this advent of self-regulating systems will occur within the new technologies of bio- and nanotechnology. It will be these technologies in concert with robotics, cognitive science, and a variety of related fields that are uniquely adapted to addressing the issues generated by the demographics and economics of the twenty-first century. These technologies now in their incipient stages are well adapted to addressing the problems of extending the human life span and the associated economic but also political and social concerns that by default will occur with lifespan extension. This transition, however, will most probably not be smooth.

The Core population of the world-system is currently in a state of aging, one in which in a very short period of time will lead to the proportion of the working aged segment of this population being exceeded by those who are in excess of age sixty(see, *e.g.,* Goldstone 2016). In contrast, the population and population structure of the developing world is still quite vibrant. With the current conditions for retirement in the Core, including but not limited to the maintenance of sufficient pension funds, this poses a huge problem. Four solutions are proposed, an increase in immigration from the Periphery to the Core, raising the retirement age of the Core working classes, unquestionably requiring medical support,

developing labor-saving devices, an area amenable to the application of robotics, and new financial technologies required to facilitate and support a population center of gravity that is moving upward in age. New financial technologies will also help to spread risk making new levels of risk supportable system wide.

One of the interesting aspects of the current world-system state is the development of support for the rising need in improved and increased magnitude of pension funds (see, *e.g.,* Grinin and Korotayev 2016). As of 2013, 84.2 per cent of the GDP of OECD countries was devoted to pension fund support. It is suggested that pension fund investment be made in developing country production and infrastructure which, through return on investment, will then have payback in further financial support of those funds. What is being alluded to in this text is the development of a globalized pension fund and therefore increased interdependence at the world-system level, something that will unquestionably require a change in the current world order. The authors suggest that this transition will in all probability not be soft.

While this is not a work for the intellectually faint of heart, it is an exceptional analysis of the interaction between cyclical economic behavior and world-system structure, an analysis that involves confirmation by historical support, the synthesis of political and sociological effects both as a consequence of economic cyclical behavior and reciprocally as influences on that behavior, and is an analysis supported by a close match between model and quantitative data. Note should be made here of the creative use of spectral analysis in analyzing the various cycles investigated here, accompanied by a Primer on Spectral Analysis in Appendix B. Further, the mechanisms of Kondratieff waves, Juglar waves, the Flying Geese model of Akamatsu, the Center-Periphery model of Arrighi, and the Disaster-Convergence model of Barro are used to disentangle the milieu of data that represents the past, present, and future of the world system. The clarity of this research reveals a world-system in transition, one that will perhaps shed the K-wave oscillations that came to prominence with the Industrial Revolution because of the dampening or buffering effects of the evolution of self-regulating mechanisms, a consequence of the trajectory of the current K-wave being experienced, mechanisms that become necessary to support the level of complexity to which the world-system has evolved. This is over all a work of scientific integrity,

of paradigmatic revelation, and of existential worth to all who value who we are and where we are going, even if that 'going' over the next decades will not be, as the authors suggest, *soft*.

REFERENCES

Catton, W. R. 1982. *Overshoot: The Ecological Basis of Revolutionary Change.* Chicago: University of Illinois Press.

Darwin, C. 1958. *The Origin of Species by Means of Natural Selection or the Preservation of Favoured Races in the Struggle for Life*. A Mentor Book. New York: The New American Library. [Note to reader: This edition of the Origin is the one that was released in 1872.]

Dennett, D. 1996. *Darwin's Dangerous Idea: Evolution and the Meanings of Life.* New York: Simon and Schuster.

Goldstone, J. 2016. Population Ageing and Global Economic Growth. *Journal of Globalization Studies* 7 (2): 11–31.

Grinin, L., and Grinin, A. 2015. Global Technological Perspectives in the Light of Cybernetic Revolution and Theory of Long Cycles. *Journal of Globalization Studies* 6 (2): 119–142.

Grinin, L., and Korotayev, A. 2014a. Origins of Globalization in the Framework of the Afroeurasian World-System History. *Journal of Globalization Studies* 5 (1): 32–64.

Grinin, L., and Korotayev, A. 2014b. The Inflationary and Deflationary Trends in the Global Economy, or 'the Japanese Disease' is Spreading. *Journal of Globalization Studies* 5 (2): 152–173.

Grinin, L., and Korotayev, A. 2015. *Great Divergence and Great Convergence.* Moscow: Uchitel Publishing House.

Grinin, L., and Korotayev, A. 2016. Global Population Ageing, the Sixth Kondratieff Wave, and the Global Financial System. *Journal of Globalization Studies* 7 (2): 11–31.

Grinin, L., Korotayev, A., and Tausch, A. 2016. *Economic Crises, Cycles, and the Global Periphery*. Moscow: Uchitel Publishing House.

McShea, D. W., and Brandon, R. N. 2010. *Biology's First Law: The Tendency for Diversity and Complexity to Increase in Evolutionary Systems*. Chicago: The University of Chicago Press.