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## K-Periodicity, Space-Time Structures and World Economics

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### **Abstract**

*The space-time structure of monetary production economies behaves by the macro- and microscopic duality of long-term and short-term wave functions via helical growth. As the global financial crisis deepens, a methodical quantum leap towards world economic science is already in the scientific making, re-researching into the meta-cyclical patterns of human economic behavior. Although the monetary wave function and the banking systems structure are at the behavioral core of this quantum economic science, it is at the same time decisive to pushing methodical economic thought forward into models of curved space-time. A more exact and innovative reading of the time value of money and the temporal structure of production is needed for such a futuristic approach.*

**Keywords:** *economic behavior, wave functions, financial structures, Kondratieff cycles, long-term dynamics, temporal structures, spatial structures.*

Economic models do apply physical and mathematical constructions generally as methodical imitations with the research motivation of scientific exactness; much could also be learned from the life sciences which problems are closer to social science, for example, organisms are adaptive and learning systems/processes. Further methodical mischief is done by ignoring global economic history, by preferring economic paper theorizing over the real productive economy and by denying the social possibility of economic long-term regularities; these methodical deficits are multiplied with a monetary view of management economics to maximize entrepreneurial finance without a real world economic perspective. The economic crises (money / bank credit created, financially transmitted via managerial misbehavior/failure) precisely document the methodical errors of the economics profession and its false imitations of scientific reasoning; this methodical mistakes are a heavy weight on the world economy and need ethical and methodological correction; only methodically consequent new economic thinking can rectify the false perceptions and wrong observations in scientific thought. Random-walk-theory, the efficient market hy-

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pothesis and rational expectation equilibrium are methodically based on Markov chains/processes which basic intuition is that given the present, the future does not depend on the past; on the contrary, we claim regularities inherent to an absolute that creates a certain scale, a world-wide pulse causing the flow of universal time and human economic activity, including biological age. Our major reference system is not local measurable time (clock readings), but a geometric 3D Minkowski space-time continuum, with injected arithmetic time – the model looks like a growing and unfolding 3D spiral with unified time flowing as gravity centre (the spiral moves, develops and stretches by centre-fugal and centre-petal forces). The cosmological motion<sup>1</sup> in time can be read backwards with respect to the present moment of time, which is just a cosmic or world time moment; this time is unified time for all space; concerning the contraction of all lengths (entities and distances between entities), all distances in the past were shorter; when, for example, cosmic time was 90 % closer to the initial moment, the interval between two instants of time equal to one second today increases tenfold (from the view of today: an interval of one second would have lasted 10 seconds then). In world time, the isotropic metric of space is the same at all points/directions; local closed time does co-exist with world flowing time. Using this methodical intuition, we can integrate absolute Newtonian time, relative Einsteinian (1936: 339–382) time and cosmic Carmelian (1996: 413–416) time; our reference system also leads to an actual realization of natural numbers (but not in 1–2D linearity). Thus the orthodox economics denial of long-term regularities is rooted in a different methodical reading of time, mainly short-term local time (closed space) and not long-term world time (open flow). This temporal perception applies to the life philosophy of a stock-market investor who can only gain on the short-operation side by multiplying financial resources via liquidating values; however, this is not the view of an entrepreneur who creates value on the long-operation side: an investor sells, an entrepreneur cares. Property of an enterprise or property of shares may be legally the same thing, but are economically totally different: the investor operates on short-term, the entrepreneur operates on long-term.

<sup>1</sup> The current view in physics is that local time, which seems different if viewed by a passenger in a moving train or by an observer on the platform, co-exists with a certain unified world time; the branch of physics that deals with this type of time is called cosmology. In Moshe Carmeli's equations, the motion of time is read backwards, hence cosmological time= $T$ , *i.e.* the ratio of backward motion of time is per temporal unit a relative expansion of  $1=\text{today}:10$  when cosmic time was 90 % closer to the initial moment of expansion; consequently, the interval of two instants of time increases tenfold (Carmeli 2001). The economic dynamic efficiency of Kondratieff waves follows exactly this quantum logic of relative temporal cosmology (*Idem* 2002). Louis de Broglie (1923) felt that a great law of nature stands behind the discovery of the wavelike or periodic properties of the movement and development of matter, *e.g.* the dynamic states of productive efficiency in an economic quantum system can methodically be completely described and explained by the dominant wave function, in our case K-periodicity, but do not forget about the 'temporal elasticity' of the observed quantum system, *i.e.* the economics of Kondratieff waves follows physical phenomena of higher order.

Schumpeter (1939) made the name and work of N. Kondratieff (1926: 573–609) very known and many economic phenomena can indeed be methodically interpreted in Schumpeterian or Kondratieff style. Currently, Nefiodov (2006) is forecasting the 6<sup>th</sup> Kondratieff with the leading basic innovations of bio-research, eco-technology and health science, eventually leading to more employment and productivity. The mainstream economics rejection of Kondratieff periodicity is the suspicion of historical Marxian materialism, market socialism and dialectical determinism as the critical Popperian rationalism is favored. We do not want to engage in a philosophical battle of randomness *vs.* determinism or subjective *vs.* objective knowledge, but we do perceive distinct degrees and limits of human freedom in economic action on the micro- and macro-level. However, periodical tendencies must not follow an economic determinism and do not exclude random walks. In any case, as we mentioned before, economic thought can be led by different time frameworks and work in different space-time-fabrics. A different physical construction of time, a different mathematical construction of space and a different ethical construction of human behavior do cause different ways of economic thinking – in addition, the danger of an ideological bias via political and/or religious beliefs is a human fact of the social world where suffering creates time-resisting meaning and where death, disasters and diseases are real. Consequently, we do not observe K-periodicity as a denial of human liberty in economic history. Economics is a global discipline of universal regularities and why should not it be possible to research deeper into the cosmological motion of human economic activity. Reading world economic time backwards (and eventually forward) requires a better elaborated methodology that goes beyond numerical 2D linearity and Kondratieff's intuition was that the world economy may possess a periodical rhythm via basic innovation patterns that alter the direction of economic activity and societal productivity. The main methodical question is how to measure the relativity of these economic processes and to identify systemic cybernetic rules. It is a poor argument to search the root cause of major economic fluctuations solely in the fractional reserve system of central and commercial banking (and in the origin and nature of money) as important as the monetary design and evolution of an economic system is. Thus, the perception and observation of the space-time continuum of human economic activity is at the core of a new economic science and thinking. It is also a fact that a stable economy needs a stable money and *vice versa*, but this again depends on a multi-dimensional space-time fabric of economic action (quantum economic logic). A quantum economic theory of human action and dynamic efficiency is a more advanced approach than accounting economic data into static equilibrium – it is the intellectual chance and challenge of the moment to sharpen the economic mind via a wave dynamic perception/observation of human action, with varying degrees of freedom.

We do view the recorded history of humankind as the regular history of learning processes (Ternyik 1989: 20, 86) and do not perceive or observe the pattern of economic cycles and fluctuations as irregular, but as a result of quantum motion, mechanically and thermodynamically. Liquidation of inventories, falling demand for labor, falling commodity prices, falling business gains are cyclical relationships of a recession and rising interest rates, profits and commodity prices are indicators of a boom. There is a deep regular connection between investment and innovation trends and the direction of investment and innovation is causing and caused economic cycles. The amount for any revenue depends on the techno-scientific stage of economic (capital-based) production and these socio-economic trends do originate from cyclical levels of production, that is from natural/physical fluctuations in societal needs for capital stock. Investment and innovation in capital stock can only grow when crucial resources are channeled and managed into economic stability as changing output multiplies into changing investment. The orthodox set of beliefs about how the economy and economic activity is running could be quantified in percentage errors of poor forecasting, resembles uninformed guesses, and post mortems do document this inexactness concerning the key indicators exactly: large amplitudes of investment fluctuations, the extreme events of the global financial crisis and the serial collapse of national economies. Many observed phenomena like monetary inflation, innovation shocks and mal-allocation of investment resources are as old as the market economy (with money, banking and stock markets evolving gradually) and it is not in our wisdom or ability to eliminate such events, but to become more aware about the observation of the physics of socio-economic processes via the scientific method in social and economic research, *i.e.* to learn by the ongoing methodical sequence of observation, theory, prediction and results. It is indeed quite boring to see the many 1-2D linear graphical curves of time, real output, booms and bust in standard textbooks and documentary resources as they are wholly based on deep scientific methodical errors that lead to further economic misperceptions. As already mentioned, we propose to rotate and trans-compose the matrix of economic knowledge into a 3D spiral that moves, develops and stretches on a space-time continuum with open flowing world time and closed local space time, that is. economic growth and development is the progressive inter-connection of human economic activity. Given today's technical computer power, it is possible to construct such a 3-4D spiral model and to 'feed' it with vital economic data. Concerning K-periodicity, we prefer intuitively the ancient Israelite 50-year rhythmic regularity, but allowing Carmelian cosmological motion; in addition, the globalization of economy is asking for the evolutionary discipline of world economic science. Advanced ethical, mathematical and scientific reasoning can bring this methodological quantum leap about: human ingenuity was always the

ultimate key to propelling productive capacities creatively forward. However, conjuncture is a construct borrowed from astronomical science and we do not subscribe to any ideological form of an 'economic orbit', but do plainly argue that short-term and long-term events in the social world of economic action do possess different degrees of human freedom (day trading is not equal to managerial economics). Moreover, we must warn against the omnipotent government of policy oracles and the twin phenomenon of big business/state leviathan (the health of the state must not be monopoly and war, but any centralism and collectivism inevitably leads to unsustainable economic conditions like excessive taxation, law/order crisis, welfare dilemmas, economic inefficiency, technical disaster, loss of liberty), that is in the language of an experienced physician: only a good treatment can lead to real healing.

The 'new economy illusion' ended, regarding data of real GDP growth, new orders for durable goods, industrial production and non-financial sector corporate profits, in November 2000 when financial paper accounting could no more reflect real economic performance. The 'profits' of Nasdaq-firms did not simply reduce, they collapsed and the losses of 2001 were equal to the sum of gains from 1996–2000. These events were reinforced by 9/11 and may be the cause of the monetary excess (liquidity creation) by the American Fed. Technology, demography, ecology and global debt are the driving forces of these imbalances and management tools have still not caught up with growing complexity. De-regulation, globalization and digitalization are leading to the 'ideal' of perfect competition, but prices swing automatically to the lowest level and nobody makes gains no more. Concerning timing and structural process, the economic events do correspond to the Schumpeterian analysis of creative destruction and to the basic patterns of long-term K-periodicity in real economic and monetary terms, both as innovative and as stock market process (we can also observe no acceleration, only some variable statistical 'stretching'); the push period of the Internet and telecom has ended, just as before the 'new era' of automobile and radio (the Golden Twenties). The 50-year K-periodicity makes perfectly sense and may well apply for reading time backwards before the advent of industrial capitalism (1750–2000; 5 super-cycles with basic innovations pushing productivity forward/upward the 3–4D spiral; allow for minor statistical variations/cosmological motion). Consequently, world economic science follows from combining the ethical, mathematical and scientific method of observation, theory, prediction and result via process-learning; the logical and empirical evidence is strong for modeling human economic activity on a 3D cyclical space-time continuum, but sharp methodical thinking is needed to arrive at practical economic tools of decision-making. However, it is better to change the intuitive perception from the priority of static equilibrium to dynamic efficiency – human hubris is always tragic when evolutionary patterns

are ignored and when false intentions mix with methodical error: science is not a *deus-ex-machina*, but a time-tested method of human investigation into existing phenomena (visible or invisible). Since 10 years, an investment and innovation turn into sustainable growth technology is observable as indicated by real interest rates of bonds – the 6<sup>th</sup> Kondratieff is slowly gaining economic momentum as will topics like ethical banking, social entrepreneurship and non-profit business (coming closer to Peter Drucker's next society and business theory). The monetary sector of the economy (commercial banks, monetary authorities) will have to implement at least the Hyman Minsky criteria (= reserve formation in boom time as bust brake) for fractional reserve banking or to invent new financial mechanisms. It is also possible that more radical solutions have to be sought (100 % full reserve for commercial banking; public monetary 'police'; fiat money remains for credit creation). In any case, the direction of investment and innovation is primarily causing periodical economic fluctuations. However, the rules of the economic game do not change, the attribute 'new' can only refer to directed investments into basic technological innovation. Otherwise, it would make no sense to research into the social science of economics; our approach is towards a quantum economic theory of human action and a complete scientific view of human economic activity as unified physical regularity. This does well include the professional art of management, because we try hard to advance economics in scientific application. We do follow Mises, Hayek, Lachmann and Kirzner in their praxeological claim and insist on the constant progress of socio-economic liberalism. Even an ideal human society has to solve the same economic formulae, equations and calculations of real world problems and even the freest society is maintained by explicit rules of conduct (which are always derived from behavioral tradition via methodical reasoning). Consequently, new economic science/thinking is a matrix transformation of the existing body of knowledge via economic process-learning and calls for 3–4D space-time modeling of human economic activity.

There is no scientific or any theoretical reason why a variable 50-year K-periodicity should not represent the basic evolutionary pattern of techno-economic innovation in the world economy. The tendency of the economics profession for the 'religious production' of random models already failed and there is no such thing as 'rational randomness'. This also implies that individual short-term efficiency is difficult to reconcile practically with common long-term efficiency as the economic, ethical and ecological effects of human action maybe contra-polar and dynamic optimization seems to be a tall order. Logically and empirically, we are investigating into mutual living chances and economic productivity – in accounting and in the real world, gain and loss are interconnected in a deeper way than algebraic computation. We propose to project K-periodicity into a 3–4D space-time-spiral and to 'feed' this world model with basic economic data; please, allow for Carmelian cosmological motion

and human statistical interference (following a warning from Murray Rothbard, central banks and fractional reserve banking are the major sources of economic misbehavior); it is our methodical intuition that the 'Kulak-professor' prepared a vital insight for human economic practice and that cyclical time dependency is a regular fact of economic action. The emerging world economic science will signify a cognitive quantum leap in human economic thought and methodologically not depend on 1–2D mathematical simplifications, an ignorance of ethical behavior and methodical mischief/numerical belief. In addition, the real function of sound money for a market economy will also be elaborated. Unfortunately, we had and still have to witness a phase of 'rational misperceptions' and almost a 'religion of economism'. Nikolay Kondratieff very well understood market processes and their long-term implications for the political economy. We have to thank Joseph Schumpeter for making the meta-cycle idea 'popular' in economics and this observational model should be tested against other predictive theories and their results. In 1720, after losing 20,000 pound of his wealth by investing into the South Sea Bubble, Sir Isaac Newton opined that it is easier to calculate astronomical conjuncture than the stupidity of men. In 1925 (during the Great Inflation), Schumpeter went bankrupt as the president of the private Vienna Biedermann Bank, losing his total wealth and repaying debts for ongoing 7 years. A dangerous river is flowing between theoretical constructs and life practice, methodically not being easy to cross. Although micro-processes of entrepreneurial management (firm behavior) are the backbone of macro-economic value creation (always being traded in monetary terms), it is also inevitable to observe the inter-mediate chains of economic circulation (financial flow) and their meta-framework (time dependency). Systemic cybernetic cognition is needed to identify the inter-active flow of economic behavior on the space-time continuum, because the socio-economic reality (space) seems to happen on a temporal relativity scale.

The triangle of micro-economics (entrepreneurship), macro-economics (money/banking/policy) and meta-economics (cosmology) can create an integrative application of new economic science/thinking that does overcome the rather primitive, oversimplified and illusionary 1D models of static numerical comparisons. The core of practical economics is anyway a clear methodical thought, hard ethical work and a liberal letting-go. Meta-economics, starting with Ernst Schumacher (1973) and Jacob Neusner (1990), is a research into economic processes of higher order. Although the economic facts are growing rapidly in disparate directions, it is reasonable to combine the separate scientific elements by advanced methodical thought. In addition, the history of technology and exact sciences and their effects on the economic sphere is difficult to explore via organized study, but there is no scientific reason to neglect further unification of data via 3–4D models. Of course, this modeling can only be of dynamic order and does not fit into the one-dimensional linearity of standard textbook liturgy and litany; technical computer power already proofed many

mathematical assumptions to being invalid and the same will happen in this decade with the common fallacies of economic reasoning. It is our prediction that a world economic science will emerge via methodical research models of meta-cyclical motion, combining entrepreneurial, monetary, technological and cosmological facts in multi-dimensional spirality. If this pertains to an eternal process order or a random finitude is an open guess that permeates the essential tension of human existence.

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