Quantum Monetary Science***The physics of monetary systems* is badly understood in the economics profession and the discipline lacks a scientific basis. In an advanced *monetary production economy*, ***all*** human needs are reduced into the need for money and the monetary quantum drives the dynamic efficiency of economic productivity. In this economic state, the typical working of the monetary body is the interplay of *fi*at credit from private banks via minimized fractional reserves and the emission of *fiat money* without the growth of economic productivity via public monetary police. This banking system is a violation of the physical or natural laws of economic production as the monetary system is a physical process of higher order, i.e. the global financial crisis is the result of methodical monetary mischief; some economic alternatives to this ***systemic error*** shall be presented.

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The Monetary Quantum

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Summary: The natural or physical laws of spatio-temporal entropy are applicable to monetary production economies. Money quantizes and dualizes, mechanically and thermodynamically, the energetic entropy of spatio-temporal economic production; the fiat emissions of credit (x interest) in the fractional reserve banking system are the root cause of cyclical economic crisis in market capitalism. A 100% monetary system is a physical necessity to separate money from credit; some polities will, according to their natural resources of precious metals, even opt for a gold ratio. This radical decentralization of the money and banking system has also to allow for the market self-emergence of alternative currencies by law. The physical duality of the monetary quantum moves the production system and checks economic development via cybernetic emission, payment and bookkeeping. An international clearing currency unit for national payments should be based on a natural index of clean energy, to manage the monetary quantum into a more sustainable economic future.

Key words: money, production, space, time, entropy

JEL: B41

Money supervenes on physics, every individual bit of behavior of money is describable in terms of physical laws; there is no monetary difference without physical difference and no monetary value, an irreducible addition to money, without physical value. A scientific theory of monetary economics can be derived from basic biophysical laws, regarding the validity of non-equilibrium thermodynamic theory of life systems, because systemic economic organization, i.e. the working body economic, will not converge to an equilibrium state. The basic economic quantum of the modern market societies is the monetary unit, not the internal market of the nation states (to which the dominating majority of economic literature is dedicated, since its inception as a research discipline); economic production quantizes time and the economic value of human knowledge is related to the amount of energy (entropy) that has been expended in the course of obtaining it, i.e. even knowledge is an economic commodity with physical properties. However, human capital, accumulated technology and book money lose their value when basic biophysical laws are violated as happened historically always with the natural collapse of high consumption societies that did not understand the entropic tendency towards increased dissipation and randomness in nature, i.e. the monetary quantum should possess negentropic properties. Consequently, the monetary practice of fractional reserve banking and the two-sided accounting operations of banks allow inflation artificially to rise; this type of monetary emission, a fiat flow-reflow of payments as double-entries in bank ledgers, causes financial over- inflation and economic production suffers. Any formulation of the production function is mainly for heuristic purposes (e.g. capital=K, labor=L , easily generalizable by additional factors, like: natural resources, entrepreneurship, money), but it goes without saying that banks should not be able to lend more money than they have income deposited, not more than the amount of income generated by production; concerning future bookkeeping, a technical separation of money (emission), income (deposits/dividends) and fixed capital (profits) has to be achieved and an international currency clearing unit, in real-time, should settle payments between nations. Money must regain its natural function of circular and vehicular means of payment for the temporal period of economic

production; it does itself not exist in continuous time, but monetary circulation is a discrete event, e.g. saving and investment are logical identities, but do not perform in equilibrium conditions. Empty monetary emissions, that do not reflect the quantitative relationship of combined productive factors in a given period of time, are a toll on economic growth; in other words, the current monetary and accounting practice does exactly reflect the ignorance of spatio-temporal entropy, i.e. there is no physical evidence in the natural laws of economic production for this kind of numerical artifacts. In addition, Goodhart's law applies to central banking: an observed empirical and statistical regularity will tend to collapse once pressure is placed upon it for control purposes; in other words, the nature of monetary management cannot be controlled by artificial means since equilibrium states in nature are impossible.

Mathematical objects have to follow precise rules, but physical laws work by evidence; consequently, we can only reduce actual objects, but of course not the hidden truth or construction principles of 'reality'. An exemplary reduction of monetary units to properties is the best method to eliminate artificial objects and to formulate a collection of basic sets, governed by similar physical laws. However, money definitely obeys 'new' laws at higher levels; high-level laws are simply not reducible to low-level laws, but the laws of each level above follow from laws of the level below, i.e. the physics of socio-economic systems, e.g. monetary systems, cannot be easily reduced to some kind of classical textbook thermodynamics and/or statistical mechanics. In this case, we would commit a grave methodical error; the interplay of natural law, human behavior and ethical principles is a bit more complicated, due to the temporal fact of evolutionary life processes that did not take place in the plane physical world. In addition, the social world of economic action is based on natural law, but it works via a circular feedback of objective facts and subjective perception; remember the traditional saying: reality is no-thing, perception is every-thing.

The scientific method is the technical way to develop from perception to observation and measurement, to obtain reasonable and workable results; consequently, modern monetary economics shares a common foundation with quantum physics. Our money is a quantum currency, the value is not constant and extremely driven by what people think it is worth; it leads an indeterminate probabilistic existence as do quantum states, but it does behave in no way neutral to the functions and factors of production. 'Reality' is created through our perception and is therefore not independent of us; the equivalent principle of uncertainty is operating in quantum physics. Modern monetary production economies have to find a scientific and methodical balance between Newtonian deterministic monetary mechanics and probabilistic quantum uncertainty; the only physical means to define currency value is by comparison with a known quantity; therefore informative transparency and a defined yardstick are necessary to ending the opaque techniques of private and central shadow banking. Financial markets and monetary economics offer the only social scientific possibility for experimentation and observational testing of economic theories in order to obtain solid data; the thermodynamic laws of energy conservation and entropy increase are phenomenological statements and general principles to formulate macroscopic empirical facts of physical evidence for practical applicability, i.e. mathematical formalization contributes little to the understanding of physical principles of economic action, especially of monetary behavior on production (e.g. the velocity formula of: MV=PQ is a misleading relict from the time of coin circulation). The natural fundamentals of space (P=production) and time (M=money) are interchangeable explanations of reality; the interplay of physical production and monetary processes moves the economic system. Today, M has become the space for decision making, monetary policy is defined in M and commanded to P; M regulates business activity and accounting standards, i.e. the uncertainty at the micro-level is created at the macro-level via central monetary planning agency. According to the law of monetary velocity (of profit, loss, cash) only a mega bill can absorb net profits to date as time behaves never neutral! Inflation is maybe the economic signal of entropy?

M is actually a balance sheet; the standard model of M as ‘reality’ of cash and assets is indeed a money illusion because the true elements of M can never be seen, but they can be identified by cause and effect, i.e. real money does not exist and only a relativistic theory can explain the ‘reality’ of modern money markets. Monetary velocity behaves in quantum waves of profit and loss; everybody can experience this quantum duality of P and M at a coin operation machine and observe the particle nature of money. For each physical transaction in P, at successive periods of time, a consolidation of M entries of past transactions is taken, to measure the financial position of the economic agent in stock magnitudes. In P, processes are time dependent, but in M, time is not continuous, it is being quantized; the connected chains of payments and accounting operations and the consistent recording of book-keeping entries never behave in real time, they behave as whole numbers to count monetary units. Any monetary reform that will be worth its name, has to resolve this disturbing duality of P and M; currently, banking operates in financial probability waves that try to quantize their financial mass faster to the rest of the monetary universe ; however, only the road of organic physical growth can assure sound financial institutions and companies. Therefore, the monetary economics of spatio-temporal entropy, the physicality of money and book-keeping have to be better understood, especially the harmful effects of M on P; the dynamic and efficient interplay of physics (laws), psychology (behavior) and ethics (principles) has to be reviewed for a possible remedy of the current financial mischief; at the center of these exact observations is monetary behavior. It is our guess that the monetary practice of fractional-reserve banking will be exchanged for better tools of monetary management, leading to 100%money and/or a ratio of precious metals; as a lot of politics is involved in this heuristic process, let us hope that pragmatic reasoning will prevail on the level of physical evidence in monetary affairs: it is indeed not easy to catch a fox in the woods without deforesting it. Economics as an established profession, does not suffer from specialized particles of scientific knowledge and research practice, but from a cognitive lack of a unifying

methodical approach, i.e. the methodical measurement and physical evidence of economic and especially monetary phenomena lies in between hermeneutic interpretation and mathematical formalization. Among the ethical principles of the Hermetic Corpus, one can study the equivalence principle: as above, so below-as below, so above; most ethical principles of time-tested wisdom literature are actually a plain reflection of natural or physical laws in simple language to guide human behavior (in order to reduce the amount of disorder in a social system). In our perception, the temporal duality of the production (P) process for marketing and the monetary (M) process for payments is a cognitive problem of socio-physical entropy, i.e. it refers to a probability distribution of uncertainty in a cybernetic duality of random variables and it is methodically difficult to quantize this temporality of P and M: (1) Money is not continuous, it flows in discrete monetary units; (2) Money behaves both as payment and a signal for future production; (3) Money movement is random; (4) Money locus and momentum cannot be known at the same time as, for example, the realtor principle teaches; (5) The nature of economic 'reality', concerning P and M, is very different from what we expect rationally. The monetary quantum works like a frequency in an economic hologram and moves the temporal duality and entropy of P and M in feedback circulation. Consequently, the general principles of quantum mechanics (below) and quantum thermodynamics (above) can be wisely applied to understand the cause and effect of the monetary quantum on P; the physics of the monetary system (M) has an economic effect on P (production system) and can cause an eminent monetary bias in the marketing cycle. The industrialization of the advanced monetary production economies was financed via private fractional reserve banking, leading ultimately to the shadow command policy of central monetary planning agency; in any case, it is time to reform this monetary trend via the physical practice of 100% money and banking, setting a clear economic mark between the polity and the market, i.e. the mathematical gambling of financial artifacts and electronic digits causes harmful physical effects to the economic production function of human societies and to the exercise of human freedom.

How can monetary economics move from a profession to a science? Is there any scientific proof, physical evidence or experimental design available for this research problem or are we condemned to imperfect but prudent intelligent guesses? How has the physics of the monetary system for the information age to be operated? Is there any financial method to eliminate human influence on base money? Must we return to the yellow brick road or are there more modern techniques in reach to control monetary quanta? Do industrialized and industrializing countries actually apply central command monetary planning to save the capitalist market economy of private fractional reserve banking or can monetary state capitalism only survive by socialist financial planning? These are puzzling questions, concerning the monetary problem, but we need a more scientific method to prove theoretical theorems and ideological claims; we strongly promote 100% money and banking, to keeping the monetary quanta as constant as possible, in order to reach more economic sustainability. As we already explained, our experimental attention is focused on the entropic or negentropic interplay of space (physics/production/P) and time (money/quantum/M); even the much lauded Deutsch Mark of the Bundesbank had lost almost half of its purchasing power in the 50 years before the Euro, due to fractional reserves and we have to count with an equal fluctuation and decrease of purchasing power (1-2% annually) under a gold ratio, because economic productivity and precious metal quantity are never in a behavioral balance, according to quantitative economic history. In a 100% money and banking system, only savings can be lent out and bankers become mutual fund managers; any socio-economic system that uses the market as knowledge gathering instrument for human exchange cannot function without monetary stability or robustness, i.e. the monetary quantum must be hold as constant as possible to guarantee economic growth and prosperity for the general populace of a sovereign territorial polity.

The physical behavior of monetary systems works on three inter-connected levels of operation:

A: Spatio-temporal entropy, i.e. quantum thermodynamics of production/P and money/M, e.g. duality of bad credit that drives out good money, according to Gresham's law;

B: Monetary quantum behavior, i.e. quantum mechanics of the monetary production economy, i.e. duality of M and P, e.g. chain of single payments as market signal;

C: Bookkeeping, i.e. accounting measures of M and P, e.g. duality of entries; these operation level is very crucial for global trade as there is no real clearing unit for international settlements, e.g. as a measure of renewable or clean energy.

Political feasibility suggests that a radical 100% money and banking reform has to be designed as a systemic mix of central banking (currency emission and stability) and private banking (narrow deposits and investment), i.e. a clear legal distinction between money and credit. Alternative currencies (local currencies, gold ounces, precious metals, barter, etc.) should be allowed by law whenever there is an operating market, to decentralize money gradually and to strengthen its original role as a market replicator. The shadow Ping-Pong of private vs. central banks and the dangerous trend to a central command monetary economy must be stopped as it is as unsustainable as any centralized administrative planning of socio-economic systems. The 'new' monetary system will put a high wall between the monetary quantum of an independent public authority and the credit quantum of private commercial banks; countries with appropriate natural gold resources or precious metals (e.g. South Africa, Russia) might even opt for a 'yellow brick' standard, to stabilize their economies for the future. However, empirical data show no statistical evidence for the superiority of 'yellow bricks'; the golden period from 1870-1914 was at least as volatile for inflation and output as

‘papyrus’. The cruelty of macro-economic decision-making will not magically vanish via the rational application of precious metals, but the decentralization of economic decision-making is the decisive point as no human oracle can know ‘it’ all. According to mathematical law, the current debt chain system will abolish itself (implosion or explosion?); in order to circumvent the final margin call, it is necessary to research into the movement and development of the monetary quantum in our electronic age, starting from the physical basis of natural-law monetary science (monetophysics). It is indeed timely to finalize the financial religion of monetary alchemy in economic science and to strategically move economics from a profession to a science; human economic action is the result of biophysical, socio-psychological and ethical decisions that are governed by the construction principles of ‘reality’. Ultimately, we are discussing the future of human civilization on this planet; as all human societies are no more natural economies, it is vital to attack the money problem on a physical scale. Our proposal is also not about seigniorage for a grand leviathan, but about restoring legality to financial transactions and to rectify a violation of natural law that causes harmful effects to the working body economic and politic. The polity and the market evolved as a social duality of economic systems control and human monetary behavior must submit to immutable laws of nature.

Before we can embark on more precise observations of the monetary quantum, let us take a cognitive walk on the origin and nature of interest. Debt changes through the continuum of time and is modified by interest: 1) Why is interest fluctuating? 2) Why does interest exist at all? 3) What happens with interest, once it is paid, booked or transferred? Our answer: Interest occurs because the monetary quantum at time1 possesses less value than at time0; between time0 and time1, the life time of the creditor has become shorter and less time remains for her/him, to redeem the money for a purchase. Without mortality there would be no interest; quantitative economic history reveals that interest is very high in social

periods of fast alternating scarcity (i.e. extreme price fluctuation) and low life expectancy; when price fluctuations stabilize and life expectancy rises, you can observe a decrease of the interest level (e.g. in the golden 19th century, European interest on capital was about 2% for English and Prussian securities). In any case, the debtor always has to deliver a plus-payment via the market; the quantum duality of the market works as a place of exchange and payment (+ plus-payment=interest, repayment of credit, eventual redemption of debt); the destabilization of every human society has its roots in the non-performance of payments (such social events did also happen under a commodity credit system when open claims could not be redeemed). Debt causes always more debt and the debt process is nothing else than the entropy of an economy; any economy that allows for debt accumulation, exchanges real economic productivity with artificial interest-pushing (today: electronic banking computation). Consequently, productive income declines and income via interest-pushing increases; according to mathematical law, inflation can never catch up with debt and progressive insolvency or bankruptcy become pathological systemic behavior. However, this current practice of fiat credit and interest, driven by non-natural fractional reserve banking, has nothing to do with real interest on credit (based on 100%money). Scripture was probably invented by Sumerian bookkeepers, but it is no coincidence that all holy books of humankind (e.g. the monotheist literature of Torah, Gospel, Qur'an) contain explicit warnings against the non-natural multiplication of interest; nevertheless, this author has found no textual evidence against natural or real interest (e.g. folk tales of the exponential multiplication of a corn on a chess board are another source of ancient human wisdom about the working of mathematical principles in 'reality'). A human economy is the productive result of space/production/P, time/money/M and energy/entropy/E; economic production quantizes time and money quantizes economic production, the monetary quantum consequently checks economic productivity. Therefore, in a monetary production economy, money has to be an exact physical representation of economic production in temporal and energetic terms, i.e. 100%money. In the physical laboratory, when energy is at zero-point level, time is eliminated and entropy is absent; ultimately, energy

(or condensed energy=matter) derives from light as a temporal product, i.e. time is the duration/difference between cause and effect, light permeates space, time and energy as causal agent. The monetary quantum has to embody these physical relationships of economic production time; in the economic laboratory of production, money is the decisive signal for human action; physical abuse of the monetary signal causes harmful effects on human economic productivity, i.e. the non-natural multiplication of fiat credit and interest is the root cause of economic crisis and breakdown (e.g. the collapse and systems change of the Soviet Empire was the simple result of a liquidity run by accepting the terms of trade of the 'West'=fractional reserve banking; for example, the consumer gulyas communism of Janos Kadar in Hungary was a pure credit bubble that was physically not backed by economic productivity). This only goes to prove our basic dictum that the monetary quantum supersedes the internal market and polity of a nation state and that no economy is a monetary island (remember Iceland).In one sentence: money quantizes economic production time.

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QUANTIZING MONEY

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Summary: The marginal minimization of the reserve requirement on demand deposits is the single cyclical cause behind the long-term crises of the monetary production economies and progressively decreases the time value of money on economic productivity. The total economic cost of this monetary and banking system (fiat credit a priori via private commercial banks; fiat money a posteriori via public monetary police) is the loss of dynamic efficiency in the space-time production structure, i.e. the quantitative increase of entropic volatility in the monetary production economy equals the quantitative increase of the fiat credit quantum (mechanically and thermodynamically). A radical maximization of the reserve requirement on demand deposits is the basic economic remedy for the temporal monetary stabilization of the space-time production structure, according to the natural/physical laws of human economic productivity.

Key words: temporal value of money; space-time production structure; reserve requirement on demand deposits; radical maximization; total economic cost of marginal reserve minimization

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The monetary universe and its physical effects on economic productivity are a perfect accounting system and the systemic laws of monetary behavior are similar to physical events. Money behaves in the same way, somewhat quantum mechanically and thermodynamically by invariant effects, to similar complex sequences of economic events. The probabilistic and deterministic nature of money causes seemingly random effects as the successive values of all numerical and periodic functions are normally distributed; quantum monetary logic is the research into the relationships and quantities of monetary production economies invariant in time and space, that is natural-law monetary science or physics of monetary production systems. Monetary analysis is a powerful investment tool and quantitative monetary change leads to fluctuations in economic productivity and market prices; any pragmatic and cyclical market analysis points to movements of the monetary quantity and interest development, i.e. the amount of the reserve requirement on demand deposits is the single most decisive economic cause of productive and price behavior and the central bank command policy on reserves directs the commercial behavior of private banks, e.g. liquidity directly effects economic production via monetary time value. Every economic activity is governed by the temporal momentum and every investment is a temporal decision; saving and investment are economically limited by the natural laws of spatio-temporal entropy and progressive interest is poison for the markets. The exact collected knowledge of about 4000years documents that a run into precious commodities (e.g. diamonds, jewelry, art objects) always signals apocalyptic behavior and that a raising gold price works as a monetary value detractor; the price movements of gold do indeed reflect the political and economic problems of a country, i.e. it is a measure of social

instability and the game does not always stop before a fire in the casino breaks out; very few people will gain a chair when the music stops, says a Keynesian metaphor. Capital growth, the most important sole factor in a market economy, works only by the economic productivity of entrepreneurship/innovation and not by financial alchemy; in addition, the markets have no memory and an investment is no instant purchase of the future, e.g. a time series under 50 years is by all mathematical laws to short for a probability accounting and a stock market generation changes every decade. The inflationary temporary momentum always appears with progressive interest and both decelerate the replicative matrix of the markets; consequently, monetary behavior quantizes and dualizes the economic productivity of land, labor and capital via spatio-temporal entropy. The quantum leap from the professional religion of money to a natural-law monetary science is an iconoclastic research process, but we urgently need Occam's razor to quantize money and to work out the physical nature of monetary production economies which are a market-based social event. In any case, the natural laws of the monetary quantum on economic production are immutable physical relationships whatever technical form of money (technologically: from stones to electronic digits) evolves on the markets for human exchange and credit. The monetary evolution of the economic quantum system, of which our productive behavior is its time-dependent wave function, will surely correct monetary quanta that are not backed via a physical increase in voluntary saving, i.e. fiat credit cannot artificially reduce the natural length of the production time (for the consumption of valuable goods) as pricing relates physically to production time, e.g. money quantizes economic production time. Cost and value (utility) are quantum relationships and non-productive biases of the monetary wave function are an existential threat to the body economic and politic. Yes, money can be created at the expense of economic productivity; the multiple creation and expansion of bank money=credit=debt checks and depresses long-term economic growth by short-term prosperity. Only a 1:1

exchange of monetary quanta via full/maximal reserves can stabilize the economic production system and make deposits safe and liquid (payable on demand); under fractional or minimal reserves, it is not possible to police the artificial expansion of money and only the owners of private commercial banks are earning economic profits, i.e. the quantum wave function of checking accounts for customers is converted into a privatized income pool, e.g. this monetary wave mechanics and thermodynamics is an ongoing systemic economic error that depresses economic production (empirical ratio:1% 'earns' and owns over 50% of human economic productivity, with progressive tendency). This economic paradox can only be resolved by analyzing the effect of the monetary quantum on human production systems in a market economy. The destructive Doppler-effect on economic liberty via collectivism and/or centralism (of property, credit and interest) is the main cause of radical social conflict, war and revolution in quantitative human history. The monetary quantum is the genetic code and cultural memory of a market economy and directs entrepreneurial activity, capital growth and human knowledge; 'reality' and its construction principles or physical regularities are of dual nature and inter-active origin .Even the most exact measurement is only a single event or point on a relative and reversible temporal chain, but 'time' is the difference between cause and effect (at zero-level energy, no time exists in space). The quantum monetary systems approach understands that all living organisms are temporal 'clocks' and that spatio-temporal entropy (energetic force of systemic disorder) drives the diversity, selection procedures and adaptive behavior of monetary evolution in human economic activity, i.e. we are facing a humanistic existential tech-know-logical challenge and scientific problem-generation that can only be solved by clear methodical thought, a liberal spirit and hard ethical work. Consequently, a new monetary species is in the making, but its future behavior will also be limited by the same physical properties of economic production; the evolutionary economics of money is a quantum paradox and it

cannot be grasped with the measurement methods of noncontroversial Aristotelian logic. Quantum monetary science, the approach to creatively combine economic, mathematical and physical knowledge (of socio-economics, measurement methods and biophysics) can eminently reduce systemic risk and professional managers and economists can further prove their technical artistry on market and/or specific risk. The economic and policy management of the monetary quantum surely involves hidden fractal dimensions and the Coasean paradigm clearly points to the total costs of the market (externalities) and the polity (institutions); what about the social costs of money and the monetary system? Traditional statistics/stochastics fails, if the fractal dimension reaches above :> 1.5-1.6 (e.g. 1995-2000/Dow Jones; 1998/Ruble crises) and also the extended tools (e.g. arch/garch; Hurst exponent; mf-dfa; wtmm) cannot catch up with the systemic entropic volatility of the monetary and market production economy (and: production is already scientific and tech-know-logical).It is this economic paradox of the monetary quantum that causes the effect of dynamic fluctuations on productive efficiency without being itself a production factor (‘money drives production, but actually produces nothing; it is the non-productive cause of productive effects’).We would really prefer to look into P.Erdös’ ‘divine book of proofs’ to find the instant earthly solution, but between eternal paradise and mortal men lies the economic time value and physical relationship of money and production (and: wo-men create money in their own image; has anybody counted the professional gender ratio in high finance?).An old Soviet joke tells that Breshnev sees good dressed civilians marching at the front of the annual military parade and he immediately asks the intelligence service for the explanation; the official elaborates: Leonid, these are monetary economists and bankers; they can easily destroy the economy of any country without using the physical force of military. In any case, the monetary detection of market and production signal processing lies at the heart of the quantum scientific method and every form of financial risk management will be facilitated

under a banking system of full/maximal reserves or 100%money/credit. Furthermore, the new information electronics technology can propel forward the dynamic allocating knowledge forces of the markets against the static inertia of monopoly, privilege and protection in the global economic polity. The minimal reserve fiat credit system accelerates the destructive entropic effect of the time value of money on economic production; this mono-causality is driven by systemic non-locality:

A= the monetary process is discrete (emission in quantum waves) and dual (saving/payment vs. investment/bookkeeping);

B= the quantitative decrease in economic productivity (real depression of growth) results from a quantitative increase in fiat credit (artificial monetary prosperity);

C= the quantity of debt increases systemic economic entropy, quantum mechanically (by every single payment via debt) and thermodynamically (by total debt expansion=inflation);

D= the quantity of inflation can mathematically never equalize the debt quanta;

E= the centralized monetary injection of inflationary quanta increases the temporal illiquidity of insolvent quanta:

F= the acceleration of the debt quanta increases the quantity of exponential debt ultimately;

G= an exponential debt chain quantum ends automatically (final temporal monetary devaluation);

H= asset devaluation (and in progressive cases, asset destruction=war/revolution/radical social conflict) and high interest (contrapuntal deflationary forces) decrease the inflationary quantum;

I= the productivity/debt quantum cannot be equalized by an infallible debtor and/or fallible creditor in a fiat credit system=minimal reserve banking, according to mathematical, physical and economic standards of logic;

J= the monetary quantum can only work in its natural/physical function as a market/productivity replicator under a full reserve banking system that separates money from credit (1:1 banking).

Conclusio: The nature of the reserve requirement is the single monetophysical mechanism of future economic productivity, determines the probabilistic time value of money and quantizes economic production via spatio-temporal entropy; today market globally, via quantum mechanical and thermodynamic monetary time value processes of human economic production.

The structural properties are:

1= debt= payment without previous productivity or voluntary saving;

2= credit= loan of monetary quanta;

3= interest= plus-payment in % on credit quanta;

4= money= econophysical measure of productivity via time value as market replicator;

5= inflation= artificial expansion of the monetary quanta via fiat credit.

The model relation is:

Productivity/debt x time/inflation= value of money

-temporality is decisive, measurement via purchasing power parity/ppp, e.g. by simple food basket and/or basic human service (who eats gold or drinks oil?)-

The serial de-finite set of monetary relations under fiat credit/minimal reserves reads:

100%debt…credit…interest…inflation…0%money

-debt as continuous temporal phenomenon for=monetary value destruction-

The monetary process under dynamic efficiency reads:

100%money…credit…interest…debt…0%inflation

-debt as discrete inter-temporal phenomenon for=economic value production-

This simple heuristic logic clarifies the serial effect of monetary ‘creation’; the debt-free emission of the monetary quantum is the causal necessity for a healthy market production economy and implies negentropic temporality; however, quantitative economic history shows that there exists a kind of ‘natural’ fluctuation of the time value of money(1-2%). The physical reason of this economic phenomenon is still a scientific guess, but methodical intuition points to a reasonable function of economic growth via ‘natural´ instability or adaptive physical development of the body economic.

Conclusio: Continuous and progressive debt via minimal reserves destroys the discrete duality and accountability of the physical time value of money on economic production=productivity is shortened and finally stopped.

Future monetary evolutions will reveal, and contemporary financial evidence documents, that the minimization of the reserve requirement is the single cause for the depressive effects on economic productivity. Mathematical relationships, e.g. traditional financial statistics/stochastics, are not identical with natural laws of economic production, but cognitive and linguistic inventions of the human

mind to abstract, reduce and condense information from real world complexity, i.e. we are always in want of better methodical mathematic language to condense complex bodies of economic reality. Physical relationships of the monetary production economy are supposed to explain the empirical facts of the nature of economic behavior by methodical evidence; therefore, it is decisive to understand human economic activity and especially monetary behavior as extremely correlated atomic modes on a single holistic continuum of physical production as space-time structure. The quantum relationships between economic (esp. monetary) behavior and physical production are may be difficult to extract from complex socio-economic event chains, but can be identified by elaborated economic method (words are clouds, method is rain).The a priori emission of private commercial fiat credit (x interest) under minimized reserve banking and the a posteriori emission of public fiat money is the driving destructive force of the modern market economy; risk management and monetary reform have to concentrate on this social mechanism of modern evil that performs an ongoing quantum destruction and devaluation of the physical time value of money on economic productivity, i.e. only **a radical maximization of the reserve requirements can stabilize the space-time structure of the monetary production economy and market growth.**

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Natural-Law Social Science:

A methodical synopsis of socio-economics as an exact philosophical science

(of time, money and energy)

The social science of natural law, founded on the methodical principles of abstract theoretical reasoning and concrete rational inquiry, is practically a lost science; the basic postulate of natural law science is the one idea that natural law is valid at any cosmic time, i.e. every naturally occurring event is bound to temporality and all social systemic processes are natural events. However, total entropy change increases for every naturally occurring event, no human society got ever something for nothing, social entropy always increases and there is no economic back to an absolute point zero. Instead of a "sociologie" as "physique sociale " that A. Comte envisioned in 1838, we have got sociological research literature and advanced statistical essays, i.e. social science moved from the dynamic concept of natural law to static methods of perception, observation and measurement of social events; a classical mathematization and modern computerization of the static method did also not better the research methodology , because "as far as the laws of mathematics refer to reality, they are not certain, and as so far they are certain, they do not refer to reality", a statement generally attributed to A. Einstein. The real advantage of the mathematical method over human language is the qualitative reduction of quantitative knowledge bodies into abstract symbols (formulae, equations, calculations); reality is the resulting law of construction principles in natural event chains, but this does not automatically imply a simple transfer of Lagrange equations, thermodynamics and Carnot cycles on social reality as systemic processes in human societies are of higher order (3^{rd} interactive order of nature, economy and humans and vice versa); there is no easy walk in reality. Our argument is that the different approaches in social science (with the matrix poles of: materialism versus constructivism/ and behaviorism versus cognitivism) do actually reflect serially different temporal events of natural law and that dynamic efficiency can be gained via exact temporology. Our viewpoint is insofar a pragmatic one as that we want things improve to work by extra-temporal expertise and our starting point is physical cosmology. Therefore, we have at first to research into the origin and nature of time or temporal events and to distinguish between local arithmetic time, global geometric time and universal cosmic time or cosmological time.

The idea of time in physics is between a geometric concept of the space-time continuum and the arithmetic concept of time; there is local arithmetic time related to a succession of experiments in time of clock readings (a closed system of periodical events) and there is unified objective time for all space, an open world-wide pulse determining the flow of absolute universal time. Human biological age is determined by that permanently flowing time, not by local measurable time. Time appeared simultaneously with the appearance of the spheres of our universe, the existence of time before the appearance would have required a motion of spheres to determine a time interval. The physical temporology of cosmological special relativity (google: astro-ph-0103008) is an extension of Newtonian absolute time and Einsteinian relative time and stands in contradiction to the Aristotelian postulate that the universe evolved from eternal matter; cosmological time is unified for all space, the contraction of all temporal lengths is the same as in Einstein's theory, but not because of the relative

velocity of reference systems, but because of the backward or retro- motion in time. As the universe evolved from a singular initial point, it comes clear that all distances in the past were shorter; this means that an interval of 1 second today would have lasted 10 seconds then, the interval between two instants of time equal to 1 second today increases 10fold; we are unable to reach the singular point of temporal origin even mentally because this would take infinite time. A constant expansion rate of our universe plays the role of constant light velocity and the age of the universe is a universal constant, this means that the age of the universe tomorrow will be the same as it was yesterday or today (the speed of light in vacuum and Hubble time in vacuum behave the same way and are both universal constants); light travels at 300,000 km per second when measured physically in vacuum, if we try to decrease or increase this rate by moving at very high speed or against the direction, we will measure the same number as before, i.e. the measurement instruments adjust themselves to the same final result. Consequently, according to cosmological relativity, all natural laws are valid at any cosmic time and this is the starting point of natural-law social science. The discovery of the laws of nature and the social perception by the human mind of the higher physical order will enable us to complete our role as conscious creatures and to perfect the entire social world; the multiplicity of the social cosmos derives from the unity and physicality of natural law, manifesting the original essence and nature of human life. Life being continuous or constant change, is equitable with continuous change, from the beginning to the end; all change is systemic, from the universe down to the smallest cell and an interlinked hierarchy of systems is involved in the change cycle-process – though this change is cyclical or repetitive, it is also progressive, like a spiral rather than a linear projection, depending on the duality of the universal laws of nature; therefore, humanity must learn to live in socio-economic balance towards sustainable natural harmony in cosmological time. The unity of natural law is not random or casual; it is causal and performs in universal time-tuned change waves, i.e. the natural science of time is the key to open up the research door for an exact socio-logical discipline. As we already mentioned, we do not claim to simply or easily transfer physical and natural-law concepts into social science and we will diligently try to integrate workable literal and statistical assumptions of socio-economics into our methodology, to arriving step-by-step at a natural science of socio-economic systemic processes. The theoretical insight into the unity of natural law will give us more practical degrees of social freedom and progressively enhance our ethical liberty.

In our age of intellectual hyper-specialization, the diverse facts multiply and grow increasingly and extremely disparate; this is not only because the technical forces of science are continually and rapidly growing, but because the many disparate facts cannot easily or simply be combined into an advanced mental order. Humankind progresses in the uncertain feeling of continuous change, in contradictions, paradoxes and set-backs and growing complexity means existentially increasing uncertainty ; in the natural succession of social orders, we can see the functions of once established customs and institutions and man’s consciousness develops; consequently, in the succession of the cognitive stages of consciousness, we can practically catch scientific sight of the natural law of the social world order, under the changing conditions of economic uncertainty; it can be considered a general rule that human activities that reduce this uncertainty or risk about people’s behavior will lead to real improvements in economic welfare by increasing total utility (in a world that displays diminishing marginal utility and where people behave simply not logical, on the large scale). In any case, the learning process of any discovery is basically intuitive, but methodical logic is used to confirm results; even in an artificial field like mathematics, progress is not made by logic and most interesting is the heuristic way of the scientific researcher to discover theorems and proofs; the human brain is a connection machine and not a von Neumann one. If our objective is really to model socio- systemic processes of natural law, then pure logic is an erroneous starting point; the ability and feature of human intelligence to reason logically is not a standard social practice. It is also more than important to keep in mind that the origin

and nature of human economic activity derives from the rules of temporality or temporological law, i.e. all socio-economic systems are bound to the physical limits of time, money and productivity, e.g. if the debt of households, firms and institutions excels the total factor productivity (of: labor, money, time, knowledge), an inevitable temporal acceleration of events takes place; there are enough documented historical phases of accelerated temporal intensity where the monetary stress of a debt economy did self-automatically grew not in linear form, but exponential progression. Clocks appeared in the Occident in the 12th century when the natural exchange economy was actually replaced by money; in the Renaissance, during the great debt or credit wave, the tower clocks began to count the ¼ hour for the first time in human history; early industrialization, with growing necessary market precision of production and distribution over long distances, invents the chronometer in 1763. The economic evolution of social systems is not a random process, but a normal result of natural law, with historical periods of high selection pressure and eventually intelligent human response to changing conditions. It is therefore decisive to study A) Quantitative economic history, B) Group-psychological experiments and C) Informed economic forecasting; this can be done on the ethical, economic or ecological level of natural law.

In our times, the temporal productivity of the knowledge worker is an absolute critical factor of market processes; in addition, the industrial management rule of increasing labor productivity via capital, automatically resulting in cost reduction, is no more valid, i.e. the productivity of money can decrease labor productivity/value creation per capita. Furthermore, nothing educates people better economically than scarce and expensive money because under the natural pressure of high cost management, the human ABC of economic action will be profoundly learned; nothing spoils economic thought faster and heavier than the instant availability of much and cheap money; the scarcity of money is the only economic means to foster a free and entrepreneurial spirit in a human society and to advance the managerial transformation of knowledge into value/utility. The managerial classes in private firms and public institutions still have a knowledge deficit in perceiving, observing and measuring the fundamental nature of this ongoing socio-economic change. It is a social scientific fact of natural law that the temporal factor cannot be smarted out by electronic computerization; money as accounting unit and token of payment must reflect the physical or natural boundaries of economic life. Any collective belief in monetary alchemy must ruin economic productivity; the only sane role of a speculator in a market society is to reduce uncertainty or risk via a gamble over prices/pricing. A market economy can only operate under the criterion of liquidity and profit maximization is always an extra-temporal phenomenon, e.g. in the economic case of an entrepreneurial innovation; private firms do stay in competitive business via their real operative performance and the managerial design of public institutions should be small, to avoiding overhead from the very beginning. The social world does pertain to natural law: 1) in a human economy, you cannot get something for nothing, 2) economic entropy tends to increase, 3) no economic return, to absolute point zero, is possible. From this follows that thermodynamic system laws are intelligently applicable to the working body economic of a human society, but a higher order of empirical insight and understanding into the natural law of social order is urgently needed, i.e. wars, revolutions and political radicalization are signals of lacking cognition into natural law. These findings do consequently not support human theories of social justice that are not grounded in the science of natural law, e.g. the theorem of interest-bearing capital in Marxism/because extra-value can be created by the circulation of fiat credit of private commercial banks, thus artificially expanding the real possibility of a 24hour marginal exploitation of labor . Also many other social theories of a natural order of the human economy are based on the empirical ignorance of natural law science; social justice and natural law will not fit easily into a mono-causal formula, equation or calculation and much more precise social thought will be required to resolve some of the most burning questions of human existence which is limited by the

natural law of finite temporality. Speaking clearly, it is not sure that the social inquiry into natural law will grant us instantly a redemptive value and it is surely not research into immortality or infinity; the biophysics of socio-economic transformations is based on natural law and we perceive cultural ideas and ideals mainly as a workable human response to coping with reality. What really matters is consequent scientific research into the construction principles of this reality; however, it goes also with any doubt that ancient cosmological wisdom implies very much time-tested knowledge of natural law, thus we see no real conflict between classical and modern thought, except on the temporal continuum. In any case, human life is complex, natural law is complex and economic decision-making is also complex; in our modern age, the driving factors of this complexity or multiple inter-connections are demography, technology, ecology and debt. According to natural law, an economy cannot satisfy needs, it can only cover demand; and demand are only those needs where somebody can pay for, i.e. there is never enough supply for the needs of this world.

The natural forces that provoke recurrent recessions and depressions are merely waiting for the return of similar socio-economic events; we still do not have the wisdom and ability to eliminate an economic collapse like that of the Great Depression. Extreme events, like the breakdown of the banking and financial system under the weight of debt default, are still possible although economic science has gained already more knowledge to use monetary and fiscal policy to tame wild events, but we admit that this wisdom is not based on textbook economics. It is impossible to manage an entrepreneurial firm by the rules of accounting and we cannot quantify corporate leadership via monetary units; the logic of financial economics does not create real productivity and utility/value, i.e. what is generally understood as living standard and welfare. On the contrary, financial logic does extract economic resources from real value creation into money illusion bubbles (like shareholder values) and destroys sustainable economic conditions, i.e. history teaches nothing but punishes brutally for the lessons not learned. The real source of long-term cash flow for any enterprise is the customer value; false monetary thought and methodical financial mischief can ruin an economy and quantitative economic history is full of negative examples when the dominance of money over the economy gained social momentum as a political combination of group psychology and economic religion. In any case, money is not an omnipotence mechanism of economics, but it is a market replicator in the economic chain of payments. All human economy and economic history is not product of a voluntary act, but a necessity of natural forces, embedded in a temporal series of payments, accounting and stock building, i.e. human economic activity is socially governed by natural law. Erroneous monetary thought and methodical financial mischief did historically always result in a rapid entropy of the socio-economic system because the mathematical logic of financial economics cannot communicate with the physical law of natural feedback signals from the real economy, i.e. in this case, the finance-mathematical logic does block the biophysical communication and transmission of economic signals from the social system and its natural environment (remember the above mentioned saying from Einstein). Medically speaking, the malady of the patient is caused by the application of the wrong substance with an overdose and even a precise post mortem is no cure (physician heal thyself and patient heal thyself, with the medicine of natural law and stay alive). The management of the next society will pay definitely more attention to this economic communication processes between the value creating system and its socio-ecological framework. What really matters are earnings after everything and the proper role of financial logic and monetary strategy is to formulate, equate and calculate the final results of economic circulation; however, these mathematical function does work only after toil and delivery when payments are received, accounted, emitted and reinvested. Economic complexity cannot be calculated or fabricated; the only workable social strategy is communicative adaptation and learning, e.g. the skilled chess-player does calculate none to one game-operation while immersing physically into the flow of the mental game. Consequently, the

working body economic can be precisely and exactly understood by the scientific application of natural law on socio- systemic processes.

Human ingenuity cannot circumvent the entropic nature of economic action; the current entropy of the working body economic is a thermodynamic result of the monetary excess caused by fiat credit; some sort of narrow banking system is needed to heat down the economic machinery; only a new economic interplay of private financial intermediation and public monetary policing is the social remedy. The wrong substance is injected into the economic body via financial alchemy; it is the same as if a car should be fuelled by water. It may be the great social illusion of this electronic age that everything is driven by information; all known factors of production (natural resources/land; human resources/labor; technical resources/capital) are indeed becoming knowledge-intense, but information is an operating feature of matter and energy which both derive from light. In all tangible production factors, the percentage of intangible knowledge-intensity may be well up to 80%, but that does not imply that the physicality of natural law does no more apply, i.e. the new economy will be governed by the old laws. Consequently, the electronic injection and circulation of fiat credit units into the working body economic is medically toxic to the biophysical organization of production and distribution in a market society, because money no more serves its original and natural role as market replicator. Its secondary role is that of an accounting measure and its tertiary and most problematic role is wealth storage; in any case, the monetary system has to find back to an economic balance of narrow banking, this means financially full reserves (on credits) for private commercial banks, separating credit (debt) and money technically; the emission of debt-free money will work by legal public authority. The nature of a possible gold standard vs. fiat currency also belongs into the political discussion of this vital and decisive economic problem; however, in a modern market society, we do use money as a communication medium of everyday life and this is the methodical reason why we have to concentrate our rational inquiry on the negative feedback effects of fiat credit on human economic productivity. It should also not be forgotten that especially money has the very temporal nature of reinforcing irreversibility in human economic activity, i.e. the monetary volume increases financially the entropic processes of an economic system which is thermodynamic by nature. In one sentence: the current monetary practice is contrary to natural law and based on an economic illusion. An evolutionary correction of this systemic failure in financial banking operations is inevitable, either by sound monetary reform or by entire economic collapse. Fortunately, today we have more economic knowledge of monetary and fiscal policy than in the late 1920s and more technical ability to tame the depression of economic development. The modern research of complexity science teaches that the physical structure of socio-economic systems functions naturally bottom-up, i.e. macro-economic measures can only reinforce or inhibit micro-economic action which practically means that every single payment matters in a market society as it is the basic physical element of the liquidity chain; the natural micro-spontaneous order of monetary market processes is the replicative elementary mechanism of the working body economic.

Conclusion:

The physicality of money is its medial service as replicative market mechanism in a modern economic society; the criterion of market economics is liquidity and not profit maximization – capitalism as an economic system of private property is based on this financial fact. Keynesianism and monetarism are means to establish a capitalist planned economy and Minsky proved the financial instability of these policy interventions. The emission of fiat credit (and the resulting collection of progressive interest)

by private commercial banks is contrary to the natural laws of economic science and no public monetary authority can statistically and mathematically police this basic methodical error that causes systemic failure. The current physics of money is against the meta-logic of investment into capital and depresses the body economic from growing; some system of narrow banking is needed to rectify the recessive nature of this monetary mischief; it should no more be allowed to create money out of thin air. A total privatization of money and a gold standard are not recommended, a creative interplay of private full reserve banking and a public monetary authority is preferable-the separation of private credit and public money seems to be the best solution. From the viewpoint of natural-law social science, the artificial injection of fiat credit from the private banking system and the subsequent expansion of the monetary volume by central banks is the basic cybernetic error of the modern market society, accelerating the irreversible thermodynamic entropy of the working body economic and causing eventually its entire monetary collapse. Even a socialist market economy is required to operate its financial circulation by the monetary duality of private banking and public authority for calculation purposes as the emerging case of China demonstrates; as we already mentioned above, there is no easy walk in reality. It is therefore wise to adapt to and learn from natural-law social science that the original role of money is that of a market replicator and that only narrow or full reserves do fulfill this physical criterion. We can learn from quantitative economic history that the monetary trend to price inflation is as old as the market economy and that the economic advent of industrial capitalism accelerated this monetary trend with the financial technique of fractional reserve and central banking. Methodologically, it is easier to forecast the economic trend of the real GNP than the real wave of inflation; predicting errors are two-thirds smaller for real GNP and one-third smaller for the real wave of inflation if methodically compared with informed guesses in postmortems. In addition, the experimental findings of group psychology are teaching us a strong dynamic and systemic error of majority biases in judgments of perceived physical phenomena. Knowing all that, it is wise to presume that memory is not history, experience not experiment and extrapolation not future; consequently, the research into natural-law social science will lead to a more sure knowledge- foundation of human action and liberal prevision. In this decade, a sort of narrow banking system will evolutionary emerge by monetary reform or by financial collapse that will economically adapt to the natural law of moneto-physics, i.e. the original and natural law of money is that of a market replicator and its role as a token of payment, a value measure, wealth storage and legal construct are social derivatives of this natural event of economic circulation. In any case, the monetary enigma is most probably the methodical key to an exact social science based on natural law.

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SOCIO-ECO-NOMICS of Innovation

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Timescales and Winds of Change

Change is considered a cybernetic force in living systems, occurring in cyclical, spiral and helical regularity, performing in retro-and progressive intervals, waves or circles. Moderns take generally very little time to reflect about how change took place in their lifetimes and their memory usually points to technical improvement, without perceiving the economic and cognitive aspects of these modifications: visible products=results are seen, but not invisible processes. The permanent metamorphosis of the human living condition, however, is what really matters in our finite lives ;unfortunately, moderns have lost contact to the cultural and natural origins of human change as all technology is essentially culture, i.e. human culture can best be perceived, observed and discovered by its tech-know-logical level. Indeed, change is timeless and any timescale mainly refers to human history as recorded, invented or fabricated. All measurements of time (and change) are bound to the operational measuring scale or device, the Bible prefers generational units, today we apply digital units. Whatever construct of time we may use, might it be arithmetic (local clock readings), geometric (world flowing time) or cosmological (special relativity time), we are unable to look back in real time and human life time is more than a linear series of moments. The regular force that seems to drive all of this change is commonly called innovation, something like a realization of ideas to serve unmet needs, i.e. every innovation is emerging to fulfill human needs. However, it is even difficult to date change exactly, e.g. from the evolution of scripture over the Gutenberg-press to internet-working. Is there really nothing new under the sun as Ecclesiastes claims or do we fill always old wine into new bottles? Are we acting like Sisyphus? Many inventions occurred at the same time and in many places, some inventions are claimed by different collectives and individuals, other inventions were never realized or could not be realized, but innovations are different: the real conversion of knowledge into value (and utility) is a learning process to fulfill human needs, innovation happens when learning converts knowledge into value, utility and wealth; it is process-learning for results/products. From the viewpoint of human action, knowledge is characterized by the selection of behavioral patterns/formulae while learning is the modification of behavioral patterns/formulae .Consequently, learning is a higher form of knowledge and the pure discovery of a fact does not automatically alter the facts, i.e. this is also the reason why most basic socio-economic injustices cannot not be rectified by the cause of innovative change; generally, just the contrary effect appears, leading to a reinforcement of existing trends, e.g. the new fulfillment of needs causes unknown pains. Furthermore, we do not see an overarching theory of innovation, but very different timescales of innovation in quantitative and qualitative terms. The best example is the recent new economy illusion of internet & telecom, resembling Schumpeterian creative destruction or a Kondratiev wave that pushes the world economy to a global financial collapse, eventually leading to systemic monetary innovation. As we already pointed out: the world is full of innovations (‘sleeping and awake’) and there is nothing new under the sun, concerning the cyclical, spiral and helical regularity of human innovative action. In fact, it is healthy to accept this paradox and not to wait for business plans, five year plans or other wish-lists; short-term gain always implies long-term pain, just keep in mind that today an average share is

hold 20 seconds and a currency 30 seconds; the very nature of innovation is gain and pain. From the very outset, we want to make it clear, that innovation was and is necessary for human survival and that it possesses an ethical, ecological and economical dynamics. It is not the way back to Eden, but the technique of survival out of paradise. Innovation is also not the way to economic stability, because innovative growth is by origin and nature not oriented at sustainability. As a matter of fact, modern knowledge & learning will only make human sense & meaning if accompanied by classical wisdom, i.e. to seeing the unchangeable in any change, without giving up the quest for ethical and technical improvement. Our meta-tech-know-logical view of innovation sees innovative change as a fact of human activity to serve unmet needs, expanding the existential horizon of human life. Nevertheless, the quality of innovative change is defined by the organization & interplay of markets & polities --- the market usually being horizontal and thin like ice on a lake and the polity being vertical and weighty, laying on the ice. Logically, innovation is about geometry and space, realizing itself on a cyclical time-continuum (that can, in humanistic terms, better be counted in generational than in digital units). Empirically, innovation can be measured by the type of technical artifacts used in a culture. Consequently, we can perceive, observe and measure sequences and hierarchies of knowledge & learning in the chain of innovative change (=regularity). Moreover, innovations do not happen so fast as most technocratic ideologies claim and they do imply an ordeal of change. Everybody likes the fruits, but not everybody likes the labor. We believe in the customer value of innovation (P.Drucker, The Practice of Management, NY, 1954), the knowledge/learning process in innovation (E.Helpman, The Mystery of Economic Growth, Cambridge/MA, 2004), the entrepreneurial spirit of the innovators (M.Young, The Social Scientist as Innovator, Cambridge/MA, 1983) and economic incentives/returns for innovators (B.Nooteboom, Learning and Innovation in organizations and economies, Oxford University Press, 20001 ; H.Davies/I.Walter, Learning from the Diffusion of Innovations, Univ. of St.Andrews, 2002). It is important to summarize that even the best ‘timing’ of an innovation is bound to managerial leadership, a very clear mission, market sensitivity, user orientation and lean design; furthermore, this is bound to key gaps in special sectors, a balanced investment or funding, large scale implementation, ratios of particular risks, testing methods and organizational creativity. The innovator cannot stand alone with ideas, efficient networking must reinforce the message and an organizational structure must be formed (for profit/non-profit; legal incorporation as private firm or public foundation; product/process focus) as no man is an island and communication matters. In addition, our view is bottom-up spontaneity and we have no credo for top-down planning; however, a polity can implement favorable a priori conditions for innovation as we will explain later on --- market adoration is another trap for innovation/innovators because of its a posterior information mechanism (the market can only activate the funeral service when the patient is dead, the polity should always withdraw from funeral services). The monetary conditions actually realize payment chains for market replication, the origin and nature of money is payment (not storage or wealth measure). We will research into the micro-(market), macro-(polity) and monetary (banking) foundations of innovation processes and identify reinforcing factors for innovators. In our opinion, liberalism is a societal theory to defend individual & collective freedom; socio-eco-nomics of innovation is a scientific discipline for the common good and it is not here to serve the specific economic interests of a certain class or strata of a people; in this sense, it is an ethical & social science of human progress (and possible regress). It is the new chance of our age to understanding the tech-know-logical application of matter & energy in informational terms, leading to an advanced theory of mind & matter. There is this fictive joke about Napoleon who conquered the holy land and who wanted to learn about the efficient information networks of the Jewish people; after being advised to study this phenomenon in a bath (mikve), Napoleon played the role of an elderly Jew in such an institution; after just sitting down in the bath and closing his eyes, somebody whispered into his ears: did you know, Napoleon is visiting this bath today. Consequently, information processes like innovations are tricky affairs and in our electronic age it is computable information that sends the decisive signals for

behavioral patterns/formulae, especially in the social world of economic action where, for example, false monetary signals can ruin a whole economy and cause a stoppage of innovative action. Today, such events are global processes with local variations, i.e. the spatial-temporal continuum of innovation happens in world flowing time. However, special innovation hubs do exist and it is easier to start-up in such a location (mainly because of communicative reasons; we compare this with a waterfall in the desert). Innovation hubs are waterfalls in the economic desert and if we study the cultural history of tech-know-logical change, it is interesting to discover that innovation hubs have certain geo-socio-logical structures all over the world where trade meets learning, commerce being the great educator and civilizer of humankind. Unfortunately, we still do not have a real theory of the body economic, but mentally limited theories of the productive use of property, serving as collateral for credit. It is also important to note that all human economic activity is driven by want and given whatever kind of production: it cannot create its own demand. Consequently, in a market economy and organized polity, it is all about payments, i.e. chains of liquidity. All economic expansions and contractions are about purchasing power parity, productivity/value creation per capita and investment intensity/direction of value creation. Wealth can only be achieved via investments, resulting from savings --- in a healthy economy, credit is limited by savings; over-consumption deprives the economy of the necessary means to invest into employment and wealth-creation. The artificial increase of market prices for assets is always a warning signal and signifies a credit crisis; real economic activity is foremost cost-driven and primarily not profit-oriented, but earnings after everything do matter. On the contrary, great profits and huge growth in the short-term are cybernetic indicators for long-term collapse --- the effect of economic success precedes liquidity in tempo-causal order/logic, but liquidity is the survival criterion in a market economy (management and finance have to be balanced by tempo and quality). The micro-macro-monetary-interplay is at the core of economic success and the business of innovation depends on the healthy perception, observation and measurement of innovation parameters. The payment (for value) of the satisfied customer closes the circle of innovation and it is the long-term cash-flow of any business (for profit or non-profit), i.e. innovations pertain to certain economic regularities and neglect of these parameters will leave the best idea unrealized. Ideas can only be realized when knowledge becomes converted into value via socio-eco-nomic management. The dominant direction of communication for innovative processes is always from the social context to economic content, eventually to serve unmet needs--- it is a socio-eco-logical view of human want and needs. In this sense, innovative activity is not a mission & vision, but a perceptive response to pressing wants and needs of the human environment. This might not be true for luxury products, but those who can afford luxury products have no need for innovation and own their fortune to some kind of coincidence/privilege (let it be so). Finally, socio-eco-nomic processes of innovation require time-consuming and resource-dependent creative problem-solving activity; the psyche of certain personalities can probably better stand this vital challenge on the timescale of finite human existence (at least, on this planet).The Druckerian distinction of the learned and the learner applies to this personal psychology ; usually, the human psyche feels great discomfort under pressing and rapid change as the American philosopher Eric Hoffer noted in his many publications on mass movements, revolutions and change.

The Micro-foundation Level of Socio-eco-nomic Innovation:

Management economics & human ingenuity/creativity

This is the starting level of all innovative processes before any desired products (services) can be delivered ; it is the very neglected area of micro-economic entrepreneurship from free-lancing over self-employment to the private firm or public association. Almost all economic theories focus mostly on the profit-maximization-formula (calculation & equation) and are therefore based on over-simplifications of entrepreneurial behavior. This misperception leads to the fact that pathological developments in entrepreneurial corporations/organizations are only detected when the total productivity (per capita) and investment intensity (direction of innovation) decline during growth phases. Productivity & investment behavior depend on the return on investment/cash flow, the knowledge of feasibility, systemic learning, strategic optimization, calculability, success analysis, mental culture, problem-solving and process-learning; in addition, it is extremely important to state that Small & Medium Enterprises/SME earn 2/3 of income in any economy and that they have the same share in employment. This only goes to show that too much scientific attention was focused on research into big corporations, probably a heritage of the high industrial age when factory mass employment was economic. Another cognitive mischief is to think that enterprises are making money, enterprises are making products (services), being paid for this economic activity in monetary terms. Even if the 25000 database- years of PIMS business experience from over 4000 firms were present in one entrepreneurial innovator, the economic realization of ideas by knowledge into value has to follow a certain micro-sequence & hierarchy to being a successful management operation (R.Buzzel/T.Gale Bradley, The PIMS/Profit Impact of Market Strategies, NY,1987 ; P.Ceccarelli/K.Roberts, I nuove principi PIMS, Milano,2002), i.e. the complexity of innovation is definitely higher than the total number of operations in chess or the number of stars in the milky way. We guess therefore that the talent of coping with complexity is a necessity for the innovator---the innovator does not stand alone, is connected to partners and helpers, develops into networking, but all ideas start at this micro-level of human inter-action. Great inventions and innovations are generally done by small social groups, centered on one innovator or two---this is due to social psychology as humans are small group creatures, despite all social differentiation and division of labor over thousands of years. In any case, the micro-economic foundation of entrepreneurship and innovation is at the core of economic novelty and the Kirznerian approach does promote this economic model (I.Kirzner, Perception, Opportunity and Profit: Studies in the Theory of Entrepreneurship, Chicago, 1973).It should be noted here that the concept of opportunity cost was invented by F.Wieser (Theorie der gesellschaftlichen Wirtschaft, Tübingen, 1914) who can well be seen as an early socio-economist. Innovating knowledge into value (and utility & wealth) via learning is a client/customer oriented strategy of perceiving gaps and needs of the socio-eco-nomic environment --- every innovation depends on the openness of the entrepreneurial innovator to the market and to the polity, an innovative strategy is a learning process to long-term success. Strategic management learning and context observation are driving the innovators forward (innovative leadership=learnership). This logic of learning processes and process-learning is mainly based on breaking through knowledge barriers and results in a new combination of productive factors; the methodical distinction of knowledge & learning leads to entrepreneurial innovation; organizational structures that try to p-reserve knowledge do impede learning. As prices do determine all costs, innovators are obliged to learn about monetary management because their project has also to sail against the winds of changing financial economic conditions---the polity and the market are a process (L.Lachmann, The Market as an Economic Process, NY, 1986) and one has also to keep an eye on systemic shifts that do effect an innovative project (might it be for profit or non-profit). The Use of Knowledge in Society (F.Hayek, American Economic Review, No.4, 1945:pp.519-30) is a much debated topic and not only from the perspective of property and resources. All existing human societies had to develop their ‘own’ knowledge basis and the Sumerian city-states can be viewed as the first proto-innovation-hubs where private & public knowledge were already used as civilizational institutions (and legally codified). A trend to a pure commodification of knowledge is for no society a healthy economic condition and knowledge should also be treated as a gift (A.Giri, Gift of Knowledge, Sociological Bulletin, ISS, Vol.60/1,2011:pp.99-104) although the travail to research for knowledge can account for property rights. The Ultimate Foundation of Economic Science (L.Mises, Princeton, 1962) is in our opinion the socio-economic theory of human action that does not want to account all human economic activity into static statistical equilibrium, but tries to expand the scientific understanding of innovative inter-action beyond rational expectation accounting techniques. We

already pointed in our study of ethical economics (S.Ternyik, Economics as Heuristics & New Economics, London, 2011) to the un-tolerable and un-bearable methodical mischief in contemporary economic thought as if some sort of ‘gang’ took over economic thinking. Whatever, innovative action is the socio-eco-nomic conversion of knowledge into value against the currents of impeding factors like monopoly, privilege, ‘heritage’ or ignorance. In any case, our travail will only make sense if the polity and the market remain free of authoritarian take-overs from political, religious or ideological radicals---as we are living in turbulent times, individual & collective freedom cannot be taken for granted as all recent events are showing us; innovation is possible, but the counter forces are not a lightweight---the biblical measure of a talent is always able to out-weight this ballast, keeping the flame of progressive innovation burning. Successful innovation can circumvent opportunity costs and impeding knowledge structures via strategic management and process-learning (= socio-eco-nomic science of human action); consequently, a precise and exact perception, observation and measurement of the environmental system of client/customer wants & needs is the key factor for getting into the business of innovation, i.e. skilled innovators are never ego-centric. The knowledge competencies for getting into the business of innovation and for staying in the innovation business are not quite the same; the former requires a heuristic knowledge body, the later an algorithmic knowledge body. As no person incorporates this totality of knowledge & skills and as perfect knowledge is anyway a rational illusion, many successful innovations are not from solo-preneurs, but at least from duo-preneurs (affirming the old credo of Bible learners: give me a study partner or death). Communicating and reducing complexity is at the core of all innovative projects; it is not important to perfectly know about a problem, it is crucial to communicate with the problem via cognitive behavior thus reducing its totality into attackable elements by formula, calculation and equation, i.e. by methodical communication do we explore into the depth of a pressing problem. Living is anyway a matter of communicating with the regular structures of this world which can be understood and perhaps modified by a set of finite rules/procedures. It is all about selection programs for informing human action to distinguish between false and right paths of decision-making to avoiding irreversible situations.

Innovation processes can be researched as learning types; they are rarely completely understood by their inventors and evolve through different stages before a set of core principles emerges, to being easily communicated and implemented, i.e. taking the organizational form of replicable programs. When problems are getting worse, when systems do no more work, than the learning processes of discontent and gap searching appear, i.e. the realization of new ideas that work to fulfill wants & needs is a psychophysical pilgrimage of pain and gain. It is seems to be difficult to breaking through the stimulus/response-reflexology of reinforcing chains of imitation and social conditioning; innovators are all-weather-types who are able to design their economic activity in exact monetary terms in order to succeed: at zero rates of interest and profit, the supply of new savings disappears and innovations die down. Over-competition is also a reason for a stoppage of discovery as innovations are a mix of competition & co-operation (we can also assure that Marc Chagall learned ‘the market’); of course, there must be a socio-eco-nomical reward for innovation, enterprise and ingenuity. Totally perfected competition kills socio-eco-nomical evolution and there will be no gains no more (unfortunately, under these rationally optimized conditions, we remain only with pain). The static world of perfected knowledge brings down price to cost as ever more competitors enter the arena. Innovators carry out new activities; they are not imitators or managers. Too much attention was given to the top-down research of large firms so typical for the process of industrialization; too little attention was given to the real players, i.e. the small and medium inventors. However, it is a fact of economic history that the living standard of the masses arose with big industry, but really less than half of important industrial inventions came from mega corporations. Consequently, keep the gate open for a variety of approaches to socio-eco-nomic innovation, market power and R&D. The polity can create efficient frameworks for micro-economics of innovation, but these learning processes never arise from the fusion of big politics (etatism), big business (monopoly) and big bankism (monetary excess). In a

free society, pathological trends can be corrected by evolutionary selection procedures, spontaneous emergence and participatory movements; in an authoritarian society, pathologies will grow by inner and outer violence. The ideological obsession with macro-economics =political economy and monetary economics=financial circulation can obstruct the vital view that the body economic is rooted in micro-economics=entrepreneurial management & real accounting. All kinds of socio-eco-nomic engineering from above have failed in history since all trees are rooted in the ground; the greatest social danger occurs when false thought reinforces and multiplies with evil intention --- such events always come with a heavy toll of human lives. In our opinion, there are enough natural disasters and diseases and we should not add fuel to fire. Consequently, every innovation is about increasing living chances and an appropriate reward for the innovators; an agenda for 7 billion human inhabitants can only be based on innovative action.

As the analysis of innovation processes documents, even economics and hermeneutics are intertwined (D.Lavoie/ed., Economics and hermeneutics, London, 1991). It is impossible to break with learning processes through knowledge barriers and to create value, if one is limited to certain methodical instruments (might they be of hermeneutical, empirical or experimental design). It is quite foreseeable that new economic thinking will move from the testing models of physical science to those of biological science, in cybernetic terms. Also the cognitive models of ethical science will gain a new momentum in future economic thought ((K.Rothschild, Ethics and economic theory, Aldershot:Elgar, 1993) as they did in the modern beginning of the profession (A.Smith, Theory of moral sentiments, Charlottesville/VA, 1986/orig.1759). Every innovator is in first instance an applied economist that has a passion for the business of innovation, driven by the creative desire to perform something new in an area of special expertise; innovators are the products of real life, it is unlikely that they are pure products of business schools because much of the things that are taught in such institutions do not work in innovation practice. The discovery process, the spontaneous emergence of something new, is bound to rigorous management economics (strategy), human ingenuity (special talent), methodical intuition (efficient tools) and monetary realism (the ability to think a project in monetary units); a breakthrough cannot be planned, in cannot be controlled in terms of timing and it will never be the product of a ‘school’ or the like. We do assume that not many people have the capacity to becoming innovators , most great achievements derive from a few people and disseminate later on with a time-lag to the general population (because of its benefit to better fulfill wants or needs than tested procedures or products). Innovation is never a one way road; it is a communication process in search of dynamic efficiency. All attempts to direct innovation top-down will fail, but it is possible to create favorable conditions for innovative projects that generally originate in special hubs, i.e. the location matters for an innovator, even in our time of electronic informatization. Prudent timing, locating and knowing are indispensable tools for getting ideas realized, knowledge being converted into value and managing the monetary flow, because in a market economy all exchange is based on liquidity (and the price level). A rising price level only shows that a lot of credit is not paid back, often resulting from artificial speculation bubbles. From this viewpoint, it is important to recall the Hayekian triangle model where every form of new production is dependent on the direction of consumption and credit--- you can be the inventor of the wheel, it does not matter, if the dominant system of human economic activity is based on the square, i.e. innovation is an ethical, economic and ecological learning process that is based on the creative communication with a systemic environment of pressing wants & needs: the reading of these signals is the art of innovation that depends on the scientific parameters of time, money and quality.

From all of this, we must conclude that there are certain macro-economic parameters that reinforce or inhibit the spontaneous emergence of innovations, something that we would call ‘economic climate’. Only a market economy and organized society that rewards and respects innovators as key socio-economic players can receive the benefits of necessary renewal for pressing problems, wants and needs, i.e. every polity gets the innovators and innovations it deserves, following the dominant existing

economic behavior. Do not forget that the market information mechanism works a posteriori; as we stated earlier, ours is an economic theory of human action, not a postmortem of equilibrium accounting. False economic behavior must be corrected/ rectified, to achieving economic improvement---all accounting is a product of activity and it is all about the right direction of economic activity which is guided by dynamic efficiency and not rational expectation equilibrium (ree) ; the real economy counts and not numerical artifacts.

The Macro-foundation Level of Socio-eco-nomic Innovation:

Political economics & social evolution

Socio-eco-nomic engineering techniques developed in the industrialization process of the modern factory production system , the large scale design of industrial capitalization implied socio-technical and psycho-technical experiments and lead eventually to the idea to plan a whole economy and the totality of a society, creating a new model of men. Consequently, the technical belief in perfected machinery evoked the utopia of controlling the sphere of human action via numerical macro modeling of human utility behavior in physical fashion. However, the closed production system of factory fabrication and mass employment is something very different from the social system of human inter-action. Big industry, big politics and big banking cannot be easily formulated, equated and calculated into terms of the social world --- the dynamics and efficiency of socio-eco-nomic processes can simply not be converted into pure technical categories: there is no alchemy of value creation, not even in the age of automatic computability; there is no deus ex machina. The political economy seems to be a product & process of social evolution and special selection procedures seem to drive the systemic structures and functions forward----we have to focus and communicate, to organize knowledge and to reduce affluence---the environment has to be observed and too much planning can impede the coincidence/gap for innovation---contradictions can be productive and networking can make fun---personality & individuality can serve as assets and entrepreneurial ethics is encouraged. What happened? The economics profession is in a transitional crisis, the old models are no more workable, but new models are still in the making. We do perceive a historical shift in economic thought that is caused by socio-tech-know-logical factors of value creation; new economic thinking will be bottom-up and not top-down. Important facts remain as that markets are horizontal and organizations are vertical, the state is a vital element of a polity, money is to circulate value, etc. ---but the methodical tools of economists will definitely change. We also know that is more than difficult to change age old injustices of certain privileges and monopolies that are inherited like a genetic disease from human wild life into institutionalized civilization; in this case, it is crucial to distinguish illusionary claims from feasible aims as socio-political life is full of lofty fabrications. Whatever, cybernetics, systems research and learning science are pointing to the inefficiencies of human planning techniques and imply a gradual improvement from small scale to large scale units. Every socio-eco-nomic system needs improvements and innovations, but these are spontaneous processes that cannot be engineered----a free society depends on concerned citizens, motivated entrepreneurship, small government and liberal ethics. Consequently, we do not think that in our times any form of Keynesianism and/or monetarism is sufficient to pull the truck back to the road; we need a macro-economic orientation that can think in sustainable frameworks of the human economy: the necessary innovations cannot be bought on credit, money must be earned, people need to work and deficits are what they are. It is indeed a miracle that such a political economics worked for more than 3 decades, but the social signals of evolutionary selection can no more be ignored and trends to more sustainability can already be observed.

If all levels work well, micro-economics is about managing value, macro-economics about policing value and monetary economics about circulating value; if we look into standard textbooks, we can observe the following: the micro level is reduced into the supply-demand-market mechanism, the macro level is presented as input-output-aggregate determinism and the monetary level is represented as commercial-central-banking fluctuation. In such an economic world view there seems to be no human economic activity, but only oscillations of economic mechanic determinations ---- this is the classical factory view of economic production, it is the language of the assembly line and machinery control. Today, this mechanistic model of economic value creation is no more valid as new technologies have moved into the socio-eco-nomic arena. Any modern polity that wants to step into the next phase of sustainable innovation in eco-technologies, bio-sciences and human health research cannot ignore this fundamental shift of the economic facts ---and to police means here to imagine economic frameworks for innovators and innovative firms (including non-profit ventures).The economic tools of yesterday are not fit for the invention of the future ; polities that ignore this crucial trends and tendencies towards a new kind of economic value creation will be the poor national entities of tomorrow As we said before , this cognitive adaptation process cannot be engineered, it has to do with creating environments and incentives that ease these economic transition and transformation. The socio-eco-nomic world is full of pressing problems: e.g. ageing populations ---growing diversity of countries---rising chronic diseases ----behavioral problems/as crime---declining real welfare---climate change; this only goes to show that we are in need to realize more potential to reduce unnecessary human suffering. None of the academic textbooks does teach about human action and economic frameworks for socio-eco-logical government ; it is also vital to think about alternative taxation models, to tax unearned income from the rent of natural resources , to ease the tax burden for wages from the labor of human resources and for interest from the capital of technical resources. In addition, any tax code should be simple and uniform to apply for all citizens. However, we do acknowledge that such renovations cannot be done overnight and imply the art of foresight, to being cautious with too rapid change that could be destructive to the ends of all striving for betterment.

The social evolution of new economic conditions and the political economy of innovation do no more correspond to the used theoretical economics; the economic theories of the last 150 years do not explain the current events in the real economy. In the past, an enterprise was capital-intense or labor-intense and economy theory did represent this fact; today, economic organization can be capital-intense and labor-intense at the same time and economy theory does not reflect this simultaneity: the electronic revolution does alter the economic fabric and most economic theories are becoming false and obsolete. The trends and tendencies of the modern economic organization do overpass the body of economic knowledge and we have to catch up cognitively: new economic theories and philosophies are needed to explain the current events that are ‘theoretically impossible’, according to canonical economics. In addition, the ongoing events of economic innovation do imply a socio-technological revolution and the human effects point to using knowledge as key resource of creating value (utility and wealth). The origin and nature of this fundamental change and the timescale of this transformation is very little understood by political, economic and social decision makers who mainly think in the above mentioned mental categories of the last 150 years; the cognitive quality of management and leadership will decide about the chances and dangers of these productive/destructive potentials on power, wealth and welfare/well-being; the driving historical factors of this socio-eco-nomic innovation are demographical, technological, ecological and monetary (debt). It is important to note that an economy can never satisfy needs, it can only fulfill demand and demand for needs is bound to payment/purchasing power. Considering the global debt situation, it will be very difficult to generate purchasing power; purchasing power can either be derived from economic performance (not from the money press) or from property as collateral for credit; even the most wealthy polities on earth are desperate to mobilize this resources as the excesses of the last 25 years have inhibited the development of new potential. Furthermore, there is no natural law existing that applies to meet human wants, needs or desires ; many people of the rich economies seem to think that, but it is a psychological illusion

based on a comparatively high living standard. The social science of economics is an ethical, methodical and ecological discipline that cognitively evolved with the cultural advancement of human technological civilization, but it is effectively and solely based on human action. Is time to recompose the body of economic knowledge and to expand the economic horizon into human action! In this case, we propose to follow the economic theory of human action as outlined by L.Mises (Human action: A treatise on economics, New Haven/CT, 1949) and the modernized approach of J. Huerta de Soto (Theory of Dynamic Efficiency, NY, 2007). However, we have a different monetary view, e.g. we do treat money as a separate category from macro-economics as will be explained in the following monetary chapter. There is only good and bad economics or right and false economics; what we want to explain is that the sphere of political economics is subject to social evolution and that we are exactly in such a period of accelerated economic innovation. Nothing what and how we are doing something today will stay the same and our research will answer why. This will also carify the burning quest for more human justice, peace and truth; most of the theoretical approaches for more economic justice (concerning the land monopoly, the money monopoly or the tax monopoly) want to do 'it' at one stroke, sometimes with one single formula. We do think that socio-eco-nomic progress is more difficult because it is bound to certain evolutionary laws of human action, i.e. it is mainly about knowledge and learning (e.g. human capital). If we give via social housing cheaper livelihoods for the poor, we cannot exclude that they will invest their saved purchasing power not into the human capital of their kids, but for example into a bigger car. Once basic wants are met, new needs are arriving and more desires grow; economics is about human action and human action is about free will although every freedom has its limits. Consequently, macro-economic thought is very much about dynamic efficiency or sustainability, the socio-eco-nomic balance of short-term and long-term goals of individual and collective human action. At this stage, it is also important to mention that many biblical laws concerning land, money or taxing were until now never realized in open large scale human societies, but only in closed small scale communities, i.e. orientation and realization are not the same. However, it is a fact that real power in all societies derives from the combination of property and knowledge; it is an open guess if this social configuration will also change. As an empirical science that is based on methodical research into human experience, we have to cognitively adapt to the social fact that developments have timescales and that human progress is gradual, i.e. we prefer the spiral/helix model of human history, with the basic categories of progression vs. retrogression. Macro-economic modeling of innovation processes should keep this scientific cognition in mind when methodical formulization, calculation and equation of economic activity take place, i.e. every innovation is about the interplay of content and context.

Historically, innovation processes have only occurred in market economies and open societies when monetary conditions (money=market replicator) were favorable; innovation, entrepreneurship and money go together and make only sense in a market economy; the same is true for capitalization as the work of L.Lachmann teaches. All that a free polity can do is to create the best frameworks for innovation hubs; ideally, this would start in the kindergarten, in schools, in vocational and in higher education; most subjects can be taught praxeological as doing by learning, the age of the dependent laborer will vanish. The nature of labor changes; the methods of human learning also have to change (D.Bradshaw/ed., Bringing Learning to Life: The Learning Revolution, The Economy and The Individual, London 1995).Innovation hubs are centers of earning and learning where knowledge is converted into value, utility and wealth, i.e. it is attractive to live and work in such environments as people do reinforce and multiply their talents by co-operation and competition. Every historical epoch had its innovation hubs and it is crucial to find out more about the key success factors. The logical parameters of free land, venture capital and knowledge labor are essential basics as the history of Silicon Valley teaches; besides from recognizing the decisive importance of 'free ground' and raising low interest capital funds, Prof. Terman of Stanford knew how to motivate young people and to connect with other talented people, maybe even attracting them. It must also be noted that such innovation processes can create externalities like environmental pollution and high social inequality; innovation cuts like a 'sharp sword' into socio-eco-nomic structures, it has logical order and a spatial-temporal sequence and hierarchy; innovations can be imitated, but you cannot built Venice twice.

However, every public polity can introduce economic frameworks like easier access to land, capital funds and knowledge dissemination; of course, it is important to learn from successful examples, but every case is different (i.e. the special location matters). A polity can organize, but only the market can realize: human action has distinct levels of inter-action and this is what we generally call society. Consequently, investing into people (which actually means that also the people must invest, not only the government) and the development of human capital are inevitable for the future success of any national entity as T.W.Schultz and G.Becker clearly documented in their research, i.e. ignorance will not pay, only learning will pay (there seems to be an anti-thesis of instant gratification and constant success). We see private-public-partnerships (ppp) as the best vehicle for the socio-eco-nomic innovation of education, health, welfare and business; all of our aspirations will only come true, if we will pursue monetary reform as we will explain later on. The macro-economy is a political process (body politic), the micro-economy is a management process (body economic), both are operated by monetary market processes (financial circulation='blood circle'), i.e. an advanced market economy and organized polity must gain control over its money or it will perish. It is a matter of fact that production is finished with the payment of the customer/client, but the nature of the banking system does decide about the availability of credit; only under certain economic conditions can the payment signalize 'recirculation' as the model of the Hayekian triangle teaches, i.e. advanced financial circulation has a lot to do with cybernetics and every payment is like a feedback for production (services).

As we mentioned before, the art and science of political economics is bound to developmental stages of social evolution as the whole world gradually becomes more interconnected; we are witnessing global economic integration and people all over the world like to better their living conditions via their innovative potential. If such great transformations can take place peaceful remains an open question of political, managerial and social leadership; some degree of social tension always accompanies important technological shifts just as pain is necessary to signify an illness, but the art is to keep the patient alive and to bring him/her back to healthy activity. The macro-economic models in use are cognitive models of the mechanical age of the last 200 years, e.g. closed industrial production systems, but they are of little benefit in today's open electronic automation age. In this case, we even have to agree to a basic Marxist theorem: human history is driven by the contra-rhythmic powers of relationships and forces in production. However, we do not see a dialectical or antithetical linearity, but a helical and cyclical unfolding that can be interpreted as materialist history or techno-evolution. We should also listen to historian Y.Bauer who warns us of 'technically competent barbarians', i.e. the ethics of liberty is an indispensable element of economic humanization. The macro-level of socio-eco-nomic innovation cannot avoid normative expectations that are beyond the positive methodology of 'knowledge accumulation'; this must not be understood as a Paretian dilemma, it can be understood as the spiritual challenge of techno-economic progress or more simply: for what do we need all that ? Consequently, there is a creative sequence in economic decision-making: 1. the necessity, 2. the utility, 3. the comfort; all of these things have a price, but not the same value. Time, money and effort/toil are determining the quantity and quality of economic goods and time is on our planet always life-time, i.e. all investments we do may materialize, but it is also a part of our life that we do invest. Nothing educates an economist better than the scarcity of money; great economic errors are always done with easy money, following the Friedmanite monetary typology. Innovations can never be centrally commanded, but macro-economic prudence can ease their discovery and realization for the benefit of the public good. Today, many events happen simultaneously and information is spreading in electronic real time; a sustainability of living standards can only be achieved by an optimization of economic performance and consequent cost consciousness: simply too many people in the rich world have lived above their productive means; the dramatic increase of complexity and the limiting scarcity of time and money can only be resolved, if sustainable resources orientation becomes the research focus of macro-economic thought, shifting scientific modeling from static equilibrium to dynamic efficiency.

The Monetary-foundation Level of Socio-eco-nomic Innovation

Financial circulation & economic sustainability

It is commonly said that people do not like to share money, time and emotion which they actually regard as private assets. As we remarked before, money is a social hybrid: 1. it is a token for payment, 2. it is a measure for value, more precisely pricing, 3.it a store for value (assets/wealth), 4. it is a socio-legal construct. Production and circulation in a market economy are very dependent on the function of money as a market replicator (value circulator); entrepreneurship and innovation do also strongly depend on money as productive and circulative force. Therefore, the economic design of the monetary system is the central factor of setting innovation in motion. The fractional monetary reserve system evolved in the industrial age of the last 200 years, being an invention deriving from Goldsmith and Lombard practices; money is very time-sensible, concerning its purchasing power. Most countries have established public monetary authorities to police the financial activities of private banks as their lending function operates as credit creation 'out of thin air'; 'healthy' fractional reserves are somewhat between 5-10 per cent , some commercial institutions have even operated below this margin. The real question that emerges here is if money should be created by law of public authority or by credit of private banks? Our point is that every innovation has to diffuse into society and that current monetary practice is contra-productive to the economic dissemination of necessary renovations in the socio-eco-nomic world. An 'Economic Policy for a Free Society' (H.Simons, Chicago, 1948) cannot ignore the monetary momentum of innovation processes; we doubt that the economic design of the current monetary system is innovation friendly; a demand for commodities is never automatically a demand for labor and investment, especially not when the demand is on credit. This monetary practice shortens the innovation circle, i.e. production shrinks while consumption is on credit. We propose monetary reform on the basic logic of the Chicago plan from the 1930s (http://www.monetay.org/chicagoplan.html; www.monetary.org/yamaguchipaper.pdf): A) Private banking has to perform the lending function (credit) by 100 per cent full reserve and B) money is created by law, i.e. we distinguish clearly between credit and money. Such an economic monetary design will propel sustainable socio-eco-nomic innovation forward as the market mechanism of interest rates will sort out and rationalize the scarcity of monetary resources. The fractional reserve practice of private/commercial banks is the main reason of the money burn rate that is guided by the greater fool paradigm; the false allocation of future resources is based on this methodical economic mischief and misbehavior of private lending institutions that create credit from nothing, i.e. interest rates do generate income for these businesses, but do not reflect the scarcity of the real resources. Consequently, the growth of the monetary volume is only a reflection of created credit; rising price levels do cut economic incentives for innovative behavior. Such a monetary practice reinforces consumptive behavior and inhibits productive behavior; it is not healthy for the political economy of freedom as it encourages the non-productive and self-destructive forces in a society to spend what is actually not existent. Everybody who is concerned about the socio-eco-nomics of innovation will have to invest time to research into this decisive problem. We do have no economic problem with fiat money, but we definitely see an economic problem with fiat credit; the distinction between money and credit is crucial as it is to understand the nature of interest rates for a market economy. Real liquidity for payment comes from economic performance or

property (as collateral for credit); creating something (interest) from nothing (fiat credit) is in the long-term mathematically impossible without ruining the market economy system where lending is limited by savings. Without this dynamic balance of saving and lending, necessary investment into vital innovative projects cannot be realized, i.e. knowledge cannot be converted into added value, utility or wealth.

Money is the DNA of an economy, it has the same central function as the memory in cultures or the genes in living organisms; it serves as an agent for information processes of production and circulation and its main function is market replication. Being a legal construct, it can also be fiat money as token for the market chain of payments; its role as measure is a more subjective function while its role for the storage of wealth is questionable. The origin and nature of money is the market place where via a chain of payments goods and services are exchanged; liquidity is the survival criterion in a market economy. Liquidity must be backed by performance and assets, i.e. a productive circulation of money for innovative investments. If the polity and the market do act in monetary affairs wisely together, we will see socio-economic innovation for unmet human wants and needs; the current monetary system is not favorable for the necessary innovative processes and it should be reformed on the basic logic of the above mentioned Chicago plan. An efficient macro-economic framework for innovation is essentially based on monetary innovation; money does not work magic, but it can work for the public good. Consequently, we do think that the age of fractional reserve banking practices will come to an evolutionary end as economic selection procedures are pressing monetary thought into new directions of financial circulation models for economic sustainability. Inventors and innovators will anyway appear as the business of innovation is a field of highly motivated people, but large scale conditions do matter. A better monetary regime will be accompanied by a higher speed and level of innovation as monetary incentives do play a crucial role in mobilizing people to advanced achievements in their respective fields. This is the way the human psyche works and the way how talent is awakened that would otherwise remain dormant. If money works well than innovations will follow, but the future economy will surely not be operated by fiat credit; monetary stability is based on the optimization of economic performance and the economic use of property; the evolutionary tendency towards sustainable innovations in bio-science, eco-technology and human health has already gained momentum as economic investment trends document, but our decade is decisive concerning the right selection of financial procedures to maintain peace and prosperity for coming generations.

Consequences/conclusio:

1: Innovative learning processes (learning that pays) generate effectively in hubs that act as communicative connectors for ideas, people and tools; today, many of these knowledge conversion processes can be done electronically (but speed has also its own dangers);

2: Entrepreneurial management on the micro-economic level is the decisive foundation of any innovation (knowledge into value) that is initially the product of a small group of inventors (in the long-term, imitation processes catch up to multiply the chain of unmet needs);

3: It is possible to reinforce innovational activity on the micro-economic level; vital functions are accessible land, low interest capital funds and incentives for knowledge laborers; the legal factors include corporate law and simple taxation;

4: The current monetary system is not a good ‘economic climate’ for sustainable innovational activity to future growth and development; monetary reform should follow the basic logic of the Chicago plan of the 1930s to separating credit from money;

5: The market economy and the organized polity work via the financial circulation of value via money; management, policy-making and banking are the most important social tools of an open and free society that grows and develops by spontaneous emergence and realization of new ideas;

6: The accounting of equilibrium is a methodical tool of economic measurement (post mortem), but economics as social science is first and foremost research into human action that is guided by dynamic efficiency;

7: Economic content and social context cannot be separated by methodical linearity; economic behavior is a learning process of cyclical regularity that unfolds in helical growth; the temporal aspect of human economic activity is decisive as life is finite and resources are limited; the ultimate human resource is innovation.

Abstract:

Innovation has always been the ultimate resource of humankind; to mobilizing the full potential of human innovation, the following technical aspects are decisive: A) entrepreneurial management to searching the gap and to organize implementation; B) policy-making to creating an efficient socio-eco-nomic framework; C) banking that truly channels money into innovative projects. Innovation is converting knowledge into value, innovation is learning that pays; it is bound on an interplay of economic content and social context to identify unmet needs.

Key-words: gap, knowledge, value, money vs. credit, human action, dynamic efficiency, learning processes/process learning, socio-eco-nomics, time/change, finite life, limited resources, management, policy-making, banking, entrepreneurship, innovation.

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K-PERIODICITY, COSMOLOGICAL MOTION 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, 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.

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, e.g. 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 crisis (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 & 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 hypothesis 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 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.

Schumpeter (1939) made the name and work of N. Kondratiev (1926: 573-609)very known and many economic phenomena can indeed be methodically interpreted in Schumpeterian or Kondratiev style. Currently, Nefiodov (2006) is forecasting the 6th Kondratiev 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 Kondratiev-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 lead 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 & 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 shouldn't 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 the intuition of Kondratiev 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 & nature of money) as important as the monetary design & 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 & 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 & dynamic efficiency is a more advanced approach than accounting economic data into static equilibrium --- it is the intellectual chance & 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 & innovation trends and the direction of investment & innovation is causing and caused economic

cycles ; the amount for any revenue depends on the techno-scientific stage of economic production (capital-based) and these socio-economic trends do originate from cyclical levels of production, i.e. from natural/physical fluctuations in societal needs for capital stock ; investment & 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 & 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, i.e. economic growth & 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 the 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) , i.e. 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 internet & telecom has ended, just as before the ‘new era’ of automobile & radio (golden 20s). 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 & innovation turn into sustainable growth tech-know-logy is observable as indicated by real interest rates of bonds --- the 6th Kondratiev is slowly gaining economic momentum as will topics like ethical banking, social entrepreneurship and non-profit business (coming closer to P.Drucker's next society & business theory). The monetary sector of the economy (commercial banks, monetary authorities) will have to implement at least the H. Minsky criteria (= reserve formation in boom time as bust brake) for fractional reserve banking or to invent new financial mechanisms (market-based money/for value creation); 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 & 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 tech-know-logical 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 inter-connected in a deeper way than algebraic computation. We are proposing 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’; Nikolai Kondratiev very well understood market processes & 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 loosing 20000 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 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 clear methodical thought, hard ethical work and a liberal letting-go; meta-economics, starting with E. Schumacher (1973) and J. Neusner (1990), is 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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PHYSICS of MONETARY SYSTEMS/MONETOPHYSICS

INTRODUCTION

It is common sense that only love has driven more people mad than money; in addition, the invention of banking is often equated with the first use of the fire and the wheel. A realistic evaluation of economic science reveals an eminent theoretical deficit, concerning money, as the late Frankfurt private banker J.P. von Bethmann postulated; canonical economic theories are centered on the use of private property for credit and interest, but they do not understand the physics of money in an economic system which, of course, takes also place in a social context of human action. Our study shall elucidate the physical (natural) laws of the monetary system, a subject we coined monetophysics; this approach goes definitely beyond the scope of economic orthodox religion.

RESEARCH ISSUES

The most common economic production function is taught as:

$P=f(K,L)$

The economic multiplication of Kapital and Labor is equated as productive function.

We are proposing at least the following economic production function:

$P=f(K,L,M)$

Our reading of the production function is an economic multiplication of Kapital, Labor and Money.

(Ben Tamari: Ecometry-Foundations of Economics,1990(Hebrew),Ecometry Ltd; Ph.D. thesis: Hebrew University, Jerusalem; visit: www.bentamari.com/ecometry.html)

Please note that both formulae do not calculate with the temporal entropy of natural resources (N); for example, land value and the utility of natural resources are excluded from this equation. Also taxation (T) is not considered in the formulation. It goes without saying that such reasoning is a stranger to natural law or to the physics of socio-economic systems. However, the decisive scientific and logical problem is that in the current monetary system, M cannot economically perform as M.

Why? The fiat credit of private banks, operating on fractional reserves, gradually converts M into C=Credit. At a certain temporal point, the economic production function performs as:

$P=f(K,L,C)$

As credit always works with interest, we experience an exponential economic crisis in the production function. Even the most prudent central bank cannot police this systemic error in the temporal long run; from the viewpoint of monetophysics, this economic problem cannot only be rectified by 100%money and/or a gold standard, so that $P=f(K,L,M)$. The elimination of human influence on base money via fiat credit for gambling on financial markets is the ultimate goal of our study; otherwise, bad credit drives out good money as Gresham's law does postulate.

METHODOLOGY

Ben Tamari's elaborations on Gresham's law and Prof. Mimkes research on the laws of banking have shown the above mentioned effects. We are aiming at a scientific model to demonstrate the physics of the monetary system, a monetary science based on natural law, with the result of monetary dynamic efficiency (productive interplay of short-term and long-term monetary factors). A physical simulation could be designed as a lottery where white balls (debt-free money) and black balls (credit) are emitted; a ratio of golden balls (gold standard) can also be used for a comparative running; please do also note: in the current monetary system, black balls do multiply exponentially more black balls in the limited globe!

Model 1: fiat base money with white balls, temporal emission of fiat credit with black balls

Model 2: fiat base money with white balls, temporal emission of 100% money credit with black balls

Model 3: golden ball standard ratio, base money with white balls and temporal emission of 100% money credit with black balls

Important: The interest function will be built into the running!!! The long-term production function of a capitalist market economy is unsustainable with Model 1 and leads to financial instability (M=C) as Minsky prophesized. Model 3 will perform the highest degree of economic stability while Model 2 is practically easier to attain, but its economic stability is politically more vulnerable, due to the self-destructive forces of the human nature.

DATA

Economic productivity/ P=f (K,L,M) / in market capitalism is bound to financial stability, i.e. full reserve banking (min. criteria: emission of debt-free money by a central bank and full-reserve credit by private commercial banks). Fiat credit stimulates the non-productive gambling / P=f (K,L,C) / in financial markets and depresses the real production function/ P=f (K,L,M). Under such a monetary regime, economic crisis is inevitable; there will be certainly empirical and statistical data available when the entropic turning point of the economic production function takes place. For example, after the introduction of the Euro, it took the Euro zone a decade to reach this entropic point. Specialized software for this additive research is not needed, but access to reliable data and comparative statistics.

DELIVERABLES

Our study could deliver a solid foundation of monetophysics, i.e. a basic research into the physics of monetary systems and the working body economic. It will definitely prove the physicality of money, the natural-law basis of a monetary system and an attack on the financial alchemy of fiat credit (x interest). In the broader sense, it is an investigation into the political economics of natural law, i.e. also in money & banking, human free will is limited by the physical law of socio-economic systems.

Monetary dynamic efficiency can only be reached by an exact understanding of time, money and entropy in a productive body economic.

TIME FRAME

The author is not in a hurry, but calculates that physical simulation/experimental design and exact formulation can be done until the end of 2014, given the complexity of the topic.

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Monetophysics

* prepared for: TAU Econophysics Group *

Your statistical post mortems on the dominant economic behavior 1) of financial markets and 2) the global monetary village clearly highlight the systemic, cybernetic and heuristic errors of commercial investment banking; concerning China, its role is comparable to that of the Soviet Union at the time of the Great Depression.

It is important to note that US economic growth in the 1990s (ante your post mortems) was not extraordinary for real GDP growth, durable goods new orders, industrial production and nonfinancial corporate profits (source: The Bank Credit Analyst, Nov.2000); by eliminating the computer-bubble, we get 2,5% GDP. The estimated $ trading volume vs. GDP reached 400 % (source : HD Brous & Co., Crosscurrents, Nov.2000), it was around 125% in the Great Depression and the average ratio is at 25% in normal times. The real computer-bubble started in 1995 when computer-power was calculated into the GDP; for every $ on real goods, 3$ were spent for shares. It is unreasonable that the computer industry with 1% of employed labor and declining product prices should make it for a boom, i.e. we can observe a pure statistical illusion and not an accounting mistake, with no backing from operative performance .At the same time, we can measure an accumulation of private (negative savings rate of 5% = real estate debt; ratio: 1$housebuilding for 10$mortgage debt; 9$ for land value speculation ?), corporate (e.g. AT&T=72 billion $ debt) and public debt (1999=521 billion $ debt; ratio: 1$GDP for 3$debt). This money illusion culminated one year before 9/11, but the terror attack definitely reinforced this trend. The methodical cause of all these effects is a technocratic and economic oversimplification/mischief of monetarism and statistics as well as a lack of knowledge about economic history and the real economy; e.g. the temporality of economic and financial events (like technical innovations and stock market behavior) is a result of long-term system dynamics and the whole money-burn-rate is a precise indicator of business stupidity and inexperience. In monetary history, there is not one case recorded where a financial expansion excess of fiat liquidity ended with a soft landing; history teaches nothing, but punishes for the lessons not learnt, i.e. inflationary asset-bubbles are movements of mass psychology and the regular empirical results are recession, depression and a major liquidation of economic wealth/value in a deflationary period of political radicalization. In daily practice, the economic model of perfect competition make real prices declining and nobody makes gains no more.

The works of I.Fisher (100% Money) and J.M.Keynes (General Theory) in the late 1920s and early 1930s were direct scientific responses on the Great Depression which both economists failed to anticipate. While Baron Keynes convinced President Roosevelt to remain with fractional reserve banking, Prof.Fisher designed the Chicago Plan for full reserve banking (info at: www.fullreservebanking.com ; wiki.mises.org/wiki/Full_reserve_banking ; www.positivemoney.org/uk/2011/10/economists_supporting_full_reserve_banking/ The latest attempt on full reserve banking and a debt free money system is at: www.monetary.org/wp-content/uploads/2011/08/yamaguchipaper-latest.pdf ---from Prof.Yamaguchi/Doshisha U/Kyoto. We can empirically not imagine to saving the current fractional reserve banking system via e.g. an anticipatory

Minsky momentum (to building up enough reserves in a boom for a bust, to circumventing financial instability) and do favor a version of full reserve banking (as basically outlined in the Chicago Plan, principally the technical separation of credit and money).For example, current EU regulations forbid the creation of additional debt free money, but there is a way to repay debts without the money supply falling: there is a small fraction of the money supply that does not expire, so called debt free money. If new debt free money is injected into the system (via public authority) at the same rate or faster than there is net debt-money expiry, then the money supply can be held constant even as loans are repaid; supposed the commercial banks are switched gradually (25% per year= 100 % in 4 years) to full reserves (i.e. no fiat credit is operated to expand the monetary volume and seigniorage is public revenue , opening up simpler taxation models). The toxic effect of fiat credit on economic value creation can surely be modeled via computational systems biology, a bioinformatical or pharmacological model; consequently, the adverse effect of commercial banking fiat credit on the value creation of the body economic is our monetophysical concern. It is vital to re-creating the original and natural role of money as a market replicator; therefore, the technical separation of money (public fiat currency, with debt free injection) and credit (private banking loan, with full monetary reserve) is inevitable for the advancement of the modern market society. In evolutionary terms, as the selection procedure of financial crisis is currently striking, a new monetary species is emerging and will replace the fractional monetary mechanism of the last 200 years in the industrial age. Alternatively, also the emergence of a competitive monetary market order with a free banking system would depend on narrow reserves; however, this economic model implies the abolishment of central banking/monetary policy with a denationalization/privatization of money and technically a gold standard. In our monetophysical model, we will continue to assume an interplay of public monetary authority/debt free currency injection and private commercial banks/full reserve credit circulation, i.e. we identify the toxic effect of fiat credit expansion=debtism as the cause of monetary instability and consequently economic crisis. Nevertheless, we are aware that canonical economic theory is mainly about the productive interaction of property and credit as all human economic activity is originally of finite temporality and needs therefore naturally a systemic credit chain. The sole aim of our proposal is to clarify the toxic nature of fiat credit, to separate money and credit technically and to restoring the original role of money as market replicator. In our current fractional reserve system, it is financially possible to extract monetary value for nothing and this large scale methodical mischief ruins the basic chain of economic value creation in a market society; it is our conviction that private, corporate and public debtism is poison for a free polity and market economy.

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THE QUANTUM SCIENTIFIC METHOD

A futuristic research project

Stephen I. Ternyik

Introduction:

The research method of quantum science explains perceived, observed and measured reality via the universal construction principles of time-reversibility, non-locality and meta-connection as causal micro-macroscopic mirror effects, i.e. the natural/physical and unavoidable connection of all the parts of the world is logically inevitable. The origin and nature of the universe is of holistic partiality and none of its natural parts originated differently in space and/or time. High school physics and chemistry about planetary atoms that have electrons orbiting around a heavy nucleus, reminding us of our solar system, this mirror models should assure us of the stability of all existence; quantum scientifically and methodically, this comfortable pictures of the smallest and largest scales of the universe, however, turn out to be an illusion. In reality, the

planetary atom and system can survive for only less than one-billionth part of a second, because the orbiting electron loses energy by emitting electromagnetic radiation. It is more than a fatal blow to classical physics that all atoms, all molecules, all solid matter and forms of life (including human beings) can survive for only a billionth part of a second. L.deBroglie (Ondes et Quanta, Comptes Rendues, 177:507-510, 1923) intuitionally imagined a fundamental law of nature standing behind that discovery of the wavelike or periodic properties of matter, i.e. every bit of energy of proper mass is intrinsically related to a periodic phenomenon. According to quantum science, cancel the wave function and in one sudden instant event all atoms, molecules and forms of life will cease to exist, since the electrons will lose all their orbiting energy by radiation and collapse upon the nuclei. M.Planck (Über irreversible Strahlungsvorgänge, Akademie der Wissenschaften, Berlin, Erster Halbband, 479-480, 1899) discovered the photoelectric effect and A.Einstein (Über einen die Erzeugung und Verwandlung des Lichtes betreffenden heuristischen Gesichtspunkt, Annalen der Physik 322, Nr.6, 132-148, 1905) did deliver the missing interpretation. E.Schrödinger (Quantisierung als Eigenwertproblem, Annalen der Physik, Band 79, 361-376, 1926) formulated the nature of the wave function and W.Heisenberg

(Über den anschaulichen Inhalt der quantentheoretischen Kinematik und Mechanik, Zeitschrift für Physik, 43, Nr.6, 172-198,1927) formulated the natural uncertainty of location and momentum of a particle; the fundamental mathematization of quantum science was done by J.Neumann (Gesellschaft der Wissenschaften/Nachrichtenband, Göttingen, 1927): the state of a quantum system is completely described by the wave function, the traditional unity of two basic features of classical scientific description, namely locality and causality, have to be given up (a subject that is considered too radical to be taught in high school) and this is striking directly into the heart of exact methodical science. Consequently, remote parts of reality are essentially connected and no force can be attributed to the connection between remote parts. Every measurement procedure removes us from the physical world of events and is not a usual time-dependent process, because we do not know where to place the exact border between the observed system and the measurement technique; the consciousness of the observer subjectively perceives that a measured physical quantity possesses a certain objectified scaling value, i.e. the conscious observer causes the sudden collapse of the wave function by any physical causality and time-reversibility.

The Psychophysical Momentum:

Musa Ibn Maymun (1135-1204) gives in the treatise of dalatul ha'irin an explanation for the interconnection of all parts as a immanent feature of the unity of all reality, because all that exists is like one individual whose parts are bound up with another and there is no differentiation in time; one eternal upper force is the cause of the existence of the meta-connected existent and true science is the research into that unified force. This methodical thought also implies a critique of the 10th proposition, concerning the physical validity of human sensation, of the mutakallimin. The Nobel laureate (1963) E.Wigner opines that there are two levels of truth (Two Kinds of Reality, The Monist 48, 248, 1964): 1) the existence

of individual consciousness and 2) the existence of material objects, mental constructs, sensations of other people. In other words: the sensations of other human beings have the same degree of reality that physical objects have, i.e. the idea of reversible time enters into the equations, calculations and formulae and the measurement behavior becomes part of the reference system; this psychophysical phenomenon is known in depth psychology as transference. Time is the inner dimension of spatial reality, but the time of our days is not equal to the time in the beginning of the universe; Hubble time in the zero-gravity limit equals 12.5 billion years and the accumulation of time from the first day/yaum to the 2^{nd}, 3^{rd},…, up to now is exactly equivalent to Hubble time and this is the maximum time allowed in nature. The age of the universe exactly equals Hubble time in vacuum=12.5 billion years and is a universal constant, i.e. the age of the universe tomorrow will be the same as it was yesterday or today, the speed of light in vacuum and Hubble time in vacuum behave the same way and the universe originated conclusively in 6 temporal units. M. Carmeli (Cosmological Special Relativity, Foundations of Physics, Volume 26, No.3, 413-416, 1996) is relating these physical quantities (space coordinates and velocities) in different temporal units, his equations involve a unified world or cosmological

time and time is read backwards, with respect to the present moment of time which is just a cosmic time moment; the contraction of all lengths (entities and distances) is the same than in Einstein's theory, but not because of the relative velocity of the reference systems, but because of the backward motion in time, unified for all space, i.e. an interval of one second today would have lasted ten seconds in the beginning or singular point of temporal origin. It is the extent and nature of energy flow that determines the physical quantities of time; it is a natural expression of properties in physical bodies and changes that occur to them, e.g. human biological age. If energy is brought down to zero level, time is eliminated; electrons occupying this zero level in unlimited numbers are available by state transitions for the building of matter and the vacuum; Sir E.Whittaker (On the partial differential equations of mathematical physics, Mathematische Annalen, Vol. 57, 333-355, 1903) demonstrated by canonical quantization that photons have a time-independent physical existence and that time emerges via electromagnetic change by systemic waves. The physical momentum of particles is spatially everywhere proportional to the gravitational potential and time is neither absolute nor independent of photon activity in space; the momentum of light generates time and the more coherent the light, the less apparent is a shift in time (in

any case, electrodynamics is associated with photons). Living organisms are temporal clocks and their natural levels of electromagnetic fields can be considered as indicators of their energy-level and how it affects the inherent rate of time-flow. Time is consumed energetically by living organisms if they are conscious and the conscious observation of these differentials in energy flow allow us to measure the equivalence of time; the brain registers energy differentials and the associated fluxes, thought itself is time in motion. Consciousness, like life itself, consumes time and when we think, we are creating time. Time is linked to the cause-effect processes to a first position of energy and therefore innate to causal mechanics. Temporal change leads to changes of physical structures, changing light patterns means changing the behavior of a systemic wave and its photonic reality. The rate of change of time varies according to the hour of the day and according to lunar phases, but the temporal rate can also be influenced by external inputs such as mechanical vibration; in physics, new properties are always acquired as the result of change in some property. We experience changes in the rate of time in our daily life; during sleep, as our energy level decreases, it can be argued that time decreases. Aspects of what is observed during the dream-state do not obey the rules of physical existence or conventional causality, probably because

the temporal rate is different. Before and after sleep, our brain frequency tends to resemble the daytime rate. Furthermore, the temporal rate of human life can be associated with gravity zones and the value of gravity varies eminently throughout the planet, in part because of the poles and in part due to the local density of matter. Matter is maybe gravity minus time? Time is equal to the energy of the light momentum and longitudinal light waves are able to enter and leave nuclei, most probably influencing the energy flow in conscious beings. Consequently, living systems consume time as part of their consciousness and measuring processes, i.e. the psychophysical momentum of human life is originally and naturally governed by energy differentials (time) and physiological signal velocity.

3 Methodical Applications of Quantum Science:

The quantum scientific method is not a theory of everything, but a basic method to more exactly researching into the space-time structure of this physical world and for the depth analysis of how human being is naturally connected to the duality of wave functions and elements, i.e. it is precise thought into the psychophysical relationships of the whole and the parts. New ideas are always developed on the margins of academia that still lacks good mechanisms for cultivating good ideas. Ideas are generally tested in daily life practice and informal intellectual networks; later on, once radical ideas become incorporated by the mainstream, i.e. every innovation moves and develops via the progressive stages of invention, diffusion and incorporation. All processes of innovation can be understood as types of learning, rather than as eureka moments of lone geniuses; new ideas start off as possibilities that are only incompletely understood by their inventors; they evolve by becoming more explicit and more formalized, as best practice worked out, and as organizations develop experience about how to make them work. This phase involves consolidation around a few core principles which can easily be communicated. Then as the idea is implemented in new contexts it evolves further, and in new combinations, with the learning once again

more tacit, held within organizations, until other simpler syntheses emerge (generation of possibilities, social formation, pilot prototypes and organizational growth). Innovation always refers to new ideas that work in meeting goals and unmet human needs; they always take the form of replicable programs and become an imperative when problems are getting worse, when systems aren't working or when institutions reflect past rather than present problems. Human discontent is the driver of innovation, the other is the awareness of a gap what there is and what there ought to be, between what people really need and what they are offered by the market and the polity. There is a rising incidence of chronic diseases including arthritis, depression and diabetes and the once acute diseases (such as cancers and heart disease) are also becoming epidemically chronic; the key solutions to these severe innovation deficits have as much to do with human behavior as with medical provision. 1 possible application of the quantum scientific method is medicine: www.quantum-logic-medicine.de. Prof. W. Köster of Frankfurt is definitely a pioneer in this field, developing the medical profession into a science (please note that medicine is the most commercialized profession on this globe, being followed closely only by journalism, but both are professionally not operated scientifically and being practiced as empirical

arts).Application 2 is economics, starting again with the methodical transition of a profession into a science; the global financial crisis is an excellent historical example and research opportunity to making this quantum scientific methodical shift happen, with a special focus on monetary economics, since all economies on this globe have become monetary production economies. This author (www.issuu.com/jehucal/docs/bio) has already presented two general economic works (www.amazon.co.uk/Economics-Heuristics-New-ebook/dp/B005F5I3GI ; New Ethical Economics Science, Islamabad, 2012, The PFI) on this problem, but the methodical focus of the special solution is quantum monetary science (http://ssrn.com/abstract=2060467; http://ssrn.com/abstract=2102463); 27 years of private entrepreneurial practice and 11 years of self-financed study are invested into this endeavor. Finally, let us turn to application 3; we think that the science of kabbalah (and the related ancient wisdom/knowledge of ontological metaphysics; e.g. Sufism, Gnostics) as researched by Prof. M. Laitman (www.laitman.com/kabbalah-science-and-the-perception-of-reality/) can open up a new door for humanity to understand the unity of creation and the creator; this is the science of G-d (theology) in its best sense. From the methodical viewpoint of quantum science, G-d is the wave function that

keeps all created parts (including us mortal human beings) together, i.e. advanced spiritual cognition can save humankind possibly from annihilation.

Conclusio: The quantum scientific method can open up new research doors in medicine, economics and theology; however, it is not a theory of everything, but exact methodical thought to explore and explain the space-time structure of this world.

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