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**THE BANKING CRISES REFLECTED
IN THE FINANCIAL ORDER OF THE REAL WORLD**

Summary: The article reflects the present banking and financial crisis on the basis of latest research results about the existence of superior economic and financial order acting within the real world (equal natural world). Within this order (equal natural order) observably all creatures use different types of energy like different currencies of money as means of payment in order to finance, produce, and use their own life (equal own living biomass able to provide services); exemplary proof is given. Decisive message reflected in and substantiated by this order is: issuing human money being only a copy of energy with nearly full lack of real value needs coverage in the natural equivalent of money which means coverage in energy of human beings and/or assets including the energy of different creatures, and not coverage in gold or different mass measures. The author shows that China is also involved in crisis. He concludes that public measures of governments to provide more (human) money in present do not solve this crisis, rather they cause a delay and smoothing of its negative impacts by broadening the basis of responsibility within human societies of present and future. A final solution if wanted must consider the rules and constraints of this natural economic order the knowledge of which is to be enlarged urgently.

Key words: banking crisis, financial policy, natural economics.

1. Remarks on the present banking crises

When in previous years, 2006 and earlier, American banks allowed unsecured mortgage loans on real estate, this behavior can be seen as the starting point for the present banking crisis. This real estate crisis was enabled by a change of the global banking system since the middle of the 1980s with new financial products, with steadily increasing expectations for income returns of investors, and by an unreserved monetary policy of central banks throughout the world; the problem was not to get money but rather to find investment forms with high interest¹. At the same time the loan creditors learnt to combine their debts into a bundle, to pack them into securities, and to sell them. It seemed to be simple: self-employed estate agents in the Middle West of the United States widely untested could give away loans, banks did not

¹ Translated from [Eigendorf 2008].

mind because they could shift these badly secured loans – signed by rating agencies – all over the world, especially to those banks which needed higher income returns to justify their mere existence. Only for too long a banker, investors, and politicians watched this development. Now the world seems to stand before the gravest financial crisis since the year 1929. Just confidence disappears urgently which is needed by market economy. Calls for intervention of the state are understandable although they contradict the dogma of free market economy. After banks the financial crisis captures the whole states. It is underlined by a flood of messages in daily newspapers. Exemplarily it is referred to a sample of messages condensed from the German newspaper “World Online” dated 7 October 2008²: Iceland fights against national insolvency, government overtakes control of banks; Belgium’s former Prime Minister Jean-Luc Dehaene shall save the bank of French-Belgium trust Dexia; after the support of German Hypo-Real-Estate bank by German federal government, the German DAX-index again turns to minus figures, Germans hold 4.56 thousand billion Euro and may lose a lot; downswing with British bank shares, after the Black Monday at London stock market with a drastic break-in of the leading index FTSE 100, on Tuesday bank shares lost again strongly; stock prices in Asia and Australia clash down, the Japanese economic index Nikkei falls to the deepest level since five years.

It is mentioned that also China is indirectly involved in the development of this banking crisis. In the late summer of the year 1998 when the economic crisis in Russia and Asia culminated, the concerned countries depreciated in panic their currencies. From then on by the foreign exchange rate they kept their domestic labour cost low, thus they were able to supply the United States and Western Europe with advantageous prices. Moreover, China and India with their hundreds of million workers pressed the price level down. Especially the Americans were supplied by the Chinese with cheap products. Step by step China accumulated billions of dollars because it exported more than it imported. The Central Bank of China invested these dollars first of all in American state securities. Hence the Americans – like riding a *perpetuum mobile* – without a crash down of the dollar were able to finance their uncontrolled consumption and balance the deficit in their balance of trade. But from natural sciences the non-existence of a *perpetuum mobile* is well known! What is the conclusion? Might there be a link between finance and natural sciences which up to now has been forgotten to be taken into consideration by bankers and by politicians? Surprisingly, the reference to a *perpetuum mobile* was not mentioned during the discussion of the banking crises by a representative of natural sciences, but rather by Jürgen Stark, the chief economist of the European Central Bank³.

² Source of the condensed messages are articles of German newspaper “World Online” dated 7th October 2008, original headlines of these articles in German language are cited within the references at the end.

³ Cited after [Eichendorf 2008].

2. Remarks on subject and aim

Indeed there is a fundamental link between financing and natural sciences. This is a result of the latest research on the evidence of an economic and financial order within the real world (equal natural world), see [Maier 2007, p. 85]. The explanation of this link is a subject of this article. Its aim is to clarify with responsible bankers and politicians especially bankers of central banks and politicians in national and supra-national governments that the non-observance of this link and its impacts is the real cause of the present banking and financial crisis and not only of this one. Simply because human and natural (equal real) financial orders are coupled and interact. Every action in one order is responded by a reaction in the other one. The decoupling of both orders is not possible because humans live and act in both, hence they are subjected to both. Furthermore, the natural and real order, respectively, is far superior and reacts sustainable on a violation of its rules. Taking this link into consideration, the structural changes of the regulatory framework of finance in present seem to be inevitable because the criterion to allocate loans and credits within the real order is of a different category. It refers to energy as measure, and not to the measure of human money and currencies (Euro, Dollar, Pound, Renminbi, Peso etc.). This detection of energy as the absolute reference of human money confirms afterwards the turn off from gold being a measure in mass units within Bretton Wood's financial system since the middle of the 1940s was a correct decision in the 1970s⁴, hence it is good news from this view. But there is still another and decisive impact. The independence of central banks as stated in the constitutional law of a central bank is not given per se but it is subjected to the natural law of conservation of energy! The latter seems to be bad news for banker and politicians too, because it impairs their rights and freedom. But to overcome the present banking and financial crisis as well as future ones this news is important. It opens a view where to go, hence it is good news for the human society as a whole. Regrettably an across-the-board thinking as executed by the discipline of Future's Research is not convenient for the representatives of finance and politics on one hand, and natural sciences on the other, as both like to remain and think in their separated categories. This fact makes the discussion of this essential link between financing and natural sciences difficult. The more important is its clarification to make bankers and politicians at least aware of its existence and address their own responsibility.

⁴ This conclusion holds as well for different absolute references for human money in mass units in history like shells, stones, pearls, etc.

3. Remarks on the financial order of the real world

It is astonishing that the economic and financial order of the real world is explored so late although its mental roots go back to the British empiricism⁵, the French physiocrats⁶ and to the German philosophy⁷ dating back at least from the XVIIth to the 19th century⁸. This order is hidden because its equivalent of money is invisible but it is existent and observable. Perhaps only the principle of Future's Research of XXth century⁹ to think about impossible seeming matters – and the existence of an economic and financial order within the real world up to now indeed seems to be impossible in the heads of most people including scientists, bankers, and politicians – opened the eyes to apply Hegel's philosophical concept, and to look at natural phenomena also through the “glasses” of the economist from different views. What is new within this approach? The answer is: new is, firstly, that we center the natural world (real world) with all species and creatures and look at human species and societies as an important species, surely, but nevertheless a subordinate one, and not vice versa as done up now in economic theories. This approach may be compared with Galileo Galilei's (1564-1642) approach to centre the sun with the Earth going around it, and not vice versa as it was done before. New is, secondly, that we consider the creation of life of creatures and species not only as an biological production process but also as an economic one executed by these creatures themselves, and not by human beings. To clarify the latter: the apples of an apple tree, for example, are not produced by a farmer within the human agricultural industry rather they are produced by an apple tree itself. We learn that Hegel's concept delivers remarkable results¹⁰: Within the economic and financial order of the real world energy plays the role of money and serves as price specification for goods and services. Different from human money energy is invisible but measurable like human money. All goods and services have a price, and not only scarce goods and services like in human eco-

⁵ Main representative is the British philosopher John Locke (1632-1704) the mental root is that knowledge is based on observations. Note: the interpretation of observations is subject of statistics discipline.

⁶ Main representative is Francois Quesnay (1694-1774) the mental root is his comparison of the circulation of blood within a human being with the circulation of goods and services within the economy.

⁷ It is thought of Wilhelm Hegel (1770-1831), the mental root is his philosophical concept to comprehend a subject by describing it from different views and putting these descriptions like pieces of a puzzle together to a consistent common picture.

⁸ The author supposes as well roots in Chinese philosophy of Taoism (because of the existing natural order is viewed as best and incisions should be avoided) and in Old-Egyptian religion (because of the faith in a god of natural order within this religion).

⁹ Main representative and co-founder of Future's Research discipline is Ossip Flechtheim (1909-1998).

¹⁰ As for the detailed empiric and theoretical substantiation of the following features, see [Maier 2007, p. 14-58]; for an introduction in Russian language see [Maier 2006b, p. 293-312]; for a brief introduction in Chinese language see [Maier 2006a, p. 38-41].

nomics. Payments of all creatures are made and accepted in energy units. Like human money occurs in different currencies, energy occurs in different types. Like human money is transferable from one person to another, energy is transferable from one creature to another. The transfer of payments (from one creature to another) is enabled by the dual structure of the natural markets with the double roles of supply and demand of the concerned creatures. Like human money is convertible from one currency to another, energy is convertible from one type to another. Like a fee is charged when banks change money from one currency to another, with converting energy from one type to another there is a fee charged to be paid in thermal energy. Creatures include a bank because they are able to convert energy from one type to another. The sun plays the role of the central bank, autonomously and independently it issues energy to the creatures on the Earth. Moreover, we learn: the area of the natural state can be assumed to be the planet system of the sun. Its laws are the natural laws. Its population is the entirety of creatures. Its social top aim is the conservation of life. The natural state finances its activities by energy from the sun and by taxes from creatures. Taxes are energy transfers from the creatures to the environment; reversely subsidies are energy transfers from the environment to the creatures. Creatures act and react with incomplete information. They represent enterprises and customers in one subject: they produce, consume, and finance their final product “life” equal “the own living biomass able to provide services” by themselves. Populations and species represent industries.



Fig. 1. The natural phenomenon “deer is grazing on a meadow”

In order to cross the impression the above listed characteristics may represent wishful thinking or science fiction, exemplarily there is given evidence to energy as means of payment, and to the transfer of payments within the natural phenomenon “deer is grazing on a meadow”.

Is it a market? And if yes what and how pay the deer for grazing? And how the payment of the deer is being transferred to the grass? Through the “glasses” of the economist the phenomenon “deer is grazing on a meadow” looks like a food market. Demand is represented by the deer population, supply is represented by the grass population, market place is the ground of the meadow, and the good is the food grass which is eaten by the deer. But is it really a market? There are crucial questions. What does a deer pay for grazing? And how is its payment transferred to the grass population? We have to find lucid answers. As we realize no price specification, to get answers we start empirically. We observe: a deer moves with grazing. We ask: “What does a deer need for moving?” We shift this question to natural sciences. Isaac Newton’s (1643-1727) answer is: a deer needs force. We ask further: “Where does force come from?” Isaac Newton’s answer is: “Force is a derivative of the potential energy”. We learn: “A deer loses energy, gains force and from it moves”. We identify “losing” with “paying” and conclude the hypothesis: “The deer pays with energy, energy is a price specification within the real world”. So far we have looked at this phenomenon with a view to the deer population. Now we apply Hegel’s concept and look at this phenomenon with a view to the grass population. We learn that this phenomenon has a second or dual interpretation which is “seeds of grass are waiting for transport to settle at a distant location”. And we learn that this dual interpretation looks like a transport market with changed roles of demand and supply. Demand is represented by the grass population, supply is represented by the deer population, market place is again the ground of the meadow, and the service which is sold is transport. According to Hegel’s philosophy we put the two pieces of this puzzle like upper and down side of a coin together to a consistent picture, and we conclude: “Both populations have to pay, the deer population on the food market, and the grass population on the transport market”. And through the observation we realize the transfer of both payments: “By eating the deer gets chemical energy from the grass where the seeds are included like in a parcel. And by being eaten the robust seeds get kinetic energy from the deer like passengers in a bus. Thus the eating procedure represents both transfers of payments in energy units made in different currencies, and the crucial questions from above have lucid answers!”

4. Remarks on the link between human and real financial orders

Undoubtedly, a fundamental link between human financial orders and the real one is given because energy plays an important role in both orders; the latter is indicated by the well-known fact that without energy nothing runs in both orders. But in each order this role is different. Within a human economic order energy either is consi-

dered as a commodity produced in a special sector of economy called energy-sector (the reader may think of electrical power), or energy is considered to be a primary input for any production (the reader may think of labour). As energy can be bought and paid with human money like any other commodity it seems to be subordinate to human money. The more money you have the more energy you can buy. Now we learn: "Within the real world and natural world, respectively, energy is not a special commodity, rather it is some kind or better it really is the "absolute money"¹¹ to measure and evaluate products, services and assets. And human money is merely a copy of this "absolute money". As a copy it does not represent all characteristics of the original. This fact and disparity, respectively, have far reaching consequences for the theory of money, the monetary policy of central banks, and the financial policy of governments. In order to avoid misunderstanding this disparity is clarified in a more detailed way. As we learn energy being invisible is transferable, convertible. It occurs in various types or currencies and it is accepted on natural markets like money on human markets. Thus it has features of human money, but not only these! As energy is measurable in physical units, it represents a real value within the natural world, and not merely an assigned value like human money in which people trust and believe, and which must be protected because coins and banknotes issued by central banks in reality do not represent the assigned values. Thus energy, its allocation to production input, and its distribution to production output of the populations and species, is not only subjected to economic laws (like human money seems to be) but also to laws of natural sciences, especially the law of conservation of energy. By this link natural laws enter the economic theory of money and restrict the autonomously and independently assumed decisions within monetary policy of central banks, and within the financial policy of governments. New energy on the Earth, namely, within the natural and real order, respectively, is issued by the central bank sun via sunlight only. We learn this from natural sciences. Obviously the sun acts independently and autonomously. Other energy on the Earth comes from natural assets and resources (the reader may think of crude oil, natural gas, coal, uranium, wind, water), and from creatures including humans (the reader thinks of labour), only. Thus the monetary and financial policy of human central banks and governments is limited and depends on four natural sources: solar energy, energy of natural assets and resources, human energy, and energy of different creatures. Furthermore when issuing human money central banks must be sure that there is adequate coverage measurable in energy units within the real world. This is a decisive message and impact of this fundamental link between human money and the "absolute money" energy. In other words: "An uncontrolled issue of human money by central banks without coverage in energy units is a violation of the natural law of conservation of energy". It challenges a sustaina-

¹¹ The excellent hint to call energy "absolute money" was given during a discussion at State University of Finance and Economics of St. Petersburg/Russia in April 2004 by Professor Michail Klupt.

ble reaction of the superior natural and real order, respectively¹², on human monetary and financial measures in order to balance this imbalance within the real world enabled and implemented by the subordinate human financial order. In human societies this reaction of the natural order is comparable with an intervention of a federal state by superior federal law into the subordinate law of a sub-state in case of contradiction of federal law and state law. Surely, within the natural state populations and species can establish sub-states with own laws and regulations which belongs to their freedom; but given the case that a law of a sub-state contradicts a law of the natural state, the latter is stronger.

5. Remarks on the real cause of the banking crises

This link between energy and human money like a mirror is now used to reflect details of the banking crises in order to search for its real cause. To avoid a misinterpretation it is noted that the term “real cause” means the cause within the financial order of the real world. Taking the cited news as a guide step by step we pass decisive details of this crisis, reflect and evaluate them. We start with the message of unsecured mortgage loans on real estate allowed by American banks because when self-employed estate agents in the Middle West of the United States widely untested the loans, the loans could be given away. We reflect that this procedure of giving away loans within the financial order of the natural world must be covered by an equivalent of the absolute money energy. This energy in physical sciences potential is imaginable as the human potential to make a real profit in energy units which can be drawn from the use of the real estate or the asset which is loaned, and which is the basis to serve obligations from this loan. Insofar the procedure to allow mortgage loans by isolated banks is no violation of this natural rule, but it is just a part of human freedom. However, the violation of this natural rule is given by the point that these loans were granted widely untested and unsecured, the interpretation of which undoubtedly means that the equivalent profit in real terms may not exist thus may not be covered in energy units. Moreover, even taking that these loans are tested and hedged according to the rules of banks within the human financial order, a security for this coverage in energy units is not given. Why is it so? The answer is: “Because the testing and hedging procedures of mortgage loans of real estate and assets refer to expected profits in the future and do not refer to real values in the future”. There is a time delay between granting and refunding the loan. This is well known that forecasts of future profits are always unsecured to a certain degree. Within the tolerance of such a forecast for future profits of a real estate or asset, self-employed estate agents and bankers are apt to focus their eyes more on the own profit in the human

¹² Briefly, the natural order is superior because of its better top aim (conservation of life versus protection of human rights), because of its better money (energy versus human money), and because the regulation of production processes is better organized (full recycling versus waste), for details see [Maier 2007, p. 58-64].

financial order. Usually this higher profit in human money is given when it grants a higher loan of this real-estate or asset in order to get back a higher refund and interest. Thus the door opens for mortgage loans insufficiently covered by the natural money energy or overrated in human money.

At this point we reflect a second decisive item of the cited messages. This behaviour (overrating future profits) has been enabled and favoured by the change of the global banking system since the middle of the 1980s creating new financial products with high interest allowing loan creditors to sell debts (the reader may think of a mortgage-loan on a real-estate) of their clients worldwide. Under these new conditions bankers were enabled to define a mortgage loan together with its refund in the future as an investment project. Using the financial tool of cash flow analysis they could calculate the so-called Net Present Value (NPV) of this project defined as the estimated money value of future net profits of this project in the present. Surely, this NPV includes uncertainty, the latter is measured by the so-called discount rate on future net profits, an assumed value let us say 15% or 20%, due to the best knowledge and experience of the bank. Bankers could calculate the so-called Internal Rate of Return (IRR) defined by this discount rate where the NPV is just zero which means there is just no loss due to best knowledge and experience of the bank. If the NPV is positive the considered project (granting a mortgage on a real estate) is evaluated as profitable and can be sold on financial markets. Usually such a project is sold interpreting the discount rate of uncertainty as profit rate. The higher the discount rate is the higher seems to be this profit rate. This is a fatal error because identifying discount rate and profit rate is true if and only if there is no uncertainty, and this is all but never the case in the real world. But who wants to understand statistics and uncertainty really? Having sold such an investment project in view of applicable law banks and their bankers are out of obligations. In a legal way they have shifted the uncertainty and risk of this investment (which is the non-coverage in the absolute money energy) to anonymous buyers and clients far away. This is an amazing as well as fatal legal construction within financial orders of human societies but it does not hold within the natural order. Hence this behaviour leads to intermediately increased stock prices of concerned banks only, before the inevitable reaction of the superior natural order with a clash down of these human stock prices balances its real values.

A man gazing at clash down of prices on a stock market. Is this an intervention of the financial order of the natural world? And if yes why? Photo: German Press Agency dpa October 2008.

In order to underline that within the natural order without the coverage in energy when a service is not possible and is not executed we reconsider the phenomenon "deer is grazing on a meadow". We identify seller A with the grass population, buyer B with the deer population, the good sold by A to buyer B on one market with grass, the service sold by B to A on the dual market with transport. We remind: "In case of market balance the good as well as the service change the holder by equivalent prices which are chemical energy of eaten grass and moving energy of the deer. The deci-



Photo 1. Man gazing at crash down of prices on a stock market

sive characteristics is: A can sell a good to buyer B for a certain price if and only if A at the same time buys a different good or service for an equivalent price from B. This is the dual construction of natural markets. Insofar there is transparency and balance of payments, overreaching is excluded, hence the market and both populations can exist. More precisely: “If the grass population delivers food of lower quality (equal less chemical energy) to a deer, this deer will vice versa deliver transport service of lower quality (equal less kinetic energy), thus both partners learn that they rely on each other. On a human market seller A can sell a good for a certain price in Euro, Dollar, Renminbi etc. to buyer B, and he can hoard this money or use it time-delayed in order to deal something with third person C. Insofar less transparency and overreaching (in real terms) is not excluded. We observe and realize that by the innovative market introduction of money human societies have dissolved the original dual structure of human markets within the natural world and replaced the dual market by a money market. A positive result of this innovation was a market flexibility up to this point not known in human economics, a huge potential for different goods and services (the reader may think of loans and new financial products), and a huge impulse for economic growth. A negative result was the problem of stability of cash value because the original dual markets with coeval exchange of goods and services are served at different time points, and an estrangement of the real market participants (the reader may think of the credit user of a mortgage-loan in Middle West of USA. and the holder of an investment certificate about this debt in Germany). The latter do not know each other and – unlike grass and deer population – do not mind and forget that they rely upon each other.

We conclude that the non-observance of the fundamental link between human money and energy which is the absolute money or reference within the natural and real world as well as its strong impact that issuing human money needs coverage in energy units is the real cause of the present banking and financial crisis. Definitely the coverage in energy of issued human money was not given which was a severe violation of the natural rule of financing. The observable clash down of stock prices is an empirical evidence for the intervention of the superior natural state into human financial orders. The aim of this intervention is to adapt the prices of the stock markets to real prices in energy units.

6. Remarks on political measures

Finally we reflect political measures to meet and restrict the negative impacts of this banking and financial crises enabled by this link. What is possible with the “eyes” from the natural order? The answer is to respond to challenges of the superior natural order, human societies may follow two strategies. One is to adapt human financial orders step by step to the requirements of the natural order, the second is to trust human’s superior elasticity among all species and defend human financial orders as long as possible¹³. What is done by central banks and governments? We observe that like fire department pumps water on fire, they pump more liquidity into the financial system in order to provide securities and save banks. This was done in autumn 2008 in the USA and in Western Europe. By such a political measure the German Hypo-Estate bank was saved. In a discussion there are supra-national changes of legal rules for financing. Not only a demission but also a legal responsibility of bankers and members of supervisory boards for their acts and omissions is inevitable,. By these measures banks and governments follow the second strategy, the excess of money is enlarged, and a crisis like the world wide crisis of 1929 is not out of scope. The real problem is not the excess of human money itself but the missing equivalent in real terms measurable in energy. This second strategy called “imbalance of Stackelberg” like a boxing fight lasts so long as human society is too exhausted for any reaction. The latter may last very long. One hundred and even far more years are a short time period within the natural order. The conclusion is that undoubtedly, public measures of present to provide more liquidity by state securities are elastic actions on this intervention of the natural state. Nevertheless they do not lead to a final solution of this financial crisis but rather to a delay and to a smoothing of its negative impacts, by broadening the basis of responsibility within human societies, and by shifting additional burdens to future generations. These measures can avoid the collapse of special banks or even the financial system in present, but they force enlarged measures in the future, especially because confidence and belief in the security of market economy are significantly damaged. Hence the effective demand for the products of

¹³ Both strategies make use of duopoly theory of Stackelberg (1901-1946) applied to the relationship between humans and the entire natural world without humans, see [Maier 2007, p. 77-84].

market economy – within Keynesian theory the decisive driving force for employment! – will decrease. A final solution if wanted at all must consider the rules and constraints of this natural economic and financial order the knowledge of which is to be enlarged urgently. Of priority need is the development of a consistent statistical concept how to measure the real prices of goods and services in energy values, a mere conversion into the measure “barrels of crude oil” or “units of coal” one can buy for a dollar or a unit of a different currency is too superficial and even wrong¹⁴.

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¹⁴ Although the discussion of this important and crucial item is not focused here, some reflections are noted: “Should this equivalent of price in energy oriented at the cost of the producer of a good or service, at the energy utility of the user of this good or service, or at what?” The measures in “barrels of crude oil” and “units of coal” are wrong because of they refer to a mass unit. Even if these measures are improved by “energy of a barrel crude oil” and “energy of a coal unit” they are still too simple because they exclude the additional amount of energy of a human and creature, respectively, which is necessary to make use of a product or service either for production or for consumption. Two examples: “If you have a barrel of gasoline (representing energy) and a car (representing a product), only this car will not ride. Firstly you have to add your own bio-energy by filling this barrel into the tank of this car then you may drive this car. Equally, if you got a credit on the burden of a mortgage on a piece of your own land, when doing nothing else you are not able to pay for the periodical rates because the nominal value of all rates is higher than the nominal value of the credit. But adding your own bio-energy to this credit in order to make a profit of this credit you may be able to pay for the periodical rates. Hence a consistent statistical measure of any potential – not only of the potential energy - should take this additional energy component of a human or different creature into consideration which we mean usually when we speak of “labour”. See also the approaches to solution within the scenario *Adapting to superior natural system* with [Maier 2007, p. 80].

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ODZWIERCIEDLENIE KRYZYSU BANKOWEGO W ŚWIECIE FINANSÓW

Streszczenie: Artykuł prezentuje skutki obecnie występującego kryzysu bankowego i finansowego na podstawie wyników ostatnich badań nad istnieniem wyższych ekonomicznych i finansowych przyczyn oddziałujących na świat rzeczywisty. W obrębie tego porządku obserwowane stworzenia używają różnego rodzaju energii, np. obieg pieniędzy wyznaczany przez średnią płatności w sensie finansowym, produkcji i korzystania z życia (rozumiane tu jako pewna biomasa realizująca usługi). W pracy podano wyniki przykładowych doświadczeń.