

FROM THE ENTROPY LAW TO "FARFALA EFFECT" AND THEIR ECONOMIC PERCEPTION

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Abstract: It is said that theories explain laws, and laws are facts of observation. At the first sight these two concepts reduced to axioms are perfectly logical and consistent, but the law is a valid creation only in an unit of time, starting with the laws of physics and finishing with the ones of economics who are no more than temporal realities. However, there are some laws of physics that have not lost their validity and have not become non-realities or factual realities because the universe has its own mechanisms of self-adjustment, self-organization. In other words, regardless of the chaos that created the universe, there was a natural and logical reorganization based on the laws of physics that have always existed. Therefore the laws of physics and economic laws were discovered and not invented. Some authors put an equal sign between the disorder (entropy) and chaos, others on the contrary are making differences between the two concepts, but both consider an unpredictable behavior, sensitive to change and conditionings which have became, in the most random situations, issues that we can easily see in the economic field. The laws of physics are the same for all observers, but the perception is different, something that explains human behavior that has lost sight of the need to ask about the possible consequences of the changes which brings them to its original state of nature, the fact that the report of it and the natural environment represents the basis of existence and the relation with the social environment determines quality of life. In this context we would like to submit to attention some aspects concerning the entropic nature and also the chaos theory found in economy.

JEL classification: B30, B40, D40, E22, F23

Key words: creation; disorder; chaos theory; the farfala effect; resources

1. INTRODUCTION

In their approach, economists have tried to build business models based on the concepts and methods taken from the the exact sciences, particularly using linear equations because of their ease of use and uniqueness of solutions.

The progress made by sciences that led to the emergence of new mathematical and statistical methods have left its mark on the modeling of economic phenomena, which can only be built on linear methods have become inadequate to describe them.

While in nature the process of entropy occurs by itself (C. Iacob, 2011)¹, the

¹ Iacob, C., Cocoșilă, M. – *Socio-economic theory based study of business organizations dysfunctional*, International Journal of Management and Technology, vol.1, no.1, 2011, www.ijmt.yolasite.com

economic process is directly dependent on human activity where the consumption of goods entails the entropy, namely degradation by failures that occur in the process.

The appearance of chaos theory permitted the use of dynamic equations because theoretically, it is possible to control variables in a certain order, but is practically impossible to be controlled well enough so that to get to know the final result.

Today, more and more companies are facing human and moral hazards (C. Iacob, 2006)², with informational risks, the risks of new technologies, causes that come and combine, accumulates and creates the avalanche effect after which it is difficult to estimate and stop the negative effects manifested.

2. OBJECTIVES

The important objective of this article is to understand the law of entropy and chaos law because recognizing chaos in economy is important both theoretically and practically.

Referring to the theoretical side, we see that if a system is chaotic, we build mathematical models which can provide a better understanding of its dynamics, while, referring to the practical aspect, we can say that the discovery of chaotic behavior enables its control.

In other words, using sensitivity to initial conditions in order to move from one state to another, means to accept other behaviors of the system, that is other results of economic policies.

3. METHODOLOGY

In order to achieve the required objectives, we will use a specific methodology based mainly on research, observation and comparative analysis of specific issues arising from issues brought into discussion. The proposed methodology allows us, on the one hand, the identification of both common issues and matters of difference between the two laws of physics, and on the other hand, how to perceive their application in economy.

4. FROM THE ENTROPY LAW TO CHAOS LAW

4.1 Argument in favor of the laws of physics and their correlation with economic laws

The universe is a whole world, perhaps infinite in time and space, infinite variety in the forms they take matter, energy and information in their perpetual development process.

A Romanian proverb says that the wise man makes in the summer sledge and in the winter cart, in other words he is cautious. We note, however, that in our surrounding reality nothing is predictable, everything is anarchic and chaotic for the derailment of the original path. And if all goes without any rules, how we think the Universe is ordered?

We can say that chaos is the order that causes the disorder. Order coexists with hazard, but between order and chaos exists minimal differences.

Matter and energy are forms of motion in the universe. Space and time are the elements or components of which physical existence is unquestionable and can not be doubted. Without space and time there is no physical movement.

² Iacob, C. - *The Nature and the Administration of the Risks for the Enterprises*, he 3rd International Conference „Economics and management of Transformation” 5-6 mai 2006, The faculty of Economic Science, University of the West, Timișoara

Whatever the chaos that created the universe behind was a natural and logical reorganization, based exactly on the laws of physics that have always existed - they were DISCOVERED, not invented. If the laws of physics are the same for all observers, however, note that their perception is relative because theories explain laws, and laws are facts of observation. This may be justified by the fact that the movement is everywhere in the universe and the laws of physics can only describe physical movement diversity of the universe. But the universe is moving in two basic forms - the substance and field - the combination of which is its diversity of objects and physical phenomena observed in the universe.

In the international arena, laws and theories belong to each actor separately, and he needs to know them in detail in order to use, like a lawyer, their utopia.

In every moment of life, individually or organized, in our economic world, we are faced with a choice. Every second we have to choose between several options; and from here the idea of parallel universes. But every decision dictates what follows and is changing destiny, because it is sufficient a minor change to reach major consequences. That is why, from the law of entropy to the chaos theory it took only one step, whose consequences can be fully felt in the economic domain.

4.2. Entropy law and its economic perception

Many people wonder why it is easier to ruin something than to do it. The answer to the second law of thermodynamics, fundamental law that governs our entire existence, known as the Law of Entropy and by virtue of which the universe becomes more disordered.

Entropy we see all around us. Plastic pretty fair, Isaac Asimov (1970)³ states: "To bring order into our room we must make special efforts, but if you leave it to its fate very soon and very easily it becomes a mess. Even if you do not enter it gather dust. How difficult is it to maintain our homes, cars and their own bodies in perfect order! How easy it is to let them deteriorate! Indeed, we have nothing to do for everything to be destroyed, to năruiască to break and wear in itself, is what is the second law".

In full accord with the statements of Isaac Asimov, we can say that human history is a consequence of eternal conflict between order and disorder. But how can we understand this? Of course we can appeal to many examples, but the most relevant seems to be the one given by Murphy who said: "If you put a spoonful of wine in a barrel of sewage, you get a barrel of sewage. If you put a spoonful of sewage in a barrel of wine, you get sewage".

And yet, what is entropy? The answer in physics. Entropy is a parameter that measures the state of a thermodynamic system disorder.

If we examine closely all those cases of temporary increase of order in a system (the second law of thermodynamics is temporarily canceled), we see that in each case, two essential conditions must be fulfilled:

- be gross energy information to direct light coming from outside the system. In this regard, Dr. Henry M. Morris (1992)⁴ states: "A process of growth that takes place by random accumulation will lead to an ordered structure but a heterogeneous ball. There must be a beginning pattern, a project or code, otherwise it will be no

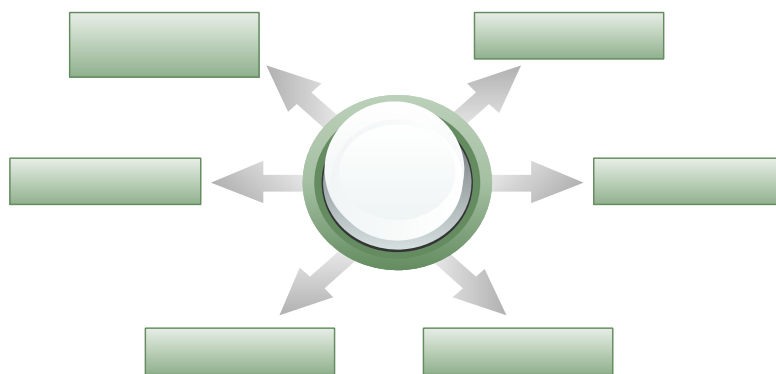
³ Asimov, I. - *In the Game of Energy and Thermodynamics You Can't Even Break Even*, Smithsonian Institute Journal, June, 1970.

⁴ Morris, H.M. - *Creționismul științific*, Societatea Misionară Română, 1992, pg. 44.

orderly growth";

- second prerequisite is to have a mechanism to convert raw energy into usable energy from the outside, meaning that dr.Henry M.Morris⁵ says: "Available energy in the environment is of no use if it can not be converted into specific forms needed to organize and link the complex structure and logical components of the complete system. If there is such a mechanism, the energy from the environment rather will destroy any structure already present".

On a careful examination of the issues presented, we see that actually working with two concepts, namely: on the one hand we talk about low entropy (negative) involving order, on the other hand, high entropy alone (positive) disorder involving . In this context, it is of no interest and claim of Erwin Schrödinger (1980)⁶ who states that matter "inanimate" tends toward disorder, whereas living matter has a "tendency" to keep order, suggesting a goal from inside. Thus, negative entropy principle is the principle of continuous transformation of order in disorder into chaos, tangible aspects of various domains, as shown in Figure no. 1.



Source: belong to the author

Figure no. 1 Areas is perceived law of entropy

Referring to resources C. Iacob and R.M. Drăcea (2012)⁷ emphasizes that concerned about practical action, man has lost sight of the need to ask about the possible consequences of the changes it brings to its original state of nature, that relationship between it and the natural environment is the existence and relationship with the social environment determines quality of life.

Connections between man, nature and society are multiple and amplified to changes in society. Nature-human-nature connection and nature-society-nature is cyclic in a spiral that is very wide. But note that the nature-human-cycle company is a non-entropic nature as the earth receives from outside solar and cosmic entropy cycle is only in relation to the entire universe.

The assimilation can say that there are cyclical connection between natural resources, its social and human civilization, the character of reciprocity. Production-

⁵ Ibidem, pg. 44-45.

⁶ Schrodinger, E. - *Ce este viața? și Spirit și materie*, Editura Politică, București, colecția Idei contemporane, traducere de V. Efimov a ediției originale apărută în anul 1967.

⁷ Iacob, C., Drăcea, R.M. - *Cost of exhaustible resources (applications lignite)*, LAP LAMBERT, Academic Publishing, 2012, pg. 12-17.

consumption cycle-resources-resources entropic in nature and therefore the company is bound by closing the cycle in terms of social equity and fairness towards nature.

Natural resources, far from inexhaustible or renewable whole, proved to have a limited character space and regeneration processes - partial and - much slower than those of exploitation and consumption, ignoring the need for self-control, limiting rationalization desires and necessities according to objective conditions have led to increased conflict between humans (society) and nature. Therefore accumulated harmful effects that led to an economic crisis materialized in a series of partial seizures as they were and are: energy crisis, food crisis resources, environmental, chemical pollution, noise, etc., each manifesting the discrepancy and acute contradictions between human needs and aspirations of its real possibilities of satisfying them.

Matters relating to the order and disorder in nature and society is not limited to the issue of resources is a much wider problem which may receive everywhere, in everything around us and our actions.

4.3. Law and perception of its economic chaos

Emergence of chaos theory meant the end of the old laws of physics that dominated scientific thinking human centuries, as was the law of entropy, which culminated with the idea that the world order will decline over time in the universe. In fact, chaos theory tried to replace the idea that entropy characterizes the energy degradation, ie all forms of energy conversion into heat, to equalize the absolute temperature of bodies in the design of a system which metaphysicians theory amounted to heat death of the universe, or in a disappearance ie long enough for any movement.

How is the law of entropy chaos theory? is a frequent question that arises because most of the time, these two laws tend to be confused. Chaos theory studies disordered systems apparently trying to find an order in apparently random data and reveals a hidden order when you enter the details of the system studied.

Chaos theory says that small variations in the parameters of a complex system can lead to completely different results. Edward Norton Lorenz (1963)⁸ highlighted the chaotic nature of weather known as the butterfly effect ("effect Farfa") stating that small variations of weather in a particular part of the world can lead to significant changes in the weather situation elsewhere in the Earth.

The reaction has ignored than expected, an unknown writer even making the statement "two butterflies flying two jewels over town wearing of a breeze." In other words, the butterflies can not trigger storms conclusion led Norbert Wiener create image "snowflake" (snowball effect or avalanche) stating that "a snowflake that falls at the North Pole can cause an avalanche at the South Pole".

One thing is certain, we are faced with the domino effect, the domino-effect. Since the economic system is a complex system, application methods of chaos control can improve the performance of the economic system.

Application of chaos theory in economics starts from the assumption that complex systems sometimes seem too chaotic for them to be able to recognize a pattern, but by using certain techniques, a wide range of parameters can be concentrated In a single point on a graph. First theoreticians of chaos have found that complex systems seem to go through some cycles of events, even if those events are rarely repeated exactly replicated. System representation as a graph indicates that there is a certain state in which the system

⁸ Lorenz, E.N. - *Deterministic non-periodic flow*, Atmospheric Science, 20:130-141, 1963.

tries to reach a kind of equilibrium. Basically, the allegations set reprinted not more than the main aspects of chaos theory⁹, which can be summarized as follows:

- the smallest change in input parameters will produce different behavior of that complex system;
- uncertainty principle denies the accuracy, and this initial situation of a complex system can not be accurately determined, therefore no evolution of a complex system;
- complex systems usually try to get in a given situation can be static or dynamic.

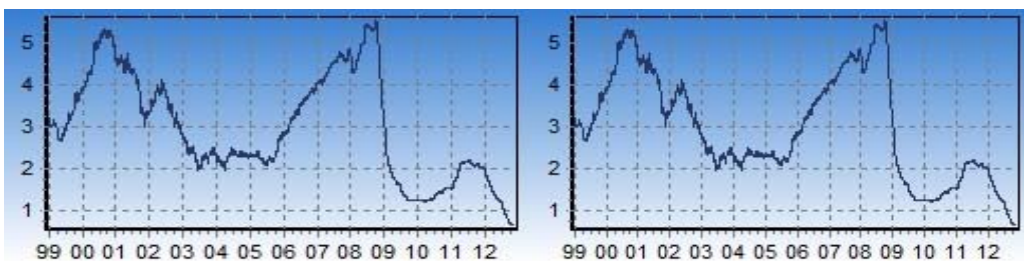
To overcome the difficulty created mathematicians invented fractal dimension, fractal ajugând term to describe any image that has the attribute of self-similarity and that you find in the economic field.

Ask ourselves if we can copy and apply a model as it was conceived? The answer to this question is yes and no as an economic system is composed of people who have mutual relationships mentality and changing are endowed with subjectivity, make different choices have different tastes, perceive information differently and so on, issues affect the structure of the economic system and mathematical models applied in economics deviation from the purely mathematical or physical.

However we can bring into question at least three economic areas in which we apply chaos theory: capital market management enterprise and economic policies.

Capital market is an area typical perception of chaos theory as the underlying assumptions of efficient markets theory is not confirmed. In arguing this idea point out that investors do not consistently manifest aversion to risk and does not react to information promptly. Typically, investors are guided by trends based on past information and strategies to extrapolate the present. Therefore, the behavior of financial market is nonlinear in new information and therefore can not be accepted statement that changes are independent courses and that markets can move in random steps but irregular assimilation of information can lead to a tendency of moving random called fractal time series¹⁰.

On a careful examination of capital markets can conclude that they are a self-similar system because the components are similar or identical to the whole. In support of this idea in mind Euribor development during 1999-2012, as shown in Figure no. 2.



Source: <http://www.robanks.ro/euribor.html>

Figure no. 2 Euribor evolution during 1999-2012

⁹ Guzga, F. – *Teoria Haosului*, <http://www.descopera.org/teoria-haosului/>, 2010.

¹⁰ The name comes from the concept of fractal.

On <http://ro.math.wikia.com/wiki/Fractal> find the following explanation: Fractals are shapes and patterns created using mathematical equations extraordinary. An intuitive definition of fractal is this: A fractal is a fragmented geometric figure or broken, which can be divided into parts so that each of them is (at least approximately) a miniature copy of the whole.

As can be seen, the evolution described above is a typical random walk (walking at random theory) or Brownian motion, as seen in Figure no. 3.



Source: <http://www.wikideep.it/cat/analisi-tecnica/analisi-tecnica/>

Figure no.3 Example of graph random walk or Brownian motion

Without going into the details of the capital market, what we can say is that experts can predict chaos such a market success. Among experts chaos Manus J. Donahue include (1997)¹¹ which states that "short-term investments are a waste of time and that such investors will disappear over time because of high transaction costs. However, stock prices in the long term, not random. Investors will gain if they follow the long-term trend. A system can be unpredictable in the short term, but the term deterministic long. "

Business management is where chaos theory shows the following three directions:

- when necessary management control and the scale of the organization it should be used;
- the relationship between freedom and necessity hierarchical control, which varies depending on several parameters;
- the partial stability can be maintained under certain conditions, so that they are not damaged connections that keep the system together.

Application of chaos theory to business management is possible because organizational system is a nonlinear system characterized by points of bifurcation, meaning that, on the one hand, there may be times when the system to change behavior, on the other hand, there may be periods uncontrollable oscillation. Worthy of consideration is the opinion of L.F. Dennard (1996)¹² who said: "What good science of chaos if we do not learn how to confront chaos and complexity? Not what concerns management? "In the final analysis, this is the most important question. If a manager can not control or force a system into some form of order management is possible? Is it necessary?"

What we grasp is that the traditional models of decision making, the manager believes that it is complete and perfect information available, but in reality there is only complete information for events past and therefore future elections should be based on information limited given that the future is subject to risk and uncertainty.

Economic policies is an interesting field as it can be perceived as chaos theory, an economic policy based on a wrong theory, produce effects that are fundamentally different

¹¹ Manus J. Donahue - *An Introduction to Chaos Theory and Fractal Geometry*, December 1997, available from <http://www.fractalfinance.com/chaostheory.html>

¹² Dennard, L.F. - *The New Paradigm in Science and Public Administration*. Public Administration Review, 56 (5), 1996.

from those predicted by theory aspect you find abundantly in the financial accounting, such as for example the lack of application of the going concern assumption. Hence, an alternative to formulate appropriate policies, with consequences different from those associated with traditional theories can be used chaotic patterns.

As Lorentz experiment, a complex react to different variables in unpredictable ways. If the system is complex, even using the same input data or similar ones will not lead to the same results.

5. CONCLUSIONS

Far from pretending to exhaust the subject matter, we conclude that the recognition of chaos in the economy should lead to changing strategic actions in order to create conditions where one can always learn something new, which may or may not appear new strategies, depending on the created situations.

Trying to simply leave the state of chaos is the biggest mistake. Important are new solutions that can integrate all information. In this context, such a process enables information that may appear solutions and strategies at all organizational levels that may offer new ways of thinking and functioning of the entire system.

In other words, where is human intervention, the study should be performed in several ways because human actions are conditioned by social mechanisms like natural phenomena that are controlled by their own laws. What matters, we believe that implies taking into consideration all relationships that exist between the economic variables, but without excluding those with secondary or indirect effects.

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