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CONTENTS

Volume 3, Issue 2, 2010

ECONOPHYSICS Section

Karl Küerten, <i>Dynamical Stability of Scale-Free Opinion Networks: Opportunists versus Contrarians</i>	135
Ion Spânulescu, Ion Popescu, Victor Stoica, Anca Gheorghiu and Victor Velter, <i>An econophysics Model for the Stock- Markets Evolution and Diagnosis</i>	149
Larysa Krasnikova and Ganna Bielenka, <i>On Application of Physical Models in Banking Risk Estimation: Valuing the Demand Deposits</i>	159
Alexei Kazakov, <i>Market Ultimate Profitability</i>	167
Irina Dmitrieva, <i>Operator Diagonalization Procedure and its Numerical Realization in the Framework of Technical Electrodynamics</i>	181

NEW ECONOMY Section

Anda Gheorghiu, <i>The Management of Country Risk for Romania Before and after the Admission into the European Union</i>	193
Dorel Bahrin, <i>Common Agricultural Policy – Romanian Perspective</i>	203
Wolfgang Ecker-Lala, <i>Risk Management for Enterprises</i>	217
Cristina Burghilea, <i>Paradigms of Growth Seen in Sustainable Development</i>	225
Cioban Costel-Ioan, <i>Effects of Credit Loan. The Rivers of Money Dried Up</i>	237

ECONOPHYSICS Section

DYNAMICAL STABILITY OF SCALE-FREE OPINION NETWORKS: OPPORTUNISTS VERSUS CONTRARIANS

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Abstract. *We present a dynamical binary opinion model for the emergence of collective decision making based on the majority and the minority principle. The network consists of N interacting agents, whose opinions are described by Ising spin variables. The connectivity structure of the network is flexible, specified by suitable probability distributions. Damage spreading techniques show how the dynamical stability of these models depends on the choice of these structures. We present critical network parameters, where the network undergoes a dynamical phase transition from ordered to disordered behaviour in analogy to earlier studied genetic and neural network models. Variation of the control parameters of the connectivity distributions can largely enhance the parameter range of the network stability. The model is meant to give possible explanations for social behaviour, in particular for the stability and instability of the individual and global opinion during an electoral campaign.*

1. Introduction

Scale-free network topologies have been found almost everywhere in the real world. Many networks evolve through the accumulation of nodes to an already existing network, where nodes attach preferentially to nodes which are already well connected. In fact, in a scale-free network the distribution of the connectivity varies widely. Some nodes are highly connected “hubs”, while the majority of the nodes are rather sparsely connected [1]. Prominent examples are computer networks and the world wide web, which respond quite differently from randomly connected networks in the presence of perturbations. If nodes are perturbed randomly, scale-free networks have been shown to behave much better than their randomly connected counterparts. However, if the attach on the nodes is specific, scale-free networks can fail catastrophically. The present work

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generalizes Galam's randomly assembled opinion network models [2,3,4,5,6,7] to networks with variable connectivity structures given in terms of probability density distributions. In these models, individuals gather in groups of variable odd size with $k = 1, 3, 5, \dots, K$, where k randomly chosen agents discuss a topic in order to arrive at a final decision, YES or NO. According to the majority/minority rule each individual can adopt the opinion of the majority or minority, respectively.

2. Majority and Minority rules of behaviour

The model network consists of N agents of a democratic community characterized by only two distinct rules of social behaviour. We assume that a fraction p of the agents adopt the opinion contradictory to the prevailing opinions of others and obey a local minority rule, while the fraction $1 - p$ of the agents follow the current trend and obey the local majority rule. The latter group can be considered as opportunists or trend followers, while the first group can be thought of as contrarians who are quite common in social societies. The implications of their existence have long been studied in the context of financial market strategies, where this group plays an important role.

The concept of the majority rule which is used in many democratic societies, demands that a numerical majority can make a decision which will apply to all parties involved in the decision-making process. This principle places an emphasis on decision making rather than consensus within a group. The majority rule is employed in a number of settings, such as elections, board meeting votes, and legislative votes, where eventually one has only one winner. Many democratic societies use the majority rule in local and international elections.

The basic principle of the majority/minority rule in social networks was originally suggested by Galam [2,3,4] in order to describe public debates, where at each discrete time step a discussion group of k agents ($1 \leq k \leq K$) is selected at random and all agents take the opinion of the majority/minority within this group.

In order to avoid a tie situation, where no majority exists, we uniquely consider groups of odd size k in this study, although the generalization of the formalism for k even is straightforward [3]. The opinion of agent i is described by a binary variable σ_i only capable to take the value $+1$ or -1 according to his specific choice. The dynamical rule governing the time evolution of the network that is, whether agent i takes

the opinion YES (+1) or NO (−1) at the next time step or not, is given by the linear threshold rule:

$$\sigma_i(t+1) = \text{sgn} \left(\sum_{(j)} \pm \sigma_j(t) \right) \quad i = 1, \dots, N, \quad (1)$$

where the plus sign in Eq. (1) refers to the majority rules and the minus sign to the minority rule. In the context of physics these two rule correspond to ferromagnetic and anti-ferromagnetic interactions, respectively. The index j only runs over all “neighbours” of agent i . The deterministic dynamics is discrete in time and the opinion of agent i depends only on the value of its K “neighbours” at the previous time step. Since the variables are binary, there exist only 2^N different configurations in phase-space such that the motion will inevitably evolve through a transient phase to an attractor, either a fixed point or a limit cycle. There are three major macroscopic variables which characterize the dynamical behaviour of the system. The first one is the public opinion at time t , the density of “ones” which defines the acceptance rate of the YES or NO state given by the total magnetization:

$$m(t) = \frac{1}{2N} \sum_{i=1}^N (\sigma_i(t) + 1). \quad (2)$$

The second macroscopic variable stems from the important question how small local perturbations influence the time evolution of the network. Such a perturbation could be specified by switching the opinion variable of only one or a few randomly selected agents from YES to NO or from NO to YES. In order to study these effects, one considers two identical replicas of the system and compares the time evolution of the two replicas starting with slightly different initial conditions. Accordingly we define the normalized Hamming distance between the two opinion vectors at time t by $\sigma^{(1)}(t)$ and $\sigma^{(2)}(t)$:

$$d(t) = \frac{1}{4N} \sum_{v=1}^N (\sigma_v^{(1)}(t) - \sigma_v^{(2)}(t))^2. \quad (3)$$

The macroscopic quantity $d(t)$ specifies the fraction of agents who differ in their opinion, when we compare the opinion vectors $\sigma^{(1)}(t)$ and $\sigma^{(2)}(t)$ of the two replicas and is the probability that the opinion of a randomly chosen agent at time t differs from that of his counterpart in the unperturbed replica. Provided that this probability $d(t)$ is sufficiently low, the system can be placed into the stable phase. Damage spreading

procedures have originally been introduced by Kauffman [8], and later successfully been applied in the theory of Ising models, spin glasses and neural network models [8,9,10,11,12], where the existence of two dynamical phases was established: a stable phase, where the system is resistant to damage spreading and a chaotic phase, where an initially small damage might spread all over the system. While in biological networks the "Lyapunov" stability ($d^* = 0$) is a necessary requirement for the survival of a system, in opinion networks a slight perturbation of a few agents should not affect a substantial part of the other agents.

A complementary measure of the opinion stability based on the individual level can be specified by the third macroscopic quantity, the normalized Hamming distance between successive time steps:

$$D(t) = \frac{1}{4N} \sum_{v=1}^N (\sigma_v(t) - \sigma_v(t-1))^2. \quad (4)$$

Here the quantity $D(t)$ specifies the fraction of agents who change their opinion from one time step to the next. As has been seen in various electoral campaigns up to about one third of the respondents change their opinion at least once during the campaign [13]. However, note that individual changes in one direction are often cancelled by individual changes in the opposite direction. The latter quantity $D(t)$ does not require replicas and is computationally easy to calculate.

3. Mean field approximation

In the limit of asymptotically large N , analytical predictions for the time evolution of the magnetization $m(t)$ (Eq. (2)) as well as for the time evolution of the distance $d(t)$ given by (Eq. (3)) can be derived, provided that:

- Every agent has exactly K incoming connections from K distinct input agents chosen with uniform probability among the other $N - 1$ agents.
- The network is sparsely connected (In-degree $K \sim \log N$) [10,11].

Under these assumptions one can easily show by statistical arguments that for K odd the probability for a randomly chosen agent to be in the YES state in the next time step is given by the iterative map [5]:

$$m(t+1) = F_K(m(t)) = \sum_{k=\frac{K+1}{2}}^K \binom{K}{k} m^k(t) (1-m(t))^{K-k} \quad (5)$$

for the majority rule and:

$$m(t+1) = 1 - F_K(m(t)) \quad (6)$$

for the minority rule. In analogy to the magnetization $m(t)$ Eq. (5) the time evolution of the distance $d(t)$ can also be written as a K -th order polynomial in $d(t)$:

$$d(t+1) = \sum_{k=1}^K \alpha_k^K(t) \binom{K}{k} d^k(t) (1-d(t))^{K-k} \quad (7)$$

where the coefficients $\alpha^K(k)$ depend explicitly on the magnetization $m(t)$. Since the distance $d(t)$ is a K -th order polynomial, the Lyapunov stability of the crucial fixed point $d^* = 0$, is governed by the first order coefficient $\alpha_1^K(t)$ given by [5]:

$$\alpha_1^K(t) = \left. \frac{\partial d(t+1)}{\partial d(t)} \right|_{d=0; m=m^*} = K \binom{K-1}{\frac{K-1}{2}} (m(t)(1-m(t)))^{\frac{K-1}{2}}. \quad (8)$$

Note that the quantity $\alpha_1^K(t)$ specifies the probability that a sign reversal of one single randomly chosen input variable at time t will change the output state of the system at the next time step, $t+1$. The stability of the system with respect to small perturbations of the initial condition is guaranteed only if $K\alpha_1^K \leq 1$ is satisfied. This can be easily derived from Eq. (7) with the aid of linear stability analysis.

4. Probability distributions of odd group sizes

The individual agents usually meet in groups of just a few, where the group sizes are not constrained to have the same fixed number K , but might vary widely. Let us now assume that the agents are distributed within $\frac{K+1}{2}$ distinct groups of odd size according to a power-law probability distribution $P_k(\gamma)$:

$$P_k \sim \frac{1}{k^\gamma} \quad k = 1, 3, \dots, K. \quad (9)$$

where γ specifies the power-law exponent. Another distribution of group sizes is a binomial distribution $P_k(\gamma)$ with control parameter q :

$$P_k \sim \binom{K-1}{k-1} q^{k-1} (1-q)^{K-k}, \quad k = 1, 3, \dots, K. \quad (10)$$

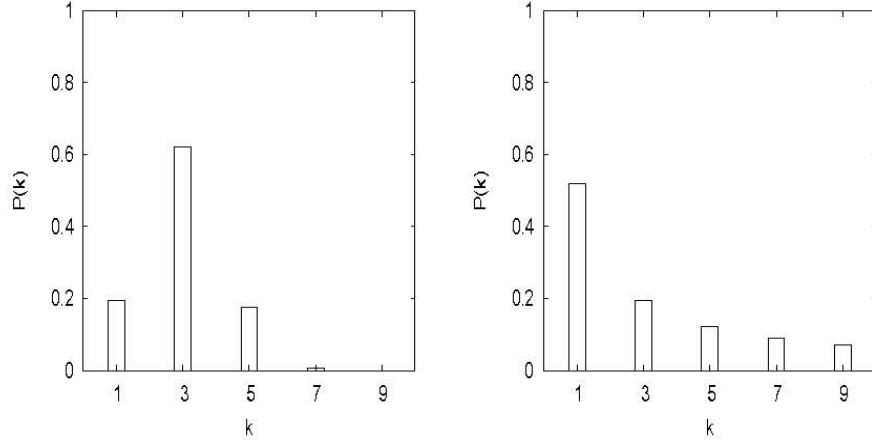


Figure 1. Binomial distribution for $q = 0.2527$ (left) and Power-law distribution for $\gamma = 0.898607$ (right) with cut-off at the maximal group size $K = 9$, respectively. The average connectivity is in both cases $\langle K \rangle \approx 3$.

Here the quantity K represents the maximal group size. Accordingly and arbitrarily chosen individual belongs to a group of size k with probability P_k . The average connectivity $\langle K \rangle$ is:

$$\langle K \rangle = \sum_{(k)}^K k P_k, \quad (11)$$

Figure 1 depicts the histogram of a binomial and a power-law distribution for $q = 0.2527$ and $\gamma = 0.898607$, respectively. The cut-off connectivity is chosen as $K = 9$ which results in five groups of size $k \in \{1, 3, 5, 7, 9\}$ and an average connectivity $\langle K \rangle \approx 3$.

Figure 2 shows the average (effective) connectivity based on a power-law distribution (left) and a binomial distribution (right) with $K = 9$. The effective connectivity $\langle K \rangle$ is a decreasing function of the control parameters γ and q . With increasing values of γ and q the connectivity distributions decrease to their minimum value $K = 1$. In the following we assume that a fraction p of the agents follow the local majority rule, while the fraction $(1 - p)$ of the agents obey the local minority rule. Throughout this study we restrict the fraction of contrarians smaller concentrations ($0 < p < 0.5$), since appreciable fractions of contrarians do not reflect the reality and are irrelevant from a social point of view. The time evolution of the magnetization $m(t)$ of the $\frac{K+1}{2}$ component mixture is a linear superposition of the pure systems of size $k=1, 3, 5, \dots, K$ and we have:

$$m(t+1) = (1-2p) \left(\sum_{(k)}^K P_k \sum_{j=\frac{k+1}{2}}^k \binom{k}{j} m^j(t) (1-m(t))^{k-j} \right) + p \quad (12)$$

where k runs only over odd values. Since the majority rule as well as the minority rule is antisymmetric with respect to the interchange of -1 and $+1$, $m^* = \frac{1}{2}$ is a universal fixed point of Eq. (12). The stability of this

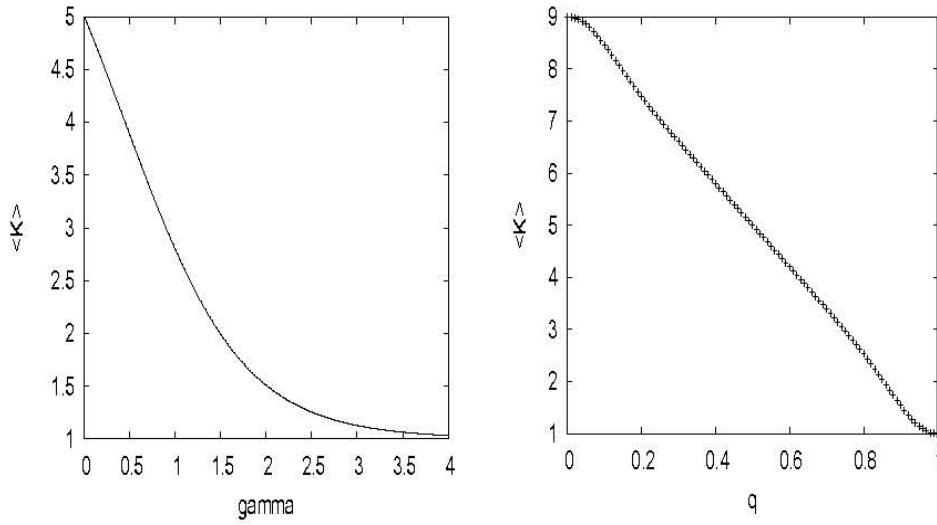


Figure 2. Average connectivity $\langle K \rangle$ as a function of γ for maximal group size $K = 9$.

decisive fixed point which was already present in the pure case, gives rise to a “tie” situation, where 50% of the agents are in favour of the YES and 50% of the agents are in favour of the NO. Note that this subject has often been discussed in earlier work [2,5]. The critical concentrations p_c^m are given by the relation:

$$\left| \frac{\partial m(t+1)}{\partial m(t)} \right|_{m=\frac{1}{2}} = (1-2p) \sum_{(k)}^K P_k k \binom{k-1}{\frac{k-1}{2}} \left(\frac{1}{2} \right)^{k-1} = 1. \quad (13)$$

Solving Eq. (13) for p yields the critical p_c^m for the bifurcation of the magnetization and we have:

$$p_c^m(K) = \frac{1}{2} \left(1 - \left(\sum_{(k)}^K P_k k \binom{k-1}{\frac{k-1}{2}} \left(\frac{1}{2} \right)^{k-1} \right)^{-1} \right). \quad (14)$$

The critical concentration for the distance ($d^* \rightarrow 0$) is given by the equation:

$$\left. \frac{\partial d(t+1)}{\partial d(t)} \right|_{d=0, m=m^*} = \sum_{(k)}^K P_k k \left(\frac{k-1}{2} \right) (m(t)(1-m(t)))^{\frac{k-1}{2}} = 1. \quad (15)$$

Since $\left. \frac{\partial d(t+1)}{\partial d(t)} \right|_{d=0}$ reaches its maximum value for $m^* = \frac{1}{2}$, independent of the parameter choice, the Lyapunov stability is guaranteed if:

$$\sum_{(k)}^K P_k k \left(\frac{k-1}{2} \right) \leq 1. \quad (16)$$

The critical parameter p_c^d can be calculated by first solving Eq. (15) for m and inserting this solution into Eq. (12).

In figure 3 the critical concentration of the contrarians for the “tie” phase as function of K is represented.

5. Results

Let us first shortly review the basic version of the model [2,3], where the agents meet in groups of the same size K . For $K = 1$, where each agent is only influenced by one single other agent, Eq. (12) becomes:

$$m(t+1) = (1-2p)m(t) + p \quad (17)$$

with the unique fixed point $m^* = \frac{1}{2}$ which is always stable in the parameter range $0 < p < 1$. At both extremes $p = 0$ and $p = 1$ we have $m(t+1) = m(t)$, while the time evolution for the distance is always:

$$d(t+1) = d(t) \quad (18)$$

independent of the control parameter p . This implies that the system is only marginally stable with respect slight changes of the initial condition what the the magnetization and the Hamming distance are concerned. For general values of K the probability distribution P_k would correspond to the choice $P_1 = P_3 = \dots = P_{K-2} = 0$, and $P_K = 1$. Due to the symmetry of the interaction rules $m^* = \frac{1}{2}$ is always a natural fixed point of Eq. (12) and specifies a “tie” situation with no preference for the YES or the NO.

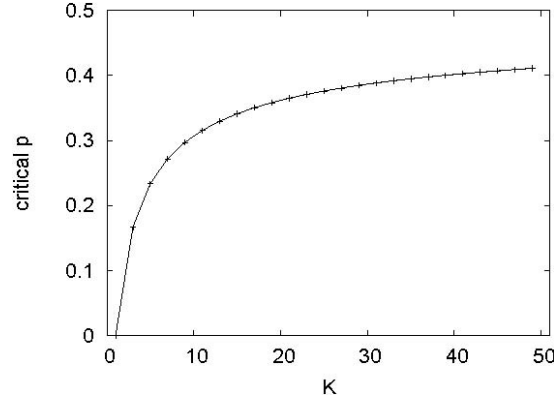


Figure 3. Critical concentration of the contrarians for the “tie” phase as a function of K .

Eventually this stationary solution loses its stability below a critical p_c^m via a bifurcation. In that case, depending on the initial condition, the system can reach one of the two stable fixed points which specify the preference for the YES or the NO. We observe that at low densities of the contrarians, the time evolution of the magnetization Eq. (10) has two attractive fixed points symmetric to $\frac{1}{2}$ which merge at the critical $p_c^m = \frac{1}{6} \approx 0.166...$ for $K = 3$ and $p_c^m = \frac{187}{630} \approx 0.297...$ for $K = 9$ via a backward bifurcation [10]. For $p < p_c^m$ the system is bistable, while for $p > p_c^m$ we have the unique stable fixed point $m^* = \frac{1}{2}$. Correspondingly whenever the “tie” situation dominates the system is unstable with respect to small perturbations of the initial configuration. Provided that only one single agent changes its opinion at an arbitrary time step t , this perturbation can propagate such that in the long time limit 50% of the agents will have changed their opinion. Around the “tie” we find Gaussian fluctuations with amplitudes proportional to $1/\sqrt{N}$ such that the outcome becomes essentially random. Note however that the magnetization, the acceptance rate of the YES and the NO, is stable, since the individual changes of the votes of the agents cancel out. Figure 3 shows also that the critical concentrations for the distance p_c^d are slightly below the corresponding critical values for the magnetization p_c^m . Figure 4 depicts the long time behaviour of the magnetization and the distance for $K = 3$. It is due to the bifurcation of the magnetization that eventually a phase transition from chaotic to ordered

dynamics occurs when the concentration of the contrarians decreases. Moreover, the quantity $D(t)$, the distance of the individual follows the same asymptotics as the Hamming distance between the two replicas $d(t)$ such that about 50% percent of the of the contrarians change their opinion from one time step to the next. We can conclude that in the whole parameter range of the “tie” the model does not reflect a real life situation, while below the critical concentration p_c^m the model is realistic, since changes in the individual opinion of this magnitude have been reported [13]. Note that for increasing values of K the critical points shift to higher values of p . Inserting the asymptotic property of the central binomial coefficient:

$$\binom{K-1}{\frac{K-1}{2}} \approx \sqrt{\frac{2}{\pi}} \frac{2^{K-1}}{\sqrt{K}} \quad (19)$$

into Eq. (14) for large values of K we find:

$$p_c^m(K) \approx \frac{1}{2} - \sqrt{\frac{\pi}{8}} / \sqrt{K}. \quad (20)$$

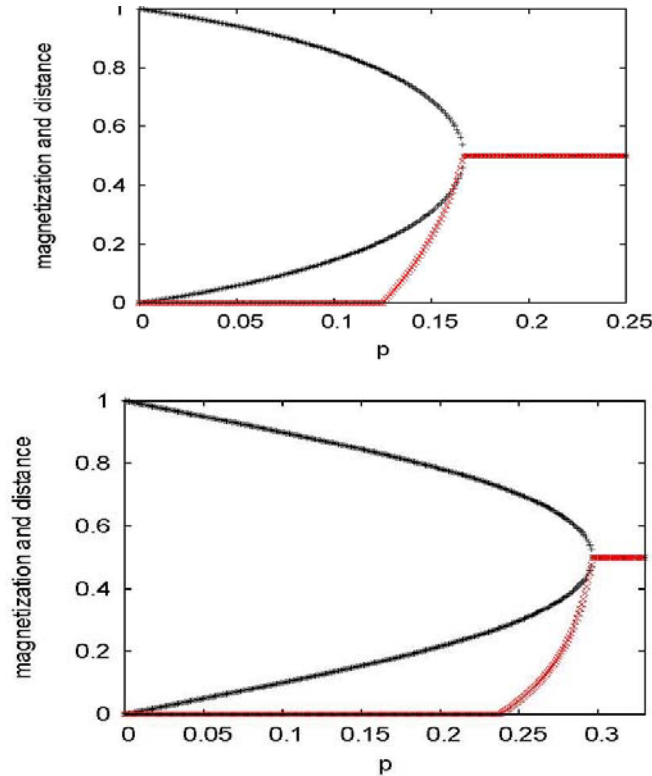


Figure 4. Long time behaviour m^* (black) and d^* (red) as a function of p for $\langle K \rangle = 3$ (top) and $K = 9$ (below).

Figure 4 depicts the critical concentrations for the phase transition from the “tie” phase to the majority/minority clear cut phase. Small group sizes K allow only a small fraction of the contrarians to stabilize the system. Allowing up to about 30% or 25% contrarians we would have to limit the connectivity parameter to $K=10$ or $K=6$, respectively. Note that these are reasonable upper limits for the concentration of the contrarians [13] as well as for the group sizes. Figure 5 depicts the asymptotic values of the magnetization m_c^m and the distance p_c^d for networks with an average connectivity $\langle K \rangle = 3$ (top) and $\langle K \rangle = 5$ (below), respectively. The right curves show the pure networks with $K=3$ and $K=5$, where each agent has exactly $K=3$ and $K=5$ neighbours. The left curves show the networks based on a powerlaw distribution, while the middle curves show the networks based on a binomial distribution. Obviously increasing fluctuations around the mean value shift the critical points to smaller values of p which corresponds to effectively lower connectivities. Thorough analysis reveals that

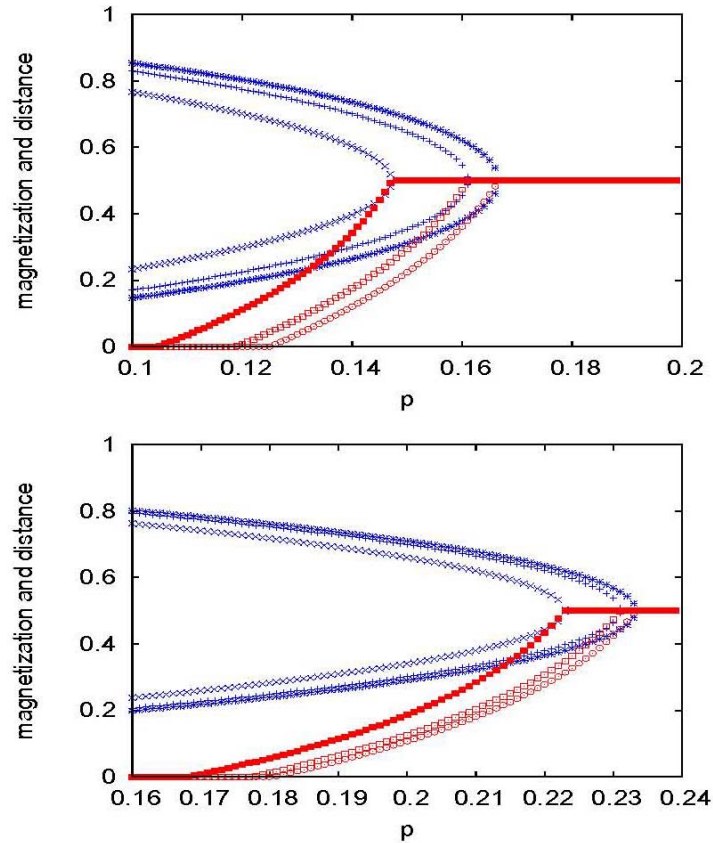


Figure 5. Long time behaviour m^* and d^* as a function of p for $\langle K \rangle = 3$ (top) with $\gamma = 0.8986$ and $q = 0.2527$ and $\langle K \rangle = 5$ (below) with $\gamma = 0$ and $q = 0.5$.

the larger the standard deviation from the mean, the stronger is the shift to the left. One important feature of the networks based on our connectivity distributions P_k is that with decreasing values of γ and q which reduce the effective connectivity $\langle K \rangle$, the “tie-region” increases which is consistent with original pure model [2,5]. On the other hand, with increasing average connectivity K the chaotic region shrinks such that the region of stability is expanded. In the limit of $\gamma \rightarrow \infty$ as well as $q \rightarrow 1$ the effective connectivity is $\langle K \rangle = 1$ which leads to the overall stability of the tie-region such that the time evolution ends up with a tie, independent of the initial condition. Figure 6 depicts the phase-time portraits in the frozen regime for $p = 0.95$ with $d^* = 0$ (left), and in the supercritical regime for $p = 0.86$ with $d^* = 0.1$ (right). In the frozen regime we essentially find fixed point behaviour after a short transient. In the supercritical regime we find cycling behaviour of moderate length and observe that a substantial fraction of the agents do not change their state at all. These agents establish a kind of frozen core in the system which is necessary for the existence of the stabil phase. They might be classified as the “inconvincibles” which never change their opinion, independent of the opinion of others. In the chaotic regime we observe that the agents change their opinion more or less randomly. Deep in the disordered phase for $d^* = \frac{1}{2}$, 50% of the agents change their opinion from one time step to the next which makes the dynamics quasi-random and unstable. This feature is hardly desirable in a realistic model and might give rise to further discussions and possible improvements of the model.

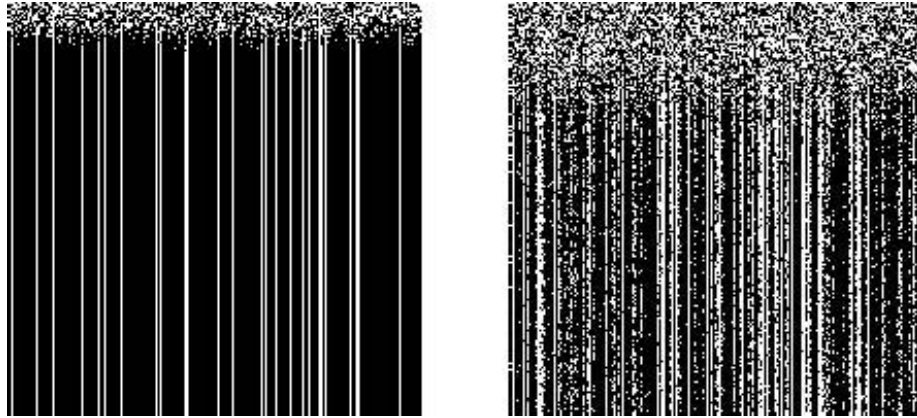


Figure 6. Space-time diagram for the YES and NO states of the agents for the first hundred time steps for the ordered phase (left) with $d^* = 0$ and the disordered phase close to critical (right) $d^* = 0.17$.

6. Conclusions

We have shown that the stability of our binary network model governed by a subtle balance of opportunists and contrarians depends crucially on the choice of the degree of the connectivity and on the choice of the of the connectivity structure. The “tie” phenomenon which was already present in the simplest Galam model reminiscent of the hung elections in the US (2000) and Germany (2002), still persists in any generalization as long as the symmetry of the interaction rules are preserved. However due to the instability of the system in the relevant parameter range the model does not give a satisfactory answer to the occurrence of the 50%:50% outcome of elections which have been quite popular in the last decade. Galam had suggested that those were not chance driven, but possibly arised due to the coexistence and interplay of opportunists and contrarians [2].

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REFERENCES

- [1] A. L. Barabási and R. Albert, Science **286**, 509 (1999).
- [2] S. Galam, Physica A **333**, 453(2004).
- [3] S. Galam, Quality and Quantity, **41**, 579-589 (2007).
- [4] S. Galam, Europhys. Lett. **70**, 705 (2005).
- [5] K. E. Kürten, Int. J. Mod. Phys. B **22**, 25/26,4674-4683 (2008).
- [6] M. Mobilia and S. Redner, Phys. Rev. E **68**, 046106 (2003).
- [7] K. E. Kürten, Phys. Lett. A **129**, 157 (1988).
- [8] S. A. Kauffman, *Origins of Order: Self-Organization and Selection in Evolution* (Oxford University Press, Oxford) (1993).
- [9] D. Stauffer, *Extreme Events in Nature and Society*, The Frontiers Collection, Part II, 233-257 (2006).
- [10] K. E. Kürten, J. Phys. A: Math. Gen. **21**, L615 (1988).
- [11] K. E. Kürten and J. W. Clark, Phys. Rev. E, **77**, 046116 (2008).
- [12] B. Derrida, J. Phys. A, **20**, L721(1987).
- [13] P. Sciarini and H. Krisi, Int. Journal of Public Opinion Research, **15**, 4, 431-453 (2003).

AN ECONOPHYSICS MODEL FOR THE STOCK-MARKETS' ANALYSIS AND DIAGNOSIS

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Victor STOICA^{*}, Anca GHEORGHIU^{*} and Victor VELTER^{***}

Abstract. *In this paper we present an econophysics model for the description of shares transactions in a capital market. For introducing the fundamentals of this model we used an analogy between the electrical field produced by a system of charges and the overall of economic and financial information of the shares transactions from the stock-markets. An energetic approach of the rate variation for the shares traded on the financial markets was proposed and studied.*

Keywords: *share, electrostatic field, stock-market, information field, potential energy.*

1. Introduction

The stock exchange rate of a share or other quoted title is the price at which those titles exchange on stock markets. This rate varies according to the law of supply and demand, and the rate approaches more or less the true value of the share.

The setting of the stock exchange rate is based on all available information about the asset proposed for trading, primarily on the intrinsic value estimated by different methods of evaluation of the company or economic entity which is traded on the stock-market. These evaluation methods are based on certain expectations, therefore contain a certain amount of subjectivity depending on the evaluators' quality, and the model used for it [4]. Therefore, these methods can only give an estimated potential rate, also called the **intrinsic value**, which could possibly help the stock investors in making buying or selling decisions. The problem of the real value arises when the absence of quotation of the asset to the stock market is higher, i.e. the reference price is not fixed yet; in this case

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theoretical estimates may serve as a basis for negotiation when taking into account for trading.

In this article, we propose a theoretical model to estimate rate of the share and its evolution over time depending on supply and demand. This model is based on the similarity between an electrostatic field – symbolizing the stock-market (or field) and the electrical charges which symbolizes all the assemble of the economic information about the transacted shares.

2. The Stock-Markets' Electrostatic Model

The market value of a share at a certain time t is an average, steady value, as determined in the negotiated market transactions. The principle followed is that of ensuring counterpart; according to this principle the purchase orders sent to a higher price and the sell orders submitted at a lower price than the market price have their chances of implementing. The accumulation/aggregation of the purchase orders is made from the highest to the lowest rate; the aggregation of the sales orders is made in reverse; the buying and selling orders to the market are primarily/mainly taken into account and are executed at the market rate which is the balance rate (value) at a certain time, when the number is comparable to the offered one.

The aggregate evolution of the securities rates on a certain market means the range of values taken by the stock market-rates aggregated in a certain time period subjected to observation on daily basis or in a one day stock-market session (Fig. 1,c).

Let's consider the shares X_i of a company C listed on any stock exchange market.

Suppose that on day $z + 1$, the stock rate of the shares X_i increases from 950 monetary units (m.u.) to 1,000 m.u. This growth rate is determined by the establishment of equilibrium between the supply and request/demand at a higher level, thus moving the rate from 950 m.u. on the day z to 1,000 m.u. on the day $z + 1$. On the day $z + 2$, the rate goes up again to a value of 1,100 m.u. and so on.

We consider the range of scalar values of equilibrium of the rate of share X_i as similar to an electrostatic field E_i produced by the charge $+q_i$ symbolizing – in economic terms – all the economic information (price, volume, type of share and so on) about the share X_i (Fig. 1,a,b).

This can be generalized considering that all information about all shares traded in the stock market A , are sources a_i for an information field E_b symbolizing the whole capital market (Fig. 1,c).

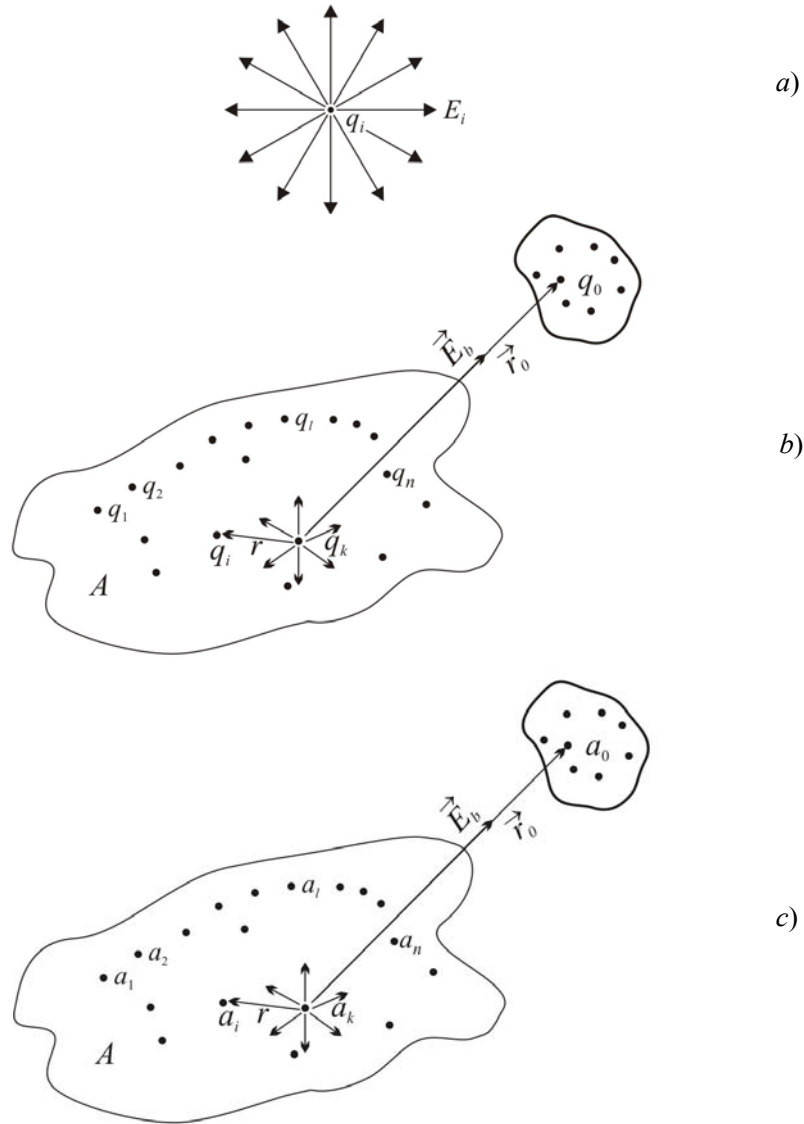


Figure 1. a) Electrostatic field created by electrical charge $+q_i$; b) Electrostatic field created by electrical charges system $q_1, q_2, \dots, q_n$; c) The stock-market information field created by $a_1, a_2, \dots, a_n$ information sources.

As the electrostatic field, the stock-market information field is a force field whose value is proportional to field intensity, E . For example, in physics the electrical force F_e is [1]:

$$F_e = q_0 E \quad (1)$$

where q_0 represents a_n electrical charge. Similarly, the force of the stock-market quotation of shares, F_b , is given by the law of supply and request, and can be expressed similar to (1):

$$F_b = R = aE_b \quad (2)$$

where a represents „the charge” of the point symbolizing the **equilibrium value** of a share X_i in the information field.

As in physics, to keep a material particle or electrical charge in a fixed point, the electrical force $F_e = qE$ is compensated by a mechanical force F_m , in the stock-market field acts the law of supply and demand, similar to the law of action and reaction in physics (Fig. 2,a).

The electrostatic field created by the charges $q_1, q_2, \dots, q_n$, interacts with the charge q_0 located at the distance r_0 (Fig. 1,b) through the Coulomb type electrical force (1) where F_e is given by Coulomb's Law [1]:

$$F_e = \frac{1}{4\pi\epsilon_0} \frac{q_0 \sum_{j=1}^n q_j}{r_0^2}. \quad (3)$$

The total charge Q inside the region A is given by the sum $\sum_{j=1}^n q_j$, and $1/4\pi\epsilon_0$ represents the proportionality constant expressed in the International System of units used in electricity [1]. Comparing the equations (1) and (3), we obtain the equation for the electrical (or electrostatic) field:

$$E = \sum_{j=1}^n \frac{1}{4\pi\epsilon_0} \frac{q_j}{r_0^2} \quad (4)$$

or:

$$E = k \frac{Q}{r_0^2}. \quad (5)$$

In Eq. (5) Q represents the total charge from region A and r_0 is the distance between the region A which creates the field E and the point P_0 where is located the charge q_0 that the field interacts with (Fig. 1,b). We notice that the fields' intensity, thus the influence over q_0 charge is smaller as the distance between the point P_0 and the region A is larger (Fig. 1,c).

Similarly, with Eq. (5) we can write equation for the stock-market information field E_b (Fig. 1,c):

$$E_b = k_b \frac{Q_b}{r_0^2} \quad (6)$$

where r_0 represents the so called information, „distance” between the field produced by the figurative points that represent the information „charges” for the shares contained by a market A (Fig. 1,c) and other share on another market located at the informational „distance” r_0 (Fig. 1,c). It is obvious that this „distance” will be as longer as big are the difference between the economic and financial information about „the shares”, like the difference between the energy or oil shares and the financial shares for banks or investment funds and so on [2].

Analyzing the region A from figure 1,c, we can see that the information distances r between the same type of shares (financial or banking, for example) are much shorter, so their interaction with the stock-market field is much stronger and the fields’ intensity is much higher:

$$E_b = k_b \frac{Q_b}{r^2} \quad (7)$$

because, as seen in figure 1,b,c, we have $r \ll r_0$. In this latter case, considering the fields’ interaction E_b with the q_i charge from within the (stock-market) region A , the force of the share given by the equation:

$$F_k = k_b \frac{q_i Q}{r^2} \quad (8)$$

is much stronger because of much smaller information „distances” r comparing with distance r_0 .

3. The Energetic Approach of the Stock-Market Rate

As is known in physics, the fields’ forces can produce mechanical work when acting on a material point or electrical charge q on a finite distance ΔS etc.:

$$L = F \Delta S. \quad (9)$$

The electrostatic field E created by the $+q$ charge, will interact with a test-charge $+q_0$ with a rejection force $F_e = q_0 E$ seeking to push away the positive $+q_0$ charge. For the $+q_0$ charge to remain motionless (in electrostatic terms, standing) is necessary to action with a mechanical force F_m equal and opposite with the electrical force F_e of the electric field i.e. (Fig. 2,a):

$$\vec{F}_m = -\vec{F}_e = -q_0 \vec{E}. \quad (10)$$

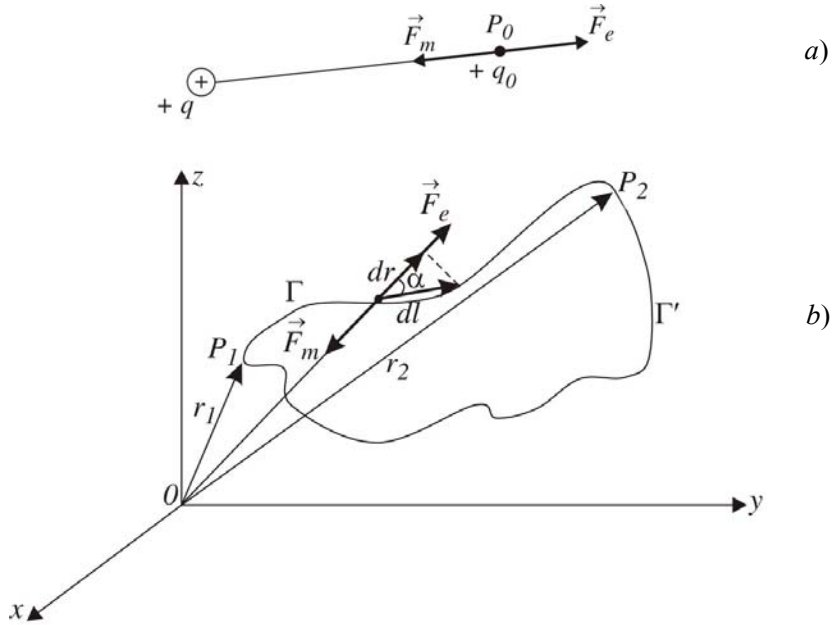


Figure 2. a) Electrical rejection force F_e is compensate by the mechanical force F_m ;
b) Calculation of mechanical work of force F_e between P_1 and P_2 points.

The elementary mechanical work dL done by the force F_m when the charge q_0 is moving on the dl displacement (see Fig. 2,b) is given by [1]:

$$dL = \vec{F}_m(\vec{r})d\vec{l} = -q_0\vec{E}(\vec{r})d\vec{l}, \quad (11)$$

where $\vec{F}_m(\vec{r})$, $d\vec{l}$ and $\vec{E}(\vec{r})$ are vector parameters.

The mechanical work of the force F_m between the points P_1 and P_2 (Fig. 2,b) is given by:

$$L_{1,2} = \int_1^2 dL = \int_{r_1}^{r_2} \vec{F}_m(\vec{r})d\vec{l} = -q_0 \int_{r_1}^{r_2} \vec{E}(\vec{r})d\vec{l}. \quad (12)$$

Taking the axes origin in the center of the source-charge $+q$ and taking into account the expression (4) will find (following the calculations see [1], p. 39), the equation for the mechanical work:

$$L_{1,2} = -q_0 \frac{q}{4\pi\epsilon_0} \int_{r_1}^{r_2} \frac{dr}{r^2} = \frac{qq_0}{4\pi\epsilon_0} \left(\frac{1}{r_2} - \frac{1}{r_1} \right) \quad (13)$$

or:

$$L_{1,2} = kq_0q \left(\frac{1}{r_2} - \frac{1}{r_1} \right). \quad (14)$$

The equation (14) shows that the mechanical work $L_{1,2}$ done for the displacement of the constant charge q_0 in the field created by the q charge from origin **does not depend on the path** followed between the points P_1 and P_2 , but only on the initial and final position, it means it depends only on the initial distance r_1 and the final distance r_2 between origin of axes and the point P_1 and P_2 respectively (Fig. 2,b). It is known from mechanics that such a field having this property (that the mechanical work depends only on initial and final points) is a **conservative field**, that means it possesses potential energy on whose behalf the mechanical work is carried out by the field forces.

Similarly it can be considered that the information stock-market field E_b is a conservative field where operates the law of supply and request in the stock-market. The work done by the stock-market field forces is given by an equation similar with Eq. (9):

$$L_b = R\Delta P \quad (15)$$

being determined by the stock-market field forces R , i.e. by the action of the law of request (Request = R) and offer and by the rate variation ΔP of the share price.

In equation (15), R represents the stock market force F_b given by the equation (see Eq. (2)):

$$F_b = R = aE_b \quad (16)$$

where E_b is the information field of the equilibrium values and other information regarding the shares, and a represents the „charge” of the point symbolizing the all information and the shares’ value X_i . The size of R (Request) represents the reliability degree or appreciation of the considered share that also determines the level of request R of the share.

Finally, under the action of the field E_b , of the force R , by raising the request and the offer, and hence the share rate (value), a stock-market „work” is performed given by the equation (see Eq. (9)):

$$L_b = R\Delta P = aE_b\Delta P \quad (17)$$

where ΔP represents the share’s rate variation.

For the **conservative** fields, like the electrostatic field, the mechanical work performed at the movement of the charge q_0 from the point P_1 to the point P_2 (Fig. 2,b) is given by the difference between the potential energies of the charge q_0 in the two points, and that is [1]:

$$L_{1,2} = W(r_2) - W(r_1) \quad (18)$$

where $W(r_2)$ and $W(r_1)$ are the potential energies of the „test” charge in the points P_1 and P_2 (Fig. 2,b). Similarly, in the stock-market a virtual point symbolizing all the information about the share X_i from a forces potential field E_b , like the capital market, possesses the stock-market **potential energy** reflected in its price or stock-market rate increase **opportunities** on whose behalf the stock-market “mechanical” work is effectuated (Fig. 3):

$$L_{b(1,2)} = W(v_2) - W(v_1). \quad (19)$$

If there is a variation of the share rate, from $v_1 = 950$ m.u. to the higher equilibrium value, for example $v_2 = 1000$ m.u., in this case the equation (19) for the stock-market work is:

$$L_{b(1,2)} = W(1000) - W(950).$$

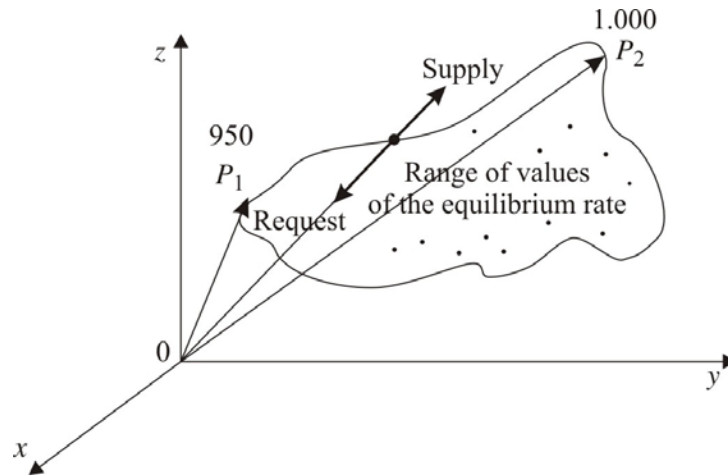


Figure 3.

As in mechanics or electrostatics, if the stock-market rate is decreasing, there is a transformation of the potential energy in kinetic energy, and vice versa for the increasing of the rate. The maximum kinetic energy is achieved in the crush moment until reaching the minimum resistance, than the process can be resumed depending on market development of the value of the share X_i (Fig. 4).

As it can be seen in figure 4, the successive variations of the transformation of the potential energy into stock-market kinetic energy can take place several times in a one day stock-market session or in other time period represented by the graphics of the evolution of share values. The minimum value of the potential energy W_{pb} is when the shares' rate value is minimum, thus the share X_i has in that moment a low “potential”. In exchange, in that moment, the kinetic stock-market energy E_{cb} , depending

to the variation (raising) **speed** of the rate and to the transaction time, is high, the shares' value can change rapidly, i.e. to increase (Fig. 4) or to begin to decrease again until it reaches a new resistance threshold of the rate.



Figure 4. Weekly evolution of DJI.

4. Conclusions

By similarity with the electrostatic field notion, we can introduce an information field concept for modeling the stock-market shares transactions.

The stock-market information field sources are the points symbolizing the totality of economic and financial information about the shares listed at that time.

Similarly with the electrical force notion given by the equation $F_e = qE$, where E is an electric field, we propose the introduction of the notion of stock-market force equal with the request R or with the supply, and being proportional with the stock-market fields' intensity with an information nature, i.e. $R = aE_b$.

The “mechanical” work executed by the forces of the stock-market field L_b is given by the product between the R force, *determined by the law of supply and request and by the price variation ΔP* (the share's rate variation), i.e.: $L_b = R\Delta P$.

REFERENCES

- [1] Ion Spânulescu, *Electricity and Magnetism* (in Romanian), Victor Publishing House, Bucharest (2001).
- [2] Anca Gheorghiu, *Diagnostic-Analysis and Enterprise Valuation* (in Romanian), Victor Publishing House, Bucharest (2010).
- [3] Anca Gheorghiu and Ion Spânulescu, *Macrostate parameter – a new econophysics and technical index for the stock-market transactions analysis*, Proceedings of ENEC-2009, International Conference, Victor Publishing House, Bucharest, Romania, 2009, pp. 71-87.
- [4] Anca Gheorghiu, *Investment Econophysics* (in Romanian), Victor Publishing House, Bucharest, 2007.

ON APPLICATION OF PHYSICAL MODELS IN BANKING RISK ESTIMATION: VALUING THE DEMAND DEPOSITS

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Abstract. *The paper presents a review of existing approaches to valuation of demand deposits. Special attention is paid to the approach for demand deposits valuation, which is based on relaxation phenomenon. Such phenomenon may be observed in magnetic, ferromagnetic and ferroelectric materials, as well as in the elastic, electric, and magnetic behavior of materials, and is defined as a delay or lag in the response of a linear system, measured relative to the expected linear steady state (equilibrium) values. The bank rate-setting mechanism for demand deposits is found to resemble closely the anelastic relaxations.*

The proposed framework may be applied in the course of risk assessment and management in commercial banks, as well as for banking regulatory policy development by supervisory authorities.

Keywords: *banking risks, demand deposits, core deposits, relaxation, anelastic model.*

Glossary: *Core deposits* – the part of customers' demand accounts that are expected to remain with a savings institution for a relatively long period of time and may be counted as a stable source of funds for lending.

Demand deposits – accounts from which deposited funds can be withdrawn at any time without any notice to the depository institution, in contrast to term deposits, which cannot be accessed for a predetermined period.

1. Introduction

One of the popular methods for liquidity and interest rate risk valuation in a bank is gap analysis, applying the allocation of assets and liabilities into a number of time baskets according to the time remaining till their maturity (or revaluation, in case of interest rate gap calculation), with further determination of the gap in each time basket. The positive gap, or excess of assets over liabilities, shows that in the respective time interval a bank is able to cover its liabilities by the maturing assets. The negative gap

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implies the necessity of attracting additional financing or selling a part of assets to ensure liability fulfillment, and indicates the presence of liquidity risk (the possibility of not being able to obtain the needed liquidity on the markets, and the risk of bearing excessive costs due to raising additional funding).

A common problem, which arises during liquidity gap profile creation, is related to the fact that calculation requires data both on outstanding balances of bank's assets and liabilities, and on their maturity schedule. The balances are known, but not necessarily the maturities. Some of the items have no determined maturity and in practice may generate liquidity flows any time, depending on the customer discretion.

Of mentioned items, demand deposits are a case of major importance. First of all, the size of this item is often significant in comparison to liquidity stock. Secondly, low rates established on this product make demand deposits a desirable funding source in terms of decreasing the total cost of funding. However, instead the added "cost" of these deposits to a bank is provision to a client of a free option of withdrawal at any day. Thus, the analysis of demand deposits is a necessary and challenging part of asset-liability management, especially useful in liquidity planning and potential liquidity need forecasting, as well as in interest rate risk management.

In the light of recent evolution of physical model application in economics, which allow embracing the key features of decision-making agents' behavior, the use of such model for demand deposit valuation would provide new insights into the core deposits phenomenon and enable the construction of underlying theory, not just the single model to use.

2. Literature review

The previous research on the topic proposes several solutions to deal with deposits with non-determined maturity. Still, currently there is no agreement on which approach should be used to determine the duration and value of demand deposits.

The simplest decision proposed is to group all demand deposits into one maturity basket with the latest future date possible (the bank's horizon or beyond), thus excluding them from the gap profile [1]. Opposite extreme solution, as embodied in Ukrainian banking regulation, envisages including all demand deposits to the shortest maturity basket available. Both cases mentioned are likely unrealistic, as they would create the significant negative gaps in one time interval, and oversized positive gaps – in the remaining ones. Payant [2] calls such methods "simply more educated guesses, substantiated through documentation".

One more approach is to divide demand deposits into stable (core) and unstable (volatile) part, based on historical observations path [1,2]. Still, the history may provide not enough information for predicting future outcomes, as the market conditions are changing.

Another approach is to apply modeling in estimating durations of demand deposits. Often, demand deposit balances outstanding or rates on them are being related to variables such as interest rates or economic growth. So, Sheehan [3] proposes to use either Treasury bill rates or the opportunity cost of funds; O'Brien [4] uses 3-month Treasury bill yield; while OTS [5] previously applied secondary-market certificate of deposit yields, and then switched to LIBOR swap yields. The models applied vary from equilibrium-based approach [6] to contingent claims perspective [4,7] to discounted cash-flow modeling [5]. All mentioned works come to the conclusion that the analysis of demand deposits is important for managing financial institution's profitability.

The analysis of previous literature on the topic reveals the necessity of further research on the topic, as the existing models show lack of coherence with practical rate-setting mechanisms and behavior of market agents. This could potentially lead to over – or under-estimation of actual duration of demand deposit stocks, and as a result, to inconsistency of banking risk estimates.

3. Application of an elastic relaxation framework for analysis of demand deposits

In order to develop a model for valuation of stable part of demand deposits, it should be taken into account that the rates for such deposits are usually set by a group of decision-making agents in a bank, who react to exogenous market forces (changes in market rates, actions of competitor banks etc.) and seek to maintain the existing balances, and to maximize profits given the presence of market forces. Poorman [8], following Hawkins and Arnold [9], states that in such case, three main postulates may be formulated about the rate-setting mechanism:

- 1) for every market rate there is a unique equilibrium rate, and vice versa;
- 2) equilibrium response is achieved only after the passage of sufficient time;
- 3) the relationship between market rate and the one set by a bank is linear.

Previously, the attempts were made to approximate this process by regression models trying to capture the relationship between market rate movements and resulting changes in bank-set rates, or by means of partial adjustment models. However, Hawkins and Arnold [9] find the parallel between the above-mentioned postulates and the assumptions underlying the relaxation processes in condensed-matter physics, including magnetic, dielectric, and anelastic relaxations. This allows creating a consistent framework for demand deposits pricing, in which the primary stressor is market rates movement and the response variable is the deposit rate. As Poorman notes, the list of other stressors may comprise costs of deposit servicing, competitor responses, macroeconomic factors and other variables [8].

Relaxation (or hysteresis) in physics is defined as a delay or lag in the response of a linear system, measured relative to the expected linear steady state (equilibrium) values. This phenomenon occurs in magnetic, ferromagnetic and ferroelectric materials, as well as in the elastic, electric, and magnetic behavior of materials, in which a lag occurs between the application and the removal of a force or field and its subsequent effect. Hawkins and Arnold [9] and Poorman [8], examining the bank rate-setting mechanism in the relaxation framework, find that their dynamics is rather close to anelastic relaxations; thus, the models designed for physical relaxation processes analysis may be applied to study the demand deposits.

According to Hawkins and Arnold [9], the above-mentioned postulates for relaxation model could be formalized as follows:

$$\tilde{r}^p = c + Jr^m; \quad (1)$$

$$\Delta r_n^p = \sum_{i=0}^N [a_i r_{n-i}^m + b_i r_{n-i+1}^p]. \quad (2)$$

Here, equation (1) reflects the first and the third postulates – namely, the existence of equilibrium relationship between the equilibrium rate on demand deposits ($\tilde{r}^p$) and the market rate (r^m). J is the share of deposits that the regulatory reserve requirements allow investing.

Equation (2) presents the idea of the second postulate about time lag needed for equilibrium response to be achieved, and is built in the form of partial adjustment model with time-dependent notation: $r_n^p = r^p(t_n)$.

It can be noticed that the three postulates formulated and the equilibrium relationship (1) closely resemble the relationship between stress and tension formulated in Hooke's law of elasticity:

$$\sigma = J\varepsilon. \quad (3)$$

Here the demand deposit rate would stand for tensile strain (ε), and the market rate would play the role of stress (σ). So, the constant c may reflect the changes in deposit rate produced by different factors (“stresses”).

Further, the differential relationship describing relaxation dynamics may be applied:

$$\frac{dr^p}{dt} + \eta(r^p - c) = J_v \frac{dr^m}{dt} + \eta \cdot J_R \cdot r^m. \quad (4)$$

Here η denotes the rate, at which the deposit rate relaxes to the equilibrium level, J_v stands for the fraction of response that occurs immediately after stress, and J_R is the coefficient for lagged response (at any future time after the stress). Thus, the change in the deposit rate with respect to time is related to the current deposit and market rates, and to the change in market rate with respect to time.

Equation (4) can be integrated to get the expression for time-dependent deposit rate. Denoting $\delta J = [J_R - J_v]$:

$$r^p(t) = c + (J_v + \delta J[1 - e^{-\eta t}])r^m. \quad (5)$$

Of here, the decomposition of the response into instant part(J_v) and time-dependent part (proportional to δJ) may be obtained:

$$J(t) = J_v + \delta J[1 - e^{-\eta t}]. \quad (6)$$

Boltzmann superposition principle allows rewriting the response function and the time-dependent deposit rate expression, as given in (5) and (6), for the higher orders of the relaxation differential equation, as follows:

$$J(t)J_v + \sum_{i=1}^N \delta J^{(i)}[1 - e^{-\eta^{(i)}t}] \quad (7)$$

$$r^p(t) - c = \sum_{i=1}^M r_i^m J(t - \tau_i). \quad (8)$$

Here N denotes the order of differential terms included into the relaxation equation, and at the same time the number of relaxation terms. Equation (8) allows determining the demand deposits rate for known history of market rate movements r_i^m at the consecutive time periods: $\tau_1, \tau_2, \dots, \tau_M$.

Hawkins and Arnold [9], and Poorman [8] state that application of the proposed model to the rates on separate deposit products, such as money market deposit accounts, allowed tracking the respective product rates rather well. This provided the conclusion that “product rates respond to market rates as if via anelastic relaxations” [9]. Therefore, the use of described model provides the theoretical description for transmission mechanism in rate setting for demand deposits and the corresponding factor relationships, and enables calculation of demand deposits rate (and further, duration, based on the assessed rate).

4. Conclusions

The review of existing studies on non-maturing deposits valuation reveals the existence of several approaches to the problem, but each of them has its own advantages and drawbacks. The majority of existing models do not conform to real-life behavior of decision-making agents and market dynamics, proposing only approximate solutions instead of a consistent framework.

Still, the application of physical models may facilitate the creation of a theory underlying the demand deposit movements. This paper reports on the prospective for use of relaxation phenomenon and the related physical models to analyze the demand deposits valuation, allowing to view demand deposits valuation from another angle and to build a consistent framework for their further study.

The anelastic model described can be used in internal risk-management practices by commercial banks, as well as by supervisory institutions for the purposes of banking regulatory policy development.

REFERENCES

- [1] J. Bessis, *Risk Management in Banking*, John Wiley & Sons, New York, 1998.
- [2] Payant, W. R. (2004), *An Alternative View of Non-Maturing Deposit Modeling*, Bank Asset/Liability Management, **20**(5), pp. 1-3.
- [3] Sheehan, R. G. (2004), *Valuing Core Deposits*, Working Paper, University of Notre Dame.
- [4] O’Brien, J. M. (2000), *Estimating the Value and Interest Rate Risk of Interest-Bearing Transaction Deposits*, Finance and Economics Discussion Series 2000-53, Board of Governors of the Federal Reserve System (U.S.).
- [5] *** Office of Thrift Supervision (1994, 2000), *The OTS Net Portfolio Value Model*.

- [6] Hutchison D. E. & Pennacchi G. G. (1996), *Measuring Rents and Interest Rate Risk in Imperfect Financial Markets: The Case of Retail Deposits*, Journal of Financial and Quantitative Analysis, **31**(3), pp. 399-417.
- [7] Jarrow, R. & van Deventer, D. (1998), *The arbitrage-free valuation and hedging of demand deposits and credit card loans*, Journal of Banking and Finance, **22**(3), pp. 249-272.
- [8] Poorman, F. A. (2001), *Using Physical Models to Describe and Value Core Deposits*, Bank Accounting and Finance, December 2001, pp. 17-25.
- [9] Hawkins R. J. & Arnold M. R. (2000), *Relaxation Processes in Administered-Rate Pricing*, Physical Review E, **62**(4), pp. 4730-4736.

MARKET ULTIMATE PROFITABILITY¹

Alexei KAZAKOV* and Maria PLOTNIKOVA**

Abstract. *In this article a problem of market research effectiveness is raised and a method to evaluate it is proposed. The authors introduce a concept of ultimate profitability of any particular market instrument or index. Systematic time shifts in market position changes from an ideal timing are considered as a reason of actual profitability declining from ultimate one and are suggested to serve as a measure of market research effectiveness. The ultimate profitability concept itself turns up to be a fruitful one able to reinforce comparative studies of national markets and market tools, investment styles and volatility studies. Following observations of emerging equity markets ultimate profitability characteristics the phenomena of hyper volatility is revealed and a clue to a rationale of high frequency long-short trading are received.*

Keywords: market, investments, research, profitability, volatility.

1. Introduction

Economy of portfolio investments

Portfolio investments theory is much about balancing expected return with risk of a desired level. Given that risk is fixed at certain level each portfolio investor strives to enhance yield of investments. In practice the choice is limited: either to increase the gross results of investment activity or to decrease the operating costs, associated with it. It is possible to try to move simultaneously in both directions, but at some moment an increase in a result and reduction in expenditures may start contradicting each other. In particular, so it occurs, if one economizes on research and/or market data processing.

If an investor plans to maintain some level of expenditures on analytical support, then there is a question: whether it is possible to

¹ Occupations as of year 2005 start when the study was conducted.

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introduce any criterion for effectiveness of those expenditures? In case an investor is institutional that may be a question of a sizable economic significance.

2. Ideal timing, or the hypothesis about zero shift

Unlike the majority of other costs, which accompany operations on financial markets, expenditures on research – is a rather poorly defined concept, and these costs are subjected to testing on the effectiveness with difficulty. We attempt to estimate the contribution of analytical support to the determination of the optimum moment of changing the market position. To the market participants this process is well known as a choice of right time to enter the market or, in short, the timing. Much of real life investment analytical cases can be transformed / reduced into the form of timing problem.

Let's accept for an axiom, that the best moments for changing market position are those ones when prices achieve their local extremes – local maximum or minimum values. Let's imagine that someone can systematically determine these price extremes with ideal preciseness. And let's call this assumption "the hypothesis about zero shift". In practice things are not so bright: with poor analytical advice an investor risks to take market position far from right moment and/or even not in right direction (which can also be considered as a significant error in a choice of 'right time'). It is almost self-evident that any actual timing process includes non-zero shifts. A well informed practitioner will tend to make relatively small shifts, while his less prepared competitor will make systematically larger shifts. We'll consider the average ('systematic') proximity of real timing to the ideal one **as a criterion of analytical support quality**.

3. Market ultimate profitability

3.1. Working Hypothesis

To measure the economic effect of shifts we need to evaluate the dependence of investment return on systematic shifts. The sequence of study asserts by itself: the history of some market tool prices is taken for few years and all extreme lows and highs are determined (points of turn on the price graph). Taking into account this marking it is defined ultimate –

maximally possible – annual profitability of active investment operations with that market tool, and then it is fixed how this theoretical profitability changes with an increase in a systematic shift of ‘actual’ moments of market position turn (from Long to Short and vice versa) from ‘ideal’ local price extremes. We assume that trading can be done in both directions (up and down) symmetrically easy (i.e. terms for both Buy and Sell Short orders execution are equal).

There is, perhaps, only one problem with this approach: it is possible to reveal multiple extremes of different scale on the price graph. Therefore before taking up the measurement of ultimate profitability, it is necessary to agree about the extent of detailing, needed for studying the price behavior. From mathematical point of view this problem resembles the coastline paradox², popularized by Benoit Mandelbrot [1]. Thus, we address self-similarity in price behavior by fixing the scale of price movements from one extreme to another. Also for the purposes of this study it is more convenient to use percentage measurement of price increments (whereas in fractal studies logarithms are used more often).

After all these assumptions and stipulations have been done we can give clearer definition of what market ultimate profitability is. *Average annual ultimate profitability* calculated for a number of years shows how much a capital invested in a particular market tool would cumulatively grow in one year (in %) on average, with an assumption that an investor occupies alternately long and short market positions, changing them accurately at the price extremes, which are distant to each other not less than the predetermined value N (in % of entry price). Value N in fact serves similar to a linear measure when determining the distance (in %) overcome by a particular market tool price (remember ‘coastline paradox’). While measuring price movements (from one extreme to another) we ‘don’t notice’ movements less than N . A particular measured movement can be, however, much bigger than N (depending on market dynamics). Ultimate profitability should grow with decreasing N as ‘market distance’ traveled by price increases. In figure 1 the dependence of average annual

² The length of coastline depends on a minimum increment of ‘yard-measure’. The smaller the increment, the longer the coastline occurred. A study of this paradox gave start to much of Benoit Mandelbrot’s later work which led to an introduction in 1975 of a new term: fractal. Fractals is a numerous class of mathematical objects, describing many natural forms, for instance, surfaces of woods and corals as well as graphs of market prices [2,3,4].

ultimate profitability on value N is presented, calculated for Russian equity RUIX index (December 1996-July 2004). Similar experimental curves can be obtained for any tradable asset or market index.

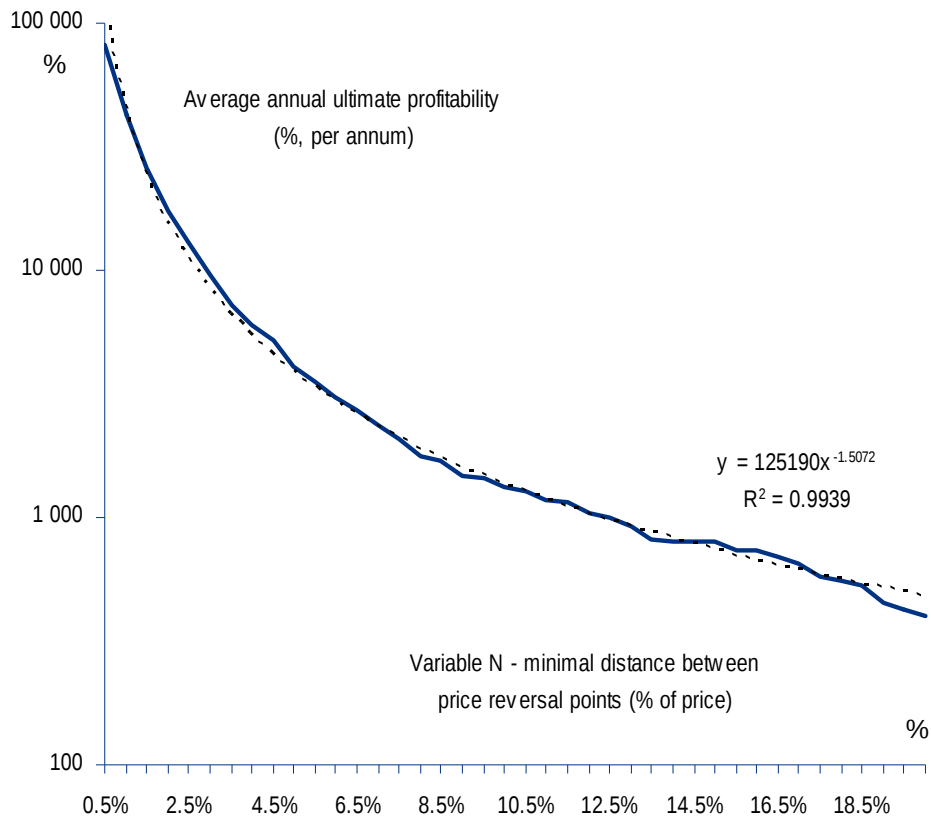


Figure 1. Dependence of average annual ultimate profitability (%) on variable N (%). RUIX index.

Source: RTS.

Note. While being an artificial construct created for the purposes of this study the average annual ultimate profitability by its economic sense is very close to the return on capital (ROC, a concept widely used in business). It perfectly represents market dynamics and helps to reveal the role of timing. It does not represent, however, some practical aspects / components affecting yield of tradable financial/commodity instruments: dividend (for equities), accrued interest (for bonds and notes), leverage (for futures and options), strike price (for options) and various built-in terms (for structured products). If necessary (not for the purposes of this study) ultimate profitability can be adjusted for those yield components / aspects.

3.2. Choice of Scale

Before fixing the scale of market consideration let's examine the dependence of an average annual ultimate profitability and number of market position reversals (transactions) on parameter N , % based on the Russian equity index RTS (Fig. 2).

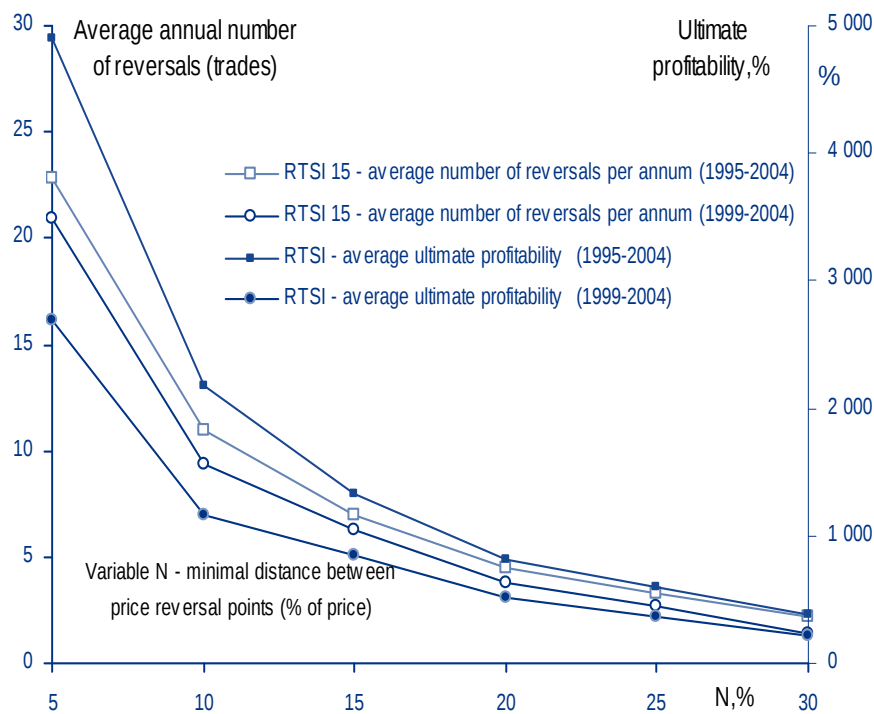


Figure 2. Dependence of the average annual number of market position reversals and ultimate profitability on the variable N (%). RTS index.

Source: RTS.

The obtained curves show that the less is N , the more turns the investor has to perform and the higher theoretically possible investment return (ultimate profitability), and vice versa. In practice a decrease in N is limited with market liquidity and trading costs. The types of available market news/data analysis also provide certain restrictions. For instance, from the practical observations on the Russian equity market the macroeconomic analysis will be useful with N not less than 15-20%, the analysis of corporate financial reports – with N in a range 10-15%. Only those ready to play on news or to exploit the technical analysis/statistical

methods, can withstand moderate equity market fluctuations ($N < 10\%$). Typical research department performs types of analysis listed above which gives us $N = 15\%$ on balance. Interestingly enough that, as it follows from figure 2, under active management of an index portfolio (which copies the composition of RTS or RUIX indices), it is theoretically possible to obtain on Russian equity market a 3-digit annual return, reversing market positions not more often than 5 times/year on average.

3.3. Results: Influence of Systematic Shift

Thus, the ultimate profitability, which theoretically can be achieved under active management of investor's portfolio, is the function of N , %³. Variable N has a direct relevance to formulating the task for the analytical support service, since different types of investment analysis are suitable to analyze and forecast price changes of different scale. Let's fix N at 15% to make it closer to practice and move further.

The next step within this study is imposition of systematic shift into the optimum 'time-table' of the market positions reversals. Regular (systematic) delay from the optimum moments of changing the position, for instance, on one day (+1d) would mean that the imaginary investor always (systematically) is one day late and turns his market position one day after prices have reached a local extreme. Systematic outrunning of reversal points is also possible, let's say, on 7 days (−7d). As seen on the figure 3, the 'shifted' ultimate profitability rather rapidly and symmetrically decreases with an increase in the systematic shift modulus (from 1 to 10 days). One of two curves on the figure 3 represents 'shifted' ultimate profitability ($N = 15\%$) based on data set which includes year 1997 (Asian crisis) and year 1998 (Russian crisis), another curve – on data which doesn't include those years. The spread between two of them gives an idea to what extent financial shocks impact average ultimate profitability. Both curves decline with an increase in systematic shift modulus – rapidly near the zero shift locality and more slowly on more distant localize. Knowing the value of assets under management, actual systematic shift and curve's differential (angle) allows anyone to calculate arithmetically

³ There is some experimental evidence that ultimate profitability is an inverse power function of N (see Fig. 1).

whether higher expenses for research (to decrease systematic shift from ideal timing) are justified with the expected increase of investment return or not.

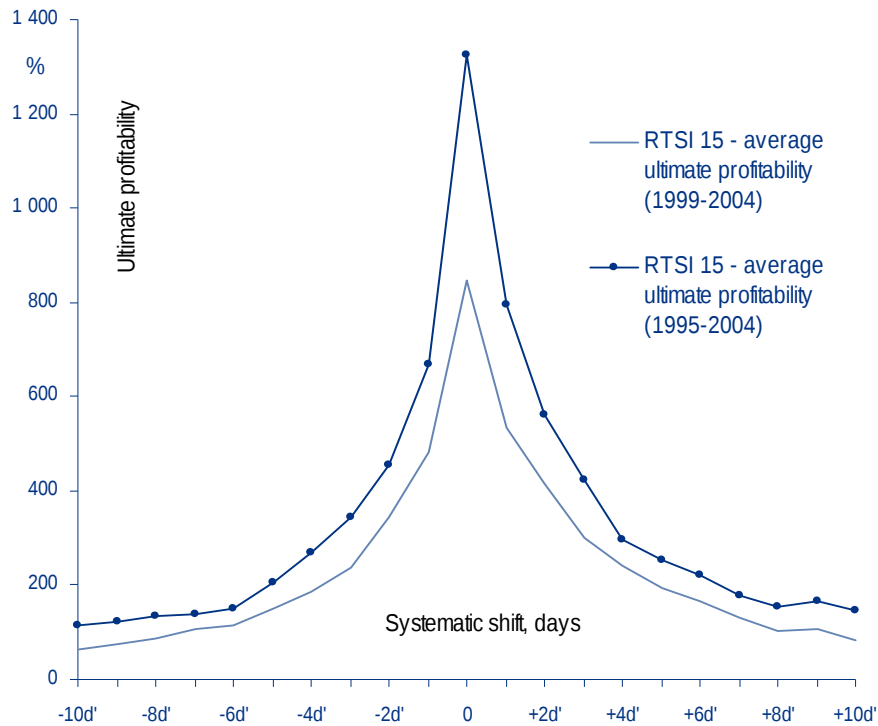


Figure 3. Dependence of ‘shifted’ ultimate profitability ($N=15\%$), % on a systematic shift (days). RTS index.

Source: RTS.

3.4. Active vs Passive Asset Management

In case a set up or a liquidation of research department is considered one would better know not the effect from in-or de-crease of research expenses but the basic interrelation of investment style, quality of analytical support (expressed in terms of a systematic shift) and spending on analytics. To make it possible let’s draw a few ‘shifted’ ultimate profitability curves (for various N) on one graph together with a <horizontal> level of an average return demonstrated by broad target market index (Fig. 4). This horizontal line represents historical average annual return received by passive investor. In practice it corresponds to return delivered by index mutual fund. According to classics [5,6] multi-year periods have to be taken.

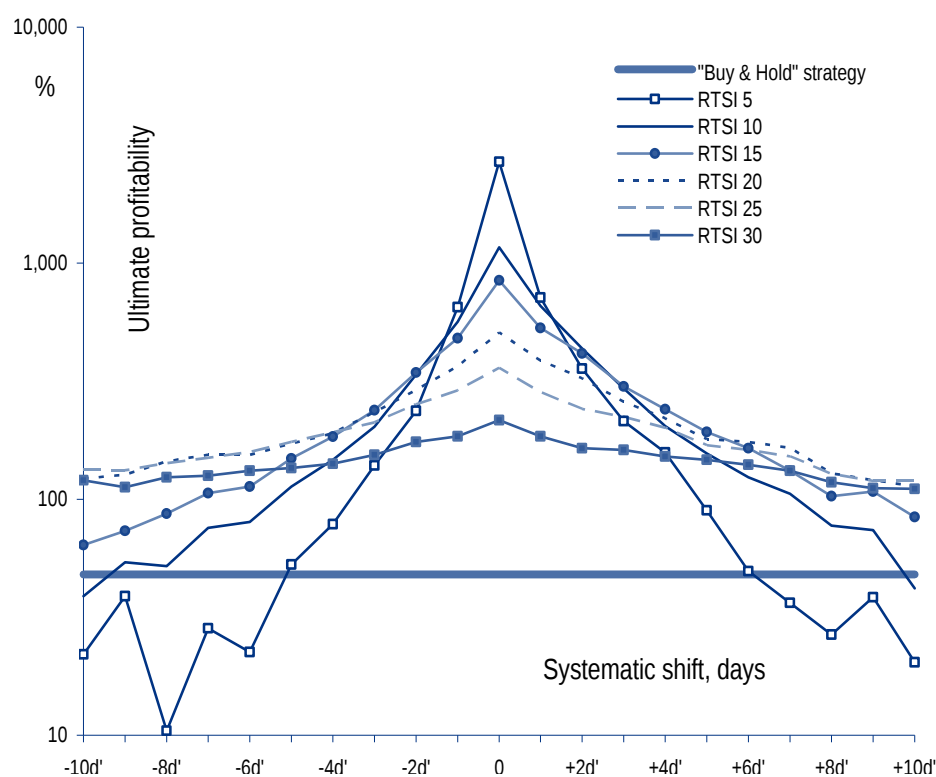


Figure 4. ‘Shifted’ ultimate profitability curves for various N , % (5%-30%). RTS index.

Source: RTS.

For short period of time there is a clear risk to get a negative reading. As a sample Russian equity market is pretty young we have used just 5-years period (1999-2004) during which index RTS growth is appr. 50% per annum on average. As it follows from figure 4, for an investor willing to play market waves with an amplitude 10% and above it is important to “catch” the extreme points of the index with an accuracy not worse than ± 10 days (deviation from ideal timing). If expected or actual accuracy (obtained from track records) is less favorable, it is better to follow long-term passive strategy ‘Buy & Hold’, and to reduce research costs to nil (or attribute them to marketing expenditures). In case an investor is going to play smaller market waves (5%+), he needs to be in time to “turn over” market position twice more rapidly, with an accuracy not worse than ± 5 days for systematic shift. Otherwise results are worse than if he/she follows strategy ‘Buy & Hold’. It is interesting that with more measured investment strategies targeting at market 20-25-30% waves it

is possible to get more than 100% annual investment return (which is twice bigger than ‘Buy & Hold’ strategy shows in Russia), – even with the systematic oversight of 10 days to or past the date of the market reversals (of chosen scale).

4. Ultimate profitability and volatility. Hyper volatility

We think that ultimate profitability is closely linked to market volatility⁴. To distinguish ‘excessive’ market moves characteristic it is sufficient to divide ultimate profitability by net directional move of the market during the time period under consideration. This net directional move is a constant (%) as it remains the same for all N indications within the chosen time period (and shift equals zero). That means that ultimate profitability and volatility are linked linearly. It might be very convenient in some cases as it allows using ultimate profitability for estimates of both potential return and potential risk (volatility).

Inter-market comparisons reveal yet another useful feature of ultimate profitability curves. As it is seen on a chart above (Fig. 5) curves corresponding to emerging markets [BUX – Hungary, MEXBOL – Mexico, BOVESPA – Brazil, KOSPI – South Korea, RTSI – Russia, MSCI EMF – composite MSCI index] are considerably higher than S&P500 index’s curve. This is not a surprise as emerging equity markets are famous for their volatility (in a comparison with matured markets). But what can be a surprise is that Russian RTS index ‘shifted’ ultimate profitability is notably higher than analogous curves for other emerging markets indices within the range of ± 8 days shift. In our view this is a clear demonstration that some emerging markets (incl. Russian and Chinese equity markets) can be even more volatile than others in the group. Obviously, the hyper volatility of a market increases the risk of passive investments in it, but at the same time it represents a potential for an advanced active investor.

⁴ This and following parts of article were added, significantly or partially re-worked in 2010, while previous text was published earlier in Russian-language magazine ‘Securities Market’ in 2005 [7].

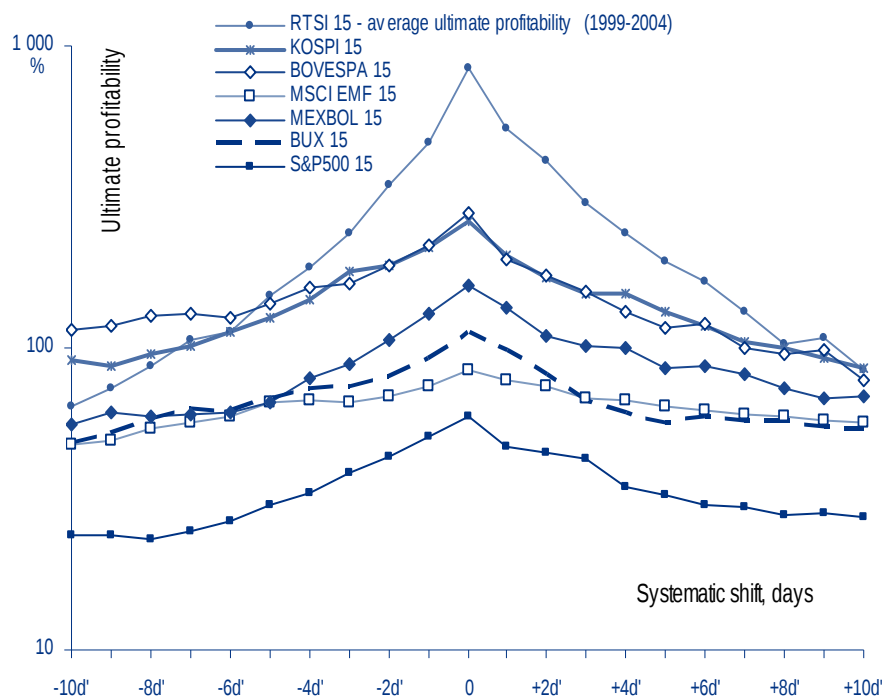


Figure 5. ‘Shifted’ ultimate profitability curves for various national stock indices ($N = 15\%$).

Source: Bloomberg, RTS.

5. Particularities of investing on emerging markets

Another findings, which can be made basing on a comparison of ultimate profitability curves for various market instruments, relates to an old and still ongoing discussion about different investment styles.

Popularity of emerging markets among international investors increased tremendously in last decades. The number of liquid instruments available for big institutional investors on emerging markets remains, however, insignificant. For instance, there is around a dozen of Russian blue chips investable for big international equity investors. That means that following a concept of highly diversified portfolio on emerging markets is impossible. International investors’ portfolios – due to the limited choice of investable liquid stocks – involuntarily consist mainly of a limited number of the same ‘blue chips’. Since many local ‘blue chips’ demonstrate even higher volatility than that of market index (Fig. 3 and Fig. 6) the portfolios consisting of them are subjected to market fluctuations with accentuated magnitude. Thus, the natural way for an international investor is to manage his/her portfolio actively and to play waves down.

Year 2008 was a disaster for local institutional investors on emerging markets. In Russia most of pension funds' and insurance companies' portfolios were not prepared for market declines of such magnitude (~75% in index RTS). Looking into the future, disappointment of institutional investors can be a very costly thing for national markets development. So learning lessons of year 2008 (Y08) is of critical importance for the future of emerging markets. And one of those lessons is that passive investments are not adequate strategy for a conservative investor bound to work on highly volatile market. Another lesson is that emerging markets' high economic growth potential doesn't mean that they are immune to external financial shocks. All in all institutional investors from emerging markets need investment strategies and respective financial products which more adequately reflect the nature of their native local financial markets. We believe that market ultimate profitability concept helps to reveal that nature and to explain some of its specific features.

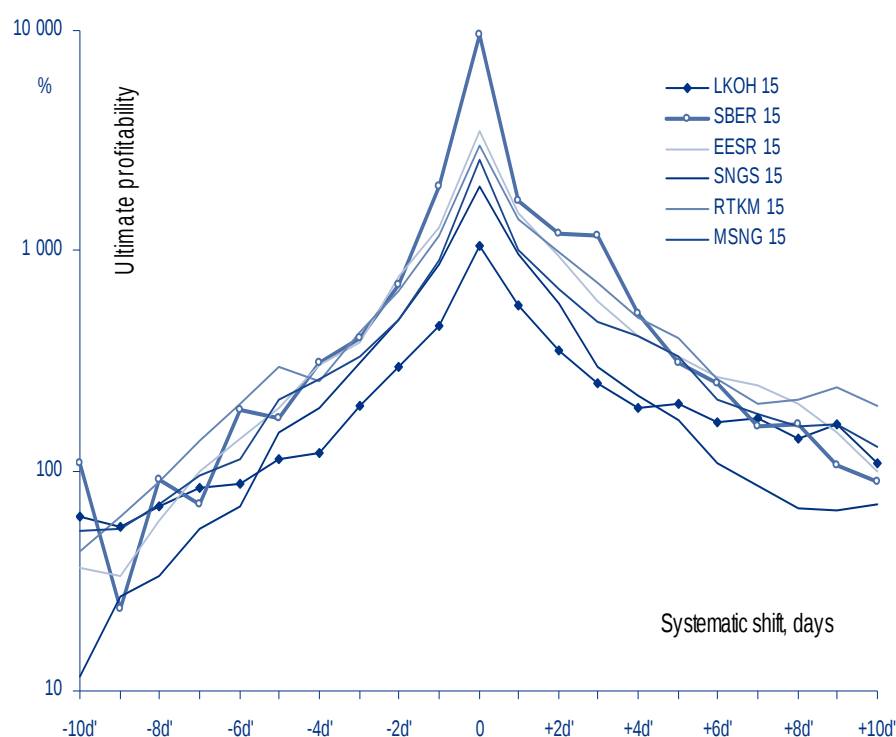


Figure 6. 'Shifted' ultimate profitability of Russian equity market 'blue chips' ($N = 15\%$).

Source: RTS.

Asset managers working on emerging markets likely have much higher potential (and incentive) to increase their investment results (than

their colleagues on matured markets) by means of active management (as opposite to passive one). As it follows from the curves of figure 5, for an active manager 5-days (one calendar week) proximity to ideal reversal days corresponds to average annual returns of 60-190% depending on a particular equity market (but independently of market direction!). That produces 50-180% potential for an increase in average annual return, as it was just 10.1% in Dec.1999-Dec.2009 period [8]. Same potential for S&P500 is less – at 34% (which is not bad at all)⁵. These returns – according to our theoretical calculations – may be 10 times higher if an asset manager is ready to play small fluctuations and to move down from 15% waves to 3% waves, i.e. into almost uncharted territory of medium-to-high frequency trading (Fig. 1).

6. Conclusions

Within this study a criterion which allows evaluating of the effectiveness of market research in economic terms is introduced. The suggested approach works well when the market research task can be presented in the form of timing problem. While much of research can be presented in that form, the methodology serves as a supplementary when an analytical task doesn't fall into 'timing' class. We notice that the bigger scale of price consideration, – the bigger number of different investment analysis types, on support of which an investor can rely, – and the higher attainable accuracy of investment advice. Transaction costs become smaller due to smaller number of transactions and the only growing concerns are properly organized work of research and portfolio's volatility. Scaling down the scope of price consideration opens a difficult road to much higher returns. We managed to find relatively simple link between value of assets under management, historical quality of market research, form of 'shifted' ultimate profitability curve, desired preciseness of 'timing', current research expenditures and expected rate of return.

Our observation leads us to a conclusion that active portfolio management based on timely identification of market reversal points by researchers (or with their support) is the most important value-adding factor in portfolio management on volatile (emerging) markets. In any case, active use of short positions for hedging of portfolios, tactical asset allocation and/or for maximization of investment return during the falling market

⁵ Last 10 years were the worst decade ever for U.S. equity investors with Large Equity annual return at -1.0% [8].

periods, can prove to be considerably much more important on emerging markets than on matured ones when compared with other asset management techniques. In this study we use Russian equity market as a main sample under consideration. We keep a hope that a reader does not link the offered methodology and conclusions exclusively to Russian or equity markets.

REFERENCES

- [1] B. B. Mandelbrot, *How Long Is the Coast of Britain? Statistical Self-Similarity and Fractional Dimension*. Science, New Series, Vol. **156**, No. 3775, May 5, 1967.
- [2] B. B. Mandelbrot, *Fractals and Scaling in Finance*, Springer-Verlag, 1997.
- [3] B. B. Mandelbrot, *A Multifractal Walk down Wall Street*. Scientific American Magazine, No. 82, Feb., 1999.
- [4] B. B. Mandelbrot and R. L. Hudson, *The (Mis) behavior of Markets: A Fractal View of Risk, Ruin, and Reward*, Basic Books, 2004.
- [5] L. J. Gitman, M. D. Joehnk, *Fundamentals of Investing*, Harper Collins Publishers, 1990.
- [6] W. F. Sharpe, G. J. Alexander, J. V. Bailey, *Investments*. Prentice Hall Inc., 1995.
- [7] A. E. Kazakov, M. V. Plotnikova, *How much does time cost on market?*, Securities Market, RF, No. 1(280), 2005.
- [8] R. Arnott, J. West, *Was It Really A Lost Decade?*, in: indexuniverse.com >sections>research> 7161-was-it-really-a-lost- decade, January 25, 2010.

OPERATOR DIAGONALIZATION PROCEDURE AND ITS NUMERICAL REALIZATION IN THE FRAMEWORK OF TECHNICAL ELECTRODYNAMICS

Irina DMITRIEVA*

Abstract. *Earlier we have proposed the diagonalization procedure for the finite dimensional system of the partial differential operator equations over the finite dimensional real space. This algorithm represented the generalized operator analogy of the well-known algebraic Gauss method and was generated by the concrete industrial problems of technical electrodynamics. The considerable distinction of the given diagonalization approach in comparison with all others consists of its independence of initial and boundary conditions, matrix structure (simple or block-like), dimensions of system and space. Moreover, the mentioned procedure does not require either knowledge of generalized function theory or the skill in inverse operator's construction. These both facts simplify the direct application of given method and allow engineers and other non-mathematicians to use the proposed technique without any difficulties. Present results generalize previous analytic assumptions and introduce the flow-chart of the corresponding current diagonalization process that is not met in usual standard numerical programs.*

Keywords and phrases: operator diagonalization procedure, flow-chart, technical electrodynamics.

1. Introduction

It is obvious that each industrial problem can be studied in various modes. If the initial approach is not experimental but theoretical, then the research procedure has the following structure:

I) mathematical model of the original problem statement is done and raises $\Rightarrow$

II) explicit mathematical problem solution (if it is possible) from which follows $\Rightarrow$ (1)

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III) numerical (computing) realization/confirmation of the analytic result II).

Rather often the interim second step looks unattainable and the third one follows after the first stage immediately as the final level of the initial engineering problem's solution.

Nevertheless, mostly those scientific investigations are preferable that deal with analytic mathematical study of given problem. So, the existence of the second step in the above mentioned scheme is generally required. This desire remains important even now, when the computer calculus abilities are very high-powered.

Thus, we propose here the complete research scheme in the case of important part of technical electrodynamics that concerns multidimensional analogous circuit theory and concrete industrial problems. Diagonalization procedure of the corresponding PDEs' systems is their natural mathematical corollary.

Really, work [1] (for example) proves benefit of the PDEs' systems with constant coefficients in technical electrodynamics, since such analytical objects represent the appropriate mathematical models of multidimensional analogous circuits whose application is very useful in the synthesis of multidimensional wave digital filters [2]. Though the last results [2] do not look modern and fresh, complete study of the above mentioned original problem of technical electrodynamics remains the same, because its explicit analytic solution and numerical confirmation were not found yet. Besides, the majority of real physical processes are described by the PDEs' or some other operator equations' systems whose proper study implies the required investigation of the concrete natural phenomenon. That is the main reason why we address again to the diagonalization process of operator equations' system that includes not only PDEs but also nonlinear arbitrary operator equations. Namely, in [3] we proposed the generalized operator analogy of algebraic diagonalization Gauss method in the case of finite dimensional system of PDEs with constant coefficients over the finite dimensional real space. The same algorithm was applied in particular case of the "symmetrical" differential Maxwell system which represented mathematical problem statement of physical/industrial phenomena that concerned signal transmissions in disturbed isotropic media [4]:

$$\begin{aligned} \text{rot} \vec{H} &= (\sigma \pm \lambda \varepsilon_a) \vec{E} + \varepsilon_a \partial_0 \vec{E} + \vec{j}^{OS} - \\ - \text{rot} \vec{E} &= (r \pm \lambda \mu_a) \vec{H} + \mu_a \partial_0 \vec{H} + \vec{e}^{OS}. \end{aligned} \quad (2)$$

In (2): the sought for vector functions $\vec{E} = \vec{E}(x, y, z, t)$ and $\vec{H} = \vec{H}(x, y, z, t)$ with corresponding scalar components $E_k = E_k(x, y, z, t)$, $H_k = H_k(x, y, z, t)$ ($k = \overline{1,3}$) represent respective tensions of electric and magnetic fields; positive constants $\sigma, \mu_a, \varepsilon_a$ are the specific conductivity, absolute magnetic and dielectric permeability of the medium; vector functions $\vec{j}^{OS} = \vec{j}^{OS}(x, y, z, t)$, $\vec{e}^{OS} = \vec{e}^{OS}(x, y, z, t)$ with their scalar components $j_k^{OS} = j_k^{OS}(x, y, z, t)$, $e_k^{OS} = e_k^{OS}(x, y, z, t)$ ($k = \overline{1,3}$) are known and describe the outside current sources and tensions; partial differential operator $\partial_0 = \frac{\partial}{\partial t}$, and positive constants λ, r are the parameter of the signal that intrudes into the medium and theoretical constant whose existence at the current stage of study can be only assumed. Nevertheless, in all cases [1], [3], [4] the diagonalization process is applied to the system of PDEs where all operators are supposed to be commutative in pairs and linear. Apparently, the last condition is unnecessary for the suggested present diagonalization procedure just as the partial differential operators are not obligatory for the initial matrix structure. Therefore, eliminating these two shortcomings we come to the diagonalization problem of the arbitrary finite dimensional operator equations' system which reflects mathematically the corresponding physical/engineering phenomenon and which analytic and numerical computation allow to solve the specific industrial problem completely, as it was shown in the scheme (1). Multi-dimensional circuits' study includes here as the particular part of those questions in technical electrodynamics which were not solved yet.

2. Analytical problem statement and diagonalization process in short

Let the finite dimensional system of operator equations be given:

$$\sum_{i=1}^n A_{ji} F_i = f_j \quad (j = \overline{1, n}), \quad (3)$$

where: $\vec{F} = \vec{F}(x)$ and $\vec{f} = \vec{f}(x)$ are the appropriate sought for and known vector functions from one and the same class K ; x is the point of some finite dimensional space that is not obligatory numerical; operators A_{ji} ($j, i = \overline{1, n}$) are almost arbitrary but must act in the class K , be necessary invertible and commutative in pairs.

The latter means that:

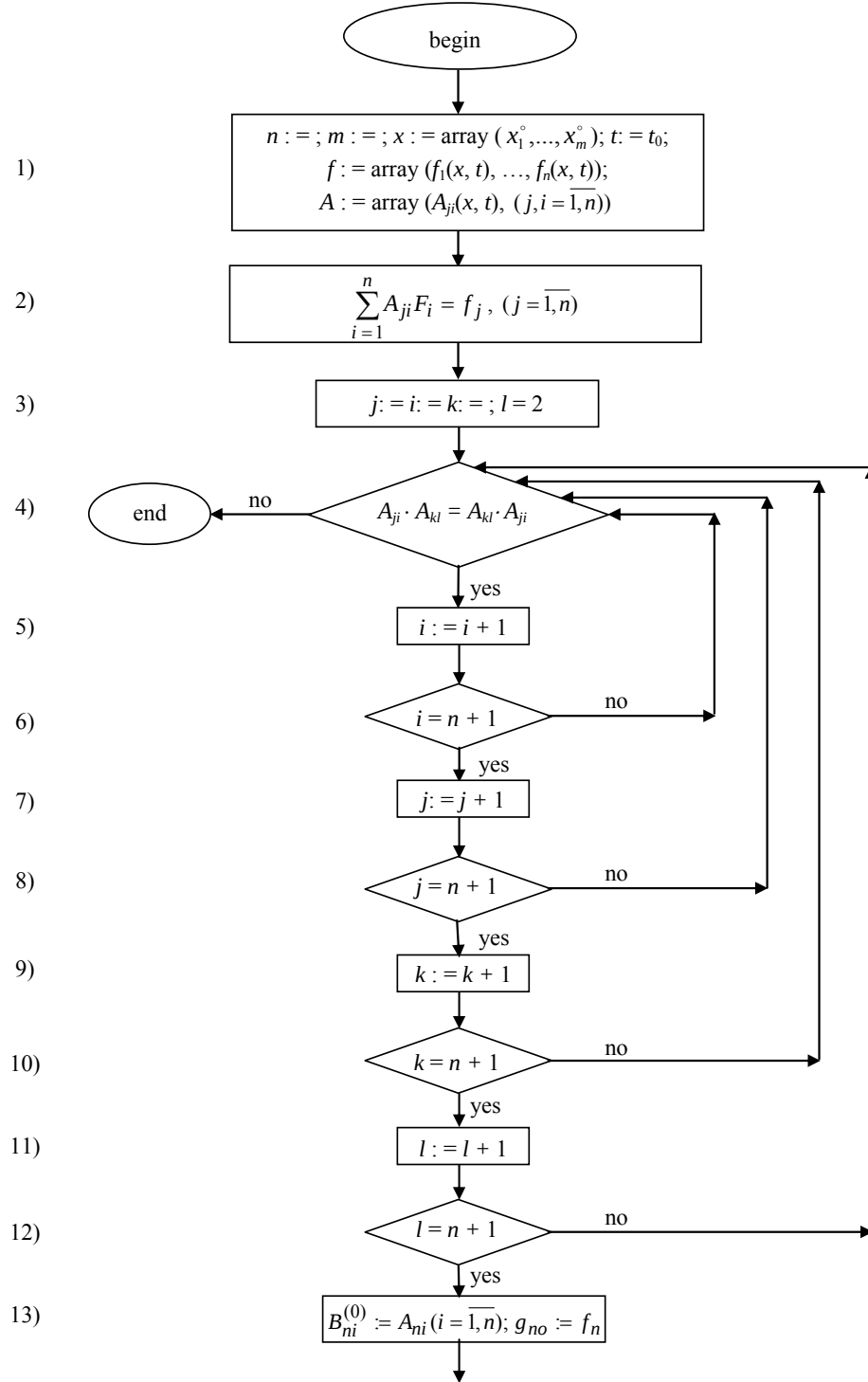
$$A_{ji}A_{kl} = A_{kl}A_{ji} \quad (j, i, k, l = \overline{1, n}), \quad (4)$$

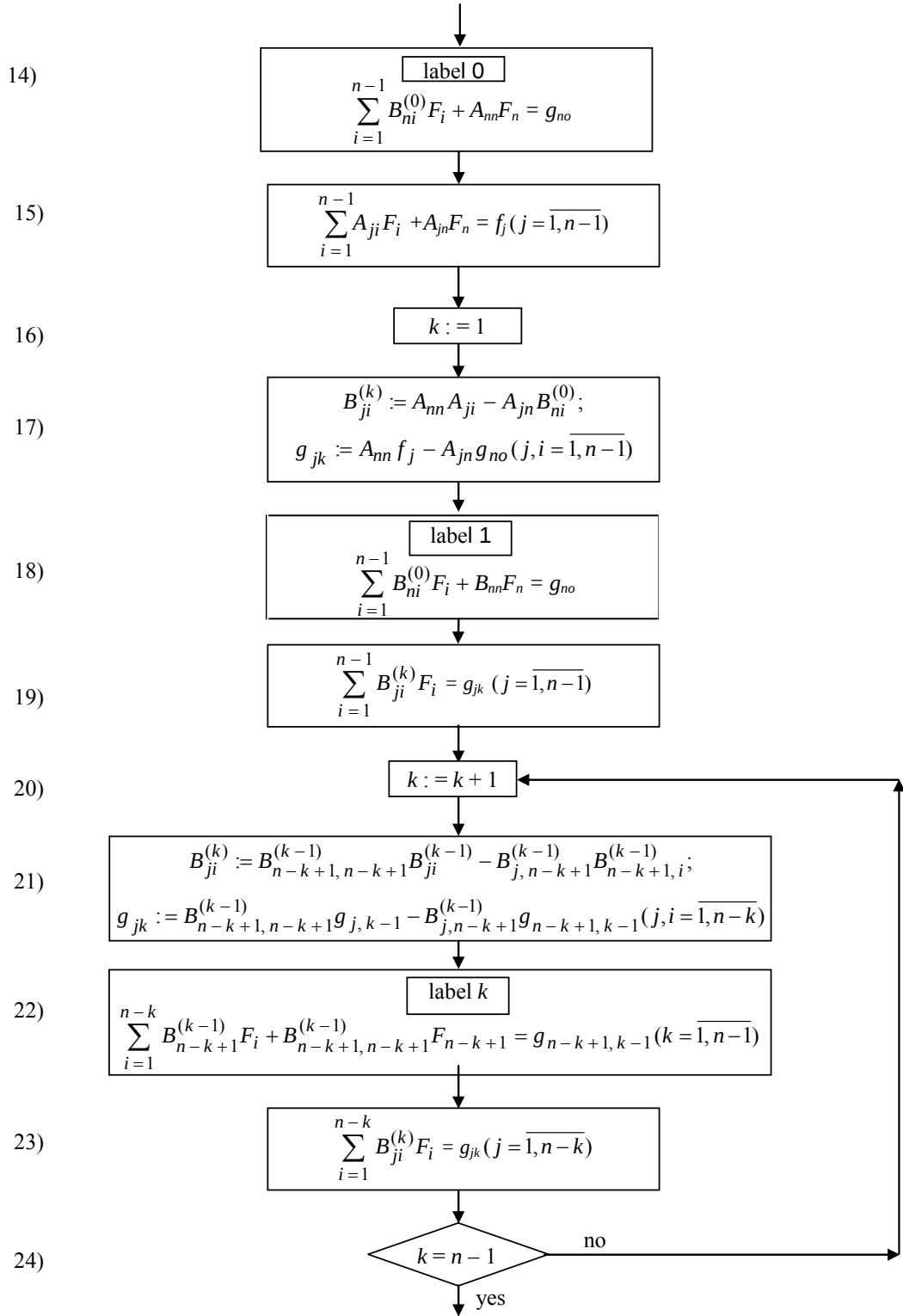
where operator product implies usual consecutive application from the inner to the external in “the right-to-the left” direction. Further, it should be noted that operator A is called invertible if for $\forall y \in \text{Im } A$ the following equation

$$Ax = y \quad (5)$$

has unique solution. Here A acts from the certain space E_1 into the other space E_2 ($A: E_1 \rightarrow E_2$), has its set of existence $D_A \subseteq E_1$ and $\text{Im } A \subseteq E_2$ is the set of operator values (operator image, in other words). Thus, the proposed variant of system (3) is more general in comparison with all other results [1], [3], [4], since its ((3)) operator elements $A_{ji} \quad (j, i = \overline{1, n})$ are not obligatory differential, but arbitrary nonlinear and satisfy only two necessary above mentioned conditions of commutativity in pairs (4) and invertibility (5). The last requirement is the additional natural innovation with respect to all recently considered assumptions [1], [3], [4], since (we must repeat it) $A_{ji} \quad (j, i = \overline{1, n})$ are not only differential, but arbitrary nonlinear and act over finite dimensional spaces that are not accepted as only numerical. Further, the current diagonalization procedure in the case of operator system (3), as in [1], [3], [4], has two stages, – the upward and downward respective directions. The first is responsible for the construction of only one scalar equation and the second form all other $n-1$ scalar equations in regard to remained components of the original unknown vector function $\vec{F}$. Here it should be noted that by the scalar equation we imply, as earlier in [1], [3], [4], such type of equation that includes only one unknown component of the original sought for vector function. So, not to be tiresome and repeat again the diagonalization procedure from [1], [3], [4] even briefly, we should like to notice that the present diagonalization algorithm of (3), though is completely analogous to the above mentioned results [1], [3], [4], in reality seems such only outwardly. The current diagonalization approach is generalized in the case of broader operator and spatial classes. The last fact means that the second analytic step of the investigation scheme (1) is finished and we can come to its final third stage which deals with numerical realization of the original industrial/engineering/physical problem. Hence, we are going to propose the present generalized diagonalization algorithmic flow-chart that is shown with all explanations in the next section 3 (see Fig. 1).

3. Flow-chart of the generalized diagonalization procedure in the case of the system (3)





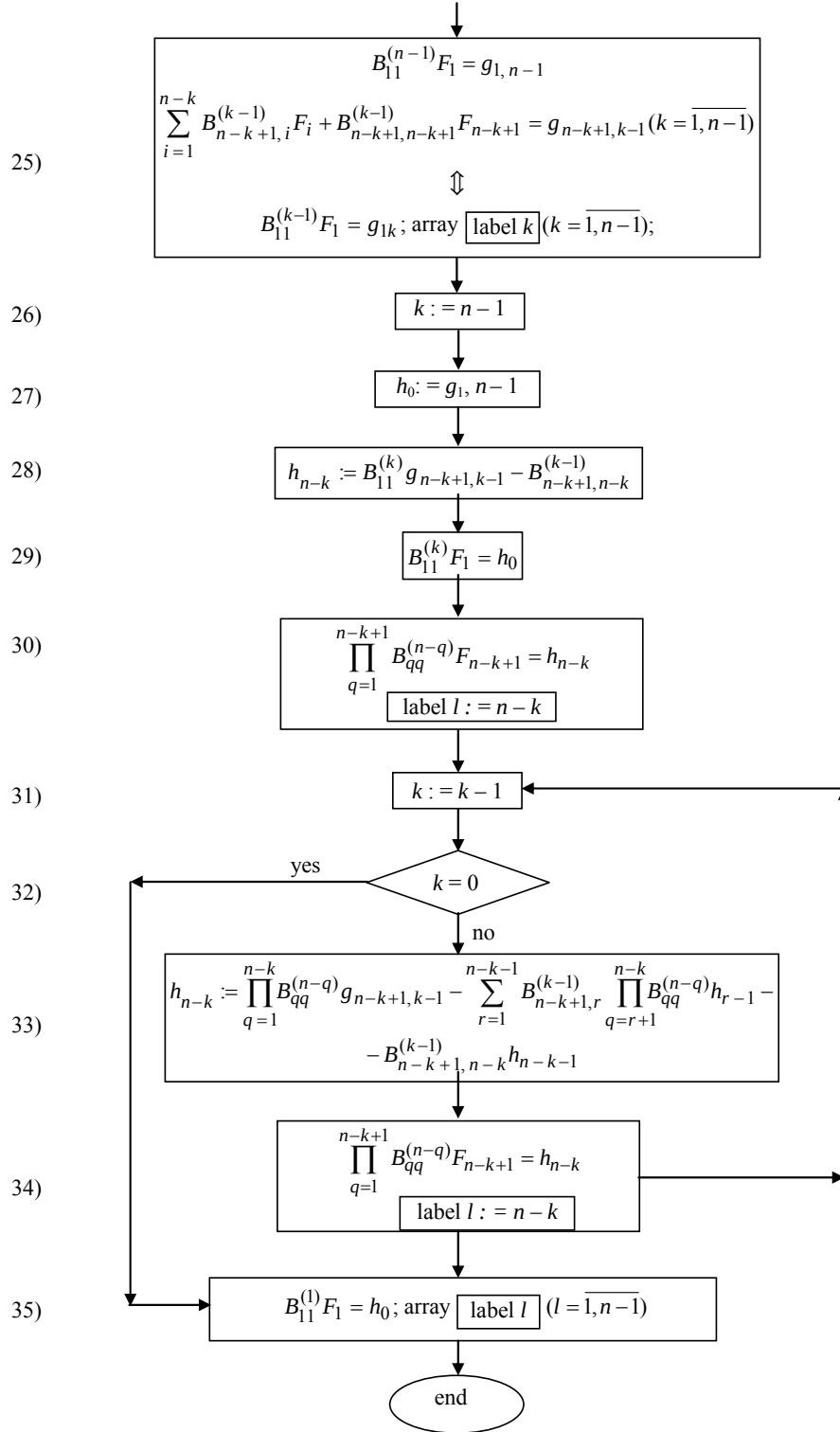


Figure 1.

From the very beginning it should be noted that the given flow-chart is proposed for the above mentioned arbitrary nonlinear invertible operators that commute in pairs, though act over the more narrow case of the finite dimensional space that is accepted as numerical only.

Nevertheless, such restriction is in conformity with former assumption from the previous section 2 concerning spatial character. It is easily explained, since the present flow-chart algorithmic structure remains the same also in the broader case, when the original matrix operators from (3) act over the arbitrary finite dimensional space that is not obligatory numerical.

The suggested current spatial restriction simplifies the proposed general numerical direct application for concrete industrial/engineering problems and its perception by non-mathematicians or other non-experts in informatics too.

Anyway, if the general mentioned spatial case is required, then the coordinates of space $x := (x_1^0, \dots, x_m^0)$ and time $t := t_0$ in the first block of the given flow-chart must be changed into the one point $x := (x_1^0, \dots, x_{m+1}^0)$ of the corresponding arbitrary finite dimensional space, which (we remind again) is not obligatory numerical, and the coordinates x_k^0 ($k = \overline{1, m+1}$) of its point x are not usual numbers.

Further, continuing the explanation of the flow-chart's block actions, we must add that block 1) gives also other remaining starting data: dimensions of system (3) $-n$ and of space $-m$; the known functions f_j ($j = \overline{1, n}$) from the right part of (3) and operator A_{ji} ($j, i = \overline{1, n}$) explicit expressions of matrix (3).

Block 2) describes the structure of the original operator equations of the system (3).

Blocks 3)-12) check the commutativity in pairs of operators A_{ji} ($j, i = \overline{1, n}$) from (3), and 13)-25) represent the first diagonalization stage of (3) in the "upward" direction. Result of this procedure is the first sought for scalar equation with respect to the component F_1 of the unknown vector function $\vec{F}(x)$. According to this "upward" diagonalization level blocks 13)-15) correspond to the so called "zero" preliminary step, 16)-19), 20)-24) and 25), in their turn, describe the first, general k -th and the final n -th steps respectively.

Blocks 26)-35) concern the second part of the diagonalization algorithm in the "downward" direction. Here 26)-30) are its first step,

blocks 31)-34) form the general k -th one and 35) is the final $(n-1)$ -th step. The result of action of all blocks 26)-35) is the complete construction of the rest sought for scalar equations with respect to the components F_i ($i = \overline{2, n}$) of the initial unknown vector function $\vec{F}(x)$.

Therefore, the realization of item III) from the scheme (1) in the case of the original problem's study in the multidimensional analogous circuit theory is finished, the required flow-chart for computer calculations is done and basically approves analytic results from [1], [3], [4].

Hence, the purpose of given paper is attained.

Conclusion

Coming to the end of given paper we must mark the following:

a) The original question that was raised by the symbolic scheme (1) was clarified completely in the case of concrete industrial problem in technical electrodynamics field theory, and both steps II), III) from (1) are present here.

b) The flow-chart from figure 1, though represents the simplest spatial numerical case for concrete industrial need in its block 1), remains the same even in more general situation when the given space is not only numerical, but simply finite dimensional.

c) Moreover, in comparison with all former results [1], [3], [4], matrix operators from (3) are utterly arbitrary and can be even nonlinear. They must satisfy only two requirements: be invertible (5) and commutative in pairs (4).

Since the proposed flow-chart from figure 1 is independent of the initial/boundary problem's conditions, of the structures of operator quadratic matrix and original finite dimensional space, as it was assumed earlier in [1], [3], [4], then we can assert and repeat for certain that the purpose of given paper is attained and solved completely in the framework of the aforesaid scheme (1).

REFERENCES

- [1] Dmitrieva, I. Yu., Ivanitchkiy, A. M., *Diagonalization of the differential operator matrix in the case of the multidimensional circuits*//Scient. Works of ONAT, 2009. No. 1, pp. 36-51.
- [2] Fettweis, A., *Multidimensional wave digital filters*//Proc. of Europ. Conf. on Circuit Theory and Design, Sept. 1976, Genova, Italy. V. 2, pp. 409- 416.

- [3] Dmitrieva, I., *Diagonalization problems in the classical Maxwell theory and their industrial applications*//Proc. of the Internat. Conf. ENEC-2006, Hyperion Univ., 14-16 May 2008, Bucharest, Romania: Ed. Ion Spanulescu, Victor Publishing House, Bucharest, 2008, pp. 11-23.
- [4] Dmitrieva, I., *On the constructive solution of n -dimensional differential operator equations' system and its application to the classical Maxwell theory*//Proc. Of the 6th Congress of Roman. Mathem., Bucharest 2007. V.1, Scientific Contributions, Romanian Academy Publishing House, Bucharest, 2009, pp. 241-246.

NEW ECONOMY Section

THE MANAGEMENT OF COUNTRY RISK FOR ROMANIA BEFORE AND AFTER THE ADMISSION INTO THE EUROPEAN UNION

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Abstract. *The paper endeavors succinct analyses in terms of Romanian political, financial and social progress during the transition from a centrally planned to a free market economy. It also pursues to predict the rewards and overcome obstacles which the country will encounter in the years to come. Unquestionably, one cannot comprehend the present framework of Romanian society and her economy without first studying the causes which led to the nowadays (present) state of affairs. The membership of the European Union proved to be a constructive and encouraging event, because it has heightened Romania's prospects to widen her opportunities, resulting in soaring economic growth. Her growth turned up from 0% in 1996 to 7.1% in 2008.*

The country risk prospective has been thoroughly evaluated since the current global economic crises shall, most likely, affect Romania's prospects for sustainable growth for foreseeable future.

Keywords: crisis, country risk, Romania, IMF, Moody's.

1. Introduction

The country risk is defined as the risk to expose an asset/business to a potential loss, due to some economic, politic, social events which are, from a certain level, at least partially, under the control of the host country and not under the control of the owner or manager. Romania's country risk has fluctuated in the past twenty years, due to dramatic changes in her ideological paradigm and state structures.

In this paper is made a brief analysis of the country risk prospective, particularly because most recent studies state that the current global economic crises shall, most likely, affect Romania's prospects for sustainable growth for foreseeable future.

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2. Romanian political, financial and social evolution during the transition from a centrally planned to a free market economy

Romania, which joined the European Union on 1 January 2007, started the transition from Communism in 1989 with a mostly archaic industrial base and a pattern of output unsuited to the country's needs.

However, its position, natural resources (like fertile soil, mineral resources) and exceptional potential for tourism, has always recommended Romania as very attractive for potential investors.

As a medium sized country (237 thousand km²), located in Eastern Europe, Romania is the second in the region in terms of the population (around 22 millions, with a density of 96 inhabitants/ km²).

In 1990, Romania has chosen a gradual reform for the transition process from centralized economy to market economy.

In its work, "The elaboration, coordination and applying governmental politics in Romania", Teodor Stolojan, ex-prime minister of Romania and expert for World Bank, numbered four causes for the slow transition process:²

a) lack of experience. Political leaders, mass-media and population did not have any experience about democracy and market economy principles, because Romania was informational systematically insulated.

b) the centralized process of taking decisions. Among the ex-socialist states, Romania had one of the most centralized systems.

c) the exhausting decade 1980-1989. The zeal to pay in advance the external debt and the investment in oversized projects comparing to the economic power of the country at that moment made the 80s' a decade full of painful sacrifices for the population. The production was realized in huge plants, making the economy inflexible; starting with the 80s' the inefficiency was aggravated by investments in areas consuming a high level of energy, by stopping the occidental technologic influx as an effect of anticipated reimburse of the external debt.

d) violent revolution. While its neighbours started transition towards the market economy peacefully, by making "velvet revolutions", Romania had a violent one, with hundreds of dead people, with enigmas historically unsolved.

² Stolojan Teodor, Romanian Center for Economic Politics, "Elaboration, coordination and applying of the governmental politics in Romania", 1999.

The first two years of transition (1990-1991) were dominated by strikes, demonstrations, culminating with the incursion of miners into the capital city in September 1991 and fall of the Government.

Under such circumstances, it was stringent to start privatization and restructuring the economic system, prices, trade, and currencies market liberalization, to elaborate balanced budgets, to implement decentralized and efficient tax systems.

Unhappily, the new authorities relaxed the economic constraints under the popular pressure, which was in contradiction with the aim of a stabile economy.

Politically, the analyzed period was characterized by instability, inconsequence in legal and fiscal domain, socialist-nationalist tendencies and nostalgia for the old communist system.

The years 1990-1991 were characterized by increasing the energy import, social costs, the dropping of investments level, which led to the massive plunge of state-owned companies' capital, exhaustion of the monetary international reserves, inflation, and dramatic fall of living standard. The liberalization of prices was done step by step, starting with 1990 and ending in 1999, while the stock market developed slowly (the commodity market in Bucharest started late, in 1995). Although the period was marked by real achievements (liberalization of prices, approval of a new constitution in 1991), it was also very shady. The drastic drop of living standard, purchase power, inflation's surge and explosion of prices are processes which affected a great part of the population, having as a result social unrest.

1992-1996 was a period characterized by significant diplomatic progresses, like: Romania became an associated member of European Union and a peace partner for NATO. Other achievements were the continuation of the legislative reform, the Mass Privatization Program (1995) concomitant with stabilization of the social situation. However, the economy was still in a bad shape, as a result of a rising level of corruption; the inflation climb unrestrained as a consequence of some inadequate monetary politics. In addition, the ex-Yugoslavian war affected as very much, because of the embargo that was imposed upon it.

In November 1996, the opposition won the elections for the first time, but despite the huge wave of popularity, but after nine months the new government proved to have similar weaknesses with the previous ones; it was unable to realize real economic growth, to stimulate more actively foreign investments, to demonstrate willingness to stop corruption. That

program has been replaced with phases from the agreements concluded with the International Monetary Fund, World Bank and European Union.

In the period 1999-2000 the state was able to get loans from the foreign markets at high interests, 12-13%. It was a big danger to fail payments, but the National Bank succeeded to avoid the collapse, like the Bulgarian scenario. Japan Credit Rating Agency was the only institution to sustain us, considering that there are no difficulties for pay the external debt; this attitude was adopted by other agencies: Standard & Poors, Moody's and Fitch; this led to an important decrease of interests, up to 5-7%.

3. Optimistic start in the third millennium-admission in NATO and aid for the E.U. integration of Romania

After 2000 multiple progresses happened, principally in the diplomatic field: Romania's admission in NATO, negotiations for adhering to the European Union. The inflation was significantly reduced (under 10%), the economic growth reached 8% thanks to strong demand in EU export markets. The revision of the Constitution, in October 2003, contributed to the rationalization of the parliamentary process, conferring to the chambers the primary responsibility for the parliamentary process.

In May 2004, a new strategy of reform was launched in the domains of public sector, decentralization, coordination of the governmental politics.

After signing the Association Accord with the European Union in 1995, later on, in Helsinki, in 1999, Romania was invited to begin negotiations with the European Union, starting with 2000. The Council of Europe from Copenhagen, in December 2002, decided the European integration of Romania, for 2007, alongside with Bulgaria. For this aim, Romania benefited from financial aid through the programs PHARE, ISPA (structural instrument for infrastructure, transports and environment) and SAPARD (financial instrument dedicated to agricultural and rural development).

Despite all difficulties, many progresses have been recorded-the period 2001-2006 was characterized by economic growth, legislative evolutions and privatizations of the big industrial objectives.

The macroeconomic stability was accomplished and the authorities demonstrated commitment for satisfying the criteria for adhering process.

The conclusion for annual country report 2004 of European Commission was that Romania fulfilled the criteria of a functioning

economy (however, with enough indulgence). In 2004, the economic growth reached a record of 8,3 %, inflation dropped at 11.9%, while the unemployment rate reached 6.2%. The record level of foreign capital of 5.1 billion dollars was due to privatization of Petrom and to a big number of greenfield projects and extension of the projects already started, especially in automotive and services industries.

The report of 2005 appreciated that in Romania existed still deficiencies, for this reason significant efforts have to be done: in public administration, effective implementation of the reform in the judiciary system, fight against corruption.

In 2005 Romania gained 22 places in the top realized by the Conference for United Nations for Trade and Cooperation (UNCTAD) from the point of view of performance index for direct foreign investments, reaching the 35-th place from 104 countries. The performance index takes into account, among others, the legislative steps to take for improving the business environment. The UNCTAD report appreciated that, in Romania, this indicator was determined by the introduction of the income tax of 16%.

From the point of the social component of the Romania's country risk, a serious social disequilibrium has been created, the general standard of living has decreased, unemployment has risen; these facts have led to a profound discontent of a great part of the population and to a huge emigrational flux. The active population working at home is overloaded with social contributions.

The encouraging social aspects are the positive attitude of the population for foreign investors and the elevated level of education, representing good premises for financiers, particularly taking into account the progresses made for aligning the European aquis in the education domain.

On January 24, 2006 at the annual seminar „Coface Country Risk Conference“, the most important event in risk management, 151 states were evaluated. For the first time, Romania received the rating grade A4 from Coface, world leader in export credit insurance, a similar score with other countries of the European Union. Romania's country risk rating advanced two grades; in December 2004 it was B, in June 2005 B+ and in December 2005 the grade reached the highest level, A4. The investment risk for Romania was then considered low, A4 indicating a mediocre payments history, that can be worsened if the economic and politic environment would deteriorate. Other risks were related to structural and cohesion funds allotted for Romania after the adhesion (32 billion euro), in danger to be lost without a good administrative capacity to manage them.

The strong points of Romania taken into consideration were: the dimension and domestic market's potential, well trained workforce, a reasonable level of costs, an acceptable public debt, foreign direct investments flux and substantial hard currency reserves.

Local companies benefited from the country risk upgrading, because they can access credits cheaply, leading to an increase of the commercial relations volume.

Moody's also upgraded the country risk level for Romania (Ba1) for long term loans, with only one rank below the grade considered safe by investors (investment grade). For the other categories, the prospects are also positive, Ba2 for bank deposits in hard currency, Ba1 for long term local debts.

Actually, the ratings have gradually increased from 1996, the first year when Moody's began to evaluate our country.

After 2006, Moody's issued annual reports about Romania, maintaining a constant level of rating, including in 2009, as seen in Table 1.

Table 1
Evolution of country risk for Romania according to Moody's

Data	Rating for long term loans	Trend	Rating for bank deposits	Trend
06.03.1996	Ba3		-	
23.12.1996	Ba3	stationary	B1	
14.09.1998	B1	▼	B2	▼
06.11.1998	B3	▼	Caa1	▼
19.12.2001	B2	▲	B3	▲
16.12.2002	B1	▲	B2	▲
11.12.2003	Ba3	▲	B1	▲
06.10.2006	Baa3	▲	B1	stationary

Source: Moody's investors service.

Similar ratings accorded Fitch and Standard&Poor's, demonstrating that Romania was on ascending tendency, reflecting an improving business environment.

4. Evolution of country risk after the adhesion to the European Union

The adhesion to the European Union at January 1st 2007, brought for Romania economic and social benefits, the chance to get financial

influx from structural funds, favorable business prospects, economic growth, the raise of direct foreign investment, stock market development, competitiveness raise, access to labor market in the European Union and standard of living amelioration. Romania's economy boomed between 2001 and 2008, averaging 6.2% real growth per year even as the population declined.

For more than a decade, emerging Europe enjoyed remarkably high growth. It was at first driven by the external sector, but from 2003 onwards, a domestic demand and credit boom increasingly took over as capital poured into the progressively more financially integrated region from highly liquid global markets. A large part of these inflows was intermediated by the local affiliates of western banks, which had come to control most local banking systems.

In such circumstances, it is therefore not unforeseen that emerging Europe was principally hard hit by the financial chaos that followed the fall down of Lehman Brothers in September 2008. Policymakers and international financial institutions responded quickly to the crisis – defusing the risk of full-scale currency crises and financial sector meltdowns. Big amounts of external financing were made available by the IMF, the European Union, and other international financial institutions. The Fund provided the overall framework with nine IMF-supported programs in the region³ (see Fig. 1).

During 2007-2008, foreign capital had fueled consumer spending and led to an investment boom. Domestic consumption and investment led to a serious GDP growth but also to large current account imbalances. Romania's macroeconomic gains have started to stimulate creation of a middle class and concentrate on Romania's widespread poverty. Unfortunately, corruption and red tape continued to burden the business environment.

After September 2008, when the global crisis hit Romania, the influx of capital stopped, GDP fell more than 7% in 2009, unemployment nearly doubled and the exchange rate weakened by more than 15 percent against the euro. The government received a €12.9 billion loan from the IMF in March 2009, as part of a coordinated financial support package of €20 billion. Since then, Romania's country risk has declined. Moody's was the only major rating agency that evaluated Romania on a stable, investment-friendly recommendation, but Fitch and Standard & Poor's placed Romania's rating in "junk" category in the fall of 2008.

³ <http://www.imf.org/external/pubs/ft/survey/so/2010/CAR102010B.htm>

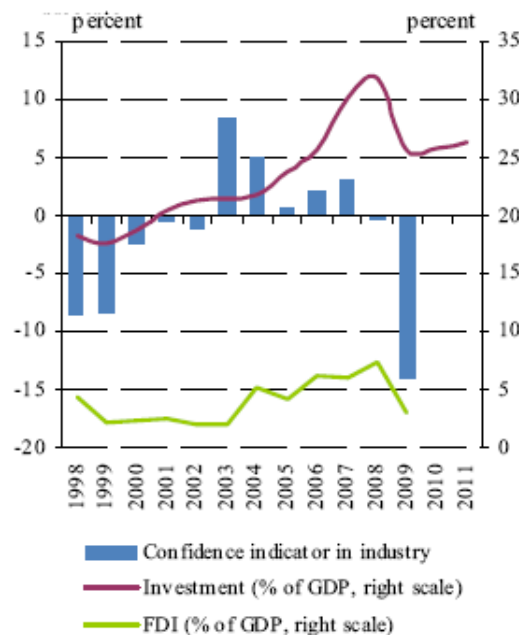
Lending to Eastern Europe					
International financing packages for countries in emerging Europe during the global economic crisis					
(as of September 2010, billions of dollars, programmed amount, unless indicated)					
	IMF	European Union	World Bank	Other	Total
Hungary (Stand-By Arrangement (SBA), Nov. 08)	15.7	8.4	1.3	0.0	25.4
Ukraine ¹ (SBA, Nov. 08 and Jul. 10)	25.7	1.3	3.4	2.1	32.5
Latvia (SBA, Dec. 08)	2.4	4.4	0.6	3.3	10.6
Belarus (SBA, Jan. 09)	3.5	0.3	0.2	1.0	5.0
Serbia, Republic of (SBA; Jan. 09)	4.0	0.2	0.4	0.0	4.6
Romania (SBA, May 09)	17.1	6.6	1.3	1.3	26.3
Poland (Flexible Credit Line (FCL), May 09)	20.6	0.0	0.0	0.0	20.6
Bosnia and Herzegovina (SBA, Jul. 09)	1.6	0.1	0.2	0.1	2.0
Moldova (Extended Fund Facility (ECF)/ Extended Credit Facility (EFF), Jan. 10)	0.6	0.3	0.3	0.1	1.3
Kosovo (SBA, Jul. 10)	0.1	0.1	0.1	0.0	0.3
Total	91.3	21.7	7.7	7.8	128.5
Source: IMF staff calculations.					
¹ For Ukraine, IMF column includes the sum of two Stand-By Arrangement (SBA) programs (that is, the amount actually disbursed under the November 2008 SBA plus the amount committed under the July 2010 SBA).					

Figure 1. International financing packages for countries in emerging Europe during the global crisis.

Source: International monetary Fund.

Romania's economy went through a process of significant adjustment in 2009 the real GDP dropped by 6.9% in 2009, mainly on the background of the low domestic demand. This drop also reduced the country's import demands and backed an unprecedented adjustment of the current account deficit.

The level on investments in Romania has drastically dropped in 2009, as seen in figure 2.



Note: Data for 2010 and 2011 are projections.

Figure 2. Investment in Romania – developments and outlook.

Source: Eurostat, EC.

After the presidential elections of November 2009 and the formation of a government coalition, the executive approved a 5.9% deficit of GDP for the 2010 budget, according to the engagements assumed with IMF and EU.

The economic output contracted 7.1 percent in 2009 and may recover slightly in 2010, thanks mainly to the recovery in external demand. The government intends to reduce the budget deficit to 5.9 percent of gross domestic product this year from 7.3 percent in 2009, a target it can reach if planned wage and pension reforms are pushed through. One ray of hope is that the foreign debt rate maintained at a good level of 85% on the average, in conditions in which mother banks reasserted their engagements to remain in Romania. In opposition, the foreign economic and financial environment improved, supporting the stability of the national currency, which helped counteract pressures on the banking system, when over 50% of the domestic credit is in foreign exchange.

5. Conclusions

Romania's return to growth may come more rapidly than for other countries in the region, such as Bulgaria or the Baltics, because the

Romanian private sector is less leveraged, and because of the flexible exchange rate which is easing the adjustment in the trade balance. Economic growth is questionable to reach pre-crisis rates for continuous periods, especially if European economic growth remains low. A more normal long-term growth rate for the country is maybe 3-4% per annum, considering that there are still a number of obstacles to rapid growth in Romania, particularly a heavy structural reform agenda and underdeveloped infrastructure. For 2010, Romania's economy is estimated to grow by 1.2%, while the current account deficit is seen narrowing to 3.5% of the GDP.

In April 2010, Fitch Ratings raised the outlook on its BB+ credit rating to "stable" from "negative". In March 2010- Romania's credit rating outlook was raised to stable by Standard & Poor's after the International Monetary Fund resumed a bailout loan to the country and the government passed an austerity budget⁴. Moody's Investors Service, remained the only agency to rate Romania as investment grade.

REFERENCES

- [1] Bloomberg Business week, March 10, 2010.
- [2] Stolojan Teodor, Romanian Center for Economic Politics, *Elaboration, coordination and applying of the governmental politics in Romania*, 1999.
- [3] European Commission – Annual country reports for Romania – 2004, 2005.
- [4] <http://www.cofacerating.com/>.
- [5] <http://www.imf.org/external/pubs/ft/survey/so/2010/CAR102010B.htm>.
- [6] <http://www.moody.com/>.

⁴ Bloomberg Business week, March 10, 2010.

COMMON AGRICULTURAL POLICY – ROMANIAN PERSPECTIVE

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Abstract. *This paper aims to present the development of the EU agricultural policy both within the Community space in general and for Romania in particular, starting from launching the EU Agricultural Policy to highlighting the principles and pillars of EU Agricultural Policy and emphasizing the 4 major stages of policy's reform and secondary legislation in field. Launched and promoted in the complex project Common Market (gradually transformed in the Internal Market), becoming the first "practical application" and its first notable success, the EU Agricultural Policy has increasingly become "the Cinderella" of the European Union with a contribution to European's Union GDP of only 2.4% and with a continuous theme of tension. The core of the current reform package of EU Agricultural Policy is to be found in the pronounced reduction of intervention prices – to the key products and the removal from the culture of arable land, encouraging the competitiveness, the farmers focusing less on product quality and more on their quality. Also, the mutations foresee the gradual transition of funds from direct payments on production to rural development. In this context, Romania has to "fight" both with overcoming the state of subsistence agriculture and with the new conditioning regarding the EU Agricultural Policy reform, but also with multinationals in this sector, more and more aggressive under the new conditions.*

Keywords: *Common Agricultural Policy; secondary legislation; reform package of EU Agricultural Policy.*

1. Introduction

The Treaty of Rome establishing the European Economic Community – TEEC (signed on March 25th 1957 and entered into force on January 1st 1958) has set the Common Agricultural Policy (CAP) as a priority for what was later to become the European Union. For a long time, the common agricultural policy has been the only integrated sectoral policy.

CAP was based on certain key objectives, particularly on the desire to ensure self-sufficiency in terms of basic foods, in response to food lacks

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from the post-war period. The result was a rigid policy, of subsidies, oriented to production, which continued to operate until 1990, when the CAP has become a victim of its own success. As the main objective of producing as many products was achieved, unwanted side effects began to appear (such as fabulous beef quantities and large quantities of grain which had to be stored by the EU in its own warehouses).

Thus, in the late 80s there was already a general agreement on the need for reform.

CAP has been much simplified by focusing different direct payment schemes in a single, being also a much more efficient mechanism and achieving more objectives at a reduced cost.

Growing support, in order to obtain food and agricultural products is now engaged especially regarding public priorities and concerns of consumers. From the policy that was offering grants for produced quantity, the support of the CAP has now become one that is dependent on the **quality of competition**, the guarantees regarding the environment and food safety in line with EU public priorities.

However, 20% of community farmers are getting 80% of direct agricultural subsidies, granted in the 27 Member States. Around 40% (which by 2013 should reach approx. 34%) of over 117 billion EUR – the EU's annual budget – are allocated for agricultural subsidies, and France is the main beneficiary (over one quarter of EU agriculture budget). And all these expenses are made in the terms that agriculture's contribution to global GDP of EU is only of 2.4%.

CAP is not anymore a vehicle for integration, but a matter of tension. Some experts stressed that the common agricultural policy has managed to prevent farmers' opposition to European integration, but nowadays, the concept that a social category must be paid in order to support the European project is outdated.

2. Fundamental principles of the Common Agricultural Policy

Founding Members of the European Economic Community have agreed that the agriculture should be included in the common market. For this, a common agricultural policy was needed, to harmonize the different national support mechanisms and to establish common customs barriers for goods coming from non-members. Common Agricultural Policy was one

of the first policies decided at EU level. Operation principles and practical translation of the CAP were established in a **Conference** which met in 1958, in Stresa (Italy), the agriculture ministers from the six countries.

Three basic principles were and are at the base of the common agricultural policy:

a) Creating and maintaining a **single market and common prices** (a single market where the agricultural products move freely);

b) Respecting the concept of **Community preference** (in the agricultural trade the preference for goods produced in the Community can be observed, the buyers of non-community products must pay a surcharge);

c) **Financial solidarity** (all the Member States are participating in the formation of the financing resources and are benefiting of the financing of the CAP's expenses).

The three principles are interrelated and can not be applied separately.

Over time, applying the three principles has brought to the Community great service, so the supplies security was provided for the main categories of food and contributed essentially to maintaining a certain balance between town and countryside and between the interests of farmers and consumers [5].

According to initial and modifying treaties, the EU market (in applying the three principles) is regulated by:

- *Prices*
- *Intervention on the market*
- *Financial aids*
- *Production quotas*
- *Common customs protection.*

EU Council approves the European Commission's proposals, which set yearly three separate prices: the target price, the intervention price and the threshold price of products.

The target price – is the price at which the Community authorities consider that transactions with agricultural products on the Internal Market must be made, in order to ensure a reasonable standard of living of the producers.

Intervention price – is the guaranteed minimum price that producers can achieve for the production sold in the EU space. When supply is greater than the demand for some products, the European Union intervenes by buying and storing that product, not allowing the market price

falling below the intervention price. The intervention price is lower than the target price.

Threshold price – according to which the import agricultural products priced lower than this price may not enter in the European Union. This price level is obtained by applying customs duties.

But, towards the target price, on the internal market functions the market price (the target price is now only a guiding value).

3. Secondary Community legislation on CAP

The Founding Treaty (Treaty of Rome establishing the European Economic Community) along with modifying treaties were the primary sources of the community law in this area (now called Operation EU Treaty).

However, a particularly important role had the secondary sources, including: **regulations, directives and decisions.**

On January 14, 1962, the Council adopted the first rules for CAP, created to establish a common market of agricultural products and financial solidarity – through the establishment of the European Agricultural Guidance and Guarantee Fund (EAGGF). Common prices (single), however, have been implemented since 1968.

The Fund had two distinct sections, namely: “Section Guidance”, for agricultural structural adjustment and modernization of agriculture and “Section Guarantees” that represents over 90% of EAGGF and was intended to put into practice the three basic principles. In order to establish *the single market of agricultural products*, their prices were unified. However, in order to avoid that the farmers in countries with high prices to be forced to accept discounts, the unique prices for each product *were established at the highest existing level. Because of this, the unique community prices for most agricultural products were consistently located above world market prices and the difference between them has not ceased to grow.*

EU Council Regulation no. 1290/2005 *on the financing of the common agricultural policy* has created (by restructuring EAGGF) two European funds for agriculture, called: the **European Agricultural Guarantee Fund-EAGF**, for financing the marketing measures and direct payments and the European Agricultural Fund for Rural Development – EAFRD to finance rural development programs (to these two main funds is added an additional background: **European Fisheries Fund – EFF**, which supports

investments for the development of aquatic living resources, modernization of fishing boats and improving the processing and commercialization of the fishery products) [1].

The Commission is mainly focused on simplifying the current programming, management and control of funds system, by creating a single fund – EAFRD and also by gradually integrating the Objective 1 (Pillar I) in this fund. EAFRD also takes the rural development funds currently granted from the two sections of the EAGGF (Guarantee and Guidance), *combining the features of the financial and management of structural funds system with the ones of EAGGF-Guarantee.*

Community secondary legislation concerning CAP includes one of the areas with most regulations. Is notable that in 1985, was adopted the *White Paper on the completion of the Internal Market* (supervised by the Single European Act – 1986) which provided as finality the elimination, up to 31.12.1992, of all internal trade barriers within the EU and the achievement of the internal market, citing the need for adopting a number of 282 legislative measures, of which approx. 1/3 concerned CAP.

By European regulations is established the common organization on the market. The Council, on the Commission's proposal, adopts European regulations, directives or decisions concerning the stability of the prices, taxes, aids or quotas and also the allocation of fishing opportunities. The Commission may adopt, in certain areas, its own rules.

As for Romania, the most important laws are concerning the Regulations No.: 2092/91, 1493/1999, 1782/2003 (sheep, goats, cattle, direct payments), 320/2004 (sugar), 797/2004 (agriculture), 2220 / 2006, 834/2007, 3 / 2008, 834/2007, 501/2008, 889/2008, 967/2008, 1254/2008, 765/2008, 710/2009, 537/2009 etc.

In order to get an overview on the complexity of the CAP regulations, we recommend the website: <ec.europa.eu/internal_market/score/docs/relateddocs/relateddocs/list-dir/im-directives_ro.pdf>. [8].

4. The purpose and the pillars of CAP

Common Agricultural Policy aims to: develop a modern agricultural system, to ensure a fair standard of living of the rural population, the stabilization of the markets and the provision at reasonable prices of the consumers.

CAP Pillars – launched by “Agenda 2000” (pillars of agricultural expenses) are concerning:

Pillar 1 – Market and income support – covers the direct payments and grants related to the market given to the common market organizations such as buying products for public deposits, the surplus recovery schemes and subsidies for exports. Pillar 1 funding has come from the Guarantee Section of the European Agricultural Guidance and Guarantee Fund (EAGGF).

Pillar 2 – Rural development – the measures are considering: encouraging the environmental protection, helping disadvantaged areas, promoting food quality, standards compliance, assuring animals’ welfare. **The measures under this pillar are cofinanced by the EU and the Member States.**

Approximately 90% of agricultural production in EU Member States is regulated in the **common market organizations**. The common market organizations gradually have replaced the national ones for the sectors covered by the CAP [3].

The community courts are stimulating and favouring through contributions of funds the establishment of such organizations.

In the marketing specialized organizations selling the entire production is made by the organization (pricing, firm contracts). The organization must provide to the members technical assistance for using the organic practices for cultivating the land. Producers' rights and obligations are stipulated in a statute.

The organization should care that its members have the technical infrastructure for storing, packaging and selling and ensure a legal commercial and budgetary management. Financing is made through EU projects and personal funds.

5. CAP reform

a) Preparatory Stage

Community’s first reactions to the adverse effects of CAP occurred in the late '70s. Although modest in **1979**, first changes to unlimited guaranteed prices system were made. It was decided therefore to introduce a co-responsibility tax on milk production having as purpose the transfer over producers of a part from the costs of storage and subsidies required for exporting on world market of the cumulative surpluses. But soon the

established co-responsibility tax has proved to be insufficient in order to stop the increasing milk production. **But next year, the ministers of agriculture have recognized, in principle that the CAP should take into account a certain limitation of the production.** In order to restrict the supply to the demand's level (domestic consumption plus export), in 1984 was introduced **the quota in milk production system.** In 1988 radical changes in the CAP have been made. **In this respect, the EU Council decided to limit agricultural expenditure covered by the European Community for the future.** The increase of the agricultural expenses had to remain significantly lower than the growth of GDP of the Community. That way it was established a compulsory "guideline" consisting in setting a limit for the budgetary agricultural expenses. In the new conditions, the agricultural expenditure growth rate could not exceed 74% of the growth rate of EU GDP.

The Twelve have decided then to apply ceilings for the main guarantees for community products, except milk, for which the quota system had been established since 1984, and sugar which was always subject to production quota. These limitations, called **stabilizers**, are mechanisms designed to control Community expenditure related to common organization of the market.

Stabilizers are applied on the basis of a fundamental principle: if production exceeds a given level (the guaranteed maximum quantity-CMG), then the support for farmers is automatically reduced. The reduction is applied to whole production and not only to the part which exceeds CMG.

The measures taken in this area, have largely contributed to financing the actions aimed at:

- Reducing surplus productions;
- Improving the processing and selling of the agricultural and forestry products;
- Improving the non-agricultural use of arable lands;
- Protecting the environment and encouraging afforestation.

b) Phase I – Mc Shary Reform

Conscious of the need for substantial restructuring, in 1991 the Commission submitted new proposals for reform. In these reform proposals, the Commission stated that the only viable option given to the long-term community agriculture resides in a **competitive pricing policy.** Only this formula allows the Union to face an inevitable competition, both

on domestic and world markets. **The agricultural policy reform should encourage the farmers to use less intensive production methods that reduce the negative environmental impact and help to reduce surpluses.**

In June 1992 the Council of Ministers of Agriculture adopted the CAP reform, the most radical in its history. This reform implied a profound reorientation of community agricultural policy (reduction of the EU support price supported of compensation payments, where applicable withdrawal of plots from the agricultural circuit). Plus, additional amounts covering cattle were payed; when the density was lower than 1.4 livestock units per hectare. This highlights the strong impulse that was given to the extensification of production methods in comparison with the intensive development of the agriculture, up to the 1992 reform.

The aim of the new agricultural policy was to provide matching the supply with the demand, without affecting the life of farmers in rural areas.

c) Phase II – “Agenda 2000”

In December 1997 the Heads of State and Government of Member Countries took the historic decision to initiate a new enlargement of the Union. Community has also established programs such as PHARE in order to support the candidate countries in the accession process. In agriculture, the aid programs have covered vast areas: from land reform to the development of new forms of management and promotion of the modernization of agro-industrial sector.

“Agenda 2000” is a strategic document approved following the meeting of the Council of the Ministers of Agriculture – Berlin, 1999, by which rural development has become (in an official document) the second pillar of the Common Agricultural Policy (CAP), aiming to strenghten the competitive growth and to provide jobs, to modernize the sector through the introduction of the requirements to protect the surrounding environment.

“Agenda 2000” has launched two new pre-accession financial instruments. One of them, SAPARD was for structural adjustment in agriculture. An annual contribution of EUR 500 million was paid annually from EAGGF – Guarantee for the 12 candidate countries. Priority was given to the measures of increasing the efficiency of farms and agro-food industry, to the initiatives to improve land and other natural resources management, to encouraging economic diversity in rural areas, promoting sustainable agriculture programs.

Key features:

- **a competitive agricultural sector** to gradually handle the competition in international markets without the need to rely on subsidies that are less and less acceptable at international level;
- **healthy production methods and environmentally protectors**, capable of providing quality products in varieties demanded by the population;
- **various forms of agriculture** based on traditional practices that are not only geared towards a high level of production, but seeks to maintain the beauty of nature and countryside and dynamic and active rural communities, creating and maintaining occupancy level of labor employment;
- an agricultural policy much more simple and easier to understand, setting out clear separation lines between the decisions to be taken together and those that remain in the competence of Member States;
- **an agricultural policy which clearly establishes that its costs** are justified by the services that farmers provide to society at large meaning.

d) Phase III

In June 2003 a new reform of CAP was adopted, **which has changed substantially how to support agriculture in EU Member States** and which should be carried out in stages until 2013. It introduced the **single payment scheme (SPS)** for the farmers in the community space, independent payments of production (production release). Coupled elements are retained, limited, in order to avoid the abandonment of production. *Direct payment is linked to the observance of environmental standards, food safety, animal and plant health, and to the requirement to keep all farmland in good condition in terms of agriculture and environment.* CAP reform in 2003 provided a strong development policy with relatively large budget allocations, new measures to promote environmental protection, animals' quality and welfare and to help farmers to meet EU production standards. It was predicted a reduction of direct payments – modular – for large farms. There is a market policy review. Reforms of the sectors: rice, durum wheat, nuts, starch potatoes, dried fodder are established.

The objectives of the new reforms are aimed at:

- maintaining community between producers and exports of agricultural products by increasing agricultural competitiveness on both domestic and international and also regional markets
- reducing the production to the demand manifested on the market;

- focusing the aid for maintaining the income on those who clearly need more support;
- encouraging agricultures in the sense of non-abandonment of lands;
- environmental protection and development of the natural potential of the states.

The core of the reform package is to be found in the marked reduction of intervention prices – to the key products and removal from culture of arable lands. For compensating the losses of income resulting from these two measures, the farmers receive compensation in the form of direct payments per hectare or per animal head.

Also, the new CAP reform is a crucial step in what supporting farmers to become more oriented towards market needs means, ie to produce what is demanded on the market, more competitive products on the European Union and world markets, while they are still receiving considerable financial support. Meanwhile, the reform encourages the production of those high quality products according to certain standards, while providing an enhanced food safety.

e) In the community specialist environments the need for a new CAP reform is already a discussion topic (which will cover **2014-2020** period) much more radical and much more painful, at least for the countries new entered in the EU. They are talking about a substantial reduction in the community agricultural budget (remaining around 15% of EU GDP) while eliminating quotas for milk and other products. And the project of this new reform will be built and promoted by the current agriculture commissioner, proposed by Romania, Mr. Dacian Cioloş.

6. The Common Agricultural Policy and Romania

Current discussions on the CAP are one of the most important debates of this time in the EU. Romania should build a clear position in this field, since agriculture is one of the most important domestic sectors, generating 12% of GNP. Approximately 40% of the active population is working in agriculture, mostly in semi-subsistence farms, without a direct link with the market.

One of the worst rural infrastructures in Europe is affecting agricultural development. Subsistence farms have on average only 1.5 hectares of land. So any decision taken in Brussels on CAP reform can have a dramatic impact on economic and social landscape of Romania.

Of the approx. 9.5 million of existing arable land in 1990, nowadays only 5.5 million ha are available for applying PAC (2 million ha. are disabled and approx. 2 million hectares belong to farms under 1 hectare – which can not benefit from European funds).

In Romania, an average farm has about 3.5 hectares, compared to 80-100 ha in EU, where 50 hectares represent only the break even, i.e. equalizing income and expenses.

According to CAP, the management community money is exclusively made in Brussels (the Romanian Ministry of Agriculture may have just some significant interventions outside the CAP).

These funds are managed in Romania by two agencies: **Paying Agency for Rural Development and Fishery**, was established by Government Emergency Ordinance no. 13 of February 27, 2006, by reorganizing the SAPARD Agency and has received accreditation of operating at the end of 2007 and **Payment and Agricultural Intervention Agency (PAIA)**, which operates under the Ministry of Agriculture and Rural Development according to the Law no. 1 / 2004 modified and completed.

In order to be caught in the CAP budget in 2006, Romania has transmitted to Brussels the *National Rural Development Programme – NRDP*, benefiting from the following funds:

a) Market and income support – Pillar I

The total value allocated (2007-2013) by EAGF is of 4.5 billion Euros for direct payments – non reimbursable

b) Support for rural development for 2007-2013 – Pillar II (on 4 priorities (directions): Priority 1: Improving competitiveness of agriculture and forestry sectors; Priority 2: Improving the environment and the countryside; Priority 3: Improving quality of life in rural areas and diversification; LEADER axis).

The 7.5 billion Euro funds granted by the EAFRD represent a real opportunity for financing the rural space in Romania. By EAFRD is granted a financing representing 50-70% of the project's eligible value.

“Side effects” concerning Romania:

A major problem of Romania's agriculture is the large share of farmers in total employed population, and the large number of elderly farmers. In this matter, EU proposes for Community agriculture the application of an early retirement scheme that can guarantee total income of up to 150.000 euros per farmer (in equal tranches for 10 years). In turn, the Romanian authorities will have to apply this scheme which will mean that older farmers (minimum 55 years) to stop all commercial farming for

good and land use to be transferred to other younger farmers who will have to demonstrate that they can improve farm viability. Moreover, by 2013, over 50% of the population living in rural areas should undergo a process of retraining (tourism, organization of small artisans workshops, etc.) or to move to the city.

In the case of milk, the milk national rate – production that enters on commercial channels and benefits from subsidies, is 3.057.000 tons per year, and is assured by a total of 826.000 milk cows on an average production of 3700 liters per cow. Currently in Romania there are 1.741.500 head of milk cows. The difference in plus will be used to produce milk for own consumption in households. Some of these households will be eligible for the support granted to semi-subsistence farms (1.000 Euros per year for up to 5 years), for transforming them in commercial farms.

A more delicate situation is encountered in the meat's cutting and processing sector. Currently, only 19 meat processing establishments meet EU standards. These establishments cover only 25% of current production of meat and meat products.

According to the provisions of the Treaty of accession of Bulgaria and Romania to the European Union – 2005, Romania was granted the following transitional periods: 3 years, until 31.12.2009, for modernization and retooling of the 26 abattoirs and meat processing units and two processing unit for poultry, according to EU requirements and the modernization and upgrading of milk processing units, 8 years, until 31.12.2014, to remove hybrid vine varieties prohibited of the *acquis* of the EU vine (issues that we will not analyze) and 3 years, until 31.12.2009, to provide state subsidies for: the quality of milk, pork and poultry, diesel, irrigation perpetuity – for those who sold or given leased land (considered after this date state aid – prohibited in the Community). Farmers have lost since January 1, 2010, for example: between 100 and 120 lei for raised pigs, 1.6 lei per kilogram of poultry, 30 bani for one liter of milk and 1 leu for the liter of diesel) [7].

We want to highlight just this point, beyond what have lost or will lose the Romanian farmers on medium and long term, because of the lack of effective measures and political vision on this area. “Forgetting” both the governors and the farmers that the subsidies non-specific to Community space have ceased since 1st of January 2010, money by EAFRD have been accessed, so the farmers have made substantial loans from banks on a cash flow calculated with subsidized prices for: water for

irrigation, electricity, diesel etc.. If the Government does not quickly find a solution regarding the introduction of these subsidies in a Community scheme, we will assist to new failures in this area.

Fruit and vegetable market is suffocated by poor quality imports and some even toxic (domestic production covers only approx. 25% of required).

Cereal market has been “seized” by multinational companies (even before entry into the EU), which already dictate the price of bread wheat. In this context we don’t know who actually receive community grants per hectare (in Romania about. 120 Euros/ha., while for Hungary approx. 400 Euros/ha are paid and for France approx. 600 Euros/ha.) **since subsidies are not taken on nationality but on arable hectare owned!**

If we add that, in the three years from accession we have accessed about 10% of the EU funds (Structural Funds, ESF, CAP etc.) when after only 2 years after joining the EU, the Czech Republic had an absorption rate of 26%, Estonia 29%, 32.5% Hungary, Latvia, Lithuania and Poland 25% each, Slovakia 27.5% and Slovenia 34% while we have contributed to the annual EU budget with approx EUR 1.5 billion, we can make an overview of how we exploit the benefits of the accession.

For Romania, which has been considered for decades, generally with solid arguments, a country with high agricultural potential, the lack of overall vision of European and world market of agricultural products and of any attempt to develop a development strategy, the new CAP reform is a big challenge, because this mechanism is to provide us the money that we supposedly need to modernize our agriculture. If we add that the future CAP reform is designed to substantially reduce the EU subsidies for agriculture, reduction necessary both for the solution of the negotiations of the Doha Round of the World Trade Organization and for the increase of community agriculture competitiveness on world market, we have a quite contradictory picture regarding the future of the Romanian agriculture.

REFERENCES

- [1] Bahrin Dorel, *European Studies* (in Romania), Victor Publishing House, Bucharest, 2009, pages 74-79;
- [2] Brown R. L., *Eco-Economy*, Technical Publishing House, Bucharest, 2002, pages 19-36;
- [3] Fuerea Augustin, *European Business Law* (in Romania), Legal Universe Publishing House, Bucharest, 2006, pages 301-308;

- [4] Oprea Dumitru, Meșniță Gabriela, *European Funds for Romania in 2007-2013*, Libris Publishing House, Iași, 2007, pages 187-234;
- [5] Rose V. C. Bellamy & G. Child, *Common Marchet Law*, Ed. Sweet & Maxwell, London 2001, pages 101-109;
- [6] Zaharia Letiția, *Eu Agriculture under the impact of Common Agricultural Policy*, Ceres Publishing House, Bucharest 2009, pages 79-92;
- [7] Treaty of Accession of Bulgaria and Romania to the European Union – 2005, Annex VIII, Rural Development, Law No. 157/2005;
- [8] Internal Marchet Directives and Regulations adopted by 01.10.2009, http://ec.europa.eu/internal_marchet/score/docs/relateddocs/list-dir/im-directives_ro.pdf.

RISK MANAGEMENT FOR ENTERPRISES

Wolfgang ECKER-LALA *

Abstract. *New economy is a very new type of economy which is based on the global economy. This type of economy assumes that all enterprises – which participate on this form of economy – have almost unlimited access to computers, computer networks and medias of communication (internet, mobile internet, mobile phones,...). Similar to enterprises of the "old economy" enterprises of the "new economy" have to take care about their risks. But those risks are different and more complex. This paper will show necessary and efficient methods of risk management for enterprises of the new economy.*

Keywords: *risk management, financial risk, commercial risk, at administrative risk, potential loss, risk reporting.*

1. Introduction

What means “risk”?

“Risk” has a lot of definitions. In general we can say that risk is a description of an event which will cause a negative effect on us.

The word “risk” has its roots in:

- Latin: *risicare* – which means “to run the risk of...”;
- Ancient greek; *ρίζα* – which means root or rock;
- Greek: *ρίζικόν* – which means rock;
- Arabic: *rizq* – which can be seen as “by grace of God”;
- Etymology: *resecum* – which means something like riff.

So if someone tries to reach e.g. an aim of a project which cannot or might not be reached in a way as the person has planned we are talking about “risk”.

In a more positive way risk can be seen as a chance. For enterprises means the phrase “no risk – no fun” the same as “if you will not take some risk you will not have success on the market”.

If we consider all risks of an enterprise we will get:

- **risks caused by the market,**
if the business volume is highly dependent on market environment the risk is determined by the market and the market behaviour, e.g. products of a telecommunication company.

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- **risks caused by society,**
the productivity can be highly dependent on the behaviour of the society, e.g. strike, change of a government, cultural aspects.
- **risks caused by individuals,**
the quality of products and/or services are dependent on the qualification and knowledge of managers or other staff.
- **risks caused by technical systems,**
reliability and availability of technical systems which are used for producing products or offering services are very important.
- **commercial risks,**
availability and the delivery of components which are necessary for producing products or offering services determine the reliability of the delivery process.
- **financial risks,**
a bad performance of payments of customers can cause a low monetary liquidity of an enterprise.
- **administrative risks,**
a very important component is a false estimation of scenarios of the future, e.g. too low budget for research.
- **risks caused by events in nature,**
in past years risks caused by nature have been ignored. E.g. the “simple” event of volcanic eruptions can lead to delays or cancellation of flight.

2. Risk management. Catalogue of risk

Risks are a permanent part of business activities. So this permanent and controlled handling of risks cannot be avoided. In some countries the existence of a risk management system in a company/enterprise is mandatory.

If we think on risks we immediately associate it with the term “risk management” which means to handle risks in a proper way.

Risk management consist of 3 phases:

- **Identification** of risks.
In this phase all (possible) risks – which can happen e.g. to a project – have to be listed.
- **Quantification.**
In this phase a measurement has to be defined or developed in order to be able to quantify each risk. “To quantify” means to

associate a risk with a number in order to present a weight for the importance of the occurrence of each risk event.

- **Control.**

In the last phase a control mechanism has to be developed in order to be able to minimize the damage which will be caused by the occurrence of a risk. Risk limitation is a part of risk control.

Risk management can be seen as a kind of insurance for managers against unexpected risks which cause monetary loss.

3. Risk management requirements

An efficient risk management system consists of:

- **early-warning system,**
which is a system in order to detect upcoming risks and sends warning signals.
- **internal monitoring system,**
which is a system to store and evaluate all risks and their combinations – a business intelligence system focused on reports for potential risks.
- **risk controlling system,**
which is a system to get a “controlled” overview over risks and the probability that one or more of them will happen in order to minimize the loss or to prevent from any kind of damage.

A risk management system can be compared with a complex route guidance system (Table 1). This “route guidance system” has a similar functionality as we know from the systems we are using in order to find location *A* to location *B* by e.g. car.

Table 1

Comparison between risk management system and route guidance system

risk management system	route guidance system
catalogue of different potential risks	map of an area
early-warning system	module which “knows” when to change the direction, positions of radars, position of traffic jams
internal monitoring system	module which knows the position of the car
risk controlling system	module which calculates the optimal route depending on the actual position of the car

A risk management is not a system which only reports risks and the probability of a risk event. It has to be a decision support system for the management. It is a kind of “business intelligence” system or it can be seen as a part of a business intelligence system. Of course it has to be a decision support system for the complete enterprise.

A prerequisite for a risk management is to identify all already known risks and future risks which can have impact on the success of an enterprise.

As listed in a previous chapter the risks can be categorized and listed as follows:

- risks caused by the market;
- risks caused by society;
- risks caused by individuals;
- risks caused by technical systems;
- commercial risks;
- financial risks;
- administrative risks;
- risks caused by events in nature.

At the end a risk catalogue can be created which has to be used during the complete risk management process.

4. Determination of relevance of risk

After all risks have been identified the “degree of importance” has to be determined. It is necessary in order to get a “feeling” which risk is more or less relevant and might cause damage. If a risk is relevant depends on:

- probability of the event which causes the risk;
- extent of loss.

The extent of loss can be estimated based on

- statistics;
- experienced data;
- intrasector comparison;
- studies or similar models;
- subjective opinion.

Remark: The determination of the extent of loss based on subjective opinion is sometimes a doubtful method. Doing it in this way is acceptable if there are no other data available.

5. Potential loss

The potential loss shows the percentaged loss of own capital in case of an event which causes damage.

The calculation of the potential loss can be done by the method “value-at-risk”.

The value at risk can be defined as:

- possibility of negative deviation from expected value

or

- negative realisation of a financial value characterized as risk.

If the expected profit is a stochastic variable which is distributed according a normal distribution:

$$P \sim N(\mu, \delta),$$

the value at risk with confidence coefficient 99% is calculated by:

$$VaR_{99\%} = -N^{-1}(0.01) \cdot \sigma - \mu = 2,32634 \cdot \sigma - \mu$$

and the value at risk with confidence coefficient 95% is calculated by:

$$VaR_{95\%} = -N^{-1}(0.05) \cdot \sigma - \mu = 1,64485 \cdot \sigma - \mu.$$

6. Risk reporting

Risk reporting has a central importance for risk management and the functionality of risk management. Assumed is that all involved persons are willing to communicate. This means that all involved persons report potential risks and risks which could not really be handled in the past (maybe up to now).

Even single risks with low importance can grow up to one very important risk. In order to avoid this situation efficient observation criteria have to be defined.

The frequency of risk reporting has to be defined by the management of an enterprise. The frequencies of reporting can be different for different departments of the enterprise.

The implementation of a central risk manager can be taken into consideration by the management. He will be the central point for analysis of all risk reports. He will report aggregation of risks to the management.

7. Risk aggregation

Common method of risk aggregation is to add all amounts of damage (or loss). From mathematical point of view this can only be done in case all events happen at the same moment or defined time interval. In fact this will not be the case in reality.

If we consider two events (A and B) the single probabilities of those events are assumed as $P(A) = 0.05$ and $P(B) = 0.03$. If both events are independent the probability that A and B happens at the same time will be the product of $P(A)$ and $P(B)$.

$$P(A \cap B) = P(A) \cdot P(B).$$

If those events are not independent it can be very difficult to estimate $P(A \cap B)$. But $P(A \cap B)$ can be e.g. only 0.001 which is less than $P(A \cap B) = P(A) \cdot P(B) = 0.05 \cdot 0.03 = 0.0015$.

So it will be more appropriate to estimate the expected loss using covariances of the risk factors. So the total risk can be measured and presented as variance of equity return:

$$\sigma^2 = \sum_{i=1}^n x_i^2 \cdot \sigma_i^2 + \sum_{i=1}^n \sum_{\substack{j=1 \\ i \neq j}}^n x_i \cdot x_j \cdot \sigma_{i,j}$$

with

x_i – quota of impact on own capital for risk factor i ;

σ_i^2 – variance of impact on own capital for risk factor i ;

$\sigma_{i,j}$ – covariance of impact on own capital for risk factors i and j

$$\sigma_{i,j} = \sigma_i \cdot \sigma_j \cdot \rho_{i,j};$$

$\rho_{i,j}$ – correlation of impact on own capital for risk factors i and j .

The formula is easy to understand but there are following problems which can be seen in practice.

- Risk based on a set of risk factors has to be measured as impact on the variance of equity return. Necessary information are in general not available in historical data.
- Correlation coefficients cannot be estimated because of unavailability of historical data.
- Quota of impact on own capital have to be calculated.

So finally most of the enterprises are on a very good way to implement risk management tools and methods. Estimating efficient and sufficient parameters will cause a lot of troubles because historical data are

not available. But this situation can improve if business intelligence systems are available and working.

8. Conclusion

Daily business is conducted by a lot of risks. Managing any kind of enterprise means also managing all risk on the way to success.

In order to be able to get appropriate information and take good decisions risk management has to be implemented in enterprises. Sometimes it is required by a national regulator. In any case performing risk management as an insurance against getting into big troubles caused by interfering events which can cause loss and damage.

If a manager knows all possible risks he will be able to handle them and to minimize a potential loss or a potential damage. And so in the end he will be able to increase the profit.

REFERENCES

- [1] Peter Reichling, Daniela Bietke, Antje Henne, *Praxishandbuch Risikomanagement und Rating*, Gabler Verlag, ISBN 978-3-8349-0332-7, 2007.

PARADIGMS OF GROWTH SEEN IN SUSTAINABLE DEVELOPMENT

Cristina BURGHELEA *

Abstract. *The interdependence between globalization and growth, could bring storm clouds at human development, clearly established itself, an analysis of program models and strategies that led to imbalances.*

In this framework would need to find the kind of economic development that has as a finality Human Development, a development based on values, on respect towards the neighboring nations, on mutual assistance in relation to the poor macroeconomic better on increasing desire of each.

Faith in Science and confident hope is that coexist and succeed, which is allow certain macroeconomic results, encouraging growth processes.

Keywords: *sustainable development, globalization, progress, hope, economic growth.*

1. Introduction

Globalization of the economy focuses on bringing to the fore the idea of what humans of us try to understand as part of sub-life: the whole paradigm of growth on its component parts.

Under the dictate and limit the uncertainties, the economy is developing a mechanism to increase its role in national markets and ensure regional and global equilibrium conditions of submission.

Increase welfare but also can support individual fulfillment, but also a serious shift reflects globalization phenomena: poverty amidst plenty, environmental degradation, the loss of trust in institutions, inflation, unemployment etc. [1].

Growth focuses on the quantitative aspect of economic development, the production of goods and services: but wasted scarce resources becoming a growth that impoverishes, dispersing unreasonable in terms of production possibilities frontier. Struggle with the uncertainties of life creates a bridge to the complexity of the concept of globalization that sends

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a message to mankind: a “new life movement divided and their externalities, positive and negative, transnational territorial Compound [2].

2. Global Growth

Globalization of life and human spirit derives from the need to explain the uncertainty that is “the sum of all the potential dangers around us, perceived or not” [3]. Certainty instead wants to be a sign of the anniversary, a sign of distinction, a sign of growth to move towards equilibrium mirage advance, thus constituting a planetary scale factor of progress.

Ultimate Wealth but absolute misery brings us a world of certainties positive or negative, brings wealth of us humans to want an unreal world, a world dominated by a Hyperion of unfulfilled desire, a world in which we have certainty of life, throw dirt on the human race into chaos, of which some come out winners, and some bends in the uncertainties of life.

Increasing significance of international trade, value added network and the scope and intensity of development, make globalization a subordinate of the World Cup, but also an innovative success by changing mindsets and adapt to the demands imposed by the “global village site”.

“Globalization, by removing barriers to free trade and integration of national economies may be a welfare and has the potential to bring wealth to all, especially the poor, but if that's the case, how to carry out the process of globalization, including agreements international trade has played a leading role in removing those barriers and policies imposed on developing countries in this process must be radically rethought” [4].

Contemporary economic growth is uneven, growth is ill, based on those unhappy with us. World Trade Organization has extended a helping hand all industrialized states that have not bought from developing states, when they needed a lifeline, but instead forced the latter to become a market outlet for them. Agriculture subsidies by developed countries is again a factor to weigh strong states perpetual wealth at the expense of poor countries could not compete.

Exchange ratio is unequal, it is uncertain, making a sick man-made environment, the space environment. So poor countries after the Uruguay Round in 1995 receive lower prices on goods exported, but are paying for expensive imported goods, thus contributing to bringing “perpetual wealth” of developed countries. But what we do with the need to give to

our neighbors? International organizations must continue efforts to help poor countries or developing countries, where it will not help develop the phenomenon that is still underway: one in which poor countries are poor and rich countries that are strong and will increase further, throwing us as the “Pact for Faust where we can sell any certainty” [5].

Globalization of the struggle for growth, according to re-create time and space, between positive and negative externalities of natural and social environments, such “externalities phase relationship between economic expansion and recession phases of the development cycle, the a time horizon equal to the lifetime of a generation of growth that enriches human development and celebrates individual and social welfare and growth and development that impoverishes deepens inequalities in wealth, development of positive externalities and negative externalities of a process – in particular – pollution and poverty, the negative externalities of mental epidemics, nationally and regionally – transnational and even global and negative externalities of natural disasters etc.” [6].

Opening borders to create the rise of globalization developed countries, global production increases, GDP growth / place, determine the acquisition of superior scientific knowledge based on a society that encourages development. Encourage the development can not actually make its effects by omitting: population growth and quality of life, unemployment, environmental degradation etc. But the overall system by circulating capital, goods, people can move and dangers that threaten the stability of everyday life and therefore in poor countries is higher crime rates, higher drug use but also economic terrorism – financially more developed.

Benefits of growth and also of development are not shared, not necessarily equally fair and just that the gap between the *North* and *South* deepens more and more.

One of the most serious problems that uncontrolled growth is in addition to the environmental situation, poverty, so every minute 15 people die of hunger, one in ten people suffer from malnutrition, one in five people has no access to water resources [7].

3. Economic Reality

Positivity is overshadowed by the fierce reality of globalization, we belong to all and rich and poor, so no lack of food causes hunger but lack

of resources, not lack of schools creates uneducated phenomenon but need money to cover (the world is more than one billion illiterate people can be educated more than 1% of global arms expenditure).

Environmental issues, again creating problems, not the rich but also poor, which for lack of funds can not master the effects of ecological imbalance, such Third World countries who expect aid from international organizations implement decisions taken by powerful states, decisions taken advantage of the rich also in pursuing their own interests, unable to fight, for lack of funds against the facts of their nation by streamlining the flow of goods in a world increasingly without conventional boundaries.

Economic growth does not guarantee and increase the living conditions of children for example India was raised as an economic force to be considered worthy world is the last place to link economic growth with the infant mortality rate; and in Canada Notes from a study done, that population health is not good in rich countries, but those revenues are distributed in accordance with the principle of social equity (see Fig. 1) [8]. In 1820 the ratio of rich and poor countries was 3 to 1, while in 1992 this ratio became 72 rich countries for every poor country.

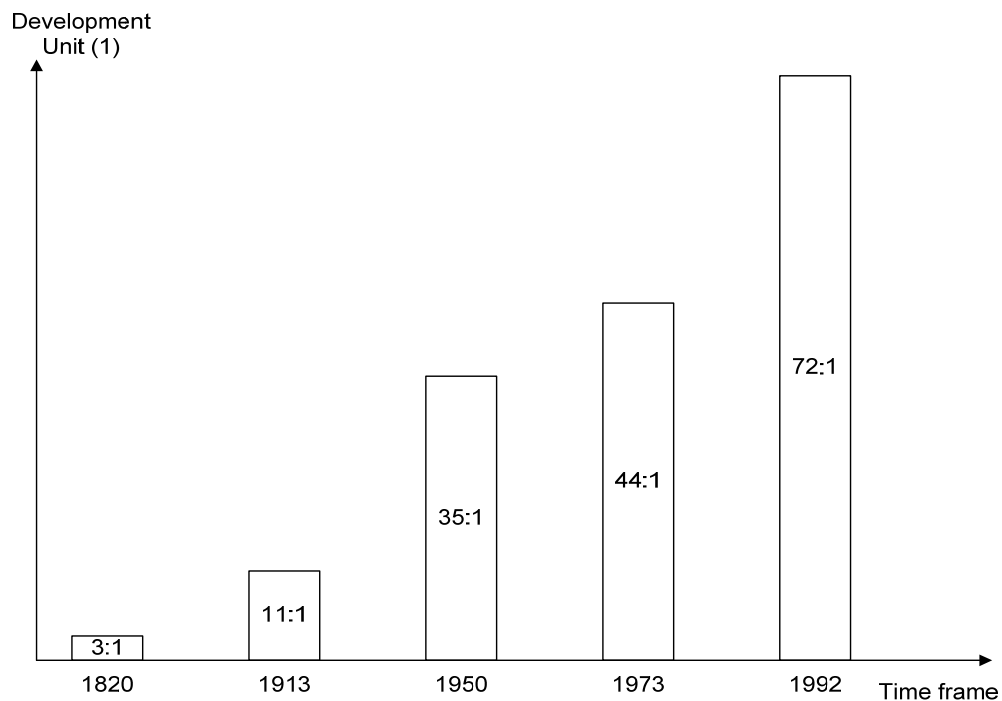


Figure 1. Approximations of the rich and poor countries.

A quarter of world states, about 48 poor countries have very low gross domestic product as against the three richest states: so that one sixth of the population of rich countries have an income of more than 70 times higher than one sixth in populations of poor countries.

Streamline the flow of goods and services as part of the globalization process may adjust the balance even periodic gaps in global wealth.

Would be an important process, but not enough as the USA, for instance, the richest, representing a percent of the population profits equal to 40% profits from the poor. In the last decade is observed that the trend is to increase the wealth of rich and lowering of living standards for the poor. All these major differences can not only threaten the balance of peace and human welfare and giving rise to antisocial behavior.

People, when they have nothing to lose, they resort to extreme gestures. Inequalities are painful, they running up there that is threatening the human species and therefore the risks and uncertainties should be controlled to the safety of life uncertain.

Understanding globalization and its motivation is strictly related to individual and social fulfillment of human welfare through the development, motivation is determined by integrating our world a better world generally universal, a world very close to the world of Eden.

A crisis emerges naturally – human development to result in growth and causes must be sought in countries which set world standards of wasteful extravagance that dominate global policies that go planet to self – destruction and not in poor countries [9].

Knowledge of human behavior that bring errors to destabilize and threaten economic growth mode to produce and consume goods are made in a period of 500 years.

Increased economic power that could not be controlled is a real danger to humanity. Protecting the global economic system using rule, foreign aid dependence of poor countries creates serious conceptual differences but the man ignores not only growth strategy through lack of social purpose.

These errors increase the opportunity costs of the advance balance, balance unbalanced nature of progress at the expense of the surrounding environment and equality between generations to come. These blocks of the human species evolution, making it even threatening.

But the common future prospects of humanity must be based on (see Fig. 2) [10]:

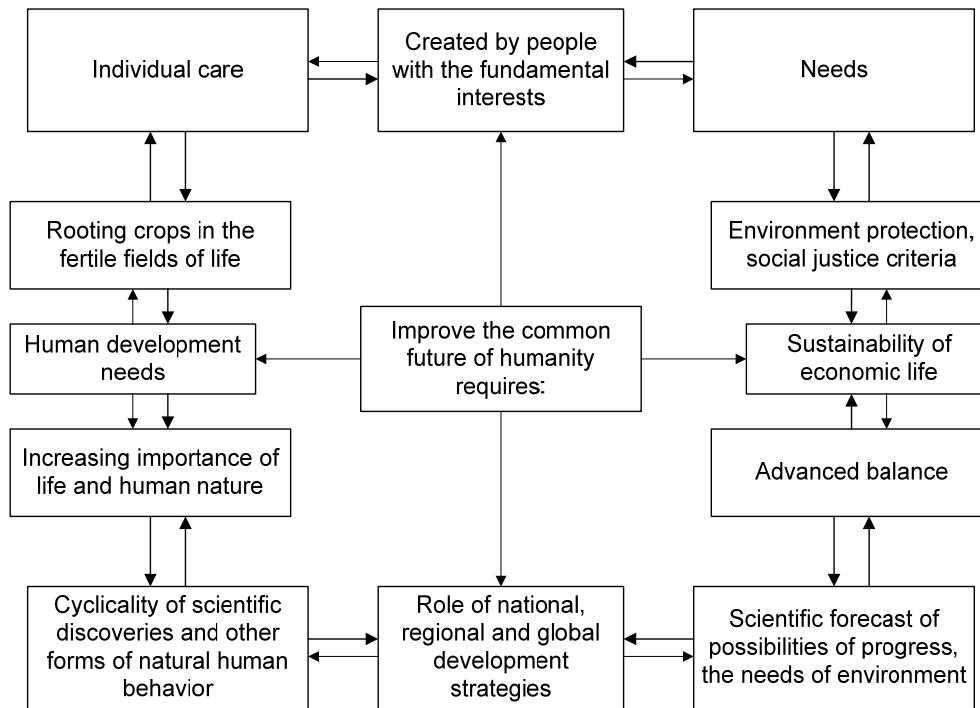


Figure 2. Common future prospects.

Human activity seen in the light of economic development is fully consistent activity that can register exponential growth, but also decreases the time that can lead to denial of the idea of “making and selling” of economic behavior. Economic change but also change the power poles bring to the fore some serious phenomena such as poverty, job insecurity, environmental degradation, inflation, unemployment etc. Universality idea actually increase should reflect economic equality of opportunity, a rationality of generations and hope coexist in time of what is not meant to be a linear economic development.

Support individual development while maintaining reasonable balance and especially the generation of competitive alternatives may be based primarily on the idea that growth can generate more attribute. A first attribute is the existence of production goods, without which an economy can not survive, but could exist. The second attribute is actually generating knowledge resources that can be realized at the human survivors and can be taken up to the point limit: one can make the difference between sacred and profane. The last attribute that can get the economy from collapse is seen as an imperative of the rationality of hope.

Hope for better. Animator growth is actually hoping that success but also waste of resources out of Pandora's box once become stranded. Awareness of human society, entail economic conditions regenerating the mind but also triggers local and global mechanisms incorporated in the development of natural and human complexity.

“Economic growth that enriches human development and individual and social welfare reaches” [11] may have several axes of development (Fig. 3). Such concepts are distinguished more growth.

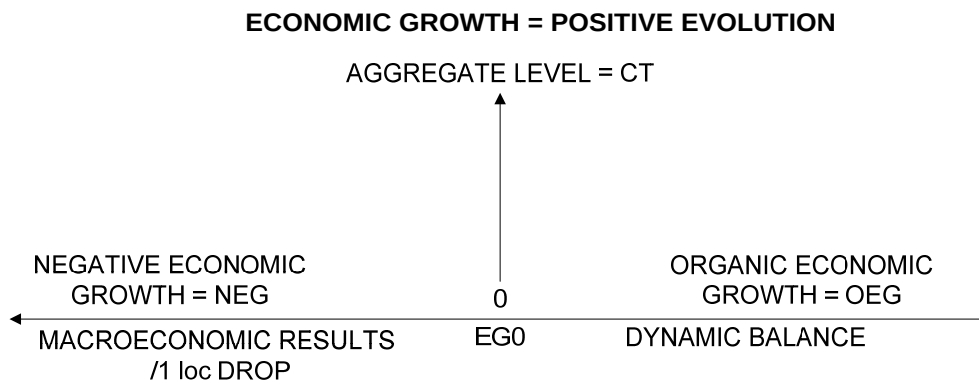


Figure 3. Aspects of economic growth.

But the upward trend of national economies and various international super-systems world, not excluding cyclical fluctuations in economic growth highlights the dynamic like a living organism, the couple who are constantly being limited recovery time.

Time is rational, he was the one that delimits the two realms: creating hope rationality and equal chance at true value human generations. Increasing poverty is a growing self-destructive generation “polarized growth in exports would damage the poor nations to such an extent that their terms of trade they would arrive to find a worse situation than that which would have had no growth.

Economists characterize this situation as the growth that impoverishes” [12].

4. Dimensions of economic development

Economic life seen in all its aspects, to develop a world scale quantitative aspects, qualitative and structural economic trends, but also the ecological balance. Quantitative Aspects of Economic Development focuses on the production of goods and services when the economy changes, which relate to lifestyle changes, living standards and economic development emphasizes people's thinking.

Regarded worldwide economic development is multidimensional. There are several stages of development (see Fig. 4):

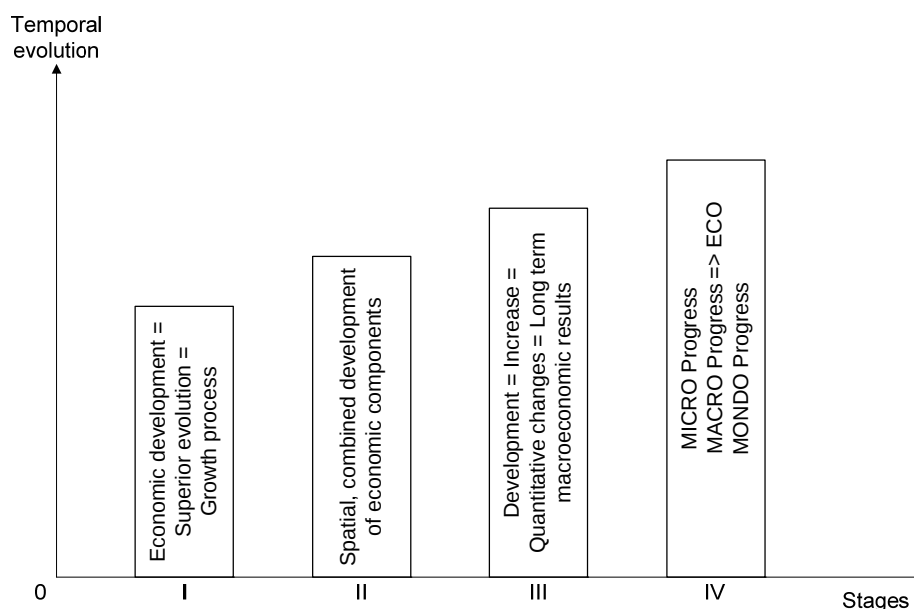


Figure 4. Temporal stages of economic development.

Progress of humanity is actually in progress and growth of us. In evolution, man is the rational being who wants to master the uncertainties about the power of freedom to overcome good sense in view of achieving progress and realization of the imperatives of life in which the human spirit to Ascension.

Regeneration and development creates an unbreakable interdependence manifested by a juxtaposition of growth over the effects of humanization and development of life on a world scale naturalization.

Inevitably common characteristics lies in the resultant vector and development company to a certain moment of time, lies in the mechanisms of national economic structure but also the purpose of raising people's living. Until today there were some countries with a share of population under a third of that world where the growth is seen as a demiurge that shines in the sky hope human welfare. In other countries where two thirds of the total population is affected by economic disparities and serious disorders of economic progress, human life parameters welfare act against poverty is not only physical but also the spirit of the individual.

Humanization and naturalization is life and increasing global macro-economic indicators, due to changes and progress as an expression of global responsibility and the implementation of national economic strategies. The

two considerations which impoverishes growth and assimilate the idea of growth that enhances the sustainable growth over a period of time.

Quality assurance in the context of sustainable economic growth Brownian scattering seen as a means of human or seen as an end in itself has some interference and extended reproduction process. Regarded as economic increase is a concept the development of eco-friendly is at the limit of being a binomial plurivalent macro.

Started new economic foundations is done primarily based on the idea of new life neofactorii showing complexity, lines of globalization, but common policies and strategies to counter negative externalities of development worldwide.

5. Interests paradigm

Current period is characterized by a change of interests which crystallize new nervous centers of power, among whom will always reign poliarhic matrix constant irrespective of the planet: Vatican perceived differently over time and economic power but also political power.

A new development is characterized by limitations and based on the hope that awareness of the illusions that spring from faith in progress, of confidence in the idea behind the emergence of better governance worldwide take start. The emergence and recession of the world's largest emerging economies: Brazil, Russia, India and China, aims to highlight global economic power of the quadrilateral. BRICs can compete, and change than most advanced economies in the world. Acronym of the four nations 'emerging' BRIC states that the imperative of our time is based on building a democratic system in which respect international law and multilateral diplomacy is seen as part of a democratic government.

The figures show interesting BRICs: 25% of the planet, 40% of the population, 20% of global GDP and 13% of global transactions. Although economic figures may seem small, essential for these countries is dynamic: it develops quickly. So fast that it has led analysts to believe that in 2050 it will be the global economic pole.

BRICs countries will take over the global economy, since few years will become stronger economically than the G7 group of most developed countries. Together, the BRICs account for about 15% of the global economy of 60.700 billion, while domestic product (GDP) of China even increased despite the recession that hit western states.

Today, Brazil, Russia, India and China (so-called BRIC countries) together hold about 31% of bonds issued in foreign markets for U.S. government. Only the total amount of bonds amounting to 806 billion dollars. Tomorrow if their governments do not buy bonds issued by the

U.S. government, the U.S. financial system will collapse within hours. Within days, the U.S. dollar will no longer exist as a reference currency widely recognized. Each week, the U.S. Treasury to sell off portions of U.S. government bonds with values between 1 and 10 billion dollars. Obama's plan to stimulate the economy requires massive debt both domestically and internationally.

Taking into account bonds issued by U.S. and Japanese government owned, the situation is even more dramatic. Japan holds around 24% of U.S. government bonds issued in nominal value of 628 billion dollars. BRIC countries together with the total amount of the bonds would amount to \$ 1,434,000,000 and the percentage of holding external debt at 55%.

In the past 12 months, believed that China's GDP will be higher than the U.S. by 2027, is less than 20 years, which means a GDP of BRICs greater than the G7. But according to Jim O'Neill, director of economic research at Goldman Sachs, who created the acronym BRIC, the growth of these countries was faster than estimated.

Brazil is one of the four whose economy has not developed to the level expected, but its growth rate is positive, even during the crisis.

A real advantage of "the 4" was a crisis that had more lenient than the highly developed states. Most important is that as countries most populous, China and India seem to enjoy the crisis. For example, India estimated a growth of almost six percent in 2009 and 2010, double the rate of previous years, only three percent. In addition, Indians voted recently for a government formed a coalition seeking to implement reforms for growth.

The crisis has been good for China, is quite shocking that the authorities realize that the period in which they could rely only on past exports. By applying social reforms and by providing massive financial stimulus package, China seems determined to enter an era of development based on local market demand.

Thus, despite falling exports, China's economy will be able to increase by eight percent this year, and local demand will increase by 12%, allowing GDP growth by 10% the previous year. Both India and China have the potential to increase 10% over the next few years.

Russia is considered the weakest of the four being too dependent on oil. But given that oil prices rose again, Russia's economy will resume growth rate.

In 2009 and 2010 global economic development will depend on these four countries. Already, they account for 15 percent of global gross domestic product. China has surpassed Germany and is about to exceed and Japan, probably next year. The other three are very close to become more important in economic terms, than Canada.

Seeking by bringing these countries at the forefront of the global economy and the establishment of G 20 involvement in economic life but the International Monetary Fund and World Bank.

I have high growth potential and Indonesia, Iran, Nigeria, Turkey and Mexico. Iran has the best chance, given the population of 80 million inhabitants and relatively high level of education. Thus, if management would change and become a more open country, would be a bright spot in the Middle East landscape.

6. Conclusions

Economic development expressed in its substance, which takes concrete form potential to enhance a country's real economic life, but human condition set in advance certainty sign of hope. This is heady necessary to produce a shift of consciousness that brings into focus a new orientation and a new world order pertaining to the development of the individual, able to use both rational processes and the non rational to us cause to know the process of casuistry which belongs to the microcosm of our world, the decisive quality of the experience of eating sentient things beauties natural and spiritual that surround us, not destroy them irreversible. "mutation of consciousness is not only fast and deep challenging, is paradigmatic, which represents a fundamental change brings into question our entire global optical and all conscious and unconscious assumptions underlying this global vision" [13].

Extensively and intensity of economic growth differ from relativity direct contribution factors make to achieve GDP growth per capita in a given time determination.

Extensively take the quantitative contribution of direct factors in the formation of per capita GNP growth rate characteristic of nations with the lowest economic level, unable to ensure aggregate demand of the market and protect resources [14].

Innovation is crucial, because growth is limited by resources. Productive infrastructure to be the mechanism that supports growth and promote quality vector propagation effects in an integrated and competitive economy.

Self-regulating the intensity and complexity is accelerating the positive effects of reverse connection [15].

Complexity growth is very positive evolution, ascending national economy, without excluding cyclical fluctuations and even some temporary regression. Currently growth is conducted using an extensive process of forming a new production technically, outlined the type of growth with strong ties with predominantly intensive quality of life [16].

Economic change simultaneously capture quantitative aspects, qualitative and structural in close correlation with demographic and general problems of human and ecological balance but. Change, structural shift in the economy, economic system behavior, the relationship between human activities and environment surprising development [17].

Multidimensionality economic development involves increasing long-term macroeconomic outcomes, economic growth has some interference and extended reproduction process. The essential difference between the processes of growth and development is that it shows an enlarged reproduction involving only resume production on a larger scale through capital accumulation, while increasing the show and factors used for this purpose, combining and input substitution.

Development requires growth, but not all growth and development results.

REFERENCES

- [1] C. Popescu, I. Gavrilă, D. Ciucur, G. H. Popescu, *General Economic Theory, Macroeconomics* (in Romanian), Second edition, ESA, Bucharest, 2008, pp. 529-578.
- [2] C. Popescu, *Growth that Impoverishes*, Bucharest, Economic Tribune, 2003, pp. 262-283.
- [3] Giardini, O., Stahel W. R., *Limits Guarantee*, Publisher Edimpress-Camrose Bucharest, 1996, p. 318.
- [4] Stiglitz, J. E., *Globalization: Hopes and Disappointments*, Economic Publishing House, Bucharest, 2005, p. 45.
- [5] C. Popescu, *Rationality and Hope* (in Romanian), Bucharest, Renaissance Publishing House, p. 338.
- [6] C. Popescu, *Rationality and Hope* (in Romanian), Bucharest, Renaissance Publishing House, p. 340.
- [7] <http://unstats.un.org/unsd/default.htm>.
- [8] http://hdr.undp.org/en/media/HDR_2009_EN_Complete.pdf.
- [9] Korten, D. C., *Corporations Rule the World*, Header Publishing House, Bucharest, 1997, p. 17.
- [10] C. Popescu, Ciucur, D. Băbeanu, M. Popescu, I., *Joy of Living*, Efficient Publishing House, Bucharest, 1998, pp. 174, 179.
- [11] C. Popescu, *Growth that Impoverishes* (in Romanian), Bucharest, Economic Tribune, 2003, pp. 262-283.
- [12] C. Popescu, I. Gavrilă, D. Ciucur, G. H. Popescu (in Romanian), *General Economic Theory, Macroeconomics*, Second edition, ESA, Bucharest, 2008, pp. 529-578.
- [13] H. B. Maznărd Jr, S. E. Mehrtens, *The fourth wave. Business of XXI century*, Antet Publishing House, Bucharest, 1977, p. 15.
- [14] C. Popescu, *Rationality and Hope* (in Romanian), Bucharest, Renaissance, 2006.
- [15] A. Szent-Györgyi, *Pleading for Life*, Bucharest, 1981.
- [16] Amartya Sen, *Development as Freedom*, Economic Publishing House, Bucharest, 2004.
- [17] I. G. Rosca (ed.), *Knowledge Society* (in Romanian), Economic Publishing House, Bucharest, 2006, pp. 263-307.

EFFECTS OF CREDIT LOAN. THE RIVERS OF MONEY DRIED UP

Costel-Ioan CIOBAN*

Abstract. *Nothing compares with the possibility that the economy will disappear when it comes to something to get your attention and disturb you the quiet of everyday life. Industrialized world is facing a major crisis of financial resources. In 2007-2008 banks and financial institutions around the world have ceased to lend to lack of resources. Worldwide financial arrangements suddenly stopped working. Global financial system has taken down the hill and hope for recovery are unlikely in the near future. What can be understood from a global financial system that now works and seems to work perfectly, and the next day is behaving as the Appocalypse is coming. The revolution brought by the information system have transformed the world economy in a global machinery of making money. Scholarships in the world come to rise to unprecedented levels today and the next second day it collapse and people found out from the media that the value of properties held by them may soon no longer even cover the loan amount taken from the bank. They find out that their life savings, saving money invested in funds which they knew of beign sure now it could disappear overnight. On the market there are always new players with new ideas and new perspectives, and a large amount of money circulating with a dizzying speed and competing for the most profitable investment opportunities. In these circumstances it is almost impossible to realize what is happening or what is to happen at some point. Investors acting and acted always in conditions of inequality in terms of information and analysis they have access. Today the playing field is very high, the stakes are higher and economic system because of its size and complexity, is incredibly fragile. Current economy is like a giant castle of cards that can collapse of many reasons, some very minor. This does not mean the collapse itself must have its place but policy makers and politicians must be careful. Today these people important for the smooth running of the world economy must take care of things that before do not really mater for them. In the new global economy, this crazy ocean of global liquidity has not only increased the number of unknown or incomplete information, but it also modified the relations between them and their relative importance. But the most dangerous thing is that most people lack historical perspective. For them the growth periods are normal thing and do*

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not enter into their calculations at any time the possibility of occurrence of stagnation or worse decline. Crisis is not the issue for them. Yet it happens!

Keywords: crisis, finance, global economy, investment, economic decline.

1. Introduction

Upward and downward movements of the production, inflation, interest rates and occupancy that affect the business cycle are forming all market economies. Economic activity is not a linear progression but support increases and decreases in volume and pace of activities over a period of time both in different economic sectors as a whole. If we take, for example, tourism, plant and animal health, construction, etc., we see that after a period of intense activity, it follows a period of significant reductions in production, employment and use of means of production.

A phenomenon as complex as the business cycle¹ that affects and influences all aspects of the economic system may be not the result of a single case. Economic crises experience over the years, as a descendent of the economical cycle created fundamental political mutations, especially in the sphere of ideas and trends of thought.

2. International economic crisis

Hit by a double storm, draining capital inflows and exports decline, the emergent Europe crosses a profound crisis. The continent has evolved rapidly over the past decade, financial and commercial ties are even closer than bringing unexpected growth and income convergence. Therefore, all parts of Europe are in the same boat and fight the same stormy weather and the emerging economies and the advanced ones will have to find their way out together. Governments and central banks took unprecedented measures to find crisis solutions and also make efforts to coordinate their actions. However in both directions is much to do.

The crisis has affected some more than others, bringing the spotlight differences in economic policies from country to country. Financial markets have begun to closely examine the economic fundamentals of the countries. The countries with inflation and larger current account deficits or loans that have financed boom in transnational loans were hit hardest.

¹ Claudiu Țigănaș, *The Economic Cycle. A Doctrinal Short Break* (in Romanian), The Scientific Annals of „Alexandru Ioan Cuza” University, Iași, Economic Sciences, 2005, vol. 50-51, pages 98-106.

They suggest that the macroeconomic and financial policies are healthy again at great price. Governments will be submitting to move carefully when it comes to tax incentives, and many will have to limit deficits to regain confidence in the overall economic sustainability.

The crisis has also highlighted the fact that the economical integration took it before the coordination of the macroeconomic policies and the financial sector in Europe. One area that needs urgent coordination is that of the macro-prudential banking rules. Clearly, the banks of the emergent Europe took big risks when fed an exceptional boom without removing the credit application and create appropriate means to protect against recession. As many of these have parent banks in advanced countries of Europe, often the host country supervisors had no means to ensure a more cautious behavior by all means.

Now, when these banks must be re-capitalized, a better coordination between supervisor's home country and host country is essential. Strong bank balances represent a prerequisite for sustaining a healthy stream, consumer durable loans and charitable company, which is also necessary to support demand and growth in most emerging economies. This is one of the reasons that efforts to address these issues are supported by the International Monetary Fund in cooperation with the European Commission. Another coordination area is the monetary and exchange rate issues problems.

For example, the ECB has been quite selective in respect of support for currencies in countries belonging to non-euro area, and discussions to clarify the roadmap for transition to the euro for countries with credible policies and healthy fundamentals. Given the strong feedback loop between emergent Europe and the euro area, filling the voids of coordination in these fields will help prevent an unwanted volatility on financial and currency markets.

3. Is the monetary policy the main reason?

The economic crisis started in 2007 and with uncertain completion time is a hot topic and stressful for many people. It is clear that today we are witnessing the worst crisis of the past 80 years. We have an official explanation of the crisis, provided by public institutions, that the problem stems from inappropriate behavior of economic agents.

First, a sentence strongly determined by economic science is that any major systemic crisis is the result of "excess" money, a process of artificial reduction of interest rates and credit expansion. History is pigmented with

numerous episodes of boom-bust type, which affects state policy inflationary economic calculation of market participants, creating illusory profits and fueling a speculative frenzy that eventually, crumble under the weight of its own inconsistencies.

From this perspective, the current economic crisis is no different from the 1930 crisis, known as the Great Depression. The determining factor is the fundamental crisis of the early inflationary policy in 2000. Advised by Ben Bernanke, the current governor of the U.S. central bank (EDF), then a simple member of the Governing Board, Alan Greenspan decided to reduce interest rates by issuing money. We witnessed such an extremely serious “monetary relaxation” matter, not taking into account the standard interest rate we refer, this interest rate falling from 6.25% to 1.75% at the beginning of the year to its end. It continued to decline, reaching a record level of 1% in 2003, the level where he remained for a year.

In the context of rising prices, the actual rate was even negative for 2 1/2 years, which means that banks were paid to take money from the Fed money have focused on the economy taking into account other incentives and political constraints affecting their decisions.

But the U.S. did not go alone in this war against economic stability. Bank of Japan had already adopted a similar policy, offering banks subordinated zero nominal interest money and the European Central Bank cut interest rates at around 2% level that has maintained nearly 4 years. Thus, by 2006 the real interest rate in the euro area and Japan was also located at a level close to zero. In Britain, the central bank's monetary policy conducted by a similar pattern. Some of the money made available by central banks have been playing “at home” and invest in their economies.

The best example is just the U.S. housing boom, but such events have been anywhere where monetary conditions have allowed the flourishing real estate speculation and Spain and Iceland are two good examples. Researchers corroborated OECD statistics from different countries and showed how the housing market boom amplitude is directly associated with the extent of credit expansion.

The other part of money have been playing “away”, that took way foreign investment materialized in turn operated the most risky investment opportunities. Historical scale, expansion of credit to developing economies is unprecedented not only similar episode in the second half of the 1970s and early 1980s, which was followed by the famous “debt crisis” they were particularly affected Latin American.

Basically, these capital flows have been filtered by the banking system. Thus, Western financial groups have attracted massive short-term resources at a reduced cost of international financial markets using them to sponsor increased turnover of their subsidiaries in emerging economies in developing countries. Most of these capital inflows were also invested in real estate assets, less liquid and risky investments by their nature, but very lucrative market as time continues to grow. This phenomenon occurred in Eastern Europe, including Romania. According to statistics, by mid 2007, when panic broke sub prime dynamics deposits ceased to keep pace with credit, banking sharply and rapidly accumulating debts of around 250 billion dollars, mostly short term. It is estimated that European banks hold 90% of these debts. According to statistics, by mid 2007, when panic broke sub prime dynamics deposits ceased to keep pace with credit, banking sharply and rapidly accumulating debts of around 250 billion dollars, mostly short-term and estimated that 90% of these debts are held by European banks.

4. Financial crisis

The current international crisis² is the crisis of too much³, but its origins are corresponding to the 1988-1989 period of the communist bloc and the disintegration of the monetary disturbances of the 1990s – early 2000s, which led the U.S., China and Europe, each for himself to develop a different policy. The main reason is the U.S. credit crunch that rocked global financial system.

But analysts and economists are divided when it comes to finding a single explanation of the most serious crisis in decades. Theories vary from one case to another, but none seems to cover the whole range of factors that have brought humanity into full crisis.

Internationally, there were five⁴ fundamental reasons as Joseph Stiglitz, which resulted in economic and financial crisis we are in:

1. Replacement in 1987 of Paul Volcker as president of the Federal Reserve (Fed) Alan Greenspan, at the request of Republican President Ronald Reagan opened the “tap” of monetary policy, without putting in motion what he de-second function of the central bank,

² Ludwig von Mises, *The Causes of the Economic Crisis*, p. 163.

³ Joseph Stiglitz, *The Globalization Mecanism* (in Romanian), Polirom Publishing House, Iași, 2008, p. 187.

⁴ Joseph Stiglitz, <http://www.vanityfair.com/magazine/2009/01/stiglitz200901?currentPage=1>.

namely regulatory oversight. Uncontrolled monetary expansion “chaired by Mr. Greenspan” has resulted in two “bubbles” financial: the IT (crisis 'dot com') to 90 and the present building.

2. Promoting the philosophy of deregulation, which continued operations costs that are currently experiencing and we will pay for years to come. Thus, in 1999, was repealed Glass Flag Act law was in force since 1933 (under the Roosevelt administration promoted) and that strictly separates the powers of investment bankers (Investment Banks) of the commercial banks (which collect deposits the population and were entitled to pay in return for loans only). By repealing this law and allowed commercial banks to investment risk, and investment banks, thereby jeopardizing their stability and thus attracted resources as deposits from individuals and legal entities, and which finally were lost, requiring government intervention.
3. Bush Jr. administration has conducted the famous “tax cut for the rich” who, in conjunction with the opening tap money by the Fed, has stressed the tendency “living on credit” of Americans (the rich have wanted more, and those with incomes environments and modest, not social protest, were given access to loans covered under Prudential, generating the sub prime crisis). In other words, anticipating the situation in Romania, the United States similar effects have been flat, while the beneficiaries of the tax system had greater access to credit to meet the needs extravagant flat and the losers were “chance” access, not America as a house of wood and plastic, but a few necessary household goods (household items, possibly cars), the so-called the “ID” credit.
4. Weak and incomplete regulation practices of rating agencies and audit companies, which allowed amplification of risk in the financial sector and companies, hindered by “bill” for taxpayers today.
5. Coup de grace, in Stiglitz's view, came when the Bush administration and the Central Bank on October 3, 2008 gave the final blow to the financial system by allowing the rescue of the financial system (The Emergency Economic Stabilization Act of 2008) Paulson's.

Another theory that belongs to the economist John Taylor of Stanford University, known as “Getting Off Track, argues that” government action and its interventions have caused prolonged and worsened the financial

crisis. Markets have not given up, says John Taylor (contradicting the theory that the crisis is a failure of free market and capitalism), but the government wrong. In recent years, explained John Taylor, the U.S. experienced a boom in the housing market, then a “bust” (disintegration) of the housing market. Almost all of our problems today arise from these processes. What caused the boom and bust site? The answer: The poor government policy, more specifically, the wrong monetary policy.

From 2002 to 2004, the Federal Reserve kept the federal funds rate below 2% by adopting the policy “easy to obtain money”. In doing so, the Fed dropped moderate policy of the last decades, which produced growth and stability. Cheap money led to rising prices of homes and led to confusion in the entire financial system.

On Main Street, the credit banks, people began to get easy money, despite a bad “credit history” and seemed for a while, determined to pay installments on time and full houses. Lenders have started to credit from increasingly risky. On Wall Street investment banks have responded to the financial boom of real estate mortgages gathering in one place, using such measures to ensure financial instruments acquired complicated.

This explains the sub prime⁵ crisis emerged amid credit offered to customers who would not normally have qualified for credit. One reason for triggering the crisis sub prime was the saturation of credit market on housing with normal credit products. Following market shares and higher earnings, banks have relaxed the conditions for application and approval for a loan. And so were born loans called “sub prime”, i.e. loans for which the bank accepts a higher risk of default, failure to guarantee the property other than property that would be purchased with credit, accepting a minimum wage of the person who receives the credit or less work experience etc.

However, because banks have realized the risk to which the subject wanted to broadcast it on the market and created financial instruments based on packages of sub prime mortgages, which were sold to investors. On the other hand, they seized packages insured risk and credit insurance companies. The result of these economic exchanges was a “soap bubble” which broke in August-September 2007, when the insolvency of the sub prime credits caused banks to begin the liquidation process of credit secured by real estate. Banks were virtually overnight the owners of many houses they put on the market to recover money invested in loans. There

⁵ <http://www.semneletimpului.ro/html/Economic/art1-crize-financiare.html>

was a chain reaction, increasing the supply of houses has reduced their prices, which caused a partial recovery of large losses in value of loans and bank accounts that gives such loans. Moreover, investors who have purchased packages of sub prime mortgages have lost because they could not recover the money and wanted to collect money from insurance companies, and bringing them to a standstill.

The crisis that started in the real estate market by lowering the price of housing has created an acute need of liquidity to banks and financial and property investment companies (which are players on stock exchange) to cover losses on exchange resulting in a crisis by lowering decrease the number of transactions and general willingness to invest. As a result, many wanted to sell. Thus, prices of traded goods fell, causing big losses for many banks and real estate investment firms.

Chain reaction started a year later, in September 2008, with the bankruptcy of investment bank Lehman Brothers, which was followed by a series of spectacular falls, including the largest global insurance group AIG, rescued in extremis by the U.S. state. With the collapse of several U.S. financial institutions, banks worldwide have begun to assess losses. Billion dollar losses were announced daily by the various financial institutions in Europe and worldwide.

5. Financial restructuring

More than likely the world will look different in coming years. This is because we are witnessing an unprecedented crisis, global, systematic, deep and lasting, the imbalance is increasing demand decreases, welfare decreases, but increases unemployment, and the fear for tomorrow. Effects are comprehensive and visible in all aspects of life: economic, political, social, and cultural. Power poles will focus on advanced economies to developing ones, will put more emphasis on “modesty” in business and capitalism will be less aggressive. We will see increased state intervention in the economy, at least for the coming years, including greater cooperation between the private and state, between shareholders and companies, stock indices will increase more slowly and more accurately reflect reality. Increased coordination will lead to changing global financial system today. Will be banks and insurers who will fight for survival, while others will find opportunities.

According to European Central Bank, developed countries will experience a decline in growth in the Euro zone from -2.2% to -3.2% ,

United Kingdom being the most seriously affected. More countries have officially declared a state of recession, from U.S., Japan, followed by European countries considered very strong recently.

As insurers, we can say that they are affected in the short term primarily due to pressure on the balance sheet assets, reducing the market value of investments in private equity, real estate, alternative investments and the reduction in interest rates. Direct effects of these decreases, until December 2008 had risen to losses of over \$ 150 billion. The volatility and financial instability are stressors insurance. Reducing the value of assets of insurance companies is complemented by input reduction of assets, as customers are turning to bank deposits or instruments without risk. Risk insurance will be concluded with greater transparency, which will be required by regulations. New risks, which assume other dimensions, are real opportunities for insurance. For example, political risk: nationalization, expropriation, changes in legislation, profits or capital repatriation restrictions. For life insurance will put more emphasis on the protection and traditional insurance and less on the investment by insurance.

6. Before conclusions...

The situation is unclear. The crisis has spread with amazing speed, being initially triggered by imprudent loans on the property market then exploded with the American colossus Lehman bankruptcy. Most serious consequence of this failure was that the banks have lost trust each other, becoming extremely suspicious. Inter-banking credit was abandoned, leading banks liquidity in finesse. Stocks that were left were deposited at central banks, where money is not lost, thus leaving the market almost dried up.

Americans believe they will resolve the crisis through excessive consumption, the money they do not have, and that it lends. Germans save as the main economic sectors are affected.

What is clear is that as first it will lose jobs and that unemployment will increase further. It is clear that the state can not solve all economic problems and that entrepreneurs should also help them with appropriate solutions, primarily through maintaining and raising the technological level. It provides a fierce fight technology. The winners of this fight will be the winners of the crisis.

It is also clear that the role will grow interventionism, the idea of economic stabilization and growth opportunities to support companies

whose possible failure would expose the economy to risks of the system. Following the review will be to increase taxes and fees tax practices and other areas, and increased private public partnerships. Moreover, for individuals the cheap loans were long gone, which for much of the population will mean reducing consumption and postpone retirement. Moreover, the money banks and companies will have increased freedom of operation and will restrict innovation, while the level of profitability. Also, there will be new business models and industry will restructure.

The crisis will undoubtedly polarize the economy. Firms will survive occupying extreme positions, on the one hand those with very cheap products and cheap, on the other hand the products expensive and very expensive.

Whatever it will be the end of this crisis, people should learn at least one thing: greed is not good nor for the economic health nor mental health of those living from it.

7. Conclusions

Crisis remains an exceptional phenomenon for both individuals and systems, it has a high degree of risk, and sometimes ends with a dramatic final. For this reasons the identification, understanding and proper management of this phenomenon should be the result of a learning process supported by a scientific-methodological support. Any crisis that occurs in the life of a structure is enhanced by a number of relational factors, fueled by divergent interests, which may guide the development organization for hazardous areas (dramatic changes, disasters, casualties, damage, or even war). However, the crisis may be an amount of opportunities that lead to abandonment of bad elements change (performance efficiency) and re-launch as a pattern, the structure ability to continue normal operations. Typically, crises occur by surprise. People, organizations, countries and even regions have learned to live under their assault, but very few of them strive to enter the world and tame them. In separate meetings, official events crises are dealt with as hazardous and are supported scenarios, imaginary, most often giving the impression that we are in possession of an efficient and comprehensive crisis management.

Contemporary history of humanity, present and even future, shows that whenever humanity has gone through such a “lock” crisis management failed, causing needless suffering and multiple dismantling all levels. People rightly wonder what happens all these oddities: revolutions, wars, unemployment, disease, poverty, organized crime, inflation etc.? And still

expects to end a world and start a new one, more conducive to their ideals and long period of waiting and disappointment produces deep changes on a spiritual level, decreasing their confidence in policy makers.

REFERENCES

- [1] Claudiu Țigănaș, *The Economic Cycle. A Doctrinal Short Break* (in Romanian), The Scientific Annals of „Alexandru Ioan Cuza” University, Iași, Economic Sciences, 2005, vol. 50-51.
- [2] Cooper George, *The Origin of Financial Crises*, Vintage Books, New York, 2008.
- [3] Joseph Stiglitz, *The Globalization Mecanism* (in Romanian), Polirom Publishing House, Iași, 2008.
- [4] Joseph Stiglitz, <http://www.vanityfair.com/magazine/2009/01/stiglitz200901?currentPage=1>.
- [5] Ludwig von Mises, *The Causes of the Economic Crisis*, Ludwig von Mises Institute, Auburn, Alabama, 2006.
- [6] Philips Kevin, *Bad money*, Penguin Group, New York, 2009.