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ECONOPHYSICS Section

INDUSTRIAL PROBLEMS OF TECHNICAL ELECTRODYNAMICS AND ANALYSIS OF THE INVERSE MATRIX OPERATOR EXISTENCE FOR THE “SYMMETRICAL” DIFFERENTIAL MAXWELL SYSTEM

Irina DMITRIEVA *

***Abstract.** Quite a lot of industrial problems in technical electrodynamics are described by the so called “symmetrical” differential Maxwell system. This fact concerns the process of signal transmissions in the various kinds of media and analogous multidimensional circuits as well. The “symmetrical” feature means here the right-sided system completeness with respect to the first-ordered differential operator representation by the time argument. Though the computing technique is so broadly spread now, the analytic research tendencies of such industrial problems remain also required. Thus, the main goal of the present paper consists of the explicit mathematical study of the aforesaid Maxwell system by the combined analytic method. The latter differs from the well-known procedures but is in conformity with classical results and is simpler in practical application. The main stage of the proposed here method is the diagonalization process that reduces the symmetrical Maxwell system to the equivalent totality of scalar equations regarding the unknown components of the electromagnetic vector field functions. The given approach has the mixed character. Namely, the external diagonalization step “by blocks” transforms the original system to the uniform scalar – vector equation with respect to the electromagnetic vector field tensions. The next, inner diagonalization step “by coordinates” is replaced by more elegant and brief explicit construction of the corresponding inverse matrix differential operator. Conditions of such operator existence are studied by methods of applied mathematical analysis and are based on the original industrial problem statement.*

***Keywords and phrases:** technical electrodynamics, “symmetrical” differential Maxwell system, diagonalization, inverse matrix operator, conditions of operator invertibility.*

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1. Introduction

Since the majority of physical and industrial problems can be described mathematically by the corresponding finite-dimensional system of partial differential equations (PDEs), its explicit analytical study remains urgently required [1]. This scientific direction concerns engineering aspects of technical electrodynamics as well, though the current computing technique is so broadly spread now [2].

Thus, the main purpose of present paper consists of the effective solution of some specific differential Maxwell system that represents the mathematical model of signal transmissions in the various kinds of media and multidimensional analogous circuits. An investigation approach is restricted here by the new diagonalization procedure that reduces the original system to the equivalent totality of respective scalar PDEs regarding the unknown components of the electromagnetic vector field tensions. Each PDE has only one unknown scalar function, and this fact allows solving the initial problem effectively.

The known preceding similar diagonalization technique was applied in direct manner using operator analogy of the algebraic Gauss method [3]-[6]. This algorithm acted through the whole matrix structure, involving all blocks and elements, either external or inner.

Though the mentioned method was uniform and quite satisfactory in simplicity of application, at some diagonalization stages it looked analytically rather tiresome. That was the main reason of birth of the suggested here combined diagonalization approach. It includes only the simpler external operator diagonalization step “by blocks” [3], [6]. Instead of its too long inner reiteration “by coordinates” [6], the appropriate inverse matrix operator is constructed.

Conditions of such operator existence base on the initial industrial problem statement and are studied completely for the symmetrical Maxwell system in the framework of technical electrodynamics.

2. Analytical problem statement

The so called “symmetrical” Maxwell system is written below:

$$\begin{cases} \operatorname{rot} \vec{H} = (\sigma \pm \lambda \varepsilon_a) \vec{E} + \varepsilon_a \partial_0 \vec{E} + \vec{j}^{OS} \\ -\operatorname{rot} \vec{E} = (r \pm \lambda \mu_a) \vec{H} + \mu_a \partial_0 \vec{H} + \vec{e}^{OS}. \end{cases} \quad (1)$$

In (1): the sought for vector functions $\vec{E}, \vec{H} = \vec{E}, \vec{H}(x, y, z, t)$ with scalar components $E_k, H_k = E_k, H_k(x, y, z, t)$ ($k = \overline{1,3}$) represent electric and magnetic field tensions; the positive constants $\sigma, \mu_a, \epsilon_a$ are the specific conductivity, absolute and dielectric permeability of the medium respectively; vector functions $\vec{j}^{OS}, \vec{e}^{OS} = \vec{j}^{OS}, \vec{e}^{OS}(x, y, z, t)$ are known and describe the outside current sources and tensions; $\lambda = const > 0$ is the parameter of the signal that intrudes into medium, and $r > 0$ is some theoretical constant whose existence can be only assumed at this research stage; (x, y, z, t) is the point of usual spatial Cartesian coordinate system; $\partial_0 = \frac{\partial}{\partial t}$; the classical rotor operator looks like:

$$rot = \det \begin{bmatrix} \vec{i} & \vec{j} & \vec{k} \\ \partial_1 & \partial_2 & \partial_3 \\ F_{i1} & F_{i2} & F_{i3} \end{bmatrix}, \text{ where } \partial_1 = \frac{\partial}{\partial x}, \partial_2 = \frac{\partial}{\partial y}, \partial_3 = \frac{\partial}{\partial z},$$

and functions $F_{ik} = F_{ik}(x, y, z, t)$ ($i = 1, 2; k = \overline{1, 3}$) are scalar components of the appropriate vector functions $\vec{F}_1, \vec{F}_2 = \vec{F}_1, \vec{F}_2(x, y, z, t)$; $\vec{F}_1, \vec{F}_2 = \vec{E}, \vec{H}$.

“Symmetry” means here the right-sided system completeness with respect to the first-ordered differential operator representation by the time variable t .

Interchange of sign in front of λ means the response of medium to signal excitation. Symbol of plus means the absorption of signal by medium and minus – the seizure of signal.

Formula (1) is the mathematical model of the multidimensional analogous circuits and signal transmissions in the various kinds of media. Both phenomena concern the most important parts of modern technical electrodynamics.

As it was said above, effective analytical study of system (1) is done in terms of new combined diagonalization method that reduces the original problem to the equivalent totality of corresponding scalar PDEs regarding the unknown components of vector functions \vec{E}, \vec{H} . Each PDE depends on the only one element of such type. The last fact immediately leads to the explicit solution of the original problem.

3. Results

The aforesaid mixed diagonalization process of system (1) consists of three stages.

The first one is the known simple operator diagonalization procedure “by blocks” that reduces (1) to the uniform scalar – vector equation with respect to \vec{E}, \vec{H} [3], [6]:

$$-(A^2 + DC)\vec{F}_i = \vec{\varphi}_i \quad (i = 1, 2), \quad (2)$$

where:

$$\begin{aligned} \vec{F}_1 = \vec{E}, \vec{F}_2 = \vec{H}; \vec{\varphi}_1 = Ae^{\overrightarrow{OS}} + D\vec{j}^{\overrightarrow{OS}}, \vec{\varphi}_2 = Ce^{\overrightarrow{OS}} - A\vec{j}^{\overrightarrow{OS}}; \\ A = rot, D = r + \mu_a \partial_0^*, C = \sigma + \varepsilon_a \partial_0^*, \partial_0^* = \partial_0 \pm \lambda. \end{aligned} \quad (3)$$

Equation (2), (3) was obtained in [3], [6].

Now it should be noted that operator product everywhere in the given paper means usual operator consecutive application from the inner to the external.

The second stage deals with the explicit construction of the inverse differential matrix operator. This approach is proposed instead of the cumbersome diagonalization of (2), (3) “by coordinates” (look [6]). Only reduction of (2), (3) to the equivalent non diagonalized system of scalar PDEs from [6] was used:

$$\begin{cases} A_{23}F_{i1} - B_{12}F_{i2} - B_{13}F_{i3} = \varphi_{i1} \\ -B_{12}F_{i1} + A_{13}F_{i2} - B_{23}F_{i3} = \varphi_{i2} \\ -B_{13}F_{i1} - B_{23}F_{i2} + A_{12}F_{i3} = \varphi_{i3} \end{cases} \quad (i = 1, 2). \quad (4)$$

In (4): F_{ik}, φ_{ik} ($i = 1, 2; k = \overline{1, 3}$) are scalar components of the unknown and given vector functions $\vec{F}_i, \vec{\varphi}_i$ ($i = 1, 2$) from (3) respectively; operator matrix elements look like:

$$\Delta = \sum_{k=1}^3 \hat{\partial}_k^2; \hat{\partial}_0^2 = \mu_a \varepsilon_a (\partial_0^*)^2 + (\sigma \mu_a + r \varepsilon_a) \partial_0^* + r \sigma;$$

$$B_{jk} = \partial_j \partial_k \quad (j \neq k); A_{jk} = \Delta - \partial_l^2 - \hat{\partial}_0^2 \quad (l \neq j, k; j \neq k) \quad (j, k, l = \overline{1, 3}). \quad (5)$$

Other notation in (5) is from (1), (3).

Further, the system (4) is rewritten in matrix form

$$KF_i = \varphi_i \quad (i = 1,2), \quad (6)$$

Where:

$$K = \begin{bmatrix} A_{23} & -B_{12} & -B_{13} \\ -B_{12} & A_{13} & -B_{23} \\ -B_{13} & -B_{23} & A_{12} \end{bmatrix}, \quad F_i = \begin{bmatrix} F_{i1} \\ F_{i2} \\ F_{i3} \end{bmatrix}, \quad \varphi_i = \begin{bmatrix} \varphi_{i1} \\ \varphi_{i2} \\ \varphi_{i3} \end{bmatrix} \quad (i = 1,2). \quad (7)$$

Taking into account operator analogy of the classical matrix theory [7], the inverse matrix operator for K is constructed explicitly.

It is easy to notice that the original matrix operator from (7) is symmetrical with respect to the main diagonal. Hence, the sought for inverse operator K^{-1} must possess the same property [7]. Really,

$$K^{-1} = (\det K)^{-1} \begin{bmatrix} K_{11} & K_{21} & K_{31} \\ K_{12} & K_{22} & K_{32} \\ K_{13} & K_{23} & K_{33} \end{bmatrix}, \quad (8)$$

and K_{mn} ($m, n = \overline{1,3}$) represent operator analogies of the corresponding algebraic supplements from K .

In (8):

$$\det K = -\hat{\partial}_0^2 (\hat{\partial}_0^2 - \Delta)^2; \quad K_{mm} = (\Delta - \hat{\partial}_0^2)(\hat{\partial}_m^2 - \hat{\partial}_0^2) \quad (m = \overline{1,3});$$

$$K_{mn} = K_{nm} = \partial_m \partial_n (\Delta - \hat{\partial}_0^2) \quad (m, n = \overline{1,3}; m \neq n) \quad (9)$$

and \det is the usual determinant [7] in the operator meaning.

The substitution of (9) for (8) that is the explicit construction for K^{-1} is obtained after obvious algebraic transformation. Namely,

$$K^{-1} = (\hat{\partial}_0^2)^{-1} (\hat{\partial}_0^2 - \Delta)^{-1} \begin{bmatrix} \partial_1 - \hat{\partial}_0^2 & \partial_1 \partial_2 & \partial_1 \partial_3 \\ \partial_1 \partial_2 & \partial_2 - \hat{\partial}_0^2 & \partial_2 \partial_3 \\ \partial_1 \partial_3 & \partial_2 \partial_3 & \partial_3 - \hat{\partial}_0^2 \end{bmatrix}. \quad (10)$$

Direct simple verification confirms $K^{-1}K = KK^{-1} = I = \text{diag}(1,1,1)$ and agrees with the main property of inverse matrix operator [7].

Then operator K^{-1} from (10) is applied to the both parts of the matrix equation (6), (7) that leads to the required equivalent totality of ordinary scalar PDEs:

$$F_i = \begin{bmatrix} F_{i1} \\ F_{i2} \\ F_{i3} \end{bmatrix} = K^{-1}\varphi_i = K^{-1} \begin{bmatrix} \varphi_{i1} \\ \varphi_{i2} \\ \varphi_{i3} \end{bmatrix} \Leftrightarrow \begin{bmatrix} F_{i1} \\ F_{i2} \\ F_{i3} \end{bmatrix} =$$

$$= (\hat{\partial}_0^2(\hat{\partial}_0^2 - \Delta))^{-1} \begin{bmatrix} \partial_1^2 - \hat{\partial}_0^2 & \partial_1\partial_2 & \partial_1\partial_3 \\ \partial_1\partial_2 & \partial_2^2 - \hat{\partial}_0^2 & \partial_2\partial_3 \\ \partial_1\partial_3 & \partial_2\partial_3 & \partial_3^2 - \hat{\partial}_0^2 \end{bmatrix} \begin{bmatrix} \varphi_{i1} \\ \varphi_{i2} \\ \varphi_{i3} \end{bmatrix} \quad (i = 1,2). \quad (11)$$

It is easy to check that the final result (11) is identical to the sought for system from paper [6]. Besides, the suggested current diagonalization method is mathematically more elegant and thrice-shorter, at least:

$$\hat{\partial}_0^2(\hat{\partial}_0^2 - \Delta) \begin{bmatrix} F_{i1} \\ F_{i2} \\ F_{i3} \end{bmatrix} = \begin{bmatrix} (\partial_1^2 - \hat{\partial}_0^2)\varphi_{i1} + \partial_1(\partial_2\varphi_{i2} + \partial_3\varphi_{i3}) \\ (\partial_2^2 - \hat{\partial}_0^2)\varphi_{i2} + \partial_2(\partial_1\varphi_{i1} + \partial_3\varphi_{i3}) \\ (\partial_3^2 - \hat{\partial}_0^2)\varphi_{i3} + \partial_3(\partial_1\varphi_{i1} + \partial_2\varphi_{i2}) \end{bmatrix} \quad (i = 1,2). \quad (12)$$

Hence, comparing the obtained formula (11) and required result of [6] that is reflected in (12), it is easy to find their complete identity.

The given analytic technique was briefly announced in [8].

It seems from the first sight now that the original problem is solved and the purpose of given paper is attained. Also, it is not so, since formula (11) includes the expression:

$$(\hat{\partial}_0^2(\hat{\partial}_0^2 - \Delta))^{-1}. \quad (13)$$

The latter is necessary in the explicit construction of the inverse matrix operator K^{-1} from (10). Therefore, it is clear, when (13) in general does not exist the suggested diagonalization method can not be accepted as non valid.

This problem raises the third closing stage of present investigation that concerns the existence of inverse operator (13) with respect to:

$$\hat{\partial}_0^2(\hat{\partial}_0^2 - \Delta). \quad (14)$$

Since $\hat{\partial}_0^2$ is the particular case of $\hat{\partial}_0^2 - \Delta$ when $\Delta = 0$, complete study in the case of $\hat{\partial}_0^2 - \Delta$ is quite satisfactory and enough.

In other words, existence of the inverse operator (13) implies execution of the following condition [9]:

$$Ker (\hat{\partial}_0^2 - \Delta) = \emptyset. \quad (15)$$

Here *Ker* is the operator kernel and describes those respective sets of functions which are transformed in zero after the given operator application [9].

When condition (15) is not true, it means existence of the nonempty functional set whose elements satisfy the equality:

$$(\hat{\partial}_0^2 - \Delta)f = 0, f = f(x, y, z, t). \quad (16)$$

Hence, if such functional set from (16) is found, it must be excluded from those functions which guarantee the validity of (15). Therefore, the appropriate operator equation must be considered:

$$(\mu_a \varepsilon_a (\partial_0^*)^2 + (\sigma \mu_a + r \varepsilon_a) \partial_0^* + (r\sigma - \Delta))f = 0, \quad (17)$$

and it represents the preceding equation (16) that is rewritten in more suitable form. In its turn, formally (17) can be reduced to simpler analogy of quadratic with respect to operator ∂_0^* :

$$\mu_a \varepsilon_a (\partial_0^*)^2 + (\sigma \mu_a + r \varepsilon_a) \partial_0^* + (r\sigma - \Delta) = 0. \quad (18)$$

Solving (18) in usual elementary algebraic manner find its discriminant:

$$D = (\sigma \mu_a + r \varepsilon_a)^2 - 4 \mu_a \varepsilon_a (r\sigma - \Delta) = (\sigma \mu_a - r \varepsilon_a)^2 + 4 \mu_a \varepsilon_a \Delta \quad (19)$$

whose first item and constant factor near the Laplace operator in the second item are positive. Since values of Δ after its application to functions $f = f(x, y, z, t)$ are arbitrary real, then values of (19) when applying to the same objects are arbitrary real too.

The initial industrial problem and its mathematical model (1) are considered in four-dimensional real space (x, y, z, t) . Since functions f are real-valued, then in the case of (19) being negative, equivalent equations (16)-(18) have the empty set of solutions and condition (15) is true. It means, in its turn, that the inverse operator (10) really exists for all

possible f which are finitely derivated in some set from the space $\{(x, y, z, t)\}$. Mathematically this condition of operator existence looks as:

$$D < 0 \Leftrightarrow (\sigma\mu_a - r\varepsilon_a)^2 + 4\mu_a\varepsilon_a\Delta < 0 \Leftrightarrow \Delta < -(\sigma\mu_a - r\varepsilon_a)^2 / (4\mu_a\varepsilon_a) < 0 \Leftrightarrow$$

$$\Leftrightarrow \Delta < -\frac{1}{4}\left(\sigma\sqrt{\frac{\mu_a}{\varepsilon_a}} - r\sqrt{\frac{\varepsilon_a}{\mu_a}}\right)^2 < 0 \quad (20)$$

and the first condition of existence of the inverse operator (10) is obtained.

Further, let $D \geq 0$ in (19). Then solution of (18) is the following:

$$\partial_0^* = \frac{-(\sigma\mu_a + r\varepsilon_a) \pm \sqrt{D}}{2\mu_a\varepsilon_a}. \quad (21)$$

Taking into account formulae (19) and (3), expression (21) can be reduced to the equivalent one:

$$\left| \frac{\partial}{\partial t} = \mp\lambda - \frac{(\sigma\mu_a + r\varepsilon_a) \mp \sqrt{(\sigma\mu_a - r\varepsilon_a)^2 + 4\mu_a\varepsilon_a\Delta}}{2\mu_a\varepsilon_a} \right|. \quad (22)$$

In (22), the signs in front of λ and $\sqrt{\quad}$ change independently of each other, i.e. there are four possible versions in reality. Namely, “- , -”; “- , +”; “+ , -”; “+ , +”, where the first sign in the given pairs corresponds with λ and the second conforms to $\sqrt{\quad}$.

Thus, according to the last remark, condition (22) can be expressed as follows:

$$\frac{\partial}{\partial t} = -\frac{1}{2}\left(\left(\frac{\sigma}{\varepsilon_a} + \frac{r}{\mu_a}\right) \mp \sqrt{\left(\frac{\sigma}{\varepsilon_a} - \frac{r}{\mu_a}\right)^2 + \frac{4\Delta}{\mu_a\varepsilon_a}}\right) + \begin{bmatrix} -\lambda \\ +\lambda \end{bmatrix}. \quad (23)$$

Basing on (23) and on the condition of $D \geq 0$ in (20), the next restriction of the inverse operator existence in terms of (15) is written below:

$$\left\{ \begin{array}{l} \Delta \geq -\left(\frac{1}{2}\left(\sigma\sqrt{\frac{\mu_a}{\varepsilon_a}} - r\sqrt{\frac{\varepsilon_a}{\mu_a}}\right)\right)^2 \\ \partial_0 = \frac{\partial}{\partial t} \neq \begin{bmatrix} -\lambda \\ +\lambda \end{bmatrix} - \frac{1}{2}\left(\left(\frac{\sigma}{\varepsilon_a} + \frac{r}{\mu_a}\right) \mp \sqrt{\left(\frac{\sigma}{\varepsilon_a} - \frac{r}{\mu_a}\right)^2 + \frac{4\Delta}{\mu_a\varepsilon_a}}\right) \end{array} \right. \quad (24)$$

The second condition in (24) means that values of the differential operator after its application by the time argument t must not coincide with quantities from the right side of this inequality.

Gathering all obtained results concerning the required inverse operator existence, the final condition can be represented as the union of (20) and (24):

$$\left\{ \begin{array}{l} \Delta < -\left(\frac{1}{2}\left(\sigma\sqrt{\frac{\mu_a}{\varepsilon_a}} - r\sqrt{\frac{\varepsilon_a}{\mu_a}}\right)\right)^2 \\ \Delta \geq -\left(\frac{1}{2}\left(\sigma\sqrt{\frac{\mu_a}{\varepsilon_a}} - r\sqrt{\frac{\varepsilon_a}{\mu_a}}\right)\right)^2 \\ \partial_0 = \frac{\partial}{\partial t} \neq \begin{bmatrix} -\lambda \\ +\lambda \end{bmatrix} - \frac{1}{2}\left(\frac{\sigma}{\varepsilon_a} + \frac{r}{\mu_a}\right) \mp \sqrt{\left(\frac{\sigma}{\varepsilon_a} - \frac{r}{\mu_a}\right)^2 + \frac{4\Delta}{\mu_a\varepsilon_a}} \end{array} \right. \quad (25)$$

Formula (25) completes the last third stage of the original problem study. Hence, the initially raised problem is solved effectively and the purpose of given paper is attained.

4. Remarks and conclusions

Though the proposed here method looks more analytical than the preceding one that was reflected in [3]-[6], it implies only the same knowledge of linear algebra, since condition (15) remains for square matrices too. So, this given technique is at the same level of understanding and simplicity for engineers as the known one from [3]-[6]. Moreover, the suggested present approach requires only preceding operator restrictions which were accepted earlier in [3]-[6]. They consist of operator commutativity in pairs and their invertibility. The explicit scalar inverse operator construction (of (13), for example) is not required at all, only operator invertibility is assumed.

Turning again to [3]-[6], it is easy to find that the mentioned property of operator being invertible was accepted a priori there, though in ideal it had to be checked for all possible cases that were met in the specific considered problem. The current diagonalization method validity is checked for one general stage of study, at least. Besides, this diagonalization step "by coordinates" in terms of inverse matrix operator, is mostly important because of too long, dull and cumbersome direct calculation at the similar stage of investigation in [3]-[6].

Moreover, the suggested analytic approach is valid for the same class of industrial problems that was considered in [3]-[6], and does not imply any additional restrictions of its application in comparison with earlier known results.

Finally, the present procedure is far shorter than the aforesaid one from [3]-[6] and appears clear and strict mathematically, remaining simultaneously easy for engineering applications.

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A STUDY OF THE DISTRIBUTION OF WEALTH IN A STOCHASTIC NON-MARKOVIAN MARKET

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Abstract: We propose a stochastic sophisticated model of a market which consists of different classes of trading agents. In particular we study the trading where there are non-markovian processes. There is a total fixed number of trading agents which exchange and transfer money. The effects of adding a class of agents which trades more frequently than standard agents (like retailers), known as super-agents have been looked at. This model is then expanded in order to allow standard agents to move between the status of employee (industrialist), employed (worker) and unemployed. We show that the probability distribution of money, income or wealth resulting in the long-term trading process may take a specific form depending on the amount of money rotated in a single turnover process, where all agents are involved. These distributions are associated with a stable steady macroscopic state resulting from dynamical trading processes and may describe different market economies. The structure of these money distributions depends crucially on average income, democracy, standard of life and other features associated with political and economic structures of the market economy at quasi-equilibrium that may be described by a few parameters only. The main focus of this paper is located around agent based asset exchange and modelling of the complex market economy with the use of various computer simulations. The quasi-stable distributions of assets and money found from these super-computer simulations have been analysed. Different complex systems consisting of normal workers, industrialists and super-agents such as big retailers like “Tesco” have been considered. The different classes of the economic agents have been included into a simulation designed to model the effect of businesses in a closed economic system. The detailed changes of the ways in which money is transferred from one type of agent to another type of agent have been investigated. Various distributions such as the Boltzmann distribution or the Bose-Einstein distribution with a formation of a Pareto tail in the high money region have been found. The effect of saving and levels of reciprocity (preferential attachment) have been analysed and seen to affect the distribution in unique ways. It is noted that an increasing standard of living, due to an increase of salary payments by industrialists to workers leads unavoidably to a stability of economy and removes the risk of the financial crisis. In such stable markets with a high standard of living and workers

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having good salaries there is a large amount of goods and money flow, the market is stable and there is no danger of a financial crisis or market crashes.

Keywords: *stochastic, medieval, market, financial, crisis, capitalism, super agent.*

Introduction into econophysics and the distribution of wealth laws

Econophysics is a relatively new interdisciplinary research field which tries to use theories and methodologies developed in physics and statistical mechanics to gain new insights into economic theory [1,2], which is also very often referred to as mathematical statistics [3]. One of the main aims of econophysics is to solve problems in economics, usually those including uncertainty of financial stability and prediction of market crashes or an estimation of risk [4]. Recently, there has been much progress in the understanding of money distribution and evolution [5]. It is interesting that such distributions arising from stochastic processes in physics can be also compared to the various distributions of money resulting from the spread of wealth in various economic systems. However, when looking at a large enough group of economic agents, which are trading continuously in some real market we may notice that the money transactions are performed effectively as random or chaotic actions [6]. For this reason one may introduce market snapshots and from them build up a statistical ensemble [7]. Treating such ensembles statistically one may describe the probability of different processes such as price variation, stock fluctuation and the type of the money distribution which arises in the course of market evolution.

When economic systems are closed and the total money rotated on the market is preserved they can be modelled using agent based asset exchange simulations (see, for example the Ref. [8]). The results of such and other similar simulations attempt to offer a greater understanding of how different features of wealth distributions come about [9]. In many cases Monte-Carlo methods have been found to be very useful. If utilised, these methods are types of computational algorithms which use random numbers and probability statistics to investigate systems which could not otherwise be investigated.

It has previously been shown that random arbitrary exchanges between agents in a closed system where the total money is conserved eventually reaches a stationary distribution which follows the Boltzmann Gibbs law [10] or the Bose-Einstein distribution [9]. Below we consider several models of the market where there are different types of agents

trading. We also consider the money exchanges between agents which are not arbitrary but satisfy some definite rules dictated by market regulations. There the amount of money exchanged varies depending on the type of agents involved in the transactions. Within the framework of these models we also provide numerous simulations of the market considered as a complex multi-class hierarchical system.

The description of the basis for simplest model of medieval markets

Numerical modelling of the market and next simulations have been developed. The market is treated as a population of agents of fixed size N which trade randomly for a number of transactions T . Each agent i initially is given the same amount of money, $m_i = \frac{M}{N}$ (where $M =$ total money in the system and m_i is the money of agent i). In each transaction both a ‘buyer’ and a ‘seller’ are selected at random from the population. The agent selected as the buyer then transfers a fraction p of its money to the seller, $m'_i = m_i - pm_i$ and $m'_j = m_j + pm_i$. The total money, M , remains constant as the conservation of energy (or money) law is obeyed. No agent can create or destroy money, only transfer it between themselves. It could be said that the simulation is in a constant state of zero flux [9-11].

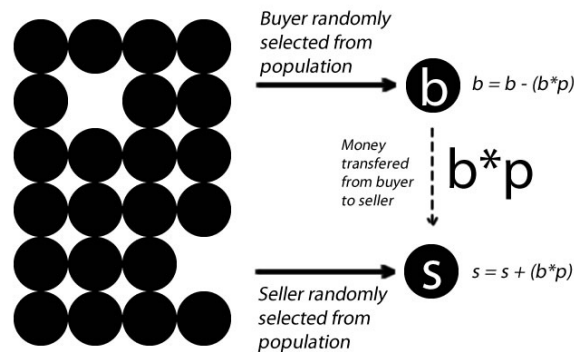


Figure 1. A medieval market may consist of a set of independent economic agents, noted by black circles, which perform a random work. For numerical modelling of the random work of many agents which meet each other occasionally it is convenient to introduce a lattice. Here the lattice is packed but for a realistic situation it should be very sparse, i.e. not densely filled and can also be multidimensional. The model can be simplified to the Angle’s type model (see, the Ref [8] and references therein), where two agents meeting each other, where one is a buyer and one is a seller, are chosen randomly from the set.

The movement of goods or services from agent to agent is disregarded as neither of these are conserved, only the movement of money and the distributions resulting from these movements is looked at and analysed. Higher values of p equate to asset exchange models in which large amounts of an agents money are transferred in each transaction and lower values of p , smaller amounts of money (see, for example the Ref.[8]).

A simulation was carried out with the following parameters: $N = 2 * 10^4$, $M = 2 * 10^7$, $T = 10^6$. In almost all simulations presented in this paper the total wealth of an agent has been classified by bins where the size of the bins used to calculate the distribution has been chosen as 10 money units, any changes to bin sizes are noted.

The results of numerical simulations are presented in Figure 2. They are more less consistent with the ones presented in the Ref. [8]. For $p \geq 0.5$ the distributions reach a stable equilibrium following the Boltzmann-Gibbs form, specifically for the value $p = 0.5$ [12, 13] and to Bose-Einsten distribution when the value of the parameter p increases [9]. If $p < 0.5$ the distribution follows a more Gaussian-like form, which is precisely speaking described by Gamma distribution [8]. For higher values of $p \sim 0.5$ it is tending towards the exponential function thus the majority of the population have no wealth. This means that the higher the percentage of money traded in each transaction, the more unfair the system eventually becomes generating a higher unemployed population.

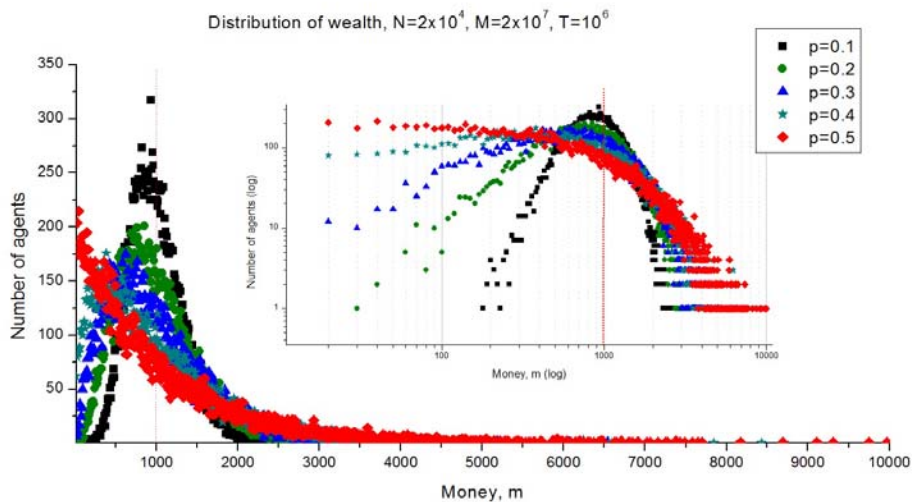


Figure 2. The distribution of money or the probability function, $P(m)$, for an agent to have the money m , obtained in numerical simulations for a medieval market. Each agent pays a different amount of money in each trade, but it is always a fraction, p , of its money. Each curve corresponds to the different values of the parameter, p . When the value of the spending

fraction, p , increases, the shape of the money distribution changes dramatically. It has an asymmetric Gaussian or Poisson-like shape at very small value of p that can be well fitted by the gamma distribution. The data is given for $p = 0.10, 0.20, 0.30, 0.40$ and $p = 0.50$ (which has a maximum at $m=0$) values. In insert, the probability function, $P(m)$, is expressed in log scale.

Fairness of the income distribution Lorenz curve and Gini ratio

Among a number of ways to measure economic inequality in distribution of wealth is the Gini-coefficient. The Gini coefficient (sometimes called the Gini ratio) G is a summary statistic of the Lorenz curve and a general measure of inequality in a population [13]. The Lorenz curve is used in economics and ecology to describe inequality in wealth or size. The Lorenz curve is a function of the cumulative proportion of ordered individuals mapped onto the corresponding cumulative proportion of their size. Given a sample of N ordered individuals with y_i the size of the i -th individual asset and $y_1 < y_2 < \dots < y_N$, then the sample Lorenz curve is the polygon joining the points $(h/N, L_h/L_N)$, where $h = 1, 2, \dots, N$, $L_0 = 0$ and $L_h = \sum_{i=1}^h y_i$. If all individuals have the same asset, the Lorenz curve is a straight diagonal line, called the line of equality. If there are rich and poor people the Lorenz curve falls below the line of equality. The total amount of inequality can be summarized by the Gini coefficient. The Gini coefficient is most easily calculated from unordered size income data of population as the “relative mean difference”, i.e., the mean of the difference between every possible pair of individuals, divided by the mean size μ :

$$G = \frac{\sum_{j=1}^N \sum_{i=1}^N |y_i - y_j|}{2 N^2 \mu} \quad (1)$$

The Gini coefficient is a measure of statistical dispersion, and varies within the range $0 < G < 1$. With a value of $G = 1$ representing a single person in the population owning all of the money, and $G = 0$ meaning wealth is split evenly across the entire population. It is calculated using the following equation (see, for a detail the Ref[13]):

$$G = \frac{1}{N} \left(N + 1 - 2 \left(\frac{\sum_{i=1}^N (N + 1 - i) y_i}{\sum_{i=1}^N y_i} \right) \right) \quad (2)$$

where:

- The value N is the number of people in the population
- All agents are sorted into no decreasing order by their assets ($y_i \leq y_{i+1}$).

Using this coefficient, changes in the ‘fairness’ of the distribution can be monitored. Seeing as larger values of p result in a more exponential distribution one would expect that higher values of p will result in higher values for the Gini coefficient. Indeed such an effect was found. Data describing the Gini coefficient changes have been obtained in numerical simulations for the described model for different values of p . It is shown in Figure 3 and 3.1, where the parameter taken as follows: $N = 2 * 10^4$, $M = 2 * 10^7$, $T = 10^6$.

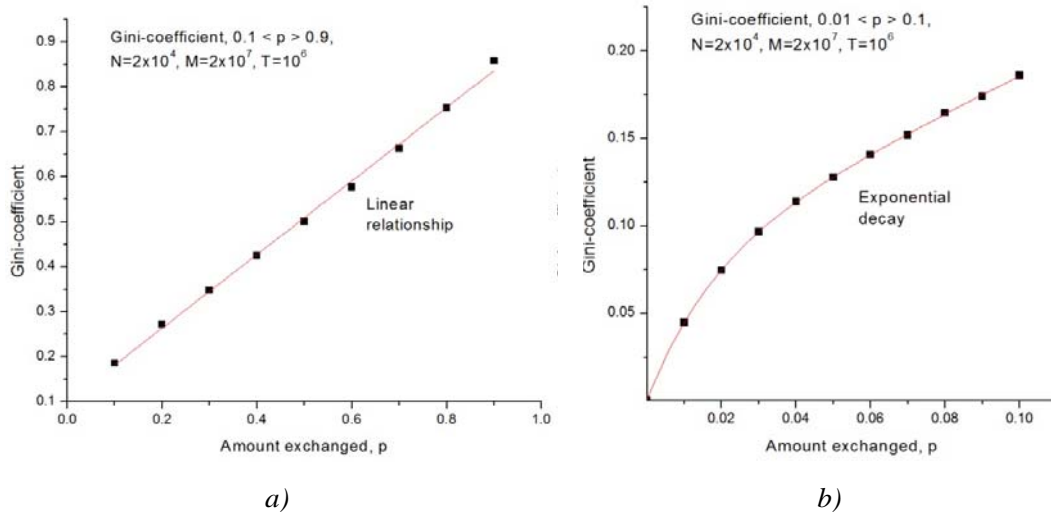


Figure 1. The dependence of the Gini ratio on the parameter p , which characterises the payment amount made by an agent in a trading medieval market. The agent always pays the fraction p of its money. This dependence is given for the parameter range, a) $0.1 < p < 0.9$; b) $0.01 < p < 0.10$. The larger the value of p the more unfair or unequal the distribution of money in the society.

For the range of the parameter values $0.1 < p < 0.9$ the relationship between p and the Gini-coefficient is nearly linear. However for $p < 0.1$ a non linear relationship has been observed. An exponential curve has been fitted to this plot and a similar exponential tail occurs at values of p close to 1. Because in future simulations only values of p between 0.1 and 0.5 will be used it can be said that the relationship will be linear between the exchange fraction parameter, p and the Gini-coefficient, G .

Market with fluctuations in p

In the next step we introduce a more general model, where economic agents may trade using a different trading fraction, p , for each interaction. In the previous model, the fraction of wealth transferred from one agent to another one was taken as constantly equal to p (see above section and the Ref.[8]). Therefore, we are interested in new effects of a constantly varying value of p , these were looked at next. The model worked the same as previously [8] except that a new value of p was decided at the start of each transaction. This new value was calculated by taking a set value for p then adding or subtracting a random number from it, this random number is known as the variation in p , this shall be known as $pvar$.

A variation in p of $pvar=0.2$ was added to the next numerical simulation with an average $\langle p \rangle$ set as $\langle p \rangle = 0.3$ so that each time a transaction was made the value of p was chosen randomly from the interval $0.1 < p < 0.5$. The new money distribution (shown by the red dots), compared to one obtained in the framework of the basic model (black squares) is shown in Figure 4. A log-log plot has been used so that the changes to the lower end of the distribution can be seen more easily.

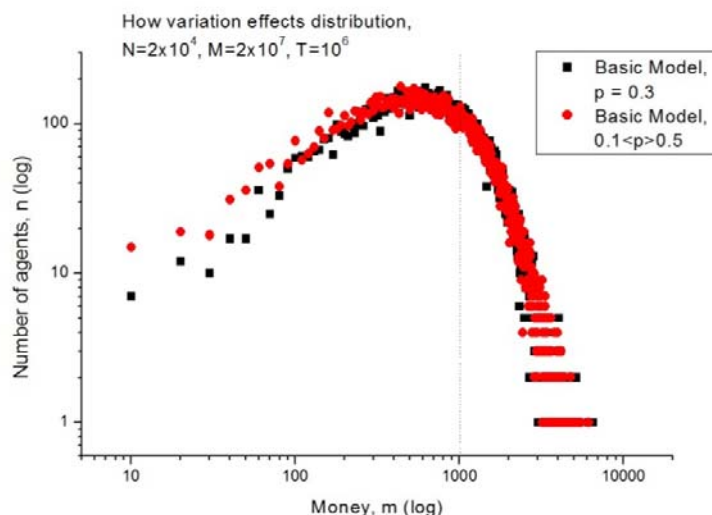
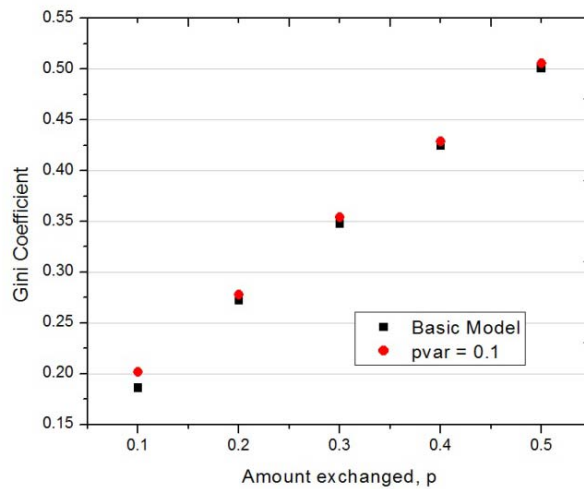


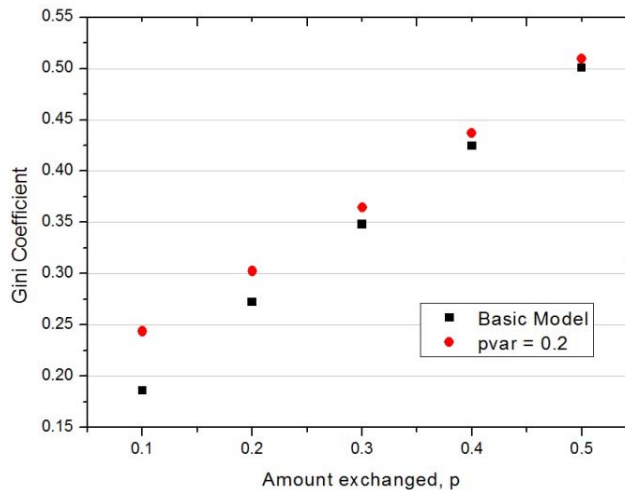
Figure 4. The distribution of money between agents, $P(m)$, obtained in the numerical simulation for a medieval market when agents make random payments at their trading event, i.e. with fluctuations in p . Each agent pays a fraction, p , of his money while a fraction is not fixed but randomly chosen with equal probability within the interval $0 < p < pvar$ (see, the red dots on the Figure). For a comparison we show the distribution of money obtained when the parameter p is fixed and equal to $p = 0.3$ (see, the black squares). One may notice that due to the trading with variable payments the number of poor people increases.

Looking at these distributions it can be immediately noted that a variation in p results in a slightly more unfair spread of money – in the appearance of more poor people. It should be also noted however that adding the same variation to $pvar$ for higher values of p had less effect to the distribution, although the simulation did still show a small shift in the distribution towards the exponential. This can be seen if you compare the Gini-coefficient for values of p without variation and with:

How the gini coefficient of a distribution changes with variation, $N = 2 \times 10^4$, $M = 2 \times 10^7$, $T = 10^6$



a)



b)

Figure 5. The dependence of the Gini ratio on the parameter p for a medieval market with variable payments. The variation of the fraction p of money exchanged in the trading events is $pvar = p_i - p$, where p_i is the fraction used in the i -th trading events and p is an average fraction. For Figure 5 a) $pvar = 0.1$ and for Figure 5 b) $pvar = 0.2$. The larger the variation of p the more unfair or unequal the distribution of money in the society. The effect is stronger for markets where only small trading fractions are used.

Both a variation of 0.1 and 0.2 have been looked at and it can be seen that a higher variation has the same effect on increasing the statistical dispersion of the population but to a greater extent.

Model with reciprocity or a preferential attachment of agents between each other

The investigation of many real financial systems reveals that economic agents are likely to choose partners not randomly but following some principles such as recommendations from friends or on the basis of their own experience, that is, there is a level of reciprocity [14]. This means that if an agent trades with another agent, it is more likely to trade with them again. A numerical simulation of this process of the good experience accumulation and preferential attachment of economic agents was implemented by storing the previous connection each agent made. The agent chosen to be a buyer is still chosen at random but the seller is either selected at random as per usual, or selected from the buyer's last previous interaction. Note that the role of the agent in the previous interaction (buyer or seller) is not recorded and does not affect the preferential attachment. The probability that an agent interacts with the previous agent is known as the level of reciprocity [14].

A comparison of how preferential attachment affected the distribution is shown in Figure 6. It can be seen that there is a larger amount of very poor agents in the model which includes previous or preferential attachment. For different values of p adding a probability of attachment to previous agents had the following affect to the Gini coefficient: The relationship between p and the Gini coefficient of the money distribution produced as a result of long numerical simulations is linear for the model with and without reciprocity. However adding reciprocity or a preferential attachment to the trading events is shown to increase the amount of statistical dispersion and inequality in the assets distribution.

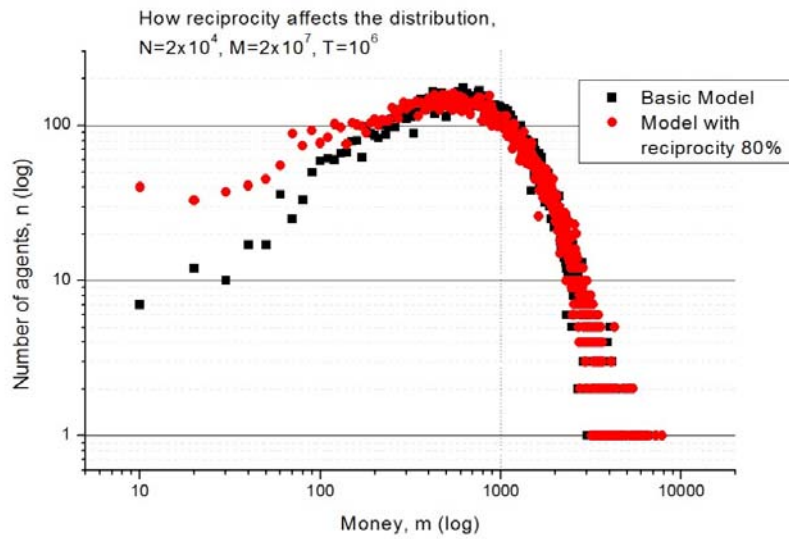


Figure 2. The distribution of money between agents, $P(m)$, obtained in numerical simulations for a medieval market when agents make social connections based on their experience which they accumulated in past trading events. The numerical data is presented by red dots. For a comparison we show the distribution of money obtained when the parameter p is fixed and equal to $p = 0.3$ (see, the black squares) for a market without preferential attachments. One may notice that due to the connections established historically for trading the number of poor people increases significantly, but this has not much influence on the rich side of the distribution.

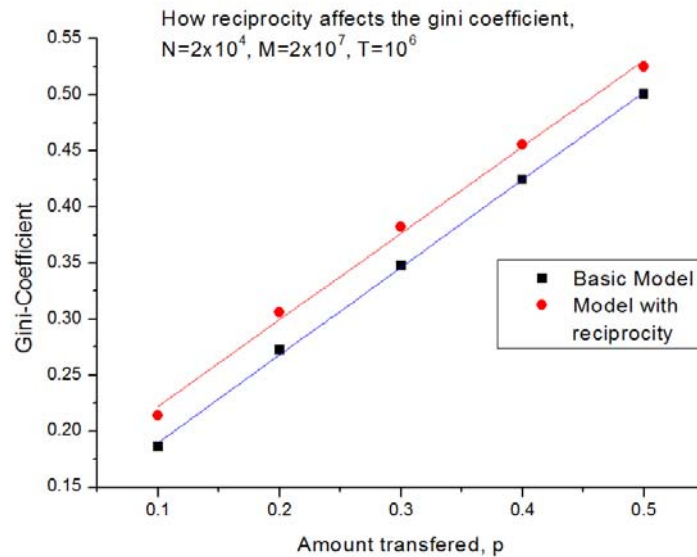


Figure 3. The dependence of the Gini ratio on the parameter p for a medieval market where social connections between traders arise accumulating past experience. The more reciprocity and thus corruption in society at any value of p the more unfair and unequal the distribution of money in the society.

Models with untradeable savings

It can be noted however that the financial system described above occasionally results in a very poor agent getting a large sum of money from an agent much richer than it. This is especially true for the model where agents are trading a large fraction of their capital, i.e. when $p > 0.5$ and where an agent can go easily from one extreme of wealth to another, in a single event poor can become rich. These sudden wealth shifts might not be considered realistic. For this reason a model in which each agent has a set amount of tradable money and a separate savings account was introduced.

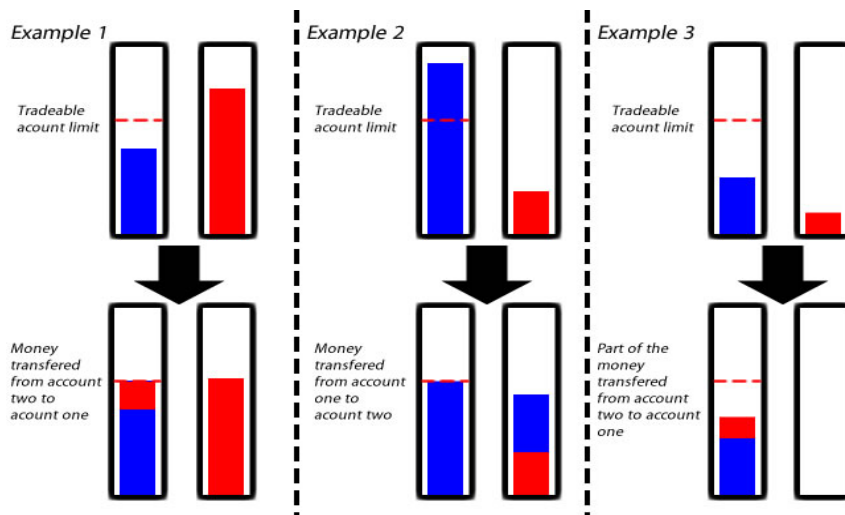


Figure 8. Three trading schemes with two accounts: the saving accounts noted in red and the trading ones noted in blue. The trading threshold is noted by the horizontal dashed line (red). Depending on the amount of money in the trading account with respect to the set threshold, the money is transferred from (the first and third columns) or to (the second column) the savings account to (the first and third columns) or from (the second column) the trading one.

In this model after each trade is made any money in their tradable account above a set threshold value, s , is moved to their non tradable account known as the savings account. If after a trade the money in the tradable account is less than the tradable account limit and there is money in the agent's savings account it is transferred to their tradable account, or part of it is so as not to exceed the tradable account limit. This system however only moves funds from one account to another directly after

a transaction has taken place. The diagram below shows how the distribution changed when the savings account was added to the simulation for $p = 0.1$.

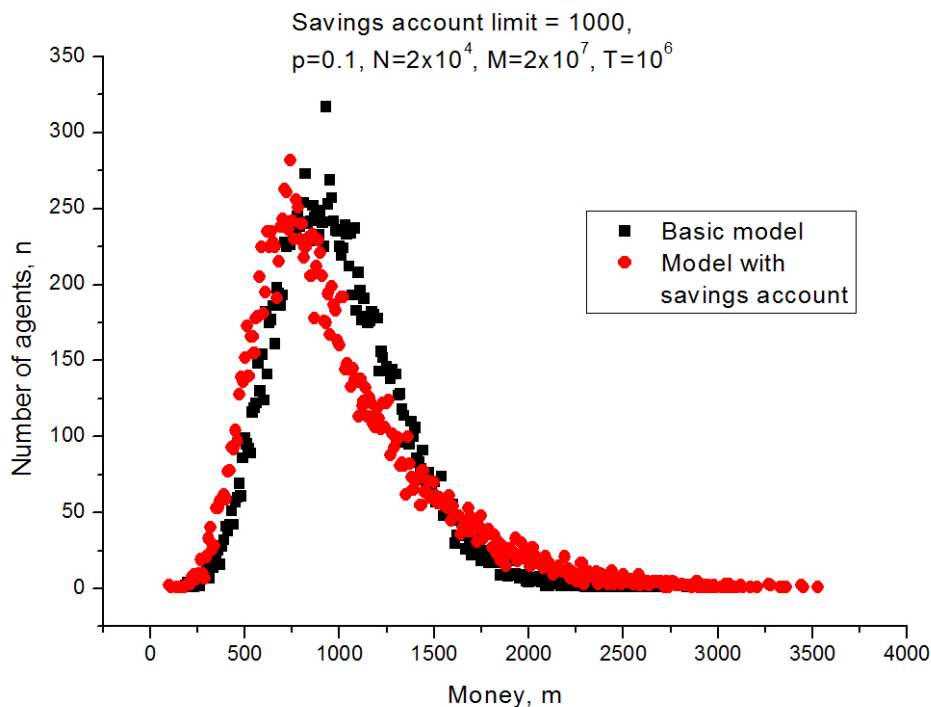


Figure 9. The distribution of money between agents, $P(m)$, obtained in numerical simulation for medieval market when agents divide their money into two accounts: the saving and the trading ones. The distribution of money has been obtained when the parameter p was taken as $p = 0.1$. The red dots correspond to the market where traders are using two accounts. For a comparison we present also a distribution of money for an original medieval market (see, the black squares). One may notice that due to the trading with two accounts the number of poorer people increases.

It can be seen that the money distribution is shifted down slightly (to a less equal distribution) when two accounts are used (both accounts are added together when the distribution is calculated). This and the same change in the money distribution can be observed for the whole range parameters, when $p < 0.5$ when a savings account is added. The distribution again is shifted to the left with an extended tail.

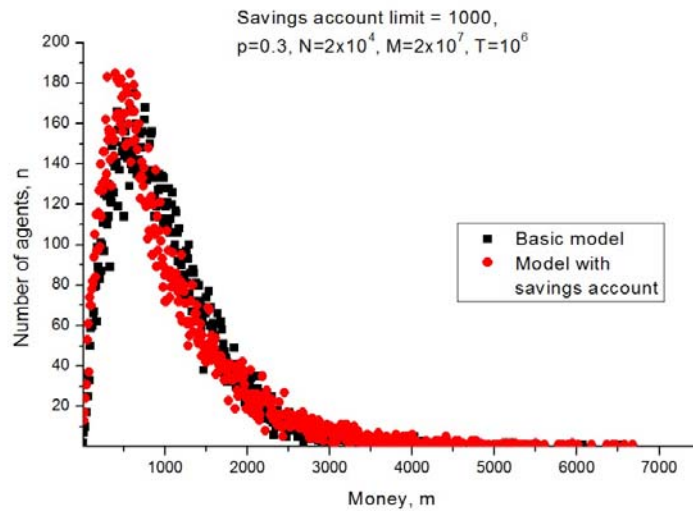


Figure 10. The distribution of money between agents, $P(m)$, obtained in numerical simulation for medieval market when agents divide their money into two accounts: the saving and the trading ones, when the parameter p and the saving account threshold were taken as $p = 0.3$ and $m_s = 1000$ money units. The red dots correspond to the market where traders are using the two accounts. For a comparison, the black squares show the distribution without savings. One may notice that due to the trading with two accounts the number of poorer people increases.

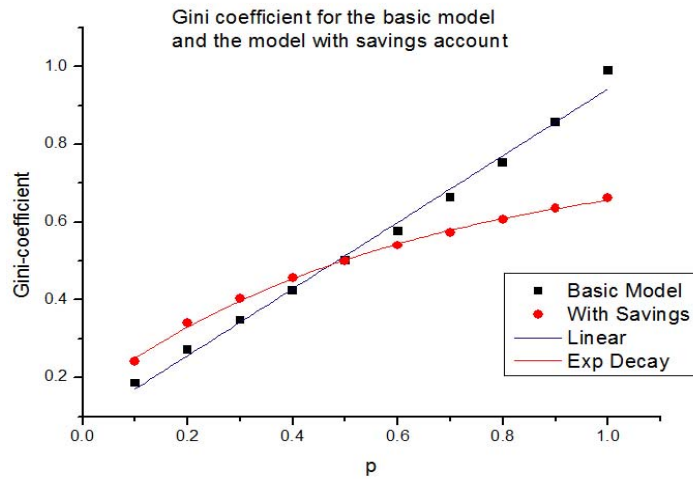


Figure 11. The dependence of the Gini ratio on the parameter p for a medieval market when agents are saving money (red dots). For a comparison, we present the linear dependence of the Gini coefficient for the market without savings (the basic model). For small fractions at any p the Gini coefficient for the market with savings is larger than without savings, therefore the distribution of money becomes more unequal with the savings. However, for the larger fractions, i.e. $p > 0.5$ the situation is reversed and the savings lead to more fair distribution of money.

Figure 11 shows that adding a savings account to the trading processes increases the statistical dispersion for $p < 0.5$. This happens because the saving works as a mechanism to allow the richest agents to give away less of their total money when they inevitably are selected as a buyer. However for the models associated with the values of $p > 0.5$ one can notice the opposite, that is a savings account decreases statistical dispersion when compared to the basic model. (Here the savings account limit is set to 1000 money units). Moreover, the effect of adding a secondary savings account to each economic agent has been looked at in terms of the richest agent. Because of the fact that the assets of the richest agent can vary hugely due to the stochastic nature of the trading events [15] an average was taken after running the numerical simulation three times both with a savings account and without. The Figures, below, would still however vary if they were to be produced again but do show that the savings account does have an effect on the wealth of the richest agent at the end of the numerical simulations.

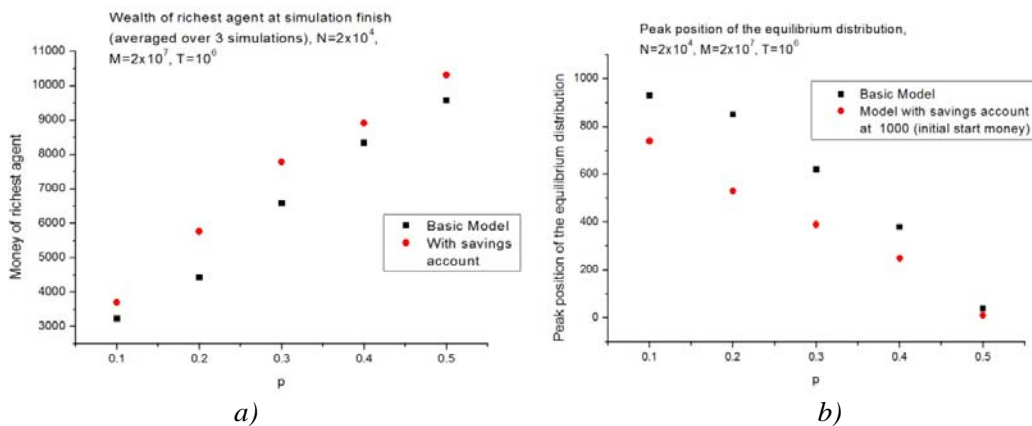


Figure 12. a) The money of the richest agent as a function of the trading fraction p for two models, with and without savings presented by red and black dots, respectively. b) The peak position of the money distribution as a function of the trading fraction p for two models, with and without savings.

It is clear that a savings account results in an increase in wealth of the richest agent for the whole range of parameters $p < 0.5$. This is however to be expected as the statistical dispersion has increased (see, Fig. 12a). The peak position of the equilibrium distribution is lowered by the addition of a savings account as shown in Figura 12b. Because adding a savings account to the simulation had a significant effect on the distribution, the effect of increasing the level at which agents start saving was looked at. The saving account level was increased to 3000, the new distribution produced from the simulation with the increased savings limit is shown compared to a

distribution with the savings limit at 1000. A log-log graph has been used so that the spread in the tail can be viewed more easily, see Figure 13:

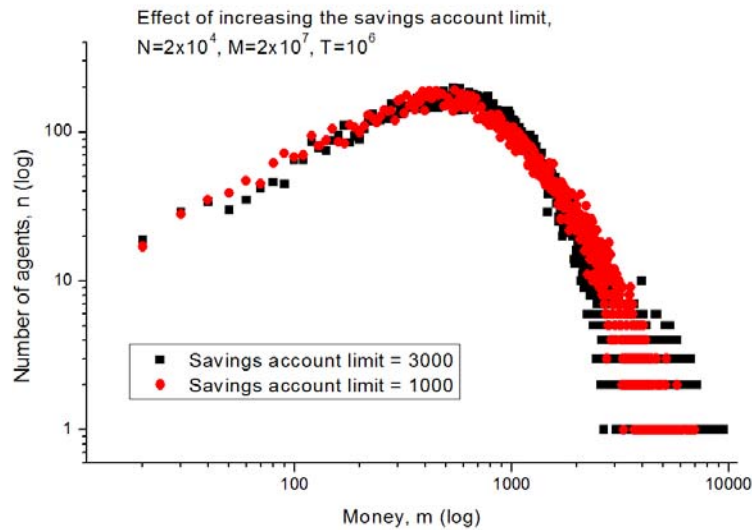


Figure 13. The distribution of money between agents, $P(m)$, obtained in numerical simulation for a medieval market when agents divide their money into two accounts: the saving and the trading ones, when the parameter p and the saving account threshold were taken as $p = 0.3$ and $m_s = 1000$ money units. The red dots correspond to the market where traders are using the two accounts with the secondary account equal to m_s . The black squares show the distribution with the savings account limit equal to $3m_s$ (3000 money units). One may notice that a lower savings account limit results in the number of poor people increasing.

Increasing the savings account limit resulted in wider tail on the log-log graph presented in the Figure 14 and a very slight increase in the number of poor people. The money distribution overall however follows the same shape, see for comparison, the Ref. [8].

Model with ‘Super Agents’

In the next models considered, a new type of player has been introduced. These are known as super-agents. To identify them a second variable called ‘size’ and noted as z_i , unique to each agent has been added to the numerical simulations. At the start of each numerical calculation and modelling of a market process certain economic agents were defined as having a larger size. The size variable dictated the likelihood of an agent being chosen to profit from a transaction. That is to be chosen as a seller, to have an extra large size or large amounts of goods is important. Such super

agents are representatives, for example, of big retailers, such as “Tesco”, “Asda” and others supermarkets which obviously have many goods to sell (a large size). Then, in all trading processes modelled the probability to choose a seller depends on its size and is defined by the equation:

$$P(i) = \frac{z_i}{N}.$$

Whereas in previous models an agent is chosen as a seller randomly, that is he was found by picking a random agent from the population. Now the agent to be the seller is chosen from an array equal to the sum of the size of the agents. Agents which have a larger size are placed into this array more times and thus have a higher likelihood of being picked when randomly chosen from the array.

One ‘lap’ of the simulation is known as an epoch. An epoch will be defined as the minimum amount of transactions needed in order for every agent to have been able to carry out at least one transaction. In all of the simulations in this report $N = 20,000$ so one epoch is on average 20,000 transactions.

The Figure 14 below shows a record of a single super agents transactions. A single agent was given a size of 20 and the simulation was run for 1 million transactions. As you can see the agent acts as a mechanism to collect money from multiple agents and then distribute it to one lucky agent multiple times. In the simulation an equilibrium was reached at $20 \times M / N$, after which the agents wealth fluctuated around that level. It should be noted that the money owned by the super agent peaked at $66 \times M / N$ but this peak value could technically approach M if there were enough transactions and the agent was ‘lucky enough’.

The red dotted line corresponds to an average money of the super-agents, $m_{sa} = \frac{M}{N} * z_{sa}$. The super agent is in equilibrium when:

$$\frac{M}{N} * p * z_{sa} = m_{sa} * p.$$

The introduction of a super agent did affect the way wealth within the population was distributed. For small values of z applied to a single agent in a population of 20,000 any change in the distribution was unrecognizable, however, for larger values for z , a change in the distribution can be seen. Below shows the distribution for a population including a super agent, $z_{sa} = 1000$ compared to a population without a super agent. $N = 2 \times 10^4, M = 2 \times 10^7, T = 10^6$.

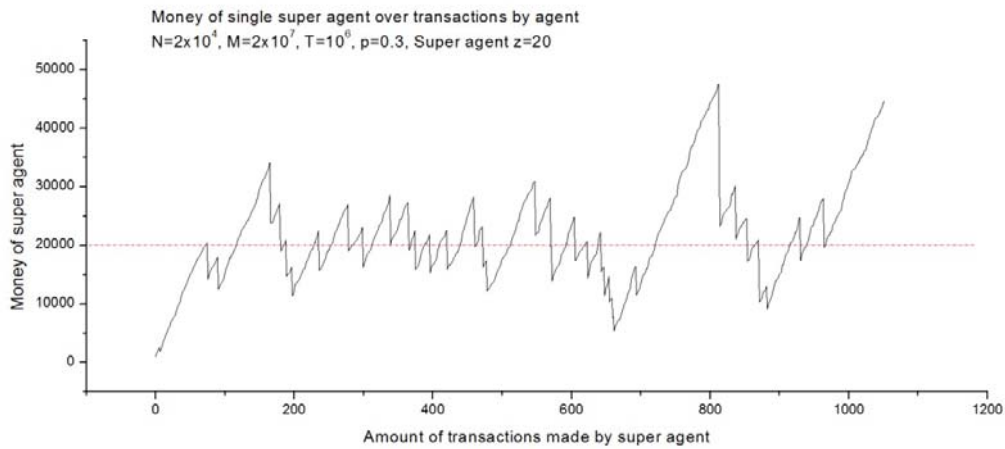


Figure 14. The saw-tooth curve represents the evolution of a super-agent's money with time. It is assumed that there is one financial transaction made by the super-agent each time step. The size of super-agent was taken as $z = 20$. There are 20000 agents on the market which transfer the fraction $p = 0.3$ of their money when they are buying anything. The dashed line corresponds to average money of the super-agent.

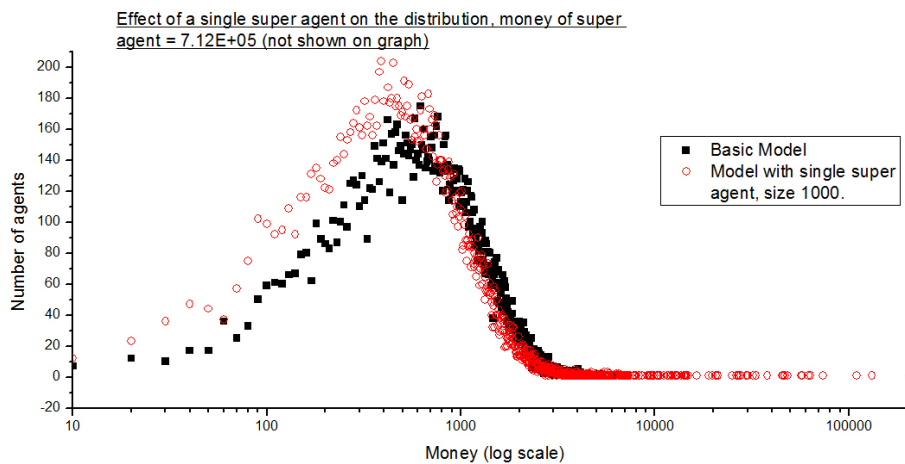


Figure 15. The distribution of money between agents, $P(m)$, obtained in numerical simulation for a medieval market with one very large super agent (red circles). The size of the super-agent was taken as $z = 1000$. The parameter p was taken as $p = 0.1$. The black squares represent the money distribution of the original medieval market with the same value of p .

Even a single super agent has a substantial effect on the money distribution, (see, Figure 15), where the results of the money distribution obtained in numerical simulations of a market with one super agents are presented. One may see there that the tail of the money distribution for

such a market where there is only one super agent is much longer and there is a larger majority of poorer agents, that is, having money $m < \frac{M}{N}$. There is also a decrease in the amount of middle wealth agents, ie the number of agents having the money in the interval $M / N < m < 3M / N$.

Multiple super agents acting as market hubs

Now let us consider a market economy where multiple agents with a fixed 'size' much larger than a standard agents size have been added to the market. The dynamics simulation was then carried out.

The goal was to see if the accumulation and then distribution of wealth which super agents do had an effect on the money distribution.

Super agents still reached an equilibrium at their average money value equal to $\frac{M}{N} * z_i$ when there was more than one of them. The average wealth of all super agents within a simulation including 50 super agents at a size of 10 is shown below on Figure 17 against the number of transactions, T .

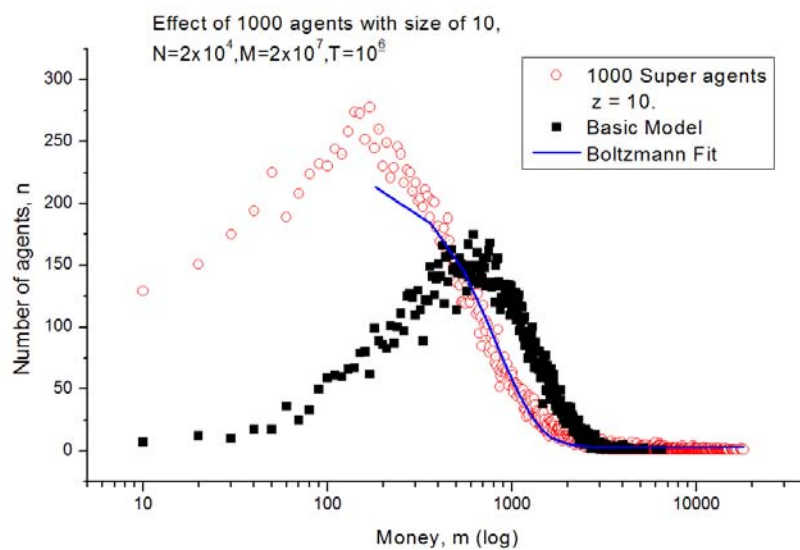


Figure 16. The distribution of money between agents, $P(m)$ obtained in numerical simulation for a medieval market when 1000 super-agents are present. The numerical data is presented by red circles. The size of each super-agent was taken as $z = 10$. The parameter p was taken as $p = 0.1$. The black squares represent the money distribution of the original medieval market (without super-agents) with the same value of p that can be fitted by Boltzmann or exponential distribution function.

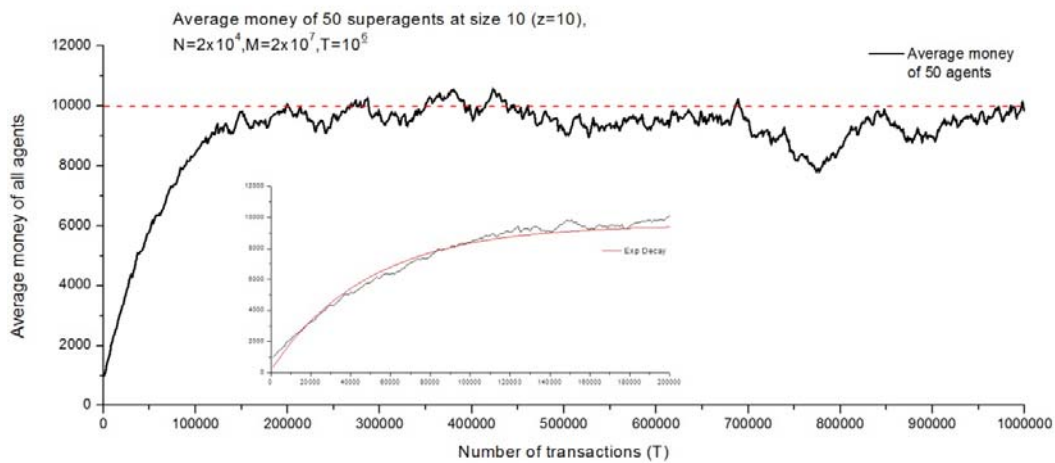


Figure 17. The average wealth of all 50 super-agents obtained in numerical simulations as a function of the number of transactions, T . Each super-agent has a size of 10. Their average amount of money quickly (exponentially) saturates to an equilibrium indicated by a dashed line. The insert indicates the exponentially fast increase in the super-agents average money.

The insert is the same graph magnified between 0 and 200,000. An exponential increase in the average wealth of the 50 super agents can be observed. This effectively corresponds to the exponential decaying total wealth of the rest of the agents.

It should also be noted that super agents can trade with each other (in fact, this is the most likely event to happen in the simulation) and as a result of this fact a lot of money transfers amongst super agents themselves. This is an experimental observation of financial operations, for example, the Fedwire network.

Below we present a snapshot of the money transactions which happen during one epoch. The links between agents have been mapped with their weightings. A darker line corresponds to a larger amount transferred (either way) between the two agents.

Shown in Figure 18 green dots are industrial or super agents with a size, $z_i = 50$. In red are standard agents. It can be seen that super agents are hubs of activity (only wealthiest agents are shown on diagram) but this is to be expected. Links from one super agent to another super agent can also be observed and often carry the most weight.

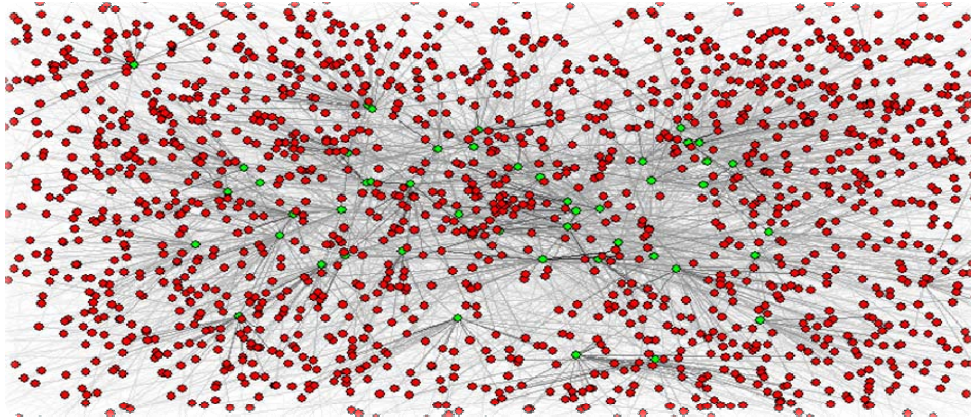


Figure 18. A snapshot of financial transactions made during one epoch. Nodes represent agents while links represent financial transactions. The darker the line connecting two nodes the more money transferred through. The green circles represent the super-agents which can be seen to be hubs of the network.

Addition of industrialists on a market and first trends of capitalism

The system of trading agents considered in the numerical simulations in previous sections above, even with the addition of super agents, can still be argued to only represent a medieval market. [5] A medieval market could be described as being a market, in which there are no businesses as such, just people, both rich and poor, trading amongst each other. The super agents currently in the model simply make more sales than other agents and as $\Delta m = m \times p$ they give away larger amounts when they are chosen as buyers due to their high level of wealth. However, they do not have production tools and cannot act like businesses.

In order to mimic a more realistic trading model, super agents would have to be able earn or lose their super agent status (like a business can), employ other agents to work for them, and pay these agents. A new model was developed in which if economic agents reached a certain level of finance, E , they could industrialise. This involved an increase in the agents size proportional to the amount of money they have in relation to the average money of each agent $z_i = \frac{m_i}{M/N}$ where $z_i \geq \frac{E}{M/N}$. This increase in size, as before, results in an increase in sales for the agent.

We model the process of agent's industrialisation as follows. At the point of industrialisation during the numerical simulation we pick at random from the population, a set of employees, w . The amount of agents that an industrial agent employs, is known as J_i . At the end of each epoch, a proportion of the money earned by an industrialised agent, via sales from non industrial agents, is paid to its employees. The industrialist is paying wages to its employees. This means that an industrialist acts as the seller when he interacts with a standard agent. Standard agents (not Industrialised) continue to trade randomly amongst themselves, industrialised agents do the same between each other, although larger industrialists have a higher probability of profiting from a financial transaction.

It should be also noted that in our model agents can only industrialise at the end of each epoch of the numerical simulation of the market. The process of paying employees occurs just before the industrialisation process (both every epoch). The probability of being a buyer is unchanged.

The amount which was paid to the agents after one epoch could be considered the businesses' costs and the amount earned during an epoch, their revenue. Because of this the success of businesses in this simulation is down to; the percentage of their earnings from customers paid to their employees and their business to business transaction success (this success is directly related to the agents size). These business to business transactions could be seen as the 'competition' among businesses.

Two methods of deciding an industrial agents percentage of earning paid to employees were looked at, the first being, their costs had a possibility of being randomised each epoch and the second their costs being fixed when they industrialise. Fixed costs however, do not allow for a business' success to change over time, therefore a system whereby an industrial agents success value, B , is randomised each epoch was introduced.

The idea of surplus value, the difference between the amount the employee is paid and the value of their work can be applied here. A success value of less than 100% would result in the workforce of the industrial agent being paid less than the value of their work, and a value of greater than 100% representing the industrial agent taking a larger cut perhaps for the risk associated with acting as the entrepreneur. If the industrial agents paid their employees less than the value of their work then they would become more successful and make a profit, whereas agents who paid their employees more than the value of their work would incur higher costs than revenue and make a loss.

Shown in Figure 19 is a diagram showing how this new simulation operates:

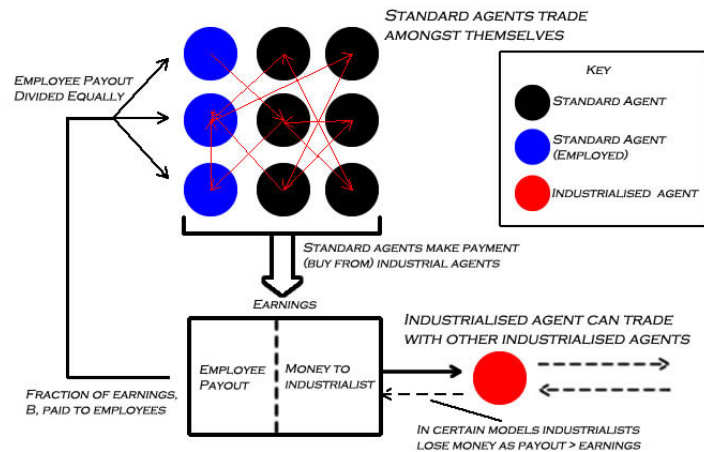


Figure 19. The structure of a capitalist market where there two classes of society: workers and industrialists. Workers are employed by industrialists and receive a salary for the job. The flow of money for a single industrialist and multiple standard agents (both employed by that industrialist and not) is shown.

The new model of the market consisting of two classes, industrialists and workers, now includes the following variables:

Variable	Description
M	Total money in the system
N	Size of the population, i.e. a total number of agents
T	Number of transactions ($T/N =$ number of epochs)
P	Percentage or a fraction of wealth transferred in any random transaction (does not affect business payouts)
B	Business success variable (usually, it is randomised so as businesses can both fail and succeed)
W	Number of employees a business can have (linked to a size of the industrialist)
J	Times agent employed (the amount of ‘jobs’ a single agent can have)
Z multiplier	Size of agents when they become industrialised. Proportional to their wealth.
Minimum industry level	Wealth at which an ordinary economic agent can become an industrialist. This can only happen at the end of each epoch.
Industrialisation chance	The probability that, if an agent reaches the minimum industrialisation level of finance, they industrialise.

To start with a model where agents industrialised at $4 \times \frac{M}{N}$ to a size of $z_i = \text{floor}\left(\frac{m_i}{M/N}\right)$, the probability of agents industrialising was 100% if they had an asset over minimum industry level. The maximum size of agents was set to 100, $z_i < 100$. Agents employ a certain amount of employees equal to 5 times their size, $w_i = 5z_i$. The amount of earnings paid to employees, B , was randomised each epoch, different for each industrialist where the value B belongs to the interval $0.7 < B < 1.3$. Each agent can only be employed by one industrial agent at a time so $J_i \leq 1$.

Next numerical simulations of the new model of capitalism with the parameters chosen above were performed. The results are shown in Figure 20.

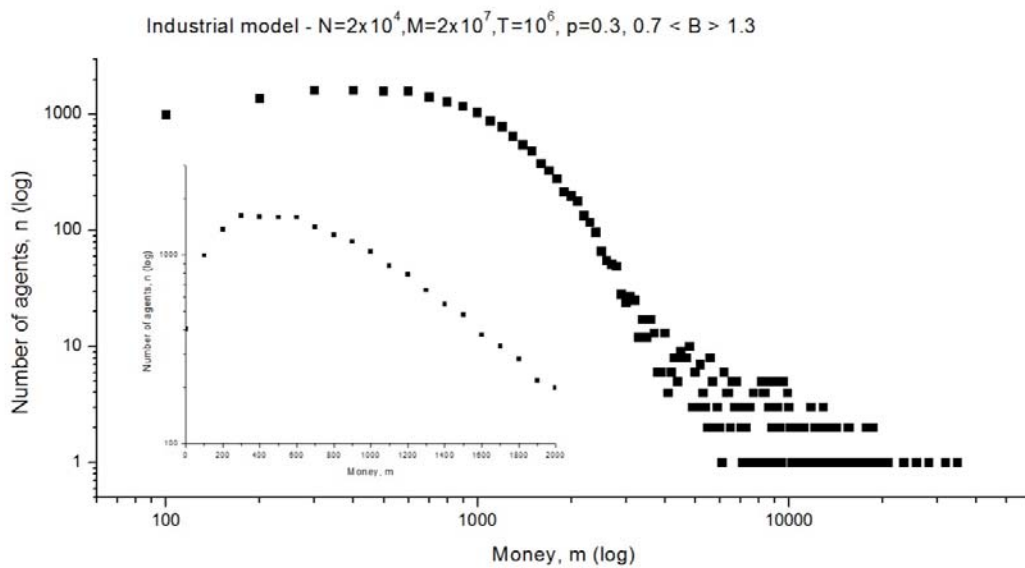


Figure 20. The distribution of money between agents, $P(m)$, obtained in numerical simulation for a capitalist market where there two classes of society: workers and industrialists. Workers are employed by industrialists and receive a salary for the job. All are trading according to the laws of capitalism. The parameter p was taken as $p = 0.3$. The amount of salary paid by an industrialist is characterised by the parameter B . It is taken randomly from the interval $0.7 < B < 1.3$. The insert shows the zoom of the distribution function in the vicinity of the peak.

Due to the fact that agents in the industrial model under certain parameters can become very rich, the bins which calculate the distribution

have been adjusted to 100 to make viewing the distributions and analysing curves on them easier. This will be the case for all distributions shown in the industrial model. A log-log scale has been used and the insert is a log-linear scale.

Interestingly there is a similarity between the distributions found from the simulation to those found by Yakovenko and Dragulescu (see figure 1, reference [6b]). For the lower part of the distribution $m < 2000$ the distribution follows a Boltzman distribution (with a slight drop as m approaches 0). For the upper part of the distribution a pareto like tail is observed. At the end of the simulation 297 agents were industrial agents employing 58% of the population. The Gini coefficient for this distribution of wealth is equal to 0.41.

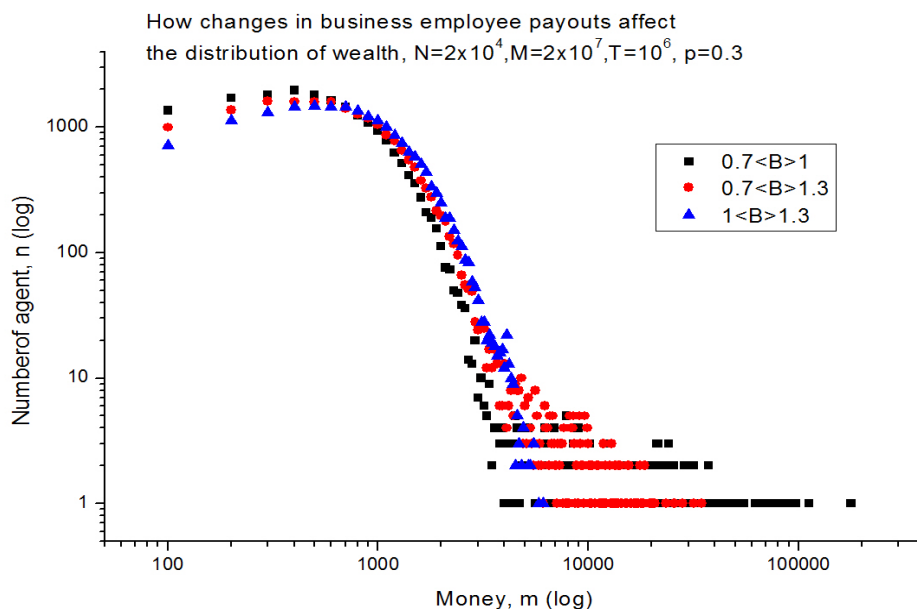


Figure 21. The distribution of money between agents, $P(m)$, obtained in numerical simulation for a capitalist market where there two classes of society: workers and industrialists. Workers are employed by industrialists and receive salary for the job. All are trading according to the laws of capitalism. The parameter p was taken as $p = 0.3$.

The effect of changing the amount paid to employees has been looked at next. A very interesting tendency was found. The Pareto tail is the largest when the payment to employers, B , is small, see for example the data of simulations presented by black squares on Figure 21, where the value of the parameter B has been taken randomly from the interval

$0.7 < B < 1$. When this payment, B , increases the Pareto tail becomes smaller and smaller, see the red dots on the Figure 21. At some critical value of such a payment, B , The Pareto tail finally disappears (see, the data presented by blue triangles on Figure 21, where the values of B were chosen randomly from the interval $1 < B < 1.3$).

It is clear, and perhaps, even, obvious, that the larger the amount paid to employees from businesses the fairer the spread of wealth. When industrial agents never pay more than their earnings from standard agents, industrialists become very rich and when industrialists always pay more than their earnings all businesses inevitably fail. It should be noted that limits have been put on industrialist size so that larger industrialists (which benefit from the increased likelihood of payments from standard agents and industrial agents) do not grow out of proportion. These limits do not exist in real life however the benefits which the business receives for being larger do seem to lessen as the business grows. This is something which could be considered in future simulations.

Conclusion

The ‘fairness’ of the distribution which has been mentioned frequently throughout this investigation does not always relate to a more successful economy. In reality, amongst other things, wealth generated by large multinational businesses via exports would result in an increase in the total wealth in the system. Because of this, a ‘fair’ distribution might not be the best distribution, the benefits business brings to economies must also be considered. However, when looking at economic inequality across various countries it has been observed that too much inequality negatively effects economic growth, whereas the same applies to too much equality [16-18].

The simulations detailed in this paper all rely entirely on the random exchange of money between agents. Although yielding some interesting results about how different parameters can significantly affect the distribution of wealth in a closed economic system, they cannot yet be said to accurately model a closed economic system. But the fact that simple stochastic simulations which mimic real life economic systems (the accumulation and distribution of wealth via businesses) result in distributions comparable to those found in income distributions from the UK/USA [12] is of interest and is something that must have relevance to the way we think about the distribution of wealth.

In the future more complicated asset exchange models could reveal relationships between physical processes and economic systems. These models would work in a similar way in which molecular dynamics simulations do where the exchanges between agents can be said to be random due to the complexity of the system.

Acknowledgments

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AN ECONOPHYSICS MODEL FOR THE MIGRATION PHENOMENA

Anca GHEORGHIU and Ion SPÂNULESCU*

***Abstract.** Knowing and modelling the migration phenomena and especially the social and economic consequences have a theoretical and practical importance, being related to their consequences for development, economic progress (or as appropriate, regression), environmental influences etc. One of the causes of migration, especially of the interregional and why not intercontinental, is that resources are unevenly distributed, and from the human perspective there are differences in culture, education, mentality, collective aspirations etc. This study proposes a new econophysics model for the migration phenomena.*

***Keywords:** migration phenomena, economic attractors, econophysics models, attraction forces, economic power.*

1. Introduction

Physics, is the most suitable for modelling the economic phenomena and structures or financial-banking operations, because it takes into consideration the process variables characteristics and permits to use some procedures – including the mathematical one – especially probability theory for minimizing or eliminating such influences depending on human factor and unexpected phenomena also, which cannot be predicted by direct methods.

Most econophysics approaches, models and papers that have been written so far refer to the economic problems including systems with a large number of elements such as financial or banking markets, stock markets, incomes, production or product's sales, individual incomes and some others models where statistical physics methods, Boltzmann, Gibbs and some other statistical distribution types are mainly applied [1÷14].

In this paper is proposed and analysed a new econophysics model for the migration phenomena.

Interregional, interstate or intercontinental migration phenomena, known since ancient times and is of particular importance both historically,

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politically, but mostly by the economic consequences which these masses movements have on their home regions or countries but also on the countries where these masses are moving sometimes forever. Knowing and modelling of the migration phenomena and especially the socio-economic consequences are important both theoretically and practically, being connected – as mentioned above – especially for their consequences on the economic evolution and progress (sometimes the regress).

2. Migration causes.

The Classical Models for the Migration Phenomena

The mass migration causes, especially of the labour are multiple and extremely diversified, and the inventory and especially the analysis of this phenomenon would require too much space to be addressed in this paper, which generally refers to the modelling of the economic phenomena/processes, using patterns from physics and other sciences.

Excluding small reverse type migrations, which occur to the local border traffic or the international seasonal tourism (summer, winter), below we'll mention some of the types of migration, mainly economic or politic, and caused by natural disasters or catastrophes, wars, revolutions, conflicts etc. (e.g. Afghanistan, Iraq, Libya, Syria, Somalia, devastating Asian earthquakes etc.)

Excepting the great migrations in history (see the “barbarian” invasions) or these produced by major natural disasters or related to socio-political or military conflicts (dictatorships, revolutions, wars etc.) there are three major categories of migrations:

1. The migration of people acceding to a higher standard of living or want a better education or job change etc.
2. The migration of the population unemployed or unskilled or poorly qualified, which takes place mainly in periods of economic recession.
3. Seasonal migration, including of those who return to their home regions (reverse migration).

Regarding the last category (seasonal migration), it is linked to the performance of agricultural labours (crop pickers, “strawberry pickers” etc.) or to the achievement of large industrial objectives or buildings (highways, dams, forestry, residential neighbourhoods or towns, gigantic compound etc.).

Typically, these types of migration are small in number and also in space or time extent.

As well, linked to the first two categories of migration, people generally may migrate to find work, or to accede to a higher standard of living, with higher wages etc. These migrations occur in the rich regions (or countries), developed with public or social services, goods or abundance of job opportunities in the industrial centres, commercial services and access to higher education (universities, research institutes etc.).

In some regions (countries), sometimes there may be large masses of unemployed or unskilled workers, either because of demographic explosions (India, Pakistan etc.), either for economic reasons, as economic and financial crises, bankruptcies or heavy activity restrictions, elimination of large mines or industrial objectives, depleting the soil or subsoil (oil, coal, gold, forestry or agricultural etc.), either to poor economic development (underdeveloped countries) and standard of living (services, goods etc.).

Here can also be embedded the small migrations of political causes, such as those from ex-socialist countries or from some Afro-Asian countries with totalitarian regimes.

Another cause of migration, especially of those inter-regional or inter states, is that labour is not homogeneous in terms of qualifications, social status, human type etc. In highly developed states (USA, Germany, Japan etc.) migrate qualified individuals, sometimes with very high qualifications (programmers, teachers, scientists) as well as workers with low qualifications or no qualifications, for maintenance work, considered by locals as being below the national level of payment or difficult to accept for their status, as sweepers, scavengers, unskilled jobs in restaurants or shops, day labourers, shippers, vendors etc., for immigrants recruited from Asian, African countries etc., sometimes working without legal status.

Small migration may also occur if the policies of big companies are to open branches of production (cars, electronics or computer equipment, etc.) in other countries, or following the opening of large shipyards, mining or similar, as mentioned above.

The migrations of modern and contemporary era may have some positive effects, leading in some cases, to some smoothing or removal of disparities in employment of labour, payroll, development of regions (those who have not yet exploited) etc.). At times, some effects of migration may be less desirable or even disastrous, adding to an increase of underdevelopment and impoverishment in abandoned areas, which are deprived of human capital for economic development (labour).

The most damaging aspect – especially for countries losing skilled workforce – attracted by higher salaries and superior working conditions (research laboratories, documentation funding etc.) – is the migration of

scientists from less developed countries (India, Pakistan, ex-socialist countries including Romania etc.) and other more developed countries (in Europe or Asia) in the United States of America, a phenomenon known as “brain drain”. We’ll not mention here the ethical aspects of the problem, especially as the losses from leaving country specialists, for whose training (schooling) countries have spent large sums of money, but we will reveal that there is an exodus and it can also be included in small migrations category but has major economic implications.

For the economic analysis and prognosis, particularly related to the labour migration, have been developed several models including different variables about the factors that determine migration and influence the economic development of the countries (regions), to absorb labour or, conversely, lead to economic regression of the countries that have lost a part of the workforce, particularly the medium or highly qualified (experts, scientists).

Classical models to describe the migration phenomena, mostly of economic type, were developed based on applying highly simplifying assumptions and therefore the results of their application or their performance was quite poor. These models focus mainly on differences in personal income (derived from wages or from other sources, e.g. businesses) between host regions (countries) and those from which migrants originated. But it must be specified – as has been said before – there are other causes of migration, in addition to these strictly connected to wages or income. Therefore, taking into account the many causes of migration, “classical” models have been corrected or substantially improved, and respectively, adjusted for specific causes groups or to gain even a global or general quality.

Such an “improved” model is based on consideration of the benefits of human capital; hence its emphasis is on migrant’s interests and qualities. This model has the advantage that into the theory of migration based on that model can be incorporated the costs and benefits of migration by introducing the net migration from one region i to another region j :

$$V_{ij} = R_{ij} - C_{ij} \quad (1)$$

where:

V_{ij} – represents the net present value of the migration potential from region i to region j ;

R_{ij} – total benefits expected to be obtained (both monetary and otherwise);

C_{ij} – current total value of the costs that may occur (both monetary and otherwise).

The economic, linguistic and cultural differences and the demographic dynamics between two regions are reflected in Figures 2 to 6 (see Appendix). The Figures refer to the price level indices and the relative dynamic of population according to, the gold reserves, the number of computers/1000 inhabitants and the number of internet users/1000 inhabitants.

The monetary flows migrations, the consumer goods migrations, the populations migrations etc. to the economic attraction centres, also called **economic attractors**, can be assimilated with gravitational or electrostatic attraction models.

The greater the distance to the attractor is, with the respect to time, and also to the transit difficulties or environmental, economic or political barriers, the greater the costs (consumption) attracted elements are.

The other migration model is based on the gravitational attraction principle, hence on the principles of physics (mechanics) in this case based on the law of attraction discovered by Newton. This model, called the gravitational model of migration, proposed and developed by geographers, has the general form [16,17]:

$$M_{ij} = f(A_{ij}, B_{ij}, D_{ij}) \quad (2)$$

where:

M_{ij} – is the total migration from region (country) i to region (country) j ;

A_{ij} – a group of parameters of the migration flow from the country of origin (e.g. the population in the region or country of origin);

B_{ij} – a group of specific variables of the destination country (region) (e.g. the population in the region or country of destination);

D_{ij} – costs (losses) due to the distance between the two regions (transportation costs including obtaining information on the destination region, documents cost etc.)

For the gravitational model was taken into consideration the introduction of economic variables. Thus, an empiric model for determining the size of migration M_{ij} (Total mass of migrants from region i to region j) can be as [15,16]:

$$M_{ij} = f[P_i, P_j, D_{ij}, (U_j - U_i), (W_j, W_i)] \quad (3)$$

where:

P_i – represents the population of the region (country) i ;

P_j – the population of the country j ;

D_{ij} – the “economic” distance, i.e. transport costs between i and j , documentation costs, papers costs etc.;

U_i – the unemployment rate in the country (region) i ;

U_j – the unemployment rate in the country j ;

W_i – the wage rate in the country (region) i ;

W_j – the wage rate in the country (region) j .

In this paper we restrict the categories of migration for economic reasons in which the oriented mass movements of people take place to find better living conditions or to find work, or to raise their training level etc.

3. The Coulomb model for the migration phenomena for economic reasons

In the following we will refer in particular at the large-scale migration, especially interregional or even intercontinental such as those known as “migrations” from the depths of Asia to Europe (that occurred during the first millennium AD), mass migration of people – especially of Europe and Africa – for the Americas. During these periods can be discerned two categories of migration, i.e. spontaneous migration, at the initiative of individuals or smaller or larger groups (looking for resources fitting to their needs) and the second category, the forced migration of large masses of people (slave deportations) transformed into human capital. Since the nineteenth century the share of political and/or economic migration grows, decreasing almost all the second category.

These individuals movements are motivated by the economic attraction for new resources (land, hunting, natural wealth, easy access to capital etc.), to areas with high economic development, or with democratic opening, vis-à-vis the totalitarian doctrines, consistent with the aspirations of some degree of culture of the migrants. If for the Europeans in the XV-XVIII centuries, the migration was mainly spontaneous and had a clear motivation (rapid enrichment, release etc.), for the North African population is a completely different situation, in the sense that their position was not one of free individuals, but one of marketable labour resource (slavery). Forced migration resulting from marketing had as its main aim the best use of the recently discovered American lands and the maximizing of the profits of the new settlers.

Essentially being an economic type polarization, analytical approaches of the phenomenon by models acting as the attractive forces like gravity, electrostatic or, more generally, electromagnetic are understand-

dable [18]. If for the gravity models, the attractors don't have a sign (positive, negative), in the Coulomb case the centres of influence have a sign and can explain the phenomenon of attraction, or rejection and from this perspective we consider it is a close description of actual economic situations.

As it is well known, the electric attractive forces are determined by the well known Coulomb's law [17, 18, 19]:

$$F = K \frac{q_1 q_2}{r_{12}^2} \quad (4)$$

where q_1 and q_2 are the interacting electric charges of opposite sign (figure 1).

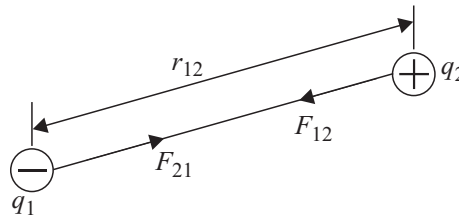


Figure 1. The electrical attraction between two electric charges of different signs.

where r_{12} – is the distance between the two charges, and K – is a proportionality constant, that depends on the properties of the environment between the two charges and of the chosen units system. The most common is the International System of Units (S.I.), where $K = \frac{1}{4\pi\epsilon}$, for spherical symmetry and $K = \frac{1}{2\pi\epsilon}$, for circular symmetry, ϵ being the dielectric constant of the environment (electric permittivity).

For modelling the phenomenon of migration from neighbour regions (countries) j , with a powerful attraction characterized by a high socio-economic status (material resources, capital, developed logistics, information superstructures, banking, commercial or educational etc.) we will appeal to the notion of field (similar with the electric or electrostatic field) E , which is determined by the ratio of the power/force (electricity) F of the attractor and the charge q_0 on which acts the field [18]:

$$E = \frac{F}{q_0} \quad (5)$$

In addition, the subject (individual or capital) can be subjected to the effects of a single centre or of multiple attractor centres, to a greater or lesser extent (attractive or repulsive).

Calculating the force of attraction on a charge q_i symbolizing the number of emigrants from the region (country) i , we have:

$$F_a = q_i E \quad (6)$$

or

$$F_a = \frac{q_i Q_j}{2\pi \varepsilon R^2} \quad (7)$$

where $Q_j = \sum_1^n q_j$ – is the charge distributed in the “rich region” j .

Knowing the intensity of the attraction forces (see eq. (7)), we can calculate the net migration flow given by M_{ij} migrant’s mass from the poor (negative) region (country) i , to the rich (positive) region (country) j :

$$M_{ij} = k \cdot F_a = k \frac{q_i \rho_j a^2}{3\varepsilon R^2} \quad (8)$$

where: q_i – symbolizes the power of the region (country) of origin, i ;

ρ_j – symbolizes the power of the region (country) of destination, j ;

a – characterizes the sizes („radius”) of region j ;

R – the distance between the two regions;

k – the proportionality coefficient.

Using the relation (7) for the Coulomb type force F_a , the total mass of migrants M_{ij} can also be written in the form:

$$M_{ij} = k \cdot F_a = k \frac{q_i Q_j}{2\pi \varepsilon R^2} \quad (9)$$

where $Q_j = \sum_1^n q_j$ symbolizes the economic power of the region (country) j or all measurable in money resources (as PIB, e.g.).

In previous equations ε represents the „environment’s” permissiveness¹ between the two regions from our example i and j .

¹ Term proposed by the authors, by similarity with the electromagnetic permittivity from physics.

As in the cases discussed in the previous subparagraph (v. §.2), can be written for the intensity of migration M_{ij} equations like (1) ÷ (7) i.e.:

$$V_{ij} = R_{ij} - C_{ij} \quad (10)$$

or:

$$M_{ij} = f[P_i, P_j, D_{ij}, (U_j - U_i), (W_j - W_i)], \quad (11)$$

with the meanings of the terms expressed in these relations.

With the support of the new model, this kind of relations can even be explained for different concrete cases; e.g. the equalities between the relations (8) and (11) we can write:

$$k \frac{q_i}{2\pi\epsilon} \frac{Q_j}{R^2} = f(P_i, P_j, D_{ij}, (U_j - U_i), (W_j - W_i)). \quad (12)$$

The physical quantities of the second member can be “correlated” to the physical quantities of the first member relations that include simultaneously electric variables q_i , Q_j and economic variables: $(U_j - U_i)$, $(W_j - W_i)$, P_i, P_j etc.

In the equations (8)-(11) from the model of electrostatic attraction forces, the „distance” costs D_{ij} can be identified by the factor $k \frac{1}{2\pi\epsilon} \frac{1}{R^2}$, where R is the physical distance between the two regions.

4. Conclusions

Based on the analogy between the migration phenomena and electrostatic, electrical interactions has been proposed a new econophysics model for the migration phenomena. The new model has its limits in explaining the massive migration phenomena and the individual reasons of the immigrants, but at the same time it offers a summary of the phenomenon from a macroeconomic point of view and draws attention to the “desertification” of certain regions in qualified human resources, due to their attraction to more prosperous regions.

In addition we must take into account the following considerations:

- A possible change of the economic paradigm.
- The development of new communications and transactions via internet.
- The Knowledge Society could change the balance of economic power of the regions (countries).

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APPENDIX

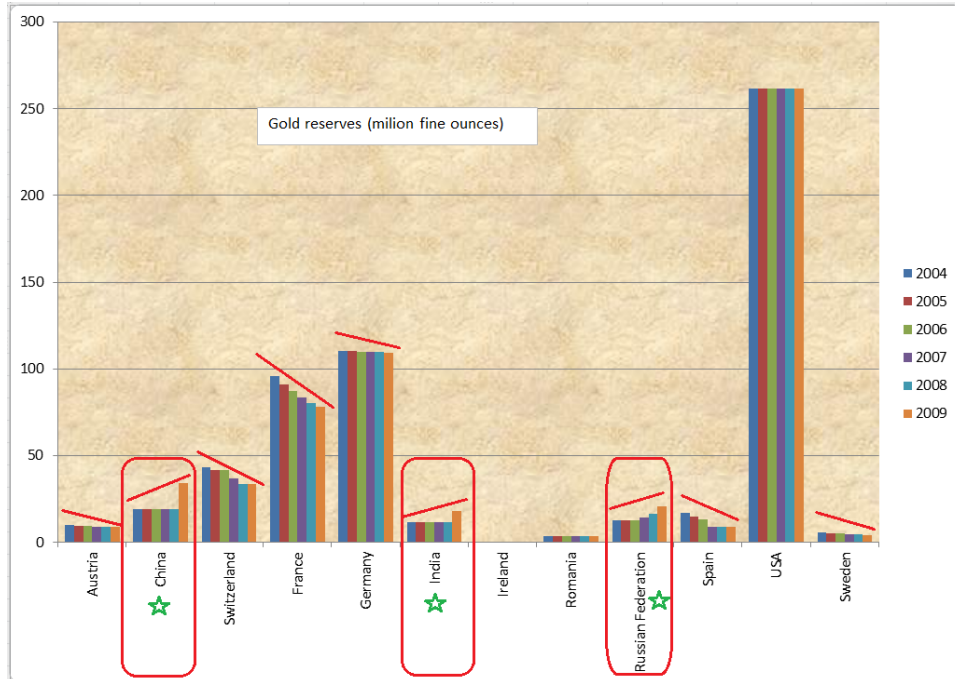


Figure 2. Gold Reserves (million fine ounces).

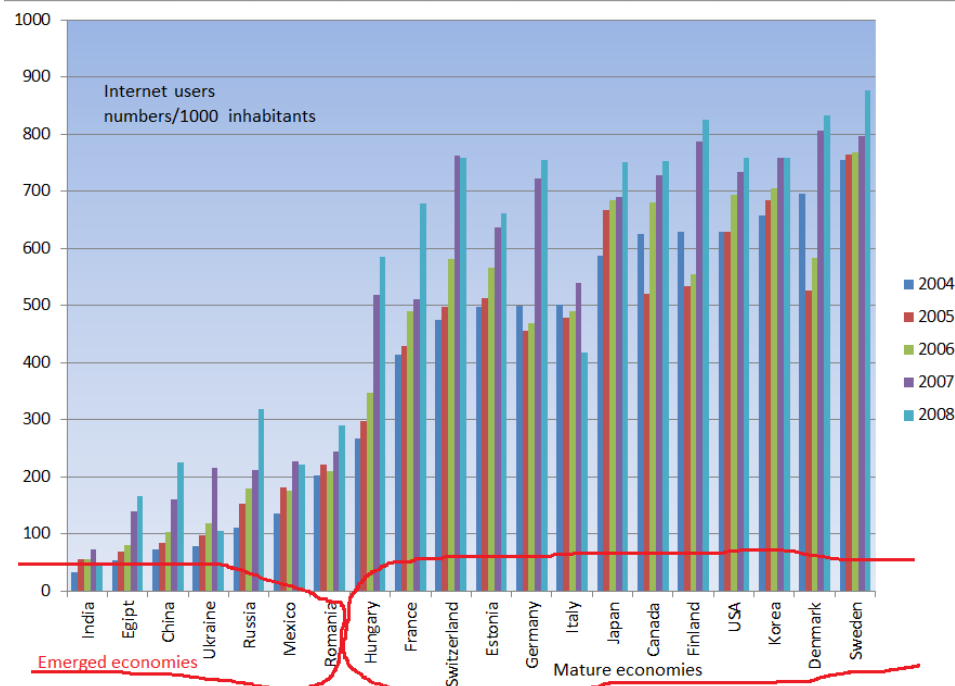


Figure 3. Internet users – numbers/1000 inhabitants.

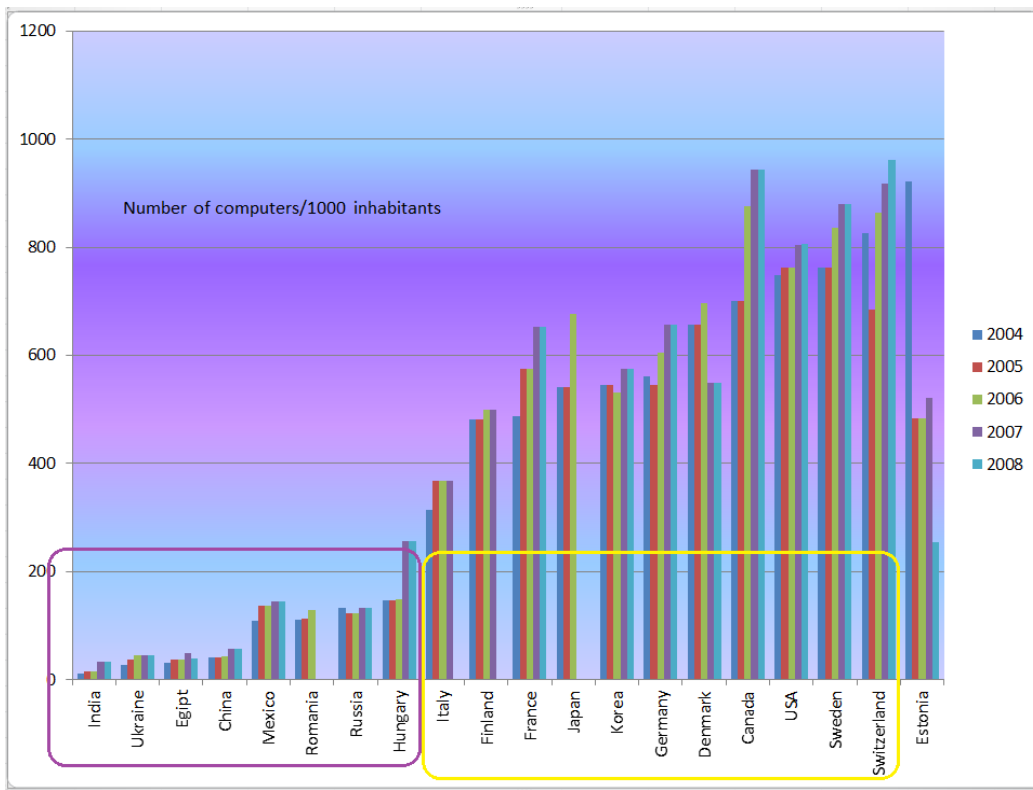


Figure 4. Number of computers/1000 inhabitants.

Purchasing Power Standards (UE-27)

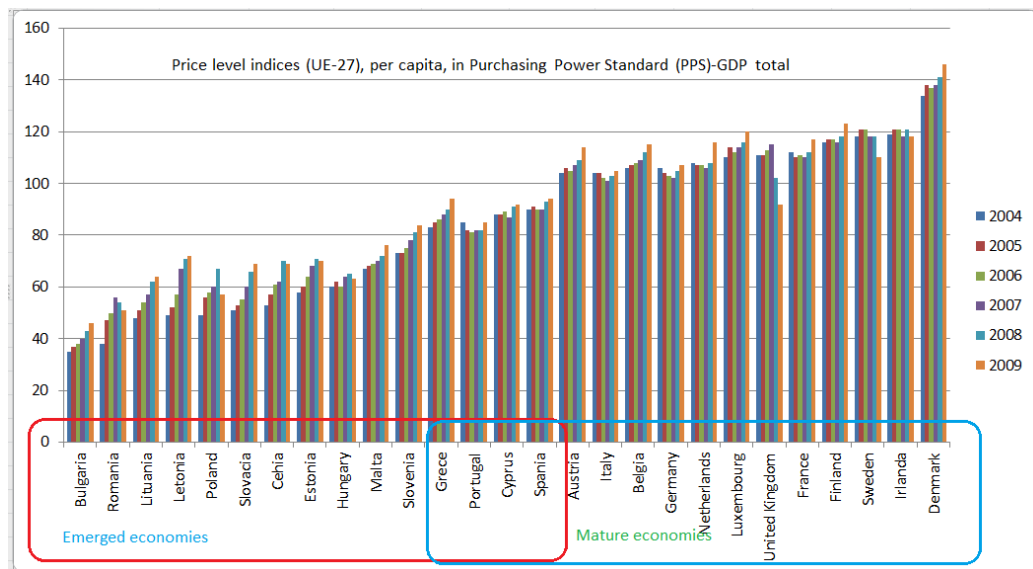


Figure 5. Price level indices (UE-27), per capita, in Purchasing Power Standard (PPS)-GDP total.

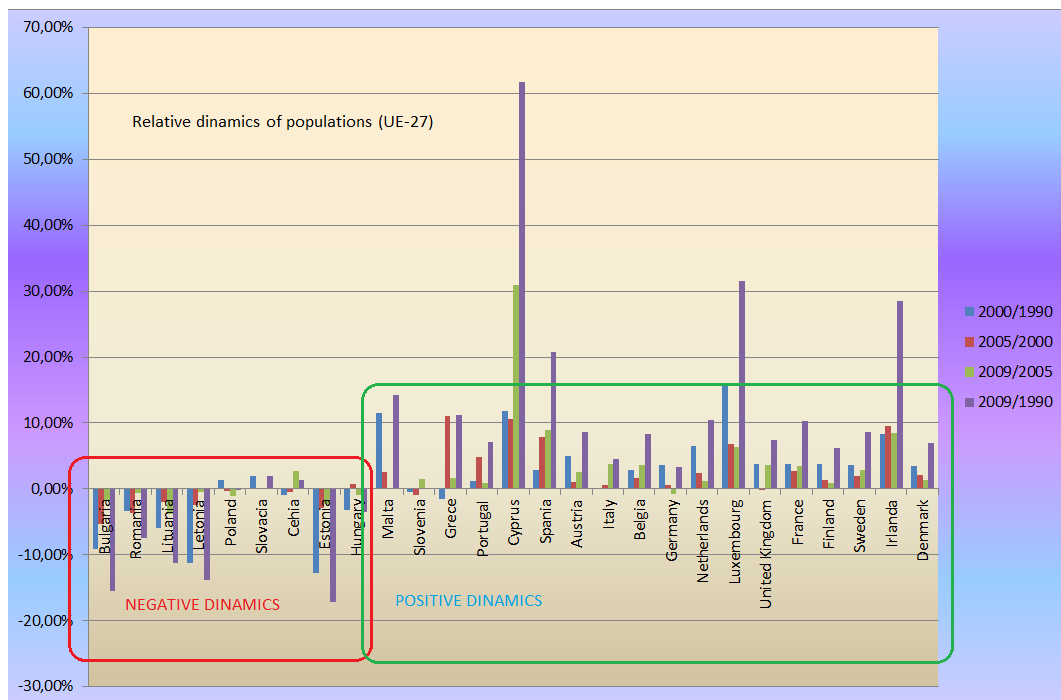


Figure 6. Relative dynamics of population (UE-27).

THE CHAOTIC PRODUCTION GROWTH MODEL OF THE MONOPOLY FIRM

Vesna D. JABLANOVIC*

Abstract. *Chaos theory is used to prove that erratic and chaotic fluctuations can indeed arise in completely deterministic models. Chaos theory reveals structure in aperiodic, dynamic systems. Chaotic systems exhibit a sensitive dependence on initial conditions. Seemingly insignificant changes in the initial conditions produce large differences in outcomes. This is very different from stable dynamic systems.*

To maximize profit, the monopolist must first determine its costs and the characteristics of market demand. Given this knowledge, the monopoly firm must then decide how much to produce. The monopoly firm can determine price, and the quantity it will sell at that price follows from the market demand curve.

The basic aim of this paper is to construct a relatively simple chaotic growth model of the monopoly quantity that is capable of generating stable equilibria, cycles, or chaos.

A key hypothesis of this work is based on the idea that the coefficient

$\pi = \left[\frac{e b}{m(\alpha - 1)(e + 1)} \right]$, *plays a crucial role in explaining local stability of the*

monopoly's production, where, b – the coefficient of the marginal cost function of the monopoly firm, m – the coefficient of the inverse demand function, e – the coefficient of the price elasticity of the monopoly's demand, α – the coefficient.

Keywords: *Monopoly, Production, Chaos, Chaotic model, Logistic Equation.*

Introduction

Chaos theory attempts to reveal structure in nonlinear, unpredictable dynamic systems. It is important to construct **deterministic**, nonlinear economic dynamic models that elucidate irregular, unpredictable economic behavior. Deterministic chaos refers to irregular or chaotic motion that is generated by nonlinear systems evolving according to dynamical laws that uniquely determine the state of the system at all times from a knowledge of the system's previous history. Chaos embodies three important principles:

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(i) extreme sensitivity to initial conditions; (ii) cause and effect are not proportional; and (iii) nonlinearity.

Chaos theory can explain effectively unpredictable economic long time behavior arising in a deterministic dynamical system because of sensitivity to initial conditions. It must be emphasized that a deterministic dynamical system is perfectly predictable given perfect knowledge of the initial condition, and is in practice always predictable in the short term. The key to long-term unpredictability is a property known as sensitivity to (or sensitive dependence on) initial conditions.

Chaos theory started with Lorenz's (1963) discovery of complex dynamics arising from three nonlinear differential equations leading to turbulence in the weather system. Li and Yorke (1975) discovered that the simple logistic curve can exhibit very complex behaviour. Further, May (1976) described chaos in population biology. Chaos theory has been applied in economics by Benhabib and Day (1981, 1982), Day (1982, 1983, 1997), Grandmont (1985), Goodwin (1990), Medio (1993, 1996), Lorenz (1993), among many others.

The basic aim of this paper is to provide a relatively simple chaotic growth model of the monopoly's production that is capable of generating stable equilibria, cycles, or chaos.

A. Simple Chaotic Model of a Profit-Maximizing Monopoly

In the model of a profit-maximizing monopoly, take the inverse demand function:

$$P_t = n - mQ_t \quad (1)$$

Where P – monopoly price; Q – monopoly output, n, m – coefficients of the inverse demand function.

Further, suppose the quadratic marginal-cost function for a monopoly is:

$$MC_t = a + bQ_t + cQ_t^2 \quad (2)$$

MC – marginal cost; Q – monopoly output; a, b, c – coefficients of the quadratic marginal-cost function.

Marginal revenue is:

$$MR_t = P_t \left[1 + \left(\frac{1}{e} \right) \right] \quad (3)$$

MR – marginal revenue; P – monopoly price; e – the coefficient of the price elasticity of demand.

Thus the profit-maximizing condition is that:

$$MR_t = MC_t \quad (4)$$

Further,

$$MR_{t+1} = MR_t + \Delta MR \quad (5)$$

Or

$$MR_{t+1} = MR_t + \alpha MR_{t+1}, \quad (6)$$

i.e.

$$(1-\alpha) MR_{t+1} = MR_t. \quad (7)$$

Thus, the chaotic model of profit-maximizing monopoly is presented by the following equations:

$$(1-\alpha) MR_{t+1} = MR_t \quad (7)$$

$$MR_t = MC_t \quad (4)$$

$$MR_t = P_t \left[1 + \left(\frac{1}{e} \right) \right] \quad (3)$$

$$MC_t = a + b Q_t + c Q_t^2 \quad (2)$$

$$P_{t+1} = n - m Q_{t+1}$$

where: Q – output of the monopolist; MC – marginal cost; MR – marginal revenue; P – monopoly price; e – the coefficient of the price elasticity of demand; n, m – coefficients of the inverse demand function; a, b, c – coefficients of the quadratic marginal-cost function.

Firstly, it is supposed that $a = 0$ and $n = 0$. By substitution one derives:

$$Q_{t+1} = \frac{eb}{m(\alpha-1)(e+1)} Q_t + \frac{ec}{m(\alpha-1)(e+1)} Q_t^2. \quad (8)$$

Further, it is assumed that the monopoly's output is restricted by its maximal value in its time series. This premise requires a modification of the growth law. Now, the monopolist's output growth rate depends on the current size of the monopolist's output, Q , relative to its maximal size in its time series Q^m . We introduce q as $q = Q/Q^m$. Thus q range between 0 and 1. Again we index q by t , i.e., write q_t to refer to the size at time steps $t = 0, 1, 2, 3, \dots$. Now growth rate of the monopolist's output is measured as:

$$q_{t+1} = \frac{eb}{m(\alpha-1)(e+1)} q_t + \frac{ec}{m(\alpha-1)(e+1)} q_t^2 \quad (9)$$

This model given by equation (9) is called the logistic model. For most choices of b , c , m , and e there is no explicit solution for (9). Namely, knowing b , c , m , and e and measuring q_0 would not suffice to predict q_t for any point in time, as was previously possible. This is at the heart of the presence of chaos in deterministic feedback processes. Lorenz (1963) discovered this effect – the lack of predictability in deterministic systems. Sensitive dependence on initial conditions is one of the central ingredients of what is called deterministic chaos.

This kind of difference equation (9) can lead to very interesting dynamic behavior, such as cycles that repeat themselves every two or more periods, and even chaos, in which there is no apparent regularity in the behavior of q_t . This difference equation (9) will possess a chaotic region. Two properties of the chaotic solution are important: firstly, given a starting point q_0 the solution is highly sensitive to variations of the parameters b , c , m , and e ; secondly, given the parameters b , c , m , and e the solution is highly sensitive to variations of the initial point q_0 . In both cases the two solutions are for the first few periods rather close to each other, but later on they behave in a chaotic manner.

Logistic Equation

The logistic map is often cited as an example of how complex, chaotic behaviour can arise from very simple non-linear dynamical equations. The map was popularized in a seminal 1976 paper by the biologist Robert May. The logistic model was originally introduced as a demographic model by Pierre François Verhulst. The logistic map is an example of how complex, chaotic behaviour can arise from very simple non-linear dynamical equations. The map was popularized in a seminal 1976 paper by the biologist Robert May. However, the logistic model was originally introduced as a demographic model by Pierre François Verhulst.

It is possible to show that iteration process for the logistic equation:

$$z_{t+1} = \pi z_t (1 - z_t), \pi \in [0, 4], z_t \in [0, 1] \quad (10)$$

is equivalent to the iteration of growth model (9) when we use the following identification:

$$z_t = -\frac{e c}{e b} q_t \quad (11)$$

and

$$\pi = \left[\frac{e b}{m(\alpha - 1)(e + 1)} \right]. \quad (12)$$

Using (10), (11) and (12) we obtain:

$$\begin{aligned} z_{t+1} &= -\left(\frac{ec}{eb}\right)q_{t+1} = -\left(\frac{ec}{eb}\right)\left[\left(\frac{eb}{m(\alpha-1)(e+1)}\right)q_t + \left(\frac{ec}{m(\alpha-1)(e+1)}\right)q_t^2\right] = \\ &= -\left(\frac{ec}{m(\alpha-1)(e+1)}\right)q_t - \left(\frac{e^2c^2}{ebm(\alpha-1)(e+1)}\right)q_t^2 \end{aligned}$$

On the other hand, using (10), (11), and (12) we obtain:

$$\begin{aligned} z_{t+1} &= \pi z_t (1 - z_t) = -\left(\frac{eb}{m(\alpha-1)(e+1)}\right)\left(\frac{ec}{eb}\right)q_t \left[1 + \left(\frac{ec}{eb}\right)q_t\right] \\ &= -\left(\frac{ec}{m(\alpha-1)(e+1)}\right)q_t - \left(\frac{e^2c^2}{ebm(\alpha-1)(e+1)}\right)q_t^2. \end{aligned}$$

Thus we have that iterating $q_{t+1} = \frac{eb}{m(\alpha-1)(e+1)}q_t + \frac{ec}{m(\alpha-1)(e+1)}q_t^2$ is

really the same as iterating $z_{t+1} = \pi z_t (1 - z_t)$ using $z_t = -\frac{ec}{eb}q_t$ and $\pi = \left[\frac{eb}{m(\alpha-1)(e+1)}\right]$.

It is important because the dynamic properties of the logistic equation (10) have been widely analyzed (Li and Yorke (1975), May (1976)).

It is obtained that:

- (i) For parameter values $0 < \pi < 1$ all solutions will converge to $z = 0$;
- (ii) For $1 < \pi < 3,57$ there exist fixed points the number of which depends on π ;
- (iii) For $1 < \pi < 2$ all solutions monotonically increase to $z = (\pi - 1) / \pi$;
- (iv) For $2 < \pi < 3$ fluctuations will converge to $z = (\pi - 1) / \pi$;
- (v) For $3 < \pi < 4$ all solutions will continuously fluctuate;
- (vi) For $3,57 < \pi < 4$ the solution become chaotic which means that there exist totally aperiodic solution or periodic solutions with a very large, complicated period. This means that the path of z_t fluctuates in an apparently random fashion over time, not settling down into any regular pattern whatsoever.

Conclusion

This paper suggests conclusion for the use of the simple chaotic model of a profit –maximizing monopoly in predicting the fluctuations of the monopoly's output. The model (9) has to rely on specified parameters parameters b , c , m , and e , and initial value of the monopolist's output, q_0 . But even slight deviations from the values of parameters parameters b , c , m , and e and initial value of the monopolist's output, show the difficulty of predicting a long-term behavior of the monopoly's output, q_0 .

A key hypothesis of this work is based on the idea that the coefficient $\pi = \left[\frac{eb}{m(\alpha - 1)(e + 1)} \right]$, plays a crucial role in explaining local stability of the monopoly's output, where, b – the coefficient of the marginal cost function of the monopoly firm, m – the coefficient of the inverse demand function, e – the coefficient of the price elasticity of monopoly's demand, α – the coefficient.

The quadratic form of the marginal cost function of the monopoly's is important ingredient of the presented chaotic monopoly's output growth model (9).

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ELASTIC COLLISIONS OF HARD SPHERES VERSUS WEALTH EXCHANGE INTERACTIONS

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***Abstract.** We discuss the widely accepted deeper analogy between the theory of market economics and the kinetic theory of ideal gases. We first derive the microscopic collision equations of a simplified model of a gas of hard spheres of arbitrary dimension. Assuming that the distribution of the velocities is identical in all regions of space we avoid tracking the spatial position of the individual particles during our random walk. Instead, we simply select randomly pairs of particles which are supposed to collide and to exchange a fraction of their energies. In spite of this dramatic simplification, commonly adapted in wealth exchange models, the velocity as well as the resulting energy distributions compare well with the theoretical Maxwell-Boltzmann distributions.*

The microscopic collision equations which describe the time evolution of the macroscopic variables are then compared with those commonly adapted in various wealth exchange models. It turns out that their formal structure is identical, however the dynamical outcome depends strongly on the choice of the microscopic interaction rules which are often taken "ad hoc" in these models. Depending on the choice of the microscopic interactions, which might not necessarily reflect the physics of collision, one can find all kinds of distributions such as uniform, Gaussian, Gamma, inverse power law and to some extent distributions which do not even manifest a stable equilibrium. However, as long as the energy of the two agents mixes and is randomly distributed between the two agents we recover the familiar Maxwell-Boltzmann distribution, where the theory of molecular chaos and the central limit theorem play a crucial role.

1. Introduction

The Maxwell Boltzmann velocity distribution applies to ideal gases, where the particles do not constantly interact with each other but move freely between short collisions, where the only interactions taken into account are binary collisions. It describes the probability of a particle's velocity, its momentum or energy as a function of the mass and the

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temperature. Provided that the probability distribution is assumed to be independent of the position of the particles, we have the homogeneous Boltzmann equation:

$$\frac{\partial P}{\partial t} = Q(P(t, \vec{v}, \vec{v}')) \quad (1)$$

which can be regarded as a cornerstone of statistical mechanics [11]. Here \vec{v} and \vec{v}' specify the velocity vectors of a particle before and after the collision, respectively. The collision operator Q accounts for all kinds of binary collisions which preserve the energy and the momentum. It forms the basis of the kinetic theory of gases, which explains many fundamental gas properties such as velocity and energy probability distributions. To be more specific, the Boltzmann equation describes the temporal evolution of the probability distribution of the density of a cloud of particles. The partial derivative of the distribution function $P(t, \vec{v}, \vec{v}')$ on the left-hand side in Eq.(1) represents the explicit time variation of the distribution function, while the right-hand side of the equation represents the effect of collisions. In the special case of short-range interactions in the hard sphere model, where particles are spheres only interacting by contact, one assumes for the post-collision velocities [11]:

$$\vec{v}'_1 = \frac{1}{2}(\vec{v}_1 + \vec{v}_2) + \frac{1}{2}\mathbf{R}(\vec{v}_1 - \vec{v}_2) \quad \vec{v}'_2 = \frac{1}{2}(\vec{v}_1 + \vec{v}_2) - \frac{1}{2}\mathbf{R}(\vec{v}_1 - \vec{v}_2). \quad (2)$$

Here, the first term is the velocity of the centre of mass, while the difference term, the relative velocity of the two particles, undergoes a rotation via the rotation matrix \mathbf{R} . The velocity, the energy and all the other macroscopic quantities will have different probability distribution functions, although all these distributions are related. The velocity distribution $P(\vec{v})$ in n -dimensional space is a product whose n factors are independent and normally distributed with zero mean.

We stress already at this point that there are fundamental differences between the collision mechanism of classical gas particles and the wealth exchange interactions of agents, where savings and highly selective random effects play a significant role, while for the classical gas molecular chaos plays the decisive role [3, 11]. In fact, the crucial problem in modelling wealth exchange is the search for meaningful real-life macroscopic rules, which describe how wealth is exchanged in economic trades. In most models currently practiced, these rules are derived from plausible assumptions in an ad hoc manner, which is clearly in marked contrast to Boltzmann's original theory, where the microscopic collisions are

governed by strict physical laws given for example by Eq.(2) in the case of the hard sphere problem. On the other hand, wealth exchange models often aim at a Pareto tail of the probability distribution of wealth [8] which is a manifestation of the existence of very rich agents, a manifestation of an unequal distribution of wealth.

2. Elastic collision in arbitrary dimensions

We assume collisions to be elastic, i.e., the total kinetic energy and momentum of the particles are conserved. Let us first treat particles which are all equal and indistinguishable with masses $m_1 = m_2 = 1$. The collision process can then be analyzed in two reference frames: the laboratory frame and centre of mass frame. Assuming that the two particles move with velocities \vec{v}_1 and \vec{v}_2 , the centre of mass of the system moves with the velocity:

$$\vec{v}_s = \frac{1}{2}(\vec{v}_1 + \vec{v}_2). \quad (3)$$

The corresponding velocities in the centre of mass coordinate system are:

$$\vec{v}_{1s} = \vec{v}_1 - \vec{v}_s = \frac{1}{2}\vec{v}_{12} \quad \vec{v}_{2s} = \vec{v}_2 - \vec{v}_s = -\frac{1}{2}\vec{v}_{12} \quad (4)$$

with $\vec{v}_{12} = \vec{v}_1 - \vec{v}_2$. The momentum, identical with the velocities in the equal mass case, are equal in magnitude and opposite in direction. Accordingly, in the centre of mass frame a collision induces a pure rotation of the velocity vectors:

$$\vec{v}'_{1s} = \mathbf{R}\vec{v}_{1s} \quad \vec{v}'_{2s} = -\mathbf{R}\vec{v}_{2s} \quad (5)$$

Here \mathbf{R} specifies a rotation matrix with the axis of rotation and the rotation angle still to be specified. Note that for dimensions $D > 2$ the velocity vectors after the collision do not necessarily lie in the same plane as the velocity vectors before the collision. Back transforming from the centre of mass frame into the laboratory frame the post-collision velocities are:

$$\vec{v}'_1 = \vec{v}_1 + \vec{\Delta} \quad \vec{v}'_2 = \vec{v}_2 - \vec{\Delta} \quad (6)$$

with the transferred momentum:

$$\vec{\Delta} = \frac{1}{2}(\mathbf{R}\vec{v}_{12} - \vec{v}_{12}) \quad (7)$$

The moments are conserved and the squared velocities take the form:

$$v_1'^2 = \bar{v}_1^2 + 2\bar{v}_1\bar{\Delta} + \bar{\Delta}^2 \quad v_2'^2 = \bar{v}_2^2 - 2\bar{v}_2\bar{\Delta} + \bar{\Delta}^2 \quad (8)$$

while energy conservation demands:

$$(\bar{v}_1 - \bar{v}_2)\bar{\Delta} + \bar{\Delta}^2 = 0. \quad (9)$$

Introducing the cosines of the angles φ_1 and φ_2 between the transferred momentum $\bar{\Delta}$ and the velocities \bar{v}_1 and \bar{v}_2 by:

$$\cos \varphi_1 = \frac{\bar{v}_1 \bar{\Delta}}{|\bar{v}_1| |\bar{\Delta}|} \quad \cos \varphi_2 = \frac{\bar{v}_2 \bar{\Delta}}{|\bar{v}_2| |\bar{\Delta}|} \quad (10)$$

into Eq.(9), we can solve for the magnitude of the transfer vector $|\bar{\Delta}|$ and find

$$|\bar{\Delta}| = |\bar{v}_2| \cos \varphi_2 - |\bar{v}_1| \cos \varphi_1. \quad (11)$$

Eventually we have for the post-collision energies:

$$E_1' = E_1 \sin^2 \varphi_1 + E_2 \cos^2 \varphi_2 \quad E_2' = E_2 \sin^2 \varphi_2 + E_1 \cos^2 \varphi_1. \quad (12)$$

Note that in the case of different masses ($m_1 \neq m_2$) the formalism is as straightforward, however lengthy, and the right hand side of Eq.(12) is not linear in the energy terms E_1 and E_2 any more.

3. Collision geometry for hard spheres

Provided we know the two velocity vectors \bar{v}_1 and \bar{v}_2 before the collision, we also know the scattering angle $\varphi_{12} = \angle(\bar{v}_1, \bar{v}_2)$. The angle of rotation φ then allows the calculation of all relevant quantities by means of a simple geometrical problem in two dimensions, where the rotation angle φ can take any value between 0 and π . We eventually find for the angles φ_1 and φ_2 :

$$\cos \varphi_1 = \frac{+|\bar{v}_2| (\cos \varphi_{12} - \cos(\varphi_{12} \pm \varphi)) - |\bar{v}_1| (1 - \cos \varphi)}{\sqrt{2(1 - \cos \varphi)} |\bar{v}_{12}|} \quad (13)$$

$$\cos \varphi_2 = \frac{-|\bar{v}_1| (\cos \varphi_{12} - \cos(\varphi_{12} \mp \varphi)) + |\bar{v}_2| (1 - \cos \varphi)}{\sqrt{2(1 - \cos \varphi)} |\bar{v}_{12}|}. \quad (14)$$

Figure 1 depicts a scattering diagram which allows to construct the post-collision velocity vectors Eq.(6) from a pure geometrical aspect. The figure:

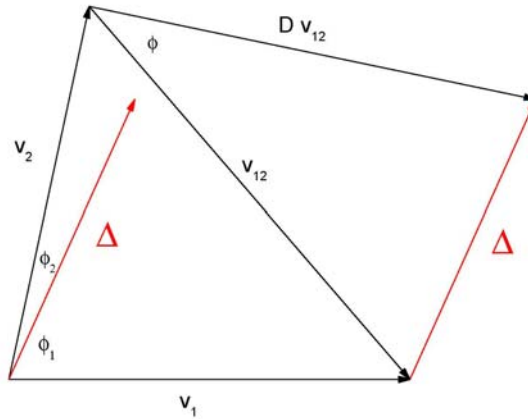


Figure 1. Scattering diagram with the main ingredients, the pre-collision velocity vectors \vec{v}_1, \vec{v}_2 which determine the crucial transfer vector $\vec{\Delta}$ order to construct the post-collision: velocities \vec{v}'_1 and \vec{v}'_2 .

also shows that the two angles ϕ_1 and ϕ_2 are not independent. They are related to the collision angle $\phi_{12} = \angle(\vec{v}_1, \vec{v}_2)$ via:

$$|\phi_1 \pm \phi_2| = \phi_{12} \quad (15)$$

where the angles in Eq.(15) are considered to be taken mod (2π) . The sign within the absolute values depends on the geometrical situation. Provided that the transfer vector $\vec{\Delta}$ lies within the parallelogram spanned by the two velocity vectors \vec{v}_1 and \vec{v}_2 , we have the plus sign, otherwise we have to take the minus sign. The two angles ϕ_1 and ϕ_2 depend uniquely on the pre-collision velocity vectors as well as on the angle of rotation ϕ . For the hard sphere model the angle of rotation ϕ is deterministic and depends on the relative space coordinate \vec{r}_{12} of the two particles at the moment of the collision as well on the radii of the particles in terms of the impact parameter [7]. For the ideal gas we make use of the molecular chaos assumption which is part of the kinetic theory of gases. The postulate says that during a two-body collision between particles, there is no correlation of velocity. However, it has been impossible to prove this assumption rigorously, although it is widely thought to be true. Accordingly, the angle of rotation ϕ can be taken at random from a uniform distribution in the interval $\phi \in [0 : \pi]$. As shown

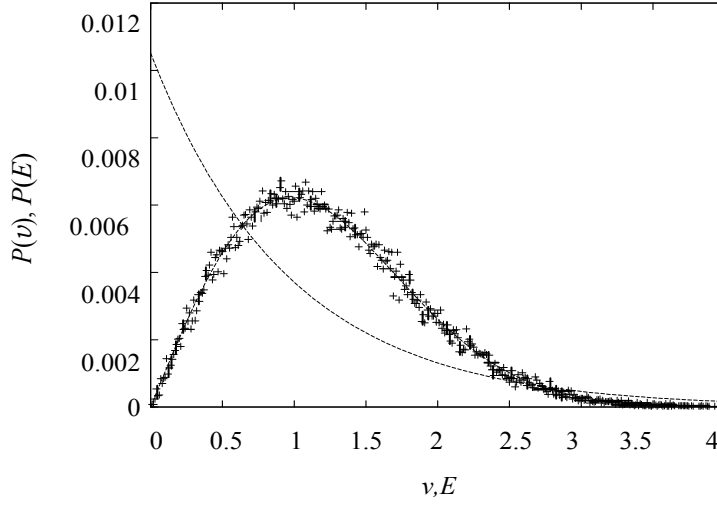


Figure 2. Velocity and Energy distribution $P(v)$ and $P(E)$ according to Eqs.(16) (17) in two dimensions for arbitrary rotation angle ϕ .

in Figure 2 the velocity distribution is Gaussian:

$$P(v) \propto v^{D-1} e^{-\frac{mv^2}{2kT}} \quad (16)$$

and depends on the space dimension D as well as on the temperature T , where the Boltzmann factor k has been set to one. The probability density function of the energy can directly be calculated by familiar transformation techniques $v \rightarrow E = \frac{m}{2}v^2$ and we have:

$$P(E) \propto E^{\frac{D}{2}-1} \exp\left(-\frac{E}{T}\right). \quad (17)$$

The energy distribution is the familiar Gamma distribution, where for dimension $D = 2$ we recover the exponential distribution. Note that there are a variety of ways to derive the Maxwell-Boltzmann statistics.

4. Interacting agents

It is meanwhile widely accepted that in certain aspects a wealth exchange model composed of an assembly of N indistinguishable agents, each of which has a certain wealth E_i , ($i = 1, \dots, N$), can be attacked with the tools of the Boltzmann legacy [11, 13] even if the interaction rules are not that physical at all. The gas particles correspond to the agents, the energy of the particles are identified with the wealth of the agent, while the binary

collisions correspond to wealth-exchange interactions between the agents. The interactions occur pair wise between randomly chosen agents who exchange wealth or energy according to the following interaction rule:

$$E'_i = pE_i + qE_j \quad E'_j = (1 - q)E_j + (1 - p)E_i. \quad (18)$$

Note that these equations are formally identical with Eq.(12) which describe the energy transfer of hard spheres with $p = \sin^2 \phi_1$ and $q = \cos^2 \phi_2$. However, in contrast to wealth exchange models, in the hard spheres problem the two angles ϕ_1 and ϕ_2 are specified by the physics of collisions Eq.(2). According to Eqs.(13) and (14) they depend on the two velocity vectors \vec{v}_1 and \vec{v}_2 as well as on the angle of rotation ϕ . They also satisfy the relation $|\phi_1 \pm \phi_2| = \phi_{12}$, although in contrast to the physics of collision, wealth exchange models assume that the corresponding interaction coefficients p and q are independent. In terms of the energy transfer we have:

$$E'_i = E_i - \bar{\Delta} \quad E'_j = E_j + \bar{\Delta} \quad (19)$$

with the transfer term:

$$\bar{\Delta} = pE_i - (1 - q)E_j. \quad (20)$$

Agent i transfers a fraction $1 - p$ of its wealth to agent j , while agent j transfers a fraction q of its wealth to agent i . The interaction coefficients p and q , both taken $\in [0, 1]$ are usually drawn from rather specific probability distributions according to the needs and aims of the specific model. Different wealth exchange models differ in their recipes of specifying the microscopic interaction coefficients p and q .

The decisive question now is: How does the probability density distribution $P(E)$ evolve in time during a large number of interactions? The time dependent distribution will obviously depend on the particular interaction rules, in contrast to nature that chooses the universal Maxwell-Boltzmann distribution in the ideal gas problem extremely rapidly [7]. The simplest wealth exchange model is characterized by a completely random exchange of energy following closely the rules of an ideal gas. One assumes that during each interaction the total energy of the two agents E_1 and E_2 mixes and randomly splits between the two agents with equal probability to gain or to lose energy. This choice corresponds to the choice $p = q$ in Eq.(20), where p is a random number chosen uniformly in the interval $[0, 1]$. This yields the well-known Maxwell-Boltzmann distribution of the energy for $D = 2$:

$$P(E) \propto \exp\left(-\frac{E}{T}\right) \quad (21)$$

with the equilibrium distribution given by the pure exponential, where the temperature T specifies the average energy.

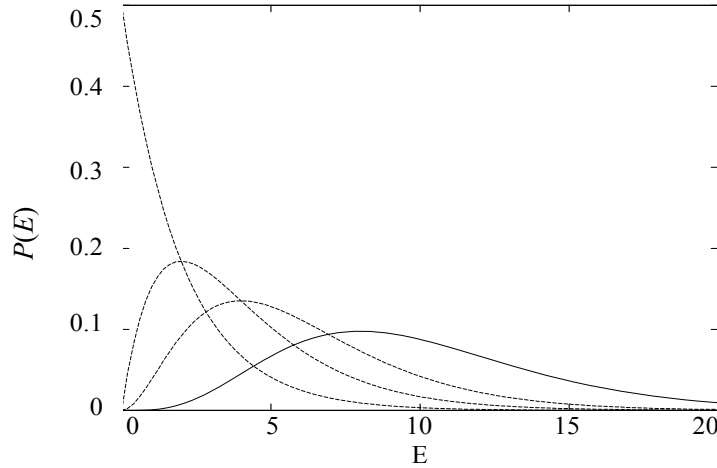


Figure 3. Gamma distribution for $T = 2$ and different values of k ($k = 0.8, 1., 2.,$ and 3.5).

4.1. Saving with fixed fraction of exchange

Features typically incorporated in kinetic trade models are saving effects and a rather specific kind of randomness. Here, saving means that each agent is obliged to keep a certain minimal fraction of his initial wealth which is not involved into the trade. Randomness means that the amount of transferred wealth is not deterministic and depends on a specific probability distribution characteristic for a specific model. It is a generalization of the basic elastic scattering model, where not the full amount of their energy, but only a fraction λ of the energy is involved in the exchange process [2, 12]. The agents save a fraction λ of their energy during the interaction such that the energy part $\lambda(E_1 + E_2)$ mixes and is randomly split between the two agents. The microscopic transfer equations for a quite general model, where a variety of commonly used models stem from, are given by:

$$E'_1 = \lambda E_1 + \varepsilon(1 - \lambda)(E_1 + E_2) \quad E'_2 = \lambda E_2 - (1 - \varepsilon)(1 - \lambda)(E_1 + E_2) \quad (22)$$

with the interaction coefficients:

$$p = \lambda + \varepsilon(1 - \lambda) \quad q = \varepsilon(1 - \lambda) \quad (23)$$

specified in Eq.(20) The stochastic control parameter $\varepsilon \in [0,1]$, which is chosen at random at each interaction, specifies how the remaining amount for exchange $(1 - \lambda)(E_1 + E_2)$ is shared between the two interacting agents.

This randomly sharing of the “bet” with a random variable ε uniformly distributed in the interval $[0, 1]$ constitutes a rather awkward recipe for professional commercial interactions, while on the other hand, it is much better suited to the ideal gas model. For $\varepsilon = 1$ we recover Angle’s [1, 4] one parameter model, the very first description of a wealth exchange model with binary interactions, where the winner or the loser are chosen at random. Here, the loser transfers a fixed fraction λ of his wealth to the winner. Note that winning and losing is an asymmetric process. The loss for the loser is deterministic, since he loses a fraction p of his wealth. In contrast, the gain for the winner is a random process, since he gains a fraction p of the wealth of his randomly chosen partner. Leaving the path of physics, the time evolution of the models seems to relax toward an equilibrium probability density distribution well approximated by the gamma distribution [1]:

$$P_\gamma(E) = \frac{1}{\Gamma(k)} \frac{1}{T} \left(\frac{E}{T}\right)^{k-1} \exp\left(-\frac{E}{T}\right). \quad (24)$$

However, in contrast to the energy distribution of the ideal gas model the fitting parameter k in Eq.(24) which is related to the dimension D , can also take arbitrary positive real values, depending on the control parameter λ , which constitutes an interesting generalization to non-integer dimensions. Only for $p = \frac{1}{2}$, when the loser transfers exactly half of its energy, the solution is analytic with $k = 1$, corresponding to the dimension $D = 2$ and follows the Boltzmann statistics.

4.2. Individual saving with random fraction of exchange

In this model agent i saves an individual fraction λ_i of his energy and invests the fraction $1 - \lambda_i$ of its wealth into the exchange process. In this model the available wealth $(1 - \lambda_i)(E_i + E_j)$ is not equally shared, but in a stochastic way via a randomly chosen control parameter ε . Eventually all agents can become equally rich or poor, i.e. we end up with Gaussian and Gamma like probability distributions, respectively. The microscopic interaction rules are given by:

$$E'_i = E_i + \bar{\Delta} \quad E'_j = E_j - \bar{\Delta} \quad (25)$$

with:

$$\Delta = \varepsilon(1 - \lambda_j^\alpha)E_j - (1 - \varepsilon)(1 - \lambda_i^\alpha)E_i. \quad (26)$$

Here the control parameters λ_i ($i = 1, \dots, N$) uniformly distributed $[0, 1]$ denote individual savings parameters, which determine the fraction of the energy of the i -th individual is saved. The stochastic control parameter $\varepsilon \in [0, 1]$, which is changed at each interaction, specifies how the remaining

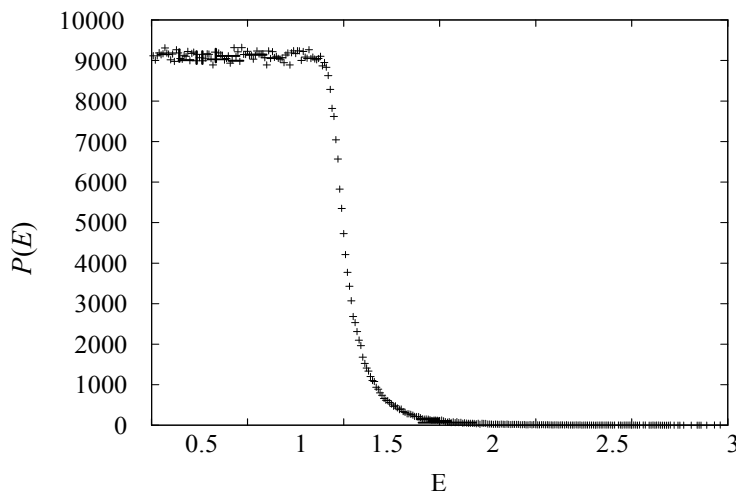


Figure 4. Non-normalized energy distribution for λ_i chosen uniformly and $\alpha \gg 1$.

amount for exchange $(1 - \lambda)(E_i + E_j)$ is shared between the two interacting agents. For $\lambda_i = 0$ we recover the unconstrained ideal gas model, where the agents encounter random elastic collisions. The resulting distribution is of the familiar Maxwell-Boltzmann type. In the individual savings model the particles are no longer identical, since the savings parameter λ_i is different for each agent. For different values of the control parameter α which regulates the savings mechanism we find a variety of distributions, even uniform distributions in the low energy part, while the tail is complemented with the famous pareto inverse power law for $\alpha \gg 1$ depicted in Figure 4.

4.3. “The rich get richer” model

In this somewhat exotic model always the richer agent wins such that the poorer agent transfers a fraction p of his wealth to the richer agent. This is obviously in marked contrast to the physics of collision, where in general the energetically richer particle transfers a fraction of its energy to the energetically poorer particle, which gives rise to a less unequal distribution. Computer simulations for the “Rich get richer model” reveal that the time evolution of the probability distribution does not reach a stationary state. Since essentially the richer agents become richer, energy

conservation implies that with increasing time there will be many more poor agents than rich ones. In the long time limit a small fraction of the agents possesses most of the wealth [6]. Eventually, the whole energy ends up being in the hands of one single agent. This “economic collapse” would correspond to a gas, where one particle has absorbed all the kinetic energy, while the other particles do

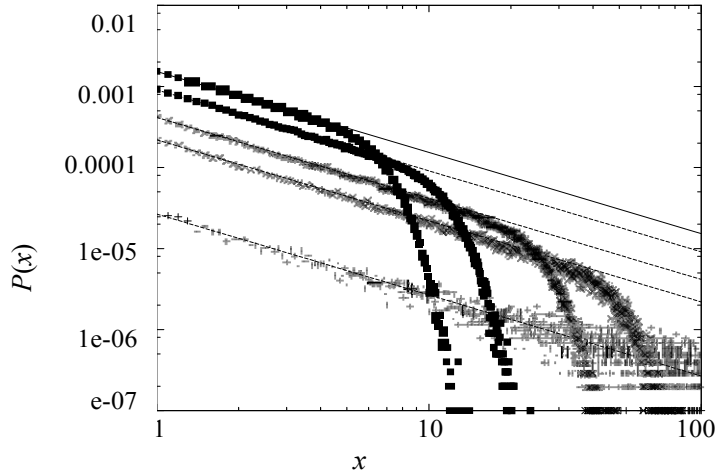


Figure 5. Energy distribution for increasing values of the energy transfer parameter p ($p = 0.2, p = 0.5, p = 0.6,$ and $p = 0.8$ from above) for the energetically poorer agent.

not move at all and rather stay at rest. Computer simulations reveal that the low energy part of the energy distribution follows a power law $P(E) \propto \frac{1}{E^k}$ with $k = 1$, while the tail of the distribution seems to follow an exponential law in accord with the Bose-Einstein distribution:

$$P(E) \propto \frac{E^{k-1}}{\exp\left(\frac{E-\mu}{T}\right) - 1}. \quad (27)$$

Note that, provided that the chemical potential μ takes the value zero the Bose-Einstein distribution also an exponentially truncated power law. Moreover, in classical gases the collisions are completely random which results in Maxwell-Boltzmann distributions. In contrast, collisions in bosonic gases are selective, since the particles prefer highly occupied energy states due to the bosonic enhancement in the occupation number the zero momentum natural orbital. We refer to a detailed description and analysis of the “Rich get richer” model in these proceedings [6]. However the appearance of Bose condensates of more than 90% in the energy

distribution might be a finite size effect due to the discrete binning procedure such that almost all poor agents will be found in the very first bin.

5. Discussion

Due to substantial differences between the collision dynamics of ideal gas particles and the modelling of wealth exchange interactions, only models based most closely on the kinetic theory of gases predict the familiar Maxwell-Boltzmann distributions. Whenever the interactions are governed by more or less exotic rules which seriously constrain the energy exchange they produce a memory effect on the agents. The result is the appearance of more or less unphysical and exotic energy distributions. By contrast, as long as the rules are chosen randomly in an unconstrained random fashion in analogy to the molecular chaos postulate, the distributions turn out to be physical and obey the familiar Maxwell-Boltzmann statistics. Macroscopically, the richness of the steady states of the energy distributions for wealth exchange models is the essential difference with respect to the theory of Maxwell particles. While the Maxwell-Boltzmann distribution is the universal stationary profile for the distribution of ideal gas particles, those for wealth exchange models can widely vary. They take forms such as uniform distributions, truncated exponential distributions, Gamma distributions, Gaussian distributions, mixed exponential and inverse power law distributions, the celebrated Pareto distributions. Note that most of these piecewise defined distributions, which are not even known analytically, can also be found in the theory of complex biological systems. On the other hand, depending upon the specific choice of the saving mechanism and the stochastic nature of the exchange interactions, the studied systems produce the desired wealth distributions, either of the Boltzmann type or those with the celebrated Pareto law. To conclude, the analogy between the theory of market economics and the kinetic theory of ideal gases does not seem to be that deep and direct as commonly believed. However there is no doubt that Maxwell-Boltzmann theory can serve as the first rate tool for the analytic and numerical analysis of wealth exchange interactions, even if these interactions are far away from the path of physics.

6. Acknowledgments

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USING FRACTAL THEORY IN DATABASES DESIGN

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Abstract. *The objective of this paper is to present a new method for Databases Design by using fractal theory. This solution could be implemented only for price fluctuations analytic system. This article will propose a concept to improve the price fluctuations analysis.*

Keywords: *database, fractal, analytic system, Portfolio Theory.*

1. Introduction

Perhaps the most important thing in the economy is to be able to predict more or less accurately what will happen to the market after some time. The dominant theory that was used for this was the Portfolio Theory. According to it, the probability of various changes of the market can be shown using the standard bell curve:



Figure 1. Portfolio Theory graph [3].

Assuming that the Portfolio Theory is accurate, we can say that very small changes happen most often, while very big changes happen extremely rarely. In practice this is not true. While on the bell curve, one can observe the probability of rapid changes to approach zero, they can, be seen almost every month at the real market. Consider taking a year of

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market activity and graphing the price for every month. You will get a broken line with some rises and falls. Now, if you take one of the months and graph it in a more detailed way, with every week shown, you will get a very similar line with some rises and falls. If you make it more and more detailed by showing every day, every hour, and even every minute or second you will still get the same, only smaller, rises and falls. In order to correct the Portfolio Theory, Benoit Mandelbrot introduced a new fractal theory that can be used much more efficiently than the Portfolio Theory to analyze the market.

Benoit Mandelbrot came up with a method of creating fractals that fit the above description. He based in on simple generator iteration and created base-motif fractals that could model the market. In the February 1999 issue of Scientific American, he published some of his fractal “forgeries” next to real market lines, showing how remarkably similar they were.

The concept of fractals has been spread over all fields of sciences and represents "a rough or fragmented geometric shape that can be split into parts, each of which is (at least approximately) a reduced-size copy of the whole, a property called self-similarity.

This paper will present in next chapters a concept to design database in order to create a price fluctuations analytic system.

2. Design database for price fluctuations analytic system

In our days, in economics, we search for a balance between demand and supply, but it becomes evident that in reality such balances are hardly be realized for most of popular commodities in our daily life.

The important point is that demand is essentially a stochastic variable because human action can never be predicted perfectly; hence the balance of demand and supply should also be viewed in a probabilistic way. If demand and supply are balanced on average the probability of finding an arbitrarily chosen commodity on the shelves of a store should be 1/2, namely about half of the shelves should be empty. Contrary to this theoretical estimation shelves in any department store or supermarket is nearly always full of commodities. This clearly demonstrates that supply is much in excess in such stores. Excess supply generally holds for most of commodities especially foods in economically advanced countries.

In order to design a correct database for a price fluctuations analytic system we must identified the numerical market model. The model consists of speculative dealers who transact with others simply following the basic rule “buy at a lower price and sell at a higher price”. These two threshold prices are determined at each time step by each dealer taking into account the information of past market price changes. It is shown that even a smallest limit case of 3 dealers can show chaotic behaviours, implying that the transaction's nonlinear effect is very strong [1]. If we organize this data into a database structures like a table:

Id_price	Buying price	Selling price
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we can obtain in time information that can be manipulating for creating analysis. The model of the table presented can be extended in order to create an analysis based on the formula:

$$C(T) = \frac{\langle \Delta r(T_0 + T) \Delta r(T_0) \rangle - \langle \Delta r(T_0) \rangle^2}{\langle \Delta r(T_0)^2 \rangle - \langle \Delta r(T_0) \rangle^2}. \quad (1)$$

In the paper FRACTAL PROPERTIES IN ECONOMICS written by HIDEKI TAKAYASU, MISAKO TAKAYASU, MITSUHIRO P. OKAZAKI, KOUHEI MARUMO, TOKIKO SHIMIZU is presented a typical example of yen-dollar rate changes in 3 different time scales. Intuitively this figure demonstrates a fractal property of exchange rates in the time axis measured by ticks, namely, Mandelbrot's classical finding also holds for this contemporary market price fluctuation. The statistics of this fluctuation is very close to random walk; actually it is easy to confirm that the power spectrum of this fluctuation clearly follows an inverse square law that is almost identical to a Brownian motion. The corresponding auto-correlation function for rate fluctuation per tick defined by the equation decay very quickly.

If we extend the table in order to accumulate the information for analysis we obtain:

Id_price	Buying price	Selling price	Transaction Time
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Also we can use the cash-flow model to build the structure of database and for a better analysis.

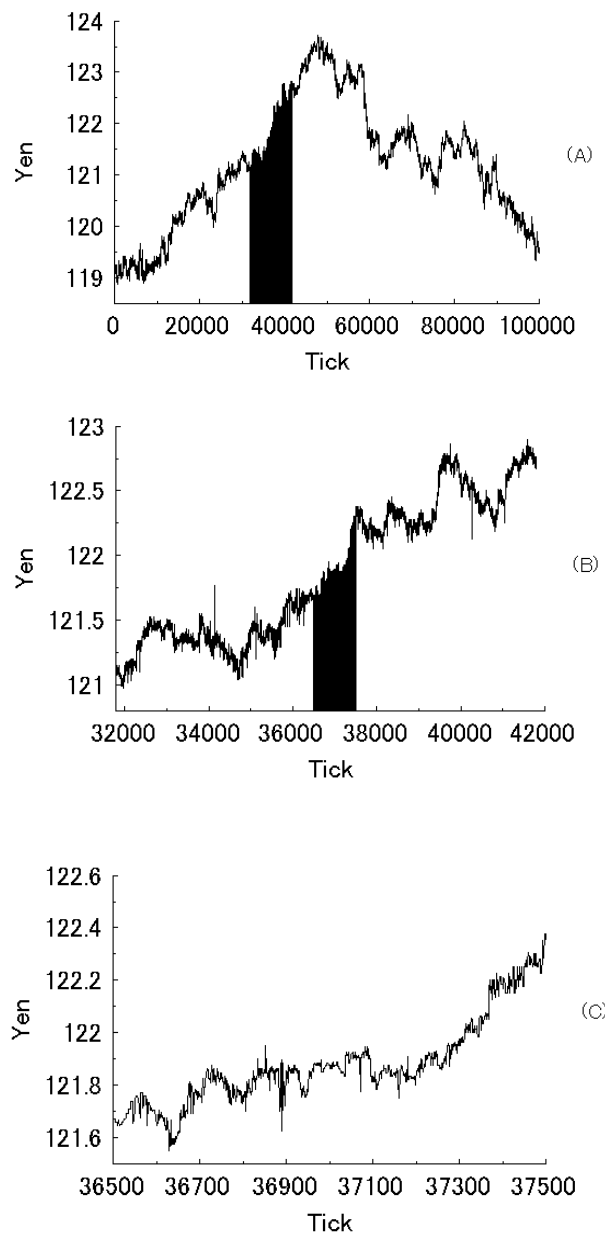


Figure 2. Fractal property in foreign currency exchange rate fluctuations. The dark part of (a) is magnified 10 times in (b), and the dark part in (b) is magnified in (c) [1].

The database model presented above is an example of organizing the data in order to obtain a price fluctuations analytic system based on fractal theory.

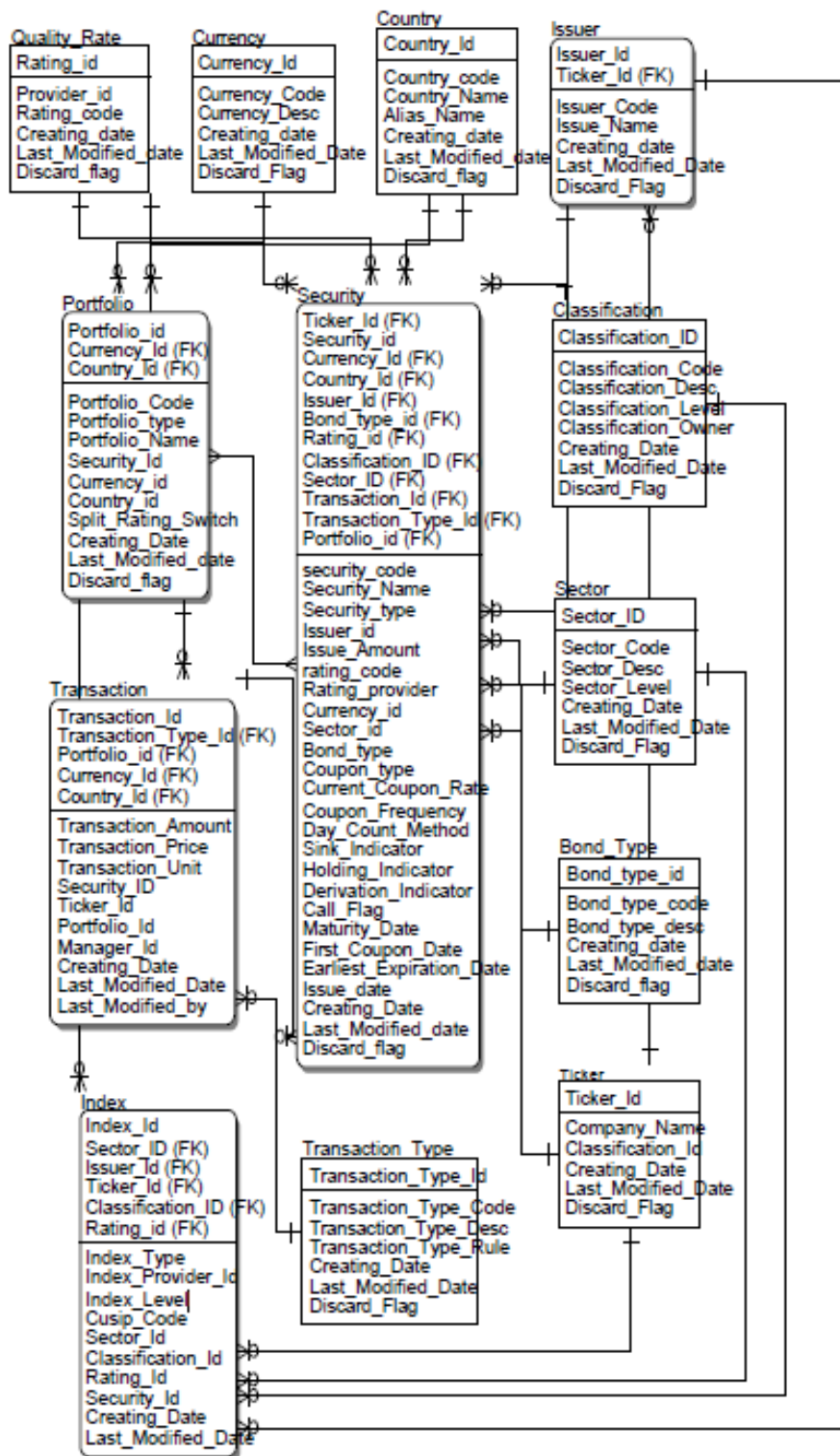


Figure 3. Cash-flow model for database design [2].

3. B-tree database indexes

In order to implement the model of database presented in previous chapter we must use b-tree. The B-tree is a generalization of a binary search tree in that a node can have more than two children.

In a tree, records are stored in locations called leaves. The starting point is called the root. The maximum number of children per node is called the **order** of the tree. The maximum number of access operations required to reach the desired leaf (data stored on the leaf) is called the **depth** (level). Some databases indexes are balanced b-trees; the order is the same at every node and the depth is the same for every leaf [4].

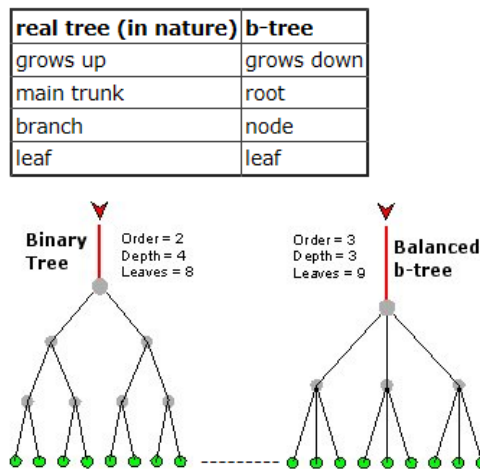


Figure 4. b-tree model [4].

The bigger the order, the more leaves and nodes you can put at a certain depth. This means that there are fewer levels to traverse to get to the leaf (which contains the data you want). In the example above and all balanced b-trees, the number of hops to a leaf = depth.

To obtain a fast response from database where most indexes are too large to fit into memory, this means that they are going to be stored on disk. Since I/O is usually the most expensive thing we can do it in a computer system, these indexes need to be stored in by an efficient I/O way. A b-tree is a good way to do this. If we make the nodes the size of a physical I/O block, it would take one I/O to move to a lower depth in the tree.

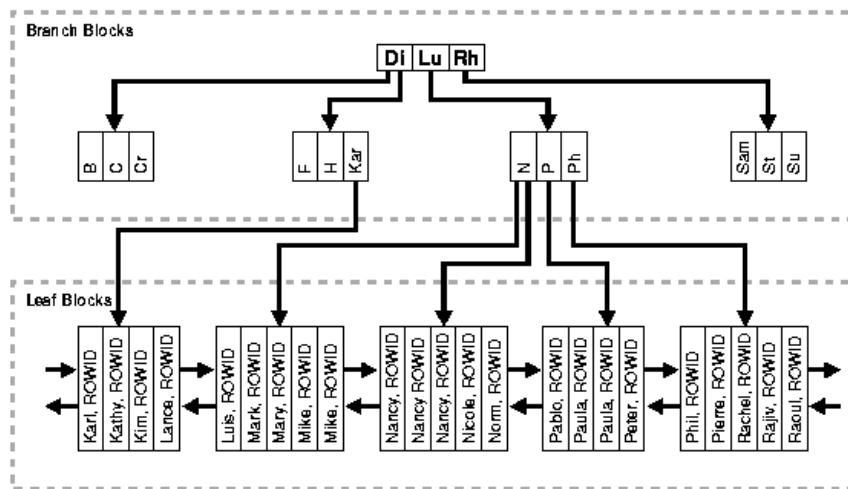


Figure 5. b-tree model organization in database design [4].

4. Conclusions

Economic systems tend to be around the critical point in general. Open markets are typical examples. When there are more buyers than sellers, the market price goes up causing decrease in the number of buyers and increase in sellers. Such well-known pulling back mechanism obviously keeps the system around the critical point. The important fact is that this criticality does not stabilize the absolute value of the market price; it only stabilizes the statistics of market price to follow the critical fluctuations. As the dealers in open markets tend to care about only the relative market price, whether it goes up or down, the absolute value is nearly meaningless for the determination of the market price. Therefore, the market prices generally wander almost randomly having statistics characterized by the critical point. From the viewpoint of fluctuations in demand and supply, company's statistics may also be considered in a similar way. When there appears a new demand in a new field of industry, companies competitively try to supply it. The winner will get a big amount of income and the company will grow. The followers will share the rest of demand and the total supply will increase. When the sum of supply becomes close to the demand, some companies cannot gain their incomes and the growth of supply is weakened. As a result demand and supply may nearly balance on average and the whole system may show critical characteristics such as fractal distributions. Therefore we must create a real solution for database design in order to use fractal theory.

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STOCK MARKET DIAGNOSIS*

Iulian PANAIT**

Many times during my trading and investment career I was looking for a single source of comprehensive technical and fundamental stock analysis to recommend to clients and junior colleagues who were asking me what to study in order to gain more rapidly the knowledge needed to better navigate the market's turmoil.

Latter, when I started to offer training programs to investors and people looking to become brokers or investment advisers, I needed to build my theoretical presentations on books and literature that have clear and concise description on various fundamental and technical indicators across all types – trend analysis, price patterns, candles, oscillators etc.

Mrs. Professor Anca Gheorghiu's book not only answers all these needs very well, but her work provides enough information that I do not see the need for another book on basic principles of stock market diagnose on the bookshelf of a young student or small portfolio investor, even though I know that other very good books are available but unfortunately available only in English language.

The book is well organized and indexed so that an investor can rapidly look up something while he is setting up trades, and get the basic info that he needs to understand before actually doing the trade. Being written by an experienced, accurate and meticulous researcher, the books references prime quality sources of knowledge, information and data for the practical studies. All these external sources are clearly mentioned so that all the readers interested to further continue the study can access them easily.

One pleasant surprise for a Romanian language book about stock market investments was how well written it was and how much I enjoyed reading it. I expected a dry reference book but instead found an excellent and engaging read.

* Anca Gheorghiu, *Stock Market Diagnosis*, in Romanian *Diagnostic Bursier*, Victor Publishing House, Bucharest, 2011.

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The book has both a fundamental and a technical approach to deciding what and when to buy or to sell in the stock market and this is very rare among the investment or trading books which usually treat only one of those two necessary types of analysis.

Mrs. Professor Anca Gheorghiu starts the book with an overall view over the instruments and techniques of chart analysis, offering students a necessary introductory atmosphere of technical analysis and its main purposes for a stock investor. This way, the reader of the first chapter of the book can have an overall understanding of the methods, objectives and fundamental types of charts used in technical analysis which will make him or her better prepared to approach the more detailed and complex information contained further inside the pages of the book.

The following two chapters represent a very valuable and useful review of the most popular and effective instruments of fundamental analysis of the stock markets. As I have mentioned before, after many years of practical experience and I can certainly say that when we speak about stock market diagnosis we cannot and should not overlook any of the two approaches: the fundamental and the technical, because they both offer important clues about the future probable direction of the price of exchange traded assets. As such, during the second chapter of the book Mrs. Professor Anca Gheorghiu refers to the main concepts and tools of corporate finance while in the third chapter she presents at a good level of detail the most important financial indicators of a company, the main methods of company and stock price valuation and the estimation of market price ratios.

During the 4th, 5th, 6th and 7th chapters of the book professor Anca Gheorghiu presents in great detail and with very useful notes and comments all the main types of technical analysis: trend analyses and indicators, price formations and candlestick formations, oscillators and volume indicators, price bands. Also the book contains important and valuable references to Gann, Elliott wave and Fibonacci analysis.

This very consistent part of the book which is dedicated to teach students and potential investors about chart analysis has the great value of being an “all in one” presentation. Mrs. Professor Anca Gheorghiu manages to emphasize all the popular methods of chart analysis and many of the important types of technical indicators, presenting them in an easy to understand, clear and unequivocal manner and with great amount of details about when to employ these tools when making real life (and real money) decisions in the market.

It is also important to mention that Mrs. Professor Anca Gheorghiu, as an experienced teacher and researcher is not a proponent or zealot about any one

indicator or analysis type, which I appreciate. She does a very good job of describing each indicator within the context of its value without trying to convert anyone to any specific technique or approach. As I do not believe in magic bullets in trading and investment, I very much appreciated her straightforward, balanced and unbiased approach.

Both students and investors will also find inside this book a modern approach to identifying and measuring risks and there is no doubt that now more than ever we cannot discuss about stock market investments without a consistent investigation and quantification of the risks involved.

Thus, chapters 8 and 9 of the book offer the reader the possibility to understand the types of risks involved in stock trading and to evaluate the impact of those risks on any particular stock market portfolio. At the same time, the reader can find inside those two chapters the tools needed for a proper risk management of the portfolio, both for direct investments and for financial investments.

Especially chapter 9 of the book Mrs. Professor Anca Gheorghiu brings a new, original and very valuable scientific contribution to the concepts of financial and risk management by using her expertise in the field of applied physics to shed a new light on the notions and measurement of simple and normalized volatility.

So, in summary, I highly recommend this book for what it is intended to be – a reference book on technical and fundamental analysis of stock market investments and a valuable source of knowledge for students and investors. I also think that the work of Mrs. Professor Anca Gheorghiu in the field of econophysics which is presented inside this book opens new ways of measuring and assessing financial risks for individual assets and portfolios, thus representing a valuable source of information for the scientific community.

NEW ECONOMY Section

THE QUALITY FUNCTION DEPLOYMENT (QFD) APPROACH IN THE REENGINEERING OF THE ENTERPRISE

Ioana ARMAŞ*

Abstract. *The present and future economic, social, technical etc. evolution requests for the modern enterprise to develop a complex structure of capabilities as: flexibility and adaptability to the external environment, fast responses to customers requests, fast developments of new products and services, competitiveness and leadership on the market, resources and costs optimizations, etc. One of the main recommended solutions for significant improvement of the enterprise's global behaviour is the reengineering of the enterprise. Also, risks in applying this solution exist beyond the human factor contributions at all the enterprise's levels.*

In order to create a framework the reengineering of the enterprise, that assures a positive and significant increase of the enterprise's performance and competitiveness, the present paper proposes the use of the QFD approach. The results obtained, will represent also contributions to the problem of complex management for the large variety of complex economic systems in the present context of globalisation.

Keywords: *reengineering, quality function deployment (QFD), competitiveness, global quality, life-cycle of the reengineered enterprise, goal oriented reengineering*

1. Introduction

The present conditions imposed to the enterprise's activities having as target its *competitiveness* correspond to a complex environment that requests a new functional structure able to **respond** and to adapt to a large diversity of problems.

In order to obtain in 'real time' such a structure, the reengineering solution may be applied to the enterprise, as the design of a new internal organization able to perform better its tasks, and to attain its goals [1]. This solution is process – oriented, such that all the enterprise's activities, viewed as events, form different dominant processes that are critical to the

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survival and to the evolution of the enterprise, and are related in a specific manner that can be represented in a process map.

If the natural causal relation between the enterprise's processes and its hierarchical and organizational structure is considered, then it becomes necessary that the structure must satisfy the accomplishment of the processes, and must respect the relations from the process map, without segmentation (i.e., the introduction of supplementary relations with the corresponding requirements due to the division of the dominant processes between the components of an imposed structure).

Thus, the reengineering of the enterprise represents the development of a new enterprise as a new structure whose elements are determined by the specific dominant processes and the process map, such that is created a framework necessary to perform simultaneously the processes, and to obtain the requested performance (figure 1).

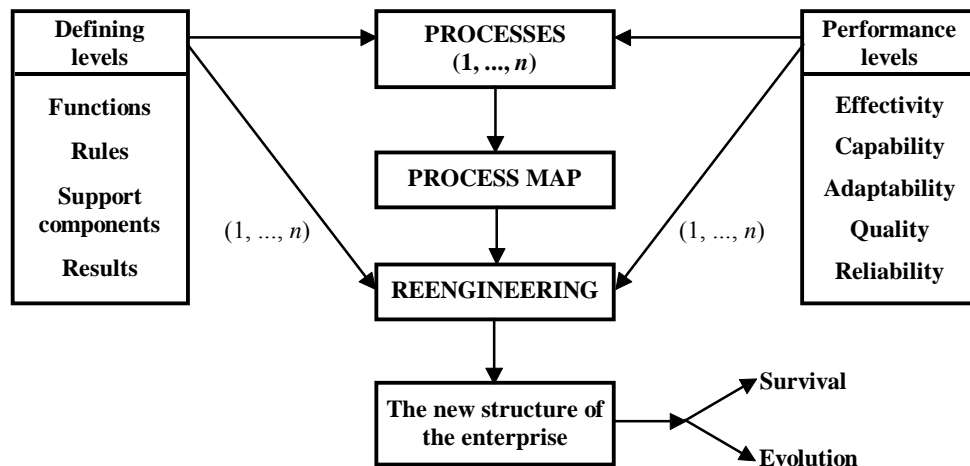


Figure 1. The framework for reengineering that considers the realization of the enterprise's processes at both definition and performance levels.

2. The enterprise's competitiveness as the reengineering result. The enterprise's global quality

Considering the goals of any enterprise regarding its survival and evolution in the external environment, results that the necessary processes that should be performed are the following:

- a) the market analysis;
- b) the product conception / research;
- c) the product development and design;
- d) the product implementation and manufacturing;
- e) the promotion of the product on the markets;

- f) the product delivery and selling;
- g) the technical support and maintenance;
- h) the management and decision process;
- i) the business development;
- j) the development of the enterprise's policy and strategies;
- k) the information processing;
- l) the control processes;
- m) the communication processes;
- n) the activities integration and coordination;
- o) the learning and experiences accumulation.

Analyzing the above processes results that they can be integrated in the set of the dominant processes that will correspond to the enterprise's goals, and will concentrate the main activities without segmentation, as following:

- A) the strategic development process;
- B) the product development;
- C) the design for the client's requests and support;
- D) the response to delivery and selling requests;
- E) the communication with the clients /users, and the enterprise's suppliers;
- F) the internal capabilities development.

Thus, the dominant and auxiliary process $a \div o$ are integrated in the new dominant processes $A \div F$ as in figure 2.

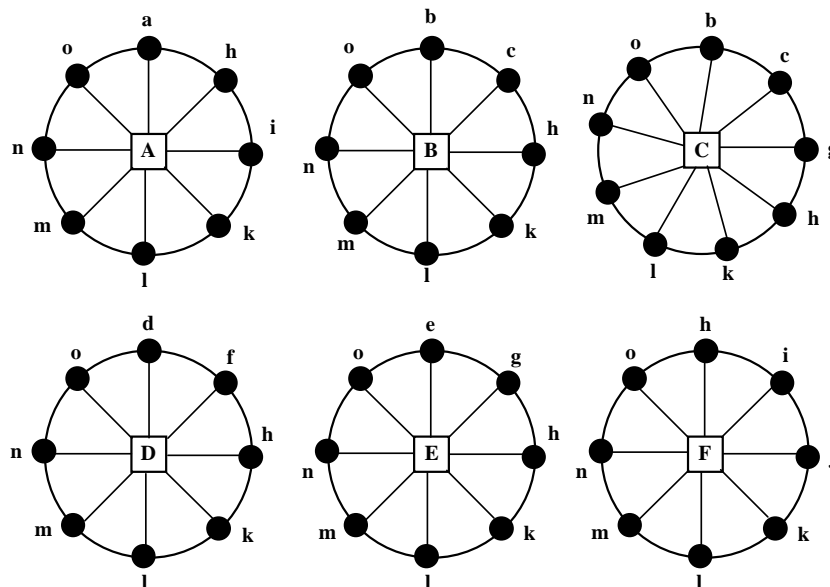


Figure 2. The integration of the processes $a \div o$ in the new dominant processes $A \div F$.

According to the above determined new dominant processes, and considering the relations between them, the corresponding process map of the enterprise will be developed as in figure 3 where one possible solution is presented.

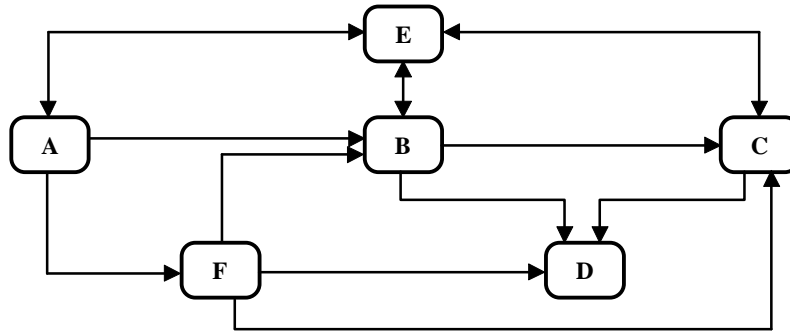


Figure 3. One possible process map for the dominant processes **A ÷ F**.

The dominant processes **A ÷ F** and the process map represent the basis for the development of the new organizational structure of the enterprise, such that a new enterprise is built, with the following main aspects of its competitiveness:

1. The enterprise becomes goal oriented at all its internal levels (i.e., teams) that are created in order to perform a specific process without segmentation.
2. Design is a component of each process, and of each activity, such that the hierarchical structure is compressed by eliminating the hierarchical levels that introduce segmentation, and accordingly delays.
3. Many activities will be performed simultaneously, being the object of the process-team.
4. The response of the enterprise to its external environment is more rapid and consistent to the external requests and expectations.
5. The enterprise is internally and externally oriented to leadership.
6. The quality management will be oriented to TQM (Total Quality Management).

According to the new processes identified as in figure 2, the enterprise will become more flexible and adaptable in satisfying the customers' requests, and also will be able to develop personalized products. Thus, the enterprise will have a larger area of capability in responding to the markets and customers / users.

The new enterprise (i.e., the reengineered enterprise) results as the organizational structure based on the dominant processes and the corresponding process map, as in figures 2 and 3.

In these conditions, the *integrated global quality of the enterprise* can be attained according to the definition of the concept [2]:

Definition 1. The *integrated global quality of the enterprise* represents the assembly of its capabilities that determine an observable, significant and influencing existence of the enterprise in the external environment, such that, through its abilities of technical, economical and financial leadership, and its integration in the society, the dynamics of the enterprise is positively visible in the evolution of the external environment.

Considering the integrated global quality concept it becomes necessary to identify the corresponding approach able to support the selection of the best solution for the enterprise's reengineering.

3. The QFD (Quality Function Deployment) approach in the enterprise's reengineering

Once the decision for reengineering has been made, the re-design of the enterprise develops different reengineering solutions, according to figure 4.

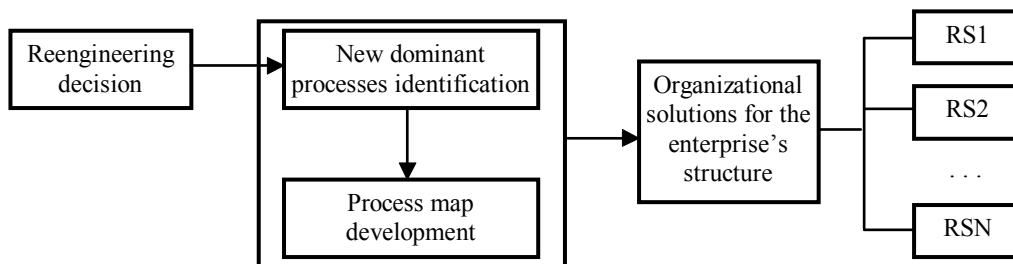


Figure 4. The development of different reengineering solutions for the enterprise.

Thus, the selection of the 'best' reengineering solution becomes a problem for which the QFD (Quality Function Deployment) approach offers the corresponding resolution.

Considering the QFD general theory [3, 4, 5] the approach will be applied to the context presented in figure 4, were the corresponding necessary adaptations will be introduced (see table 1).

Table 1

The QFD approach in the enterprise's reengineering analysis and decision.

1	<i>The reengineering goals identification and classification</i>														
<p>The main goals that are wished to be attained by the reengineering process will be determined and classified in three types: basically goals (B), performance goals (P), and high performance goals (HP).</p> <p>For example, these goals may be the following:</p> <p>G1 – high flexibility of the enterprise; G2 – fast adaptability to the dynamics of the external environment; G3 – leadership oriented on the markets; G4 – high quality of the products G5 – price competitiveness on the market; G6 – profit growth; G7 – good image in the external environment.</p> <p>Thus, the goals matrix will be developed as in figure 5, with a possible classification.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Goals</th> <th style="text-align: center;">Type</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">G1</td> <td style="text-align: center;">HP</td> </tr> <tr> <td style="text-align: center;">G2</td> <td style="text-align: center;">HP</td> </tr> <tr> <td style="text-align: center;">G3</td> <td style="text-align: center;">HP</td> </tr> <tr> <td style="text-align: center;">G4</td> <td style="text-align: center;">B</td> </tr> <tr> <td style="text-align: center;">G5</td> <td style="text-align: center;">B</td> </tr> <tr> <td style="text-align: center;">G6</td> <td style="text-align: center;">P</td> </tr> </tbody> </table> <p style="text-align: center;">Figure 5. The reengineering goals identification and classification.</p>		Goals	Type	G1	HP	G2	HP	G3	HP	G4	B	G5	B	G6	P
Goals	Type														
G1	HP														
G2	HP														
G3	HP														
G4	B														
G5	B														
G6	P														
2.	<i>The goals analysis</i>														
<p>Once the goals identified, they will be analyzed from the following points of view (figure 6):</p> <ul style="list-style-type: none"> • the goal importance (L_i) will be determined by evaluating them on a scale from 1 to 10, according to the classification performed at stage 1; • for each reengineering solution (S_1, S_2, \dots) is estimated the level at which each goal is attained, using also a scale from 1 to 10; • the criticality (K_i) of the goals for the enterprise's policy are identified as following: $K_i = 3$ if the goal G_i is severely critical; $K_i = 2$ if the goal G_i is median critical; $K_i = 1$ if the goal G_i is minimally critical; • the global weight of each goal will be determined with the relation: $w_i = L_i \cdot K_i, i = \overline{1, n}, n = 7; \tag{1}$ • the relative weight of each goal is determined with the relation: $Q_i = \frac{w_i}{\sum_{i=1}^n w_i} \cdot 100(\%) \tag{2}$ 															

Goal	L_i	S_2	S_1	K_i	w_i	Q_i
G1	10	6	8	3	30	21.43
G2	10	10	10	3	30	21.43
G3	9	5	9	1	9	6.43
G4	9	5	8	3	27	19.28
G5	8	2	10	2	16	11.43
G6	7	6	8	3	21	15.00
G7	7	5	9	1	7	5.00
TOTAL					140	100

Figure 6. The analysis of the reengineering goals.

3.	<i>The competitiveness characteristics identification</i>
<p>The set of goals $G1 \div G7$ will be transferred to the corresponding set of characteristics $C1 \div C12$.</p> <p>Thus, for the considered example the following characteristics will be considered:</p> <p>C1 – the time of response to the customers’ requests; C2 – the number of markets; C3 – the average share of the markets; C4 – the number of independent designs; C5 – the number of new products; C6 – the investment level for research in new products; C7 – the levels of the predicted profits; C8 – the average risks level of the enterprise’s evolution; C9 – the numbers of customers attached to the enterprise’s products; C10 – the costs with warranties and post-warranty maintenance; C11 – the number of redesigns in order to make the products competitive; C12 – the percentage of people that know the name of the enterprise and its products.</p>	
4.	<i>The identification of the correlation between the reengineering goals and the competitiveness characteristics and the computation of the characteristics’ weights</i>
<p>The correlation between the reengineering goals $G_i, i = \overline{1, n}, n = 7$ and the identified competitiveness characteristics $C_k, k = \overline{1, p}, p = 12$ are determined such that (figure 7): σ represents a strong correlation; μ – a median correlation; ω – a low correlation.</p> <p>To each type of correlation a non-dimensional measure is considered: $\sigma = 9$, $\mu = 3$, and $\omega = 1$.</p> <p>Considering the global weight of each reengineering goal, $w_i, i = \overline{1, n}, n = 7$ determined with relation (1) in figure 6, and the corresponding metrics elements in the correlation matrix (see figure 7), the weight of each competitiveness characteristic $C_k, k = \overline{1, p}, p = 12$ will be calculated with the relation (see figure 7):</p> $\varepsilon_k = \sum_{i=1}^n w_i \cdot g_{ik} \quad (3)$ <p>where $g_{ik}, k = \overline{1, p}, p = 12$ are the values of the correlation metrics of the competitiveness characteristics C_k for the reengineering goals G_i.</p>	

G/C	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
G1	$\alpha=9$					$\alpha=9$	$\omega=1$	$\mu=3$				
G2	$\alpha=9$	$\mu=3$		$\alpha=9$	$\alpha=9$	$\alpha=9$	$\mu=3$	$\mu=3$				
G3		$\alpha=9$	$\alpha=9$		$\mu=3$	$\alpha=9$		$\mu=3$	$\alpha=9$	$\omega=1$		$\omega=1$
G4	$\alpha=9$	$\mu=3$	$\mu=3$		$\mu=3$				$\alpha=9$	$\alpha=9$	$\alpha=9$	$\omega=1$
G5			$\mu=3$	$\alpha=9$		$\alpha=9$	$\alpha=9$	$\omega=1$	$\mu=3$	$\alpha=9$	$\alpha=9$	
G6		$\alpha=9$	$\alpha=9$	$\mu=3$	$\mu=3$		$\alpha=9$	$\alpha=9$	$\omega=1$	$\alpha=9$	$\mu=3$	
G7	$\mu=3$					$\mu=3$		$\omega=1$	$\alpha=9$	$\mu=3$		$\alpha=9$
ε_k	$\varepsilon_1=804$	$\varepsilon_2=441$	$\varepsilon_3=399$	$\varepsilon_4=477$	$\varepsilon_5=441$	$\varepsilon_6=786$	$\varepsilon_7=453$	$\varepsilon_8=419$	$\varepsilon_9=456$	$\varepsilon_{10}=606$	$\varepsilon_{11}=450$	$\varepsilon_{12}=99$

Figure 7. the correlation matrix between the reengineering goals G_i and the competitiveness characteristics C_k . $\varepsilon_k, k = \overline{1,12}$ – the weights of the competitiveness characteristics C_k .

5. *The comparative analysis of the designed reengineering solutions*

Each reengineering solution (S_1, S_2, \dots) is quantitatively specified at the competitiveness characteristics level, $S_j(C_k), k = \overline{1,p}, p = 12, j = 1, 2, \dots$, for this purpose a scale from 1 to 10 being used.

According to the weights of the competitiveness characteristics and the solutions' specifications, the global conformity measure for the reengineering solutions, $F(S_j), j = 1, 2, \dots$, will be determined with the relation:

$$F(S_j) = \sum_{k=1}^p \varepsilon_k \cdot P_{jk}, \quad (4)$$

where P_{jk} are the quantitative specifications of the reengineering solution $S_j (j = 2$ for the considered example) for the competitiveness characteristics $C_k, k = \overline{1,p}, p = 12$.

The results for the considered example are presented in figure 8.

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
P_{1k}	7	10	6	8	9	7	10	8	6	5	10	9
P_{2k}	8	5	10	7	10	10	9	5	10	6	10	7
ε_k	804	441	399	477	441	786	453	419	456	606	450	99
$F(S_j)$	$F(S_1)=44758$						$F(S_2)=47797$					

Figure 8. The comparative analysis of the reengineering solutions S_1 and S_2 .

The selection criteria of the 'best' reengineering solution in the QFD analysis context is the following:

$$F(S_B) = \max_{j=1,2,\dots} F(S_j). \quad (5)$$

For the considered example, according to relation (5), the selected reengineering solution is S_2 , due to the fact that $F(S_2) > F(S_1), F(S_2) = \max_{j=1,2} F(S_j)$.

4. The Goal-Oriented Framework for Reengineering (GOFR)

In the context determined by the above results, the Goal-Oriented Framework for Reengineering (GOFR) is developed as in figure 9, where the concept of the Life-Cycle of the Reengineered Enterprise (LC-RE) is considered, according to the following definition:

Definition 2. The Life-Cycle of the Reengineered Enterprise (LC-RE) represents the main phases that are performed during the stages of the enterprise's developments determined after the enterprise's reengineering processes.

The main phases of the Life-Cycle of the Reengineered Enterprise (LC-RE) are:

- the enterprise continuous evaluation, analysis, goal identification, and reengineering decision;
- the design of the reengineering solution (QFD analysis included);
- the implementation of the reengineering solution at the level of the organizational structure of the enterprise;
- the continuous improvement of the new (reengineered) enterprise.

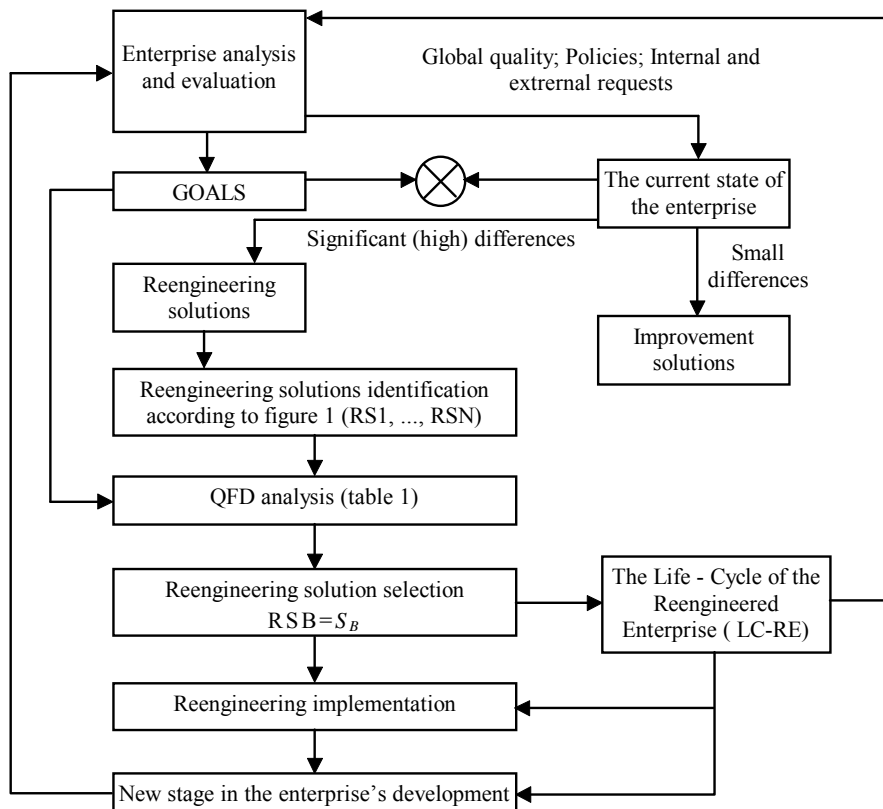


Figure 9. The Goal-Oriented Framework for Reengineering (GOFR).

5. Conclusions

The survival and positive evolution of the enterprise is a major problem in the present complex context of globalisation and multidimensional performance (i.e., technical, economic, financial, social, environmental etc.).

In these conditions, the present paper considers the enterprise's reengineering, and applies the QFD approach for the goal – oriented analysis of the possible reengineering solutions, such that the risks of reengineering are minimized due to the selection of the optimal solution. In this context the concept regarding the global quality of enterprise was introduced as the basis for enterprise's evolution and goals identification. Also, the Goal-Oriented Framework for Reengineering (GOFR) was developed and the Life-Cycle of the Reengineered Enterprise (LC-RE) concept was defined.

The results represent a practical management approach that should be applied in any enterprise in the process of its evolution and continuous development.

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EUROPEAN UNION ENERGY POLICY AND GOOD ADMINISTRATION

Dorel BAHRIN*

***Abstract.** EU legislative package on EU's future policy in the field of energy – climate change was approved at the European Council Summit of 13 December 2008 and adopted at the plenary meeting of the European Parliament at 23 April 2009. The legislative package contains the objectives undertaken by the European Union within the European Council in 2007, with the aim of at least 20% reduction in emissions of greenhouse gases (GHGs) in the European Union, increase with 20% of the proportion of renewable energy sources (SRE) in the total energy consumption and increase of the energy efficiency by 20% in the period until 2020. From the legislative package targets 20/20/20, within the EU, Romania has specific objectives, among which the increased use of renewable energy from 17,8% in 2005 to 24% in 2020, the diminish the Greenhouse gas emissions for ETS (big polluters) with 21% by 2020 and in the spirit of fairness between Member States, the permission to increase GHG emissions by 19% for non-ETS sectors (small polluters). It is estimated that the 20/20/20 targets of the package are very difficult to attain even for developed countries of the EU, and is therefore extremely difficult for a country like Romania, with an emerging economy. Over 50% of Europe's energy comes from countries outside the European Union – and the dependence is growing. Russia is one of the largest energy suppliers and disputes about transit of exported products has caused in recent years, serious imbalances in supply. This warning indicates the need for the EU to closely monitor oil and gas reserves and be prepared in case of emergency energy. Among the priorities in the area include the development of the southern corridor, which could carry gas from the Caspian Sea region via Turkey. Its construction could start in 2011. Through Communication no. 677 of 17 November 2010, the EU Commission proposed a series of energy corridors to link the EU's priority cross-border flow of electricity, gas and oil.*

***Keywords:** European Union Energy Policy; Greenhouse gas (GHG); oil and gas pipeline; small polluters; energy sources (SRE).*

1. Introductory remarks

The European Union is increasingly dependent on foreign sources of energy supplies which prove to be less reliable. After repeated quarrels

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between Russian-and Ukrainian, the oil market seems to be out of control, that is why now Europeans can only try to respond to crises as well not only unexpected, but also increasingly frequent. An energy policy and strategy at EU level has become necessary for reasons pertaining to National security. [1]

So far 56% of total EU energy consumption is provided from imports (percentage will increase to 75% by 2030) and the percentage in the case of oil dependence on foreign sources is even higher: 75%.

The European Union enlargement process involves growth and development strategies of the States in order for them to adapt to the requirements imposed, and appropriate policies to legitimize and institutionalize these strategies.

The main elements of the Acquis in the field of energy are the EC Treaty and secondary legislation mainly on competition and state aid, the internal energy market (including directives on electricity, price transparency, transport of electricity and natural gas, hydrocarbons, providing licenses, emergencies and mandatory existence of strategic stocks), nuclear energy, energy efficiency and environmental protection sector.

The Community Acquis in the field of nuclear energy consists of a framework of political and legal instruments, including international agreements. Currently, they are focused on the health and safety, including radiation protection, security of nuclear installations, radioactive waste management, investment, stimulate research, the common market of nuclear energy supply in the field, and international relations.

The implementation of the Acquis requires not only requires adequate legislation but also properly functioning institutions (for example, a regulatory body in accordance with the directives relating to electricity and natural gas, nuclear power and authority to control activities etc.).

2. The Politics and EU energy strategy

European Commission published on 8 March 2006 the document: **Green Paper on the European Competitive and Sustainable Energy Policy.** "[7]

The document states:

- A clear strategy to diversify natural gas sources;
- A new infrastructure such as liquefied natural gas terminals and new pipelines to carry Caspian oil and gas and North Africa;
- A strategy for gas reserves;
- A unified European energy network;

- The attempt to create a single market for gas and electricity;
- A debate about the use of nuclear energy;
- Greater efforts to restrict the use of fuels and developing alternative energy sources;
- An open and competitive energy markets.

The Green paper also entails the adoption of an unified position in the EU energy field, which may mean that there will established a new position of European Commissioner responsible for energy issues in the negotiations on behalf of the EU.

The “European Energy Charter of 2006” was drafted as a political statement in order to stimulate collaboration between East and West in the energy sector and is a legally compulsory multilateral document , devoted to intergovernmental cooperation in the energy sector. Its principles relate to the cooperation of countries in the fields of transport and energy trade, investment, energy and effectiveness of dispute settlement. This paper contributes to the internationally accepted standards and practice of sustainable development environmental impact assessment. Under this agreement energy efficiency is considered an important lever to achieve its goals by: collaboration in achieving sustainable development and compliance with international environmental standards, raising awareness of population on the consequences of energy production, exchange of scientific information and research on technologies, practices and processes that reduce negative environmental impacts and contribute to energy efficiency, exchange information on methods and technologies based and economically efficient environmental energy policy.

The Lisbon Treaty – 2007 recognizes the existence of new challenges for the Union, such as combating climate change while promoting solidarity between Member States in the energy field. The EU has treated the energy security seriously only after the gas crisis (Russian-Ukrainian dispute).

On the Agenda of the European Council on 19-20 March 2009 it was set out a new, ambitious and visionary plan in the field, containing:

- National plans of action in case of emergency;
- The amending of the Directive on gas supplies which dates from 2004 (Directive 2004/67 / EC-on measures to safeguard security of natural gas).

The review should include national plans of action in case of emergency, compulsory and containing a joint statement on emergency situations, the allocation of stocks available to affected states, the

activation of emergency measures in the states affected or less affected in order to increase the volume of gas to those states affected.

- A trilateral agreement between the EU, Russia and Ukraine to ensure transit;

- The negotiation of a more complex agreement with Russia, to replace the Partnership and Cooperation Agreement in 1997.

- Energy security clause in trade agreements, association, partnership and cooperation with producer and transit countries, which would establish a code of conduct and would prohibit disruptions due to trade disputes; the measures would be adopted unilaterally in the event of an interruption, or in case of making any change of contract or terms of supply by one partner.

- Supporting the diversification of transport routes, such as Nabucco, Turkey-Greece-Italy (TGI) and South Stream. EU will continue to be highly dependent on the medium-term supply from third countries. EU countries import 50% of Russia's energy consumption, a proportion that will rise to 70% by 2030.

- Nuclear energy must be used at the highest level of safety technology (long given up at her), the EU and neighbouring countries should adopt European standards in terms of nuclear safety.

- 2050 targets: 80% fewer emissions of greenhouse gas, 60% renewable energy and energy efficiency 35%.

The package of laws on future policy in the energy-climate change was approved at the European Council of 13 December 2008, adopted at the plenary meeting of the European Parliament on April 23, 2009. The legislative package contains the objectives undertaken by the European Union European Council in 2007: at least 20% reduction in emissions of greenhouse gases (GHGs) in the European Union, increase by 20% of the share of renewable energy sources (RES) in the total of energy consumption, and increase energy efficiency by 20% in the period up to 2020.

The European Parliament and the European Council adopted on 23 April 2009, the following acts: Directive 2009/28/EC on the promotion of renewable energy use, Directive 2009/29/EC on improving and extending the Community scheme for trading emissions allowances Greenhouse gas; Directive 2009/31/EC on the geological storage of carbon dioxide 406/2009/CE Decision on Member States' efforts to reduce emissions of greenhouse gases to meet EU commitments to reduce emissions of greenhouse gases by 2020.

Within the 20/20/20 targets in the legislative package throughout the EU, Romania has specific objectives, among which the increased use of

renewable energy sources from 17.8% in 2005 to 24% in 2020, reducing greenhouse gas emissions for ETS (big polluters) by 21% and in the spirit of fairness between Member States, permission to increase GHG emissions by 19% for non-ETS sectors (small polluters).

The legislative package targets 20/20/20 are very difficult to reach even for developed countries of the EU, and are therefore extremely difficult for a country like Romania, with an emerging economy.

Through the Communication no. 677 of 17 November 2010, “Energy 2020”, the EU Commission proposed a series of energy corridors to link the EU's priority cross-border flow of electricity, gas and oil.

The Commission proposes a new method that includes the following steps:

- The identification of the map of energy infrastructure requirements for a European super-intelligent network that interconnect networks at the continental level.

- Focusing on a limited number of European priorities, to be implemented by 2020 to meet long term objectives and justifying the optimal action at European level.

- Based on a methodology agreed in advance, identifying concrete projects needed to implement these priorities – projects declared of European interest

- To respond to changing market conditions and technological development in a flexible manner and based on regional cooperation.

- Support the implementation of projects of European interest through new tools, such as improving regional cooperation, licensing procedures, methods and improved information for policy-makers and citizens and innovative financial instruments.

In the context of longer-term perspective to be presented in the Roadmap for 2050, the EU must start to design, plan and build energy networks of the future, with which the EU will further reduce greenhouse gas emissions. This unique juncture should be capitalized. In the long term, expensive approaches at Member State or at the project level and not very appropriate solutions can be avoided only through a coordinated approach to optimized European infrastructure.

According to the strategy of “Energy 2020”, in the next decade, European Union requires investments in energy infrastructure of 1.000 billion. To accelerate strategic projects of the EU, the Commission proposes a simpler and faster procedure for granting building permits, establishing a deadline for obtaining final authorization and European

funding. It will also be established a “single desk” to handle applications for all permits required to realize a project.

3. Romania's Energy Strategy

European integration is a long process. It focuses on the assimilation of European values, integration into European economic, institutional adaptation and implementation of good governance. Also important is to achieve a convergence of national and community interest. Of course, membership to NATO and the EU imposes “constraints of alliance” and “mechanisms of integration (economic, political and military) that foreign and security policy cannot ignore. Traditional national interests will intertwined with those of EU and NATO. At the same time, policymakers in Bucharest must respect the bilateral, trilateral, regional and international treaties Romania has signed.

A current political debate concerns the National Security Strategy of Romania – GD 1069 / 2007 (See also Decision No. 1535 of 18.12.2003 regarding the approval of the turning to renewable energy.) European Commission a reasoned opinion – the second stage of infringement proceedings of the Accession Treaty (infringement) – against 20 Member States, including Romania, which have not transposed into national law the European directive on energy efficiency. Romania has transposed partially the Directive 2006/32 on end-use energy efficiency and energy services, by GEO 22/2008 on energy efficiency and promoting the final consumers of renewable energy. [9]

However, the relationship between national security, energy security and sustainable development strategy has barely been put into public discussion. In the West, the most important strategic guidelines at the politico-military level are systematically publicized and the pros and cons are analyzed. Political culture in any society necessarily includes major security and diplomatic issues. Citizens are encouraged to assume responsibilities in the external engagements of democratic states and act in such states as pressure factors on the governmental level. Such behaviours are absolutely necessary and democratic also in Romania.

Currently, as an official document, there is the National Security Strategy, approved by the CSAT on 17 April 2006. It identifies the vulnerabilities as: dependence of vital resources hard to access, persistent negative demographic trends, the high level of social insecurity and the role of the middle class, poor development and civil society civic spirit, weakness of strategic infrastructure, poor health of the population, failure

of the education system, inadequate organization of the system crisis, etc. We could enumerate also the slow recovery of economic and social disparities with the EU, the quality of governance, the gap between the complexity of current economic issues and political leaders managerial culture, the weakness of the national capital, the second-rate of self-management in society, mainly formal adoption of European values etc.

On this background, the strategy focuses on building a system of security and prosperity in the Black Sea. Romania considers that the Black Sea region is a geopolitical space open to international democratic community in which she can fully manifest as allied, partner and friend. For this purpose, it actively promotes the necessity of defining and implementing a Euro-Atlantic Strategy for the Black Sea region, taking into account the experience of a NATO-EU stabilization process in South-Eastern Europe and the need for balance in order to promote the democratic aspiration of states, to pre-encounter risks and threats and to contribute actively and effectively to resolve conflicts, tensions and disputes.

Efforts will be targeted at **developing the energy and transport corridors able to link economically the Black Sea region states and Euro-Atlantic community to allow a higher recovery of the potential of maritime and river ports in the region, along with a focus on environmental protection and restoring the ecological balance of the Black Sea.**

Black Sea Region is a paramount connector located on the corridor linking the Euro Atlantic community (as a security provider and consumer of energy) to the Middle East-Caspian Region – Central Asia (as an energy supplier and consumer of safety). In terms of energy, Black Sea region is the main transit area and – to a large extent – a major source of energy that is consumed in Europe. Forecasts envisage the possibility of substantially increase its share in the coming decades, which gives it a crucial role in European energy security.

In terms of policy and energy security, one can remark the new official new approach after 2005-2006. Thus, in 2005 it was issued a document entitled **Energy policy of Romania during 2006-2009.**

The government prepared afterwards a Project on Energy Strategy for 2007-2020, approved on September 5, 2007 by HG 1069/2007. This governmental document has been aligned with the main aims and objectives of EU energy. Energy Strategy authors consider that the national energy system has a number of vulnerabilities (weaknesses), such as production facilities, transportation and distribution partially outdated and

obsolete, with consumption and high operating costs high, plants and equipments used for lignite exploitation and physically obsolete, high operating costs and low performance.

One can add the lack of equipment for the implementation of advanced technologies in the sector of coal mining and production efficiency, reduced transportation-distribution chain-end consumer. Also, the electricity generation sector is organized into channels of mono-fuel technology. Mining companies are not generally efficient.

Simultaneously, it highlights the increasing dependence on imported oil and natural gas, although Romania provides 60% of its needs of raw materials from internal resources. Economically exploitable reserves of oil, natural gas and uranium are more limited. External oil prices on international markets are increasingly volatile.

However, there are opportunities for development of the energy sector, because Romania has a favourable geographical position to actively participate in development projects of main pan-European oil and natural gas pipelines, the existence of physical and financial energy markets, and access to regional markets electricity and natural gas, with opportunities to achieve regional system services. The investment climate is attractive to both foreign and domestic investors, including the privatization of various companies currently owned by state, there is increasing confidence in the functioning capital market in Romania, which allows successful listing on the stock exchange of energy companies, the full liberalization of energy markets and natural gas in 2007, creating opportunities for increased investment in energy efficiency and renewable energy resources unused; accessing EU Structural Funds for projects in energy, the existence of a major hydropower sector able to provide the required amount of ancillary services, extensive experience and infrastructure to exploit the existence of domestic primary energy resources, based on coal and uranium, the detection of new perimeters with considerable reserves of coal and uranium.

The Energy Strategy's stated *aim* is to ensure the so-called energy independence in the context of sustainable development of Romania and the European Union.

4. Conclusions

EU states are forced to move towards a common energy policy for several reasons. First, to ensure security of supply, particularly through diversification in conditions in which Europe now depends on a number of

vital supplies dangerously low. The most obvious example is Russia. Second, because we have established at EU level, the reaction mechanisms in the event of a supply crisis, including one provoked by terrorist attacks. Third, because we have re-launched EU investment in research and in using renewable energy sources. Fourth, because the Europeans must intensify the fight to reduce environmental hazards and global warming.

The European energy policy, approved by the European Council in March 2007, establishes the basic objectives of EU energy policy: competitiveness, sustainability and security of supply. In the coming years, it should be carried out an internal energy market by 2020, renewable sources must contribute with 20% to the final energy consumption, emissions of greenhouse gases must decline by 20% and energy efficiency needs to determine a 20% reduction in energy consumption. In an increasingly sharp international competition for world resources, the EU must provide, at reasonable prices, security of supply for over 500 million citizens. The relative importance of energy sources will change. EU will become even more dependent on imported fossil fuels, especially oil and gas, and electricity demand will increase significantly.

The Energy 2020 Paper adopted by the European Commission on 10 November 2010, calls for changing the way we plan, build and operate our energy infrastructures and networks. Energy infrastructure is at the forefront of strategic initiative.

The existence of appropriate energy networks, integrated and reliable is an essential prerequisite not only to meet EU objectives in energy policy, but also for the EU's economic strategy. Developing energy infrastructure will enable the EU to achieve a functioning internal energy market at its best, will increase the security of supply, will allow the integration of new renewable energy sources, increase efficiency and enable consumers to benefit from new technologies and intelligent use of energy.

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FINANCIAL AND ECONOMIC CRISES: ROMANIAN VULNERABILITIES

Corina-Maria ENE, Anda GHEORGHIU, Dan-Gabriel CRISTEA *

Abstract. *The current global economic crisis was ignited in the financial markets of the major developed economies but soon the real economy was affected. The developing world, Romania in particular, has not been isolated from its impact. International trade and capital flows serve as a transmission mechanism that illustrated that the hypothesis of a de-coupling between the developed and developing world does not hold. Romanian economy mostly does not have fully developed financial systems and is less integrated into the global financial market, hence the initial expectation in some circles that our national economy would be isolated from the contagion of the crisis. This paper argues that this was an unrealistic presumption and that the disease had a serious fall-out in Romania. Consumer spending was cut back, investment plans were cancelled and stock levels were run down. The economic situation is serious. GDP has shrunk, the unemployment level is rising, investments are still slowing, lending is tight and budget deficits are growing fast. Fiscal policies implemented by our country are subordinated to our lack of necessary funding and access to. However, that generated a monopoly on this sector of the IMF. Also, a social crisis became imminent.*

Keywords: *financial instability, financial and economic crises, recession.*

JEL Classification: E6.

1. Introduction

The financial instability triggered by the United States subprime crisis which began in summer 2007 has led to a progressive deterioration of economic situation. The reasons that led to the crisis are manifold. Increased innovation in structured finance products, willingness by lenders to take excessive risks, low interest rates and investors' greed allowed complex investment products to be sold to an ever wider range of investors. Economic world has not been protected from its impact and

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various indicators during the first half of 2008 already suggested a decline in world growth prospects.

After the first eight months of 2008, a brutal crisis erupted again, when first, major United States financial firms, then European financial institutions and a number of banks showed signs of insolvency. No policy maker, banker or economic and financial analyst has experienced anything as serious as this before. The crisis then expanded in magnitude, and full-scale turmoil ensued in financial markets, buffeting many developed and emerging economies. The global financial and economic crisis became the worst economic setback since the Great Depression of 1929-32. A number of emerging economies such as Hungary, Romania, Latvia and Ukraine, as well as Iceland, had then to turn to the International Monetary Fund (IMF) for assistance. The often imagined gap between the financial sector and the so-called real economy was bridged with the financial woes being transformed into real economic regression; again the world was reminded that the dichotomy between the financial and real world does not exist. The unusual magnitude of the on-going crisis is raising major concerns about the future of the world economic outlook.

2. The decline in the propensity to invest

Credit has become less abundant and more expensive. It is more difficult for non-financial companies to invest in foreign operations or to make cross-border deals. Also, poor earnings of large companies in a broad range of industries, as evidenced by declared or projected profits from the third quarter of 2008 onwards, reduce the companies' self-financing capabilities. According to estimates, global FDI flows in 2008 fell by 21%. This evolution is due to early global economic downturn, tighter credit conditions, declining corporate profits and uncertain prospects for global economic growth short term.

In 2008, the inflow of FDI attracted by Romania registered value of 9.024 billion euro, up by 24.4% compared with precedent (7.25 billion Euro). Considering the period 1990-2008, the flow of FDI attracted by Romania in the last year is very close with value registered in 2006, being only 36 million less compared with the record of 9.06 billion euro.

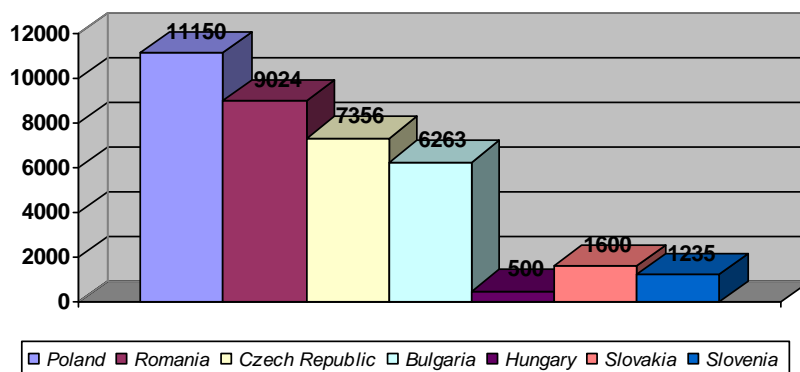


Figure 1. FDI evolution in Romania in the regional context, in 2008 (million Euros).

Source: www.wiiw.ac.at

As a result, we can say that before 2009, the main foreign capital in Romania consisted of direct foreign investment (especially capital ownership as a result of privatization), and other investments (loans and grants border from parent banks), while investment portfolio were generally low. After the global financial crisis, the contribution of FDI is reduced, despite the fact that Romania has remained an attractive business destination.

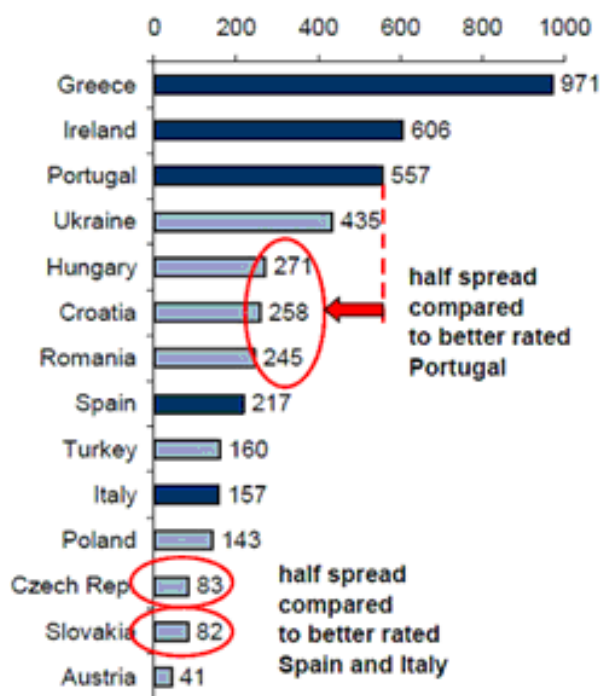


Figure 2. FDI evolution in the regional context, in 2010.

Source: Bloomberg, Erste Group Research.

As the global economy recovers from recession, Romania could benefit from new contributions of FDI in areas such as industrial goods, agriculture and food industry, the IT sector and renewable energy, while the current account decreased reduced external vulnerability Romania in the future.

3. Difficulties for Banks

The economic decline that resulted has created difficulties for banks, especially because of their heavy loan concentrations in credit for commodity-related industries, housing finance and durable goods financing. These are all markets that also had experienced boom periods which in times of lower economic growth are likely to increase the problem of imminent debt write-offs. Under these conditions banks are also forced into a position of tightening credit provisions with the commensurate knock-on effects on demand in the economy. A growing bubble inevitably bursts, but a characteristic of the current crisis is the contagion that set in with a number of booming asset and commodity markets crossing a precipice into record-breaking falls in prices and values. The outcome has been the creation of financial and economic events unknown in the living memory of all economic agents, from ordinary households to supposedly astute bankers and asset and risk managers. Many bankers, including the largest and most respected in the world, found themselves with balance sheets severely crippled by distressed assets to a point of technical insolvency, and consequently in dire need of recapitalization.

Consumer spending was cut back, investment plans were cancelled and stock levels were run down. Worldwide, investors ran for the cover of safe havens and, where this was not possible for small-scale investors, money market investments became dominant.

4. Negative Economic Growth

In 2009 all EU-27 Member States, except Poland, have ended the year with negative growth, compared with the previous year.

Romania was among the last seven EU on the basis of this decline. On the other side, international developments confirm that this crisis, which began as a financial one, has become an economic one and it is characterized by lower GDP.

In 2008 and 2009, the cumulative effects of the crisis based on relative change in real GDP, provides the following recorded values.

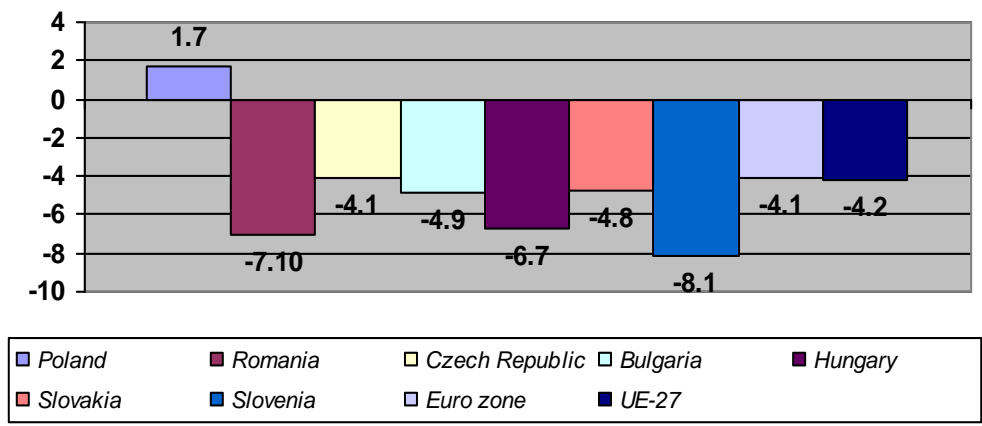


Figure 3. Negative growth.

Source: European Commission.

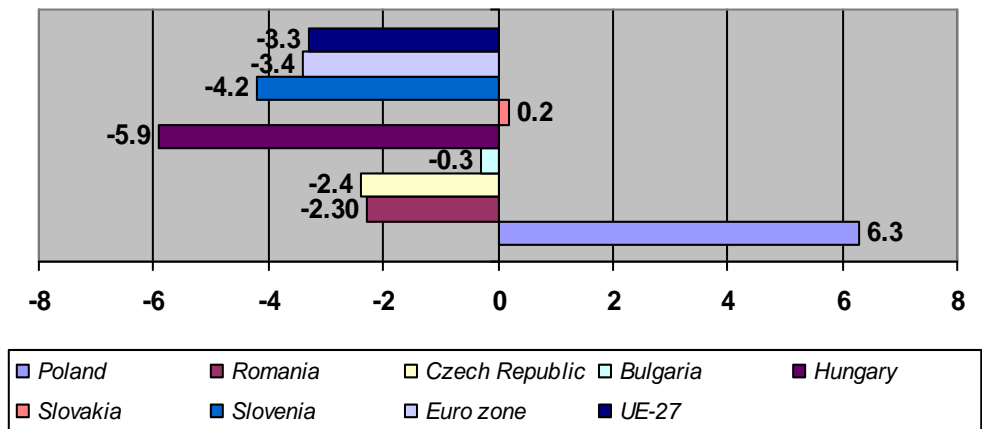


Figure 4. Relative change in real GDP in 2010.

Source: European Commission.

Romania was given by European Commission with an increase of 0.8%, but this value is expected to take determined without account of recent decisions wage decreases and increases in taxation. Latest forecasts from IMF give to our country an estimated rate of -2% , which shows the inefficiency of governmental measures.

5. Labor Market

Although the Community market proved to be more resistant to recession than expected (mostly due to short-term policy measures, past reforms and continuing employment in some Member States) in all

Member States of the EU-27 unemployment rate increased in 2009 compared to that recorded in 2008, unemployment being negatively associated with this economic and financial crisis.

In 2010 and 2011 the following values of unemployment rate have been registered:

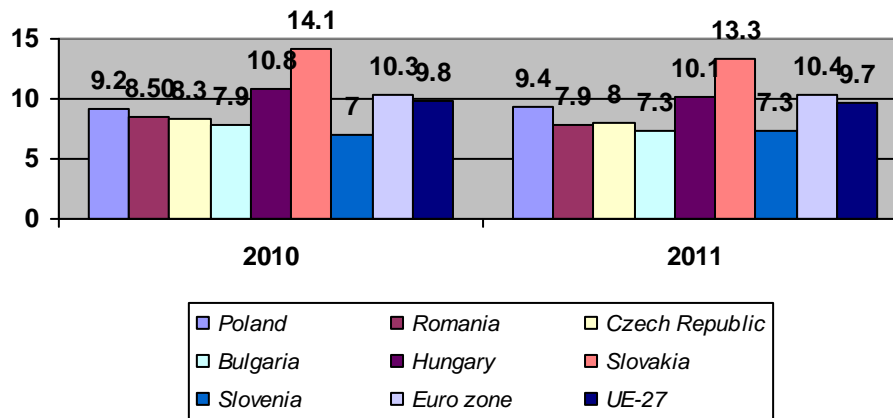


Figure 5. Unemployment Rate.

Source: European Commission

6. Budget Deficits and Public Debts

The public deficit has tripled in 2009 in EU-27, reaching 6.79% of GDP from 2.25% in 2008. This damage was caused, in part, by operation of automatic stabilizers and discretionary measures taken to support the economy, but reflects a stronger than usual fall in revenue to slow growth reaction.

The situation became critical in Romania due to an inability to increase in GDP share of budget revenues and reduce public spending. Our country has the lowest share of GDP of the EU, both budgetary revenue and expenditure budget. These costs are very small comparing with the actual financing needs of Romania (for infrastructure education, health, scientific research, environment protection). In these circumstances public debt to GDP will continue to grow during 2010-2011.

7. Characteristics of the Romanian Capital Market during the crisis

In the years preceding the current financial and economic crisis, the value of many companies has risen to unreasonable levels. After 2008,

there was a sharp reduction of their value. This was a global trend and, unfortunately, the Romanian stock market confirmed these developments.

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.

Romania was of the most affected European countries in 2009. Neither the status of NATO member, nor the umbrella of the EU offered sufficient solutions to retain the foreign capital into the country during the crisis. The effects were really visible at the end of 2008 and spring 2009. Most liquid shares were devalued by 70-80%.

The evolution of trading volume and value at Bucharest Stock Exchange during 2008-2010 is illustrated in Figure 6. Few investors made their presence felt on the domestic stock market. Trading volumes have returned to levels of damage; the market came back in a zone of uncertainty. The market liquidity has been characterized by high volatility, with periods of very low transactions values. BET has sharply fluctuated, both in 2009 and 2010. The most dramatic decrease was recorded in the first two months of 2009, when BET decreased by 34.5%. BET then reverted to an upward trend to 61,7 & higher than a year earlier.

The perception of investors towards the risk associated with investments in the capital market deteriorated in 2010 due to concerns about sovereign debt. In the first half of 2010, market capitalization increased by 37 %, reaching a value of 93.7 billion lei, at 30 June 2010 (source: NBR). Meanwhile, the liquidity of the stock was characterized by a high volatility. In the first half of 2010, BET has seen significant fluctuations, increasing by 27 % in the first three months and decreased by 20 % over the next three.

The Romanian capital market during the crisis have had similar developments as other emerging markets in the region, i.e. small number of issuers, low liquidity, few investors, high vulnerability to external shocks and pronounced segmentation. BET followed similar trends with those of the regional stock market dynamics (such as Hungary and Poland); hopefully a contagion effect from Greek stock exchange was not detected. Most likely, the credibility of Romania rose after the agreements with international financial institutions and therefore, the decline of the Greece's market did not affect the BET index, as clearly confirms Figure 7.

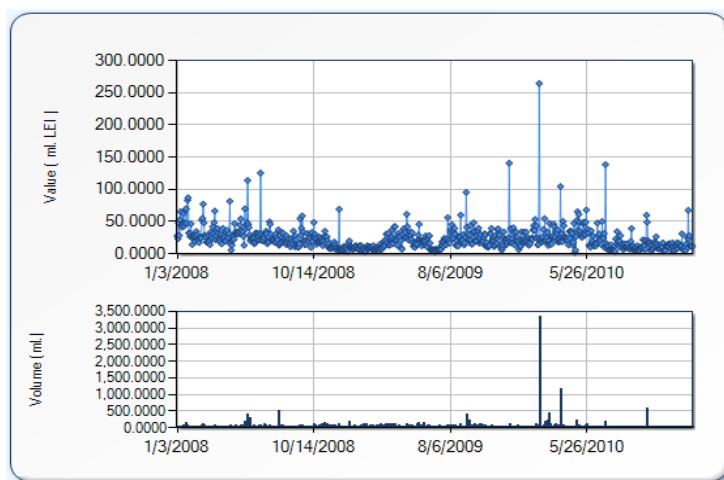


Figure 6. The evolution of trading volume and value at Bucharest Stock Exchange during 2008-2010.

Source: bvb.ro.

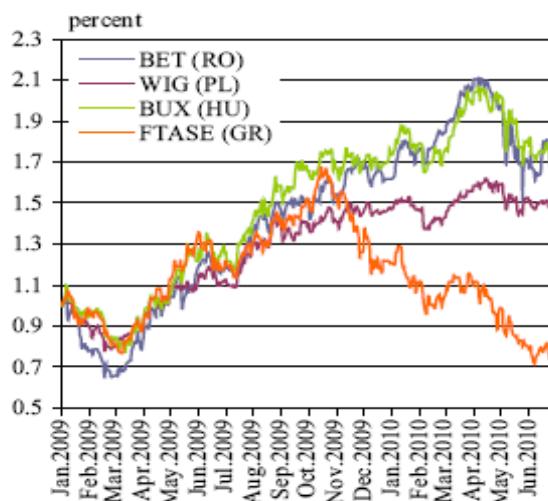


Figure 7. Regional stock market dynamics (reference period Jan.2009-Jun.2010)

Source: Bloomberg.

8. Conclusions

How deep and long will the slow-down be; when can Romanian economy expects an end to the decline associated with the recession? This is a complicated question which cannot be answered with any degree of confidence. Firms and households that face uncertain economic conditions, that have no access to credit and lack confidence in financial institutions

will not invest and consume. A specific policy goal is the restoration of the credit system in which banks are the principal actors. Restoring confidence in the financial system and credit flows and increasing government expenditure typically do not have an immediate impact and will take time to work through to real economic activity, including growth in the demand for Romania's export commodities. But demand management has to be complemented by maintaining and expanding open trade and investment strategies and a serious commitment to assist the developing world in coping with the reversal in international capital flows.

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THE ECONOMICAL CRISIS, PERFORMANCE MODELS AND VALUE-BASED EDUCATION

Ana-Maria GRIGORE*, Andreea MITROI**

Motto: The significant problems we face cannot be solved at the same level of understanding where we were when we created them.

Albert Einstein

Abstract. *Moral capitalism will replace the present brutal and merciless capitalism when we are able to look above our own interests, considering them from a systemic perspective.*

Moral capitalism cannot arise from nothing. The way in which moral norms are absorbed and implemented is determined by the familial and social context that we inhabit. People should learn to be „good” or behave in a moral way. We are not born like this, but we are born with a certain capacity to learn and understand the moral rules of behaviour.

The educational system should get rid of the perennial mentality of individualism and its emphasis on effectiveness at any cost, and focus on the appreciation of values like the respect for other peers, other cultures, and the environment.

Keywords: *moral crisis, moral capitalism, education, value-based education.*

1. Introduction

They say that a near-death experience makes one re-evaluate their priorities and values. The world economy has just undergone such an experience. The crisis has brought to light not only the flaws of the ruling economic model, but also the flaws of our society.

Much has been written about how the financial sector indulged in mindless risks and how this and the resulting fiscal deficits have seriously afflicted the economy; however, little has been recorded on the emergence

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of a fundamental „moral deficit”, which appears to be more serious and even more difficult to correct than the financial problems. The incessant pursuit of profit and placing one’s interest before everything seem to have failed in attaining the dreamt prosperity; instead, these have unquestionably contributed to the outgrowth of the moral deficit (Stiglitz, 2010).

2. The Spiritual Crisis and the Moral Capitalism

The current economic crisis is actually a spiritual crisis (Zohar, 2009). This translates to a complete lack of vision for our future development, due to a very low spiritual capital.

Wall Street was responsible for its own death, a sort of negligence suicide. It lived and died on account of the unleashed force of the market capitalism. The financial centre collapsed under its own excesses, the best examples being John Belushi, Jimi Hendrix, Janis Joplin or Jim Morrison (Young, 2009).

It is also worth remarking that the present crisis represents the most recent and serious consequence of the way in which the importance of ethics and responsibility have been neglected in the decision making process of the business environment.

The rush to make money has led to dysfunctional financial markets, which has eventually caused the great financial crisis of 2008. Therefore, it should now be a lesson of what can happen to an economic system dominated by greed and personal interests.

In 1991, Pope John Paul II revealed his vision of the world since the fall of the Soviet bloc. He clearly suggested that although Communism had come to an end, it had not been substituted by the clean capitalism. He denounced the ‘consumer society’ as attempting to demonstrate that it can satisfy people’s material needs better than Communism, while excluding spiritual values. Consequently, the Pope supported the idea of a ‘moral’ capitalism.

Along the same line, it becomes evident that if one’s primary values are utterly materialistic, everything will be weighed in dollars and cents. As a result, the obsessive quest for material gain has been conducive to short-term thinking and focus on personal interests. Today, man is motivated by the desire to possess, not by ideals. At the same time, the money-oriented culture fathers cynicism and indifference to life’s tragedies and people’s needs.

Moral capitalism implies that business people use their decision making power to analyze and balance their own urges, like greed and other

temptations. It also connotes that virtue and personal interests are increasingly interdependent.

Moral capitalism cannot exact spiritual perfection, yet it only requires our uninterrupted effort to surpass primary urges. It much relies on our humanity and capacity to activate the divine side of this passing world and use our virtues to direct passions.

Ridderstrale and Nordstrom wrote in their “Karaoke Capitalism” (2007) that ‘leaders face the challenge of transforming *bureaucracies* into *amorocracies*. Bureaucracy came from the French *bureau*, meaning office. The new organization comes from the Italian *amore*. It is an organization based on passion and love’.

According to the same authors, ‘all extraordinary achievements depend on passion – in sports, art, politics, business, etc. Certainly, successful companies have core capabilities that determine what they can do. Most organizations also have core opportunities reflecting what is possible to do. But more important than anything else are the core passions, what people in organizations actually care about doing.’

In a 2009 interview, Danah Zohar posits that ‘corporate social responsibility is the term that people use when they mean compassion. Every corporation is for CSR but they don’t usually practise it. But if you really are compassionate (which doesn’t mean pitying people but feeling [empathy] for them) you are going to be much better at relating to your employees and the wider community.’

Danah Zohar also underlines the fact that moral capitalism cannot emerge from nothing. It is our full responsibility to make good things happen. Family and society influence the way in which moral norms are acquired and put into practice. People have to learn how to be good. They are not born good, but come to life with a certain capacity to be so.

The present article upholds the opinion that education is the surest and most powerful long-term way of solving this fundamental issue of our epoch. It is necessary that moral values be included in the curriculum. Education is an efficient weapon. School ought to eliminate the mentality oriented to individualism and effectiveness at all costs. Education can be a means for people to return to real values, such as the respect shown to other peers, other cultures, as well as the environment. One of the solutions could be the complex and humanist approach of man, which includes the attempt of developing all forms of human intelligence, not only the rational one.

In his 'The 8th Habit: From Effectiveness to Greatness', Stephen Covey enumerates four types of intelligence: mental (IQ), physical (PQ), emotional (EQ), and spiritual (SQ).

The spiritual intelligence is the most important of all, as it guides the other three types of intelligence. According to Danah Zohar, 'SQ is the ability to access higher meanings, values, abiding purposes, and unconscious aspects of the self and to embed these meanings, values, and purposes in living a richer and more creative life [...] It was the intelligence that guided men and women like Churchill, Gandhi, Nelson Mandela, Martin Luther King Jr., and Mother Teresa. The secret of their leadership was their ability to *inspire* people, to give them a sense of something worth struggling for.'

Danah Zohar and Ian Marshall point out in 'SQ – Spiritual Intelligence, The Ultimate Intelligence' that 'unlike IQ, which computers have, and EQ, which exists in higher mammals, SQ is uniquely human and the most fundamental of the three. It is linked to humanity's need for meaning; an issue very much at the forefront of people's minds [...] SQ is what we use to develop our longing and capacity for meaning, vision and value. It allows us to dream and to strive. It underlies the things we believe in and the role our beliefs and values play in the actions that we take and the shape we give to our lives.'

The highest forms that these four types of intelligence take are: vision for the mental intelligence, discipline for the physical intelligence, passion for the emotional intelligence, and conscience for the spiritual intelligence.

As stated by Thomas Jefferson, 'the moral sense, or conscience, is as much a part of man as his leg or arm. It is given to all human beings in a stronger or weaker degree, as force of members is given them in a greater or less degree. It may be strengthened by exercise [...]'.

3. Education Today

Theoretically, there is a lot more education today than it was in the past. Practically, this is contradicted by so many instances of degradation that one can witness nowadays: more greed, selfishness, lack of sincerity and integrity. Unfortunately, education does no longer represent emancipation, ennoblement and evolution.

The educational system is wrongly directed: it aims at shallow acquisition, based on information intake, instead of developing the individual as a human being. Overall, the system is focused on material results, while the spiritual factor is neglected, which clearly encourages negative

human features like jealousy, hate and rivalry. Kindness, compassion or honesty are forgotten virtues.

In 'Moral Values and Higher Education', Dennis L. Thomson emphasizes that university ought to 'replace customary morality by reflective morality' if it really wants to approach moral values.

Furthermore, the moral education available through the customary morality can be compared to microwave cooking: it provides one in a few minutes what reflective morality can accomplish only after long and often excruciating reassessment. Dennis L. Thomson concludes in a suggestive manner that 'for customary morality, there is no wrestling with the angel in the dark night of the soul.'

Science is policy, not a belief, as physicist J. J. Thomson tries to emphasize. This underlies one of the important differences between morality and religion and, at the same time, tells education from instruction, with focus on conveying to learners what is considered to be a real belief. As far as instruction is concerned, there is a key at the end of every book. On the other hand, education is not concerned with storing and using information, nor does it focus on acquiring, processing and employing new data. To illustrate, chemistry education is a matter of teaching not chemistry, but how to be a chemist. As J. J. Thomson demonstrates, there is no doubt that the moral development in higher education aims beyond the moral instruction during one's childhood. It is not morality that is taught, but how to be a responsible and reflective militant of morality.

What is, under these circumstances, the true meaning of the word 'education'? Does education make you wiser? Happier? Content? Does it make you become a better person? Or is education much more than this?

The role of education is to enhance the value of the potential already existing in children.

Education is actually the process of removing the ignorance that covers one's inner knowledge (Krishna, 2008).

4. Value-Based Education

In transition countries like Romania, the communist regime had a minimum contribution to the value system. The values proposed by the communists were rejected or gradually lost their supporters. However, at the time of the communist fall, the collapse of the value system was not followed by the adoption of a new set of solid values. Therefore, people have had nothing to relate to, their behaviour and decisions being generally

steered by personal material interests. Such countries have fallen into a value crisis, a sort of general nihilism.

Consequently, today's Romania can benefit from a return to the values and traditions prior to the communist regime. People can regain what once offered them strength and trust; in turn, these can become the necessary reference points for taking the right decisions in the free market transactions (Young, 2009).

In a corrupt business environment, moral capitalism is out of the question. The reference points are no longer firm, while there is no belief in the existence of some truth. 'Anything works.'

Education needs to be enriched with VALUES. First, however, we need to understand the true meaning of 'values'. They are virtues, ideals and qualities, on which actions and beliefs are based. Values are primary principles, which shape our view of the world, attitude and behaviour. There are, on the one hand, the inner values: Love, Kindness, Compassion, Commiseration, Liking, Empathy; on the other hand, there are the values one must apply in daily activities: Punctuality, Discipline, Submission, Way of conduct, Compliance.

Why are values important?

- Values bring quality and meaning to life.
- Values reveal a person's identity and character.
- Values are a guideline to what one should do or should not do.
- Values help people to understand that what they are is more important than what they have.

Value-based education assists the development of the students' character, good conduct, moral integrity, self-discipline, compassion, love for all living things, responsibility, and many other positive qualities. Moreover, education makes students feel at their ease. Gradually, being disciplined, punctual, etc. becomes the students' second nature. Their academic performance improves, along with the capacity to spend more time studying.

Despite all this, the curriculum does not attach enough importance to the value-based education. Is it because the value-based education is not a course that can be printed and marked? Is it because the result of teaching cannot be seen immediately? Or is it because we think that students will acquire these values in one way or another and that it is not our responsibility to teach them these values?

So, what do we need?

We need urgent change from what we are to what we should become. It is necessary that school understand the value of education and of supplementary education. We need a complete metamorphosis of education and, accordingly, we should expect a butterfly emerging from the cocoon; however, improvement does not result in a butterfly, but only in a faster caterpillar.

Where does value-based education fit in the curriculum? Anywhere.

Students are not born with a set of values. They all the time acquire all types of values from parents, teachers, classmates.

It can therefore be said that, in a way, values are more readily acquired than learnt. Nevertheless, students need guidance to acquire the right values. Evidently, this is not a one man's job.

Indian professor Prasad Krishna believes that the value-based education is achievable through three types of approaches:

1. The independent approach – teaching fundamental values in an independent manner. The weekly schedule includes particularly chosen times, when students are voluntarily and deliberately induced fundamental values.

2. The integrated approach – the values and the subjects in the curriculum are conceptually brought together. For instance, while teaching the pendulum and its movement, an analogy can be drawn with the way in which our state of mind evolves.

3. The subtle approach – the teacher has such a personality that he/she is both a model and a mentor.

Conclusions

It has become a common cliché to notice that the Chinese pictograms for the word 'crisis' both read 'danger' and 'opportunity'. We have seen the danger. The question is: will we take the opportunity to escape the moral and ethical confusion that surrounds us, will we regain the balance between individualism and community, between means and ends and, above everything else, will we educate people ready to live up to a number of shared ideals and values?

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GREECE: AN EXPECTED DENOUEMENT

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The world goes through a period whose drama surpasses everything that happened during the Great Depression of 1929. Monetary and fiscal-budgetary complications contribute greatly to the mess that covered the whole world. Although the economic theory and practice were enriched with every crisis spent over time, the current imbalances require serious innovations in macroeconomic policies. However, these cannot be conceived only in national terms, but taking into account the regional and even global impacts. The interdependencies have become so obvious that the major problems facing one country generates imbalances in an area sufficiently large to determine concerted actions.

An example of this is offered by Greece. A small country with insignificant share in the global economy, but a member of the European Union and especially of the Euro area. This is the country whose imbalances are talked about in most concerned terms and whose consequences are major on a regional scale (even if their interpretation was shallow in the first instance). It confirms, perhaps more than any other country that has a weak public governance system in the highest degree.

Greece pays a significantly tribute for errors comitted too long. It has a suffocating bureaucracy, a level of corruption extended to the political class (under Article 62 of the Greek Constitution, government members cannot be prosecuted without the approval of the Parliament). Greek authorities are ineffective to stop these society flaws. The claims of farmers and civil servants have been satisfied without the slightest effort to analyze their opportunity. The state apparatus was unnecessarily expanded and pushed the cost of wages to unsustainable levels.

An important part of these errors can be imputed to the European authorities who were deceived by false reports of the Greek Government. The statistics were constantly adjusted by the Greek authorities. Two

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examples are proof of this: not including a part of defense expenditure (Greece continues to spend about 3% of GDP on defense, more than all other European countries, even in current conditions) and hospitals public debt in the government deficit calculations, which submitted a false picture of public finances of Greece. In early 2009, the European Commissioner for Economic and Monetary Affairs at the time, Joaquin Almunia said, based on data provided by the government: „Greek economy is in a better situation than the average in the Euro area, currently in recession”. But very soon came out the real information about the Greek economy which provided a terrifying image of the government of this country and the risks threatening the whole Euro area. Corroborating this situation with the information on other economies and the need to support Greece, the German Finance Minister, Wolfgang Schäuble, said in an internal document addressed to Jean-Claude Trichet, European Central Bank President, that „We are facing a real risk that, for the first time, the whole euro area to enter bankruptcy”¹. And he asked, using a dark language, a package of financial assistance and the involvement of private banks in bearing the costs of saving Greece.

Greece reports to Brussels led to massive financial support of Greece by the EU, which ultimately means that the resources actually came from contributions of other European citizens whose rights were much more modest than for Greek citizens. Total Community structural assistance allocated to Greece during 1994-2013 was more than 68.6 billion Euros.

The immediate causes of the crisis is due to the huge and growing government deficit that Greece recorded in the EU accession, which resulted in a rapid increase of the public debt. In 2006 the budget deficit stood at 3.6% as a share of GDP and the public debt was almost equal to the country's GDP. In 2009, the budget deficit reached 13.6% and the public debt was 15% higher than GDP. Two years later, despite the attenuation of the budget deficit, the public debt is heading rapidly towards 200% of GDP. No other country in the EU has reached so high levels, which justify approaches for Greece bankruptcy and its exit the Euro area. And this despite the fact that other countries like Spain, Ireland, Italy, Portugal, whose future is also worrying, at least in the short term.

But the main cause of the worsening situation of Greece is an inefficient public policy mix, coupled with a hostile business environment legislation, which competed to create a deadly combination for the economy and society in general.

¹ Euobserver.com

As is normally today, the European Union and International Monetary Fund agreed to support Greece through a loan of over 110 billion, with low levels of interest. In terms of external credibility loss, the cost of alternative financing on the financial markets was extremely high, which would be aggravated even more the dramatic situation.

Not only Greece, but also countries such as Germany, France and Great Britain have set very ambitious targets in this respect.

But the results are below expectations. Moreover, extending their application, as they were initiated, tends to turn into a brake to economies recovery. If for Greece, reducing the public expenditure respond to objective requirements, then this is much less evident in countries such as Germany or France. Germany and France probably did not need to resort to such an extent to fiscal austerity diets. Given the importance of these economies in Europe, once these countries are slowing down their growth, they reduce the chances of recovery for other countries. For Germany and France are the locomotives of the European economy, and Germany even of the world economy.

Why then many countries have resorted to fiscal austerity programs, some draconian? One explanation, perhaps the most grounded and widespread, is related to regaining the credibility on the financial markets. The public expenditure reducing in the case of Greece, responds to objective issues, for this country really needs to rebuild a positive image (which will take a long time). Instead, such an argument in the case of Germany or even France and the United Kingdom does not work. Germany is the most solvent state and its sovereign debt is the safest in Europe. As a result, financing this economy on different financial markets is easy and cheap. Japan, whose debt level is very high for a long time, has now reached almost 200% as compared to the GDP. And neither this country doesn't face major solvency problems. Serious solvency problems arise rather for Spain, Portugal and Ireland.

A second justification for fiscal austerity is the compliance with nominal convergence criteria for joining Economic and Monetary Union. Public debt and budget deficit should not exceed 60% and 3% of GDP. Greece has failed in any year since 1991, to comply with these limits. Moreover, there were other states that did not meet these conditions. In 2006, an economic prosperity year, six states violated the public deficit criterion and nine states the public debt criterion². This raises the natural question of whether the compliance with these criteria of convergence is

² Corneliu Harea, *European Austerity Policies – A Necessary Evil or a Dangerous Effort?*, <http://www.europuls.ro>, 2011.

appropriate, especially now in full recession, when unemployment peaked and the risk of deflation is real.

About this issue, J. Stiglitz asserted: “The fiscal austerity will prevent Europe’s growth and therefore the recovery of the most affected economies: after all, nothing would help Greece more than a robust growth of its trading partners. A poor increase will hit the income taxes, undermining the very proclaimed purpose of fiscal consolidation”.

Whatever is the motivation for fiscal austerity programs, “Greece must achieve agreed fiscal objectives and put into practice the agreed structural reforms to achieve the compliance and to secure the funding from its partners. This is essential for ensuring sustainable public finances and improving the perspectives of the Greek citizens in terms of economic growth, jobs and wealth” said Olli Rehn, the European Commissioner for Economic and Monetary Affairs.

Greece is a member of the Euro area. And therefore, the problems about Greece are so concerned for Europe, in the context of the entire area is passing through the worst crisis since the single currency introduction. The Euro introduction has been and continues to be a political project. In the long run, its maintenance chances require an extremely solid economic foundation. In its absence, and even the inexistence of a viable short and medium term support, the euro becomes an unsustainable project³.

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SUSTAINABLE DEVELOPMENT AS RESULT OF NEW ECONOMY

Claudia IONESCU*

***Abstract.** This paper provides a point of view regarding nowadays global and European context and of relevant institutions involved in providing sustainable development. The analysis of different models gives the future trends of sustainable development, from my point of view.*

The main question of the paper is to find out whether the new economy creates sustainable development in the regions.

The problems we face are complex and serious – and we can't address them in the same way we created them. But we can address them. What kind of Europe do we want – for ourselves and for future generations?

The research included a literature review of sustainable development, some interpretations of the SD and the EU instruments, the mechanism and the impact of some instruments on the sustainable development of the world.

Keywords: crisis, EU, new economy, regional policy, sustainable development.

1. Introduction

We are using the planet's resources faster than they can be replaced and the current high levels of material throughput and resource consumption are chiefly responsible for this. Economic development today depends on the complex co-ordination of different activities. The evidence is mounting that this cannot be managed efficiently from remote capitals. It requires geographical proximity among institutions, authorities, capital, research and labour. In the European Union regions have become the primary spatial units where knowledge is transferred, where local innovation systems are built and where the competition to attract investments takes place.

It may seem paradoxical but globalisation reinforces the need for subsidiarity and partnership. Global governance is trying to deal with problems which are at global scale. In the same time, the regional level is becoming increasingly important and plays an increasingly active role in reacting to global changes such as climate change, energy, the internal

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market, or the demography challenge. So there is a need to adjust regional policy to the new challenges by using new economy principles².

States, as well as other levels of governance, depend increasingly on mutual cooperation. Abilities to facilitate and engage such cooperation, and become more a partner state, are therefore a crucial requirement of capacity to govern³ or in other words leadership. For upgrading capacities to govern is therefore that states will continue to be the dominant type of governance actor, but with significant changes in their role within inter-governance architecture, and together with the strengthening of sub-state, super-state and global governance⁴.

According to economic theory, consumer demand is a key driver of economic growth. It is also strongly related to individuals' well-being, because in a growing economy people are increasingly affluent and able to purchase goods and services that enhance their quality of life. It is assumed that standards of living, narrowly or broadly conceptualised, have risen in association with economic growth, and there is evidence that when national income declines sharply, so does well-being. If this understanding is correct and current levels of material consumption are environmentally unsustainable, there seem to be only two possible outcomes: compromised well-being for future generations due to environmental degradation, or compromised well-being now due to curtailed consumption. However, careful consideration of the evidence for relationships between well-being and environmental sustainability suggests a third possibility, one that simultaneously acknowledges the well-being benefits of a strong and stable economy and the negative impacts on well-being associated with unsustainable material consumption.

The usual formulation of '*acting locally and thinking globally*' needs to be taking into consideration from the other site '*act globally and think locally*' and that can reflect the consideration of the effects of global decisions on humans in their agenda setting. A major reform, necessary from the perspective both of states and humankind, is to promote some kinds of continental supra-state governance, as exemplified by the European Union⁵.

The European Union illustrates a new successful forum of supra-state continental govern.

² James Roberson (2005), *The new economic of sustainable development*, The Old Bakehouse, p. 19

³ Dror, Yehezkel (2002), *The capacity to govern*, Frank Class Publishers, p. 173

⁴ *Ibidem*

⁵ *Idem*, p 174

In short, a strong and stable economy is supportive of well-being. However, *in kind of* economic model, stability is structurally depending on continuing consumption growth. When this growth is material consumption it leads to problems with environmental sustainability. In considering the relationships between well-being and environmental sustainability, it is therefore essential to explore not only *direct* links between the environment and people's well-being, but also effects that are *mediated* through individuals' behaviour within the context of the current economic system.

2. Sustainable development

Sustainable development is dealing with dilemmas as: It's good to be physically healthy, but what if you are poor and don't have access to education? It's good to have a secure income, but what if the air in your part of the world is unclean? And it's good to have freedom of religious expression, but what if you can't feed your family? So, the concept of sustainable development is rooted in this sort of systems thinking. *It helps us to understand ourselves and our world on long, not just on short term.*

The problems we face are complex and serious –and we can't address them in the same way we created them. The explanation of the sustainable development offers the potential to identify and control some variables in the development process and thereby:

- involves participants who have the interest, ability, maturity and knowledge to influence the process;
- increases the predictability of the outcomes;
- increases the efficiency, professionalism and quality of the deliverable, consequently the quality of life.

The study includes a literature review of sustainable development models, European Union system and policies, governance, the instruments including: the concept of sustainable development and cohesion policy, legislation, strategies, institution, programmes and the impact of that.

The global system is composed by: different kind of regions, countries, cities, towns and rural areas. The meaning of the regions depends on their level – global: for example we know South America, EU, Caucasian region etc or for a deeper level in the EU we have – NUTS⁶ regions.

⁶ The NUTS classification is hierarchical in that it subdivides each Member State into three levels: NUTS levels 1, 2 and 3. The second and third levels are subdivisions of the first and second levels respectively. Member States may decide to go further still in terms of hierarchical levels by subdividing NUTS level 3.

From the point of view of Dror Y.⁷ there are ten relevant characteristics of global change:

1. Rapid non-linear change.
2. Increasing uncertainty and inconceivability.
3. Globalization.
4. Multiplying complexity.
5. Powerful global actors.
6. Growing prosperity coexisting with increasing inequality.
7. Intense frustrations, trauma, despondency and unrest.
8. The likelihood of harm and evil.
9. A lot of conflict and violence.
10. All the changes are leading to mutations.

So, it is still difficult to behave at global level because of lack of the abilities to crystallise and concentrate the will and the power needed to cope with the opportunities, because a lack of real global governance.

3. The EU in global context

In a constantly changing international context, the single market of the EU presents many advantages in terms of innovation, competitiveness and choice, whilst respecting labour, health, safety and environmental standards. Through its nature, it has attracted foreign investments and firms.

The EU continues this process to cope with globalisation, concentrating on the pillars identified in the Communication “Global Europe competing in the world”.

- the trade and competition policy instruments which guarantee a competitive space by responding to foreign subsidies and other unfair practices;
- promotion of cooperation on multilateral and bilateral norms. The EU must take inspiration from international standards and its own standards must serve as a world reference, ensuring it a leading role, especially if it speaks with one voice;
- ensuring that the benefits of market openness reach European citizens, especially in terms of choice and price, but also by following up on trade agreements.

⁷ Dror Y. p39

The internal market is one of the pillars of the European Union. Completed in 1992, the single market is an area without internal frontiers in which persons, goods, services and capital can move freely, in accordance with the Treaty establishing the European Community. The internal market is essential for prosperity, growth and employment in the EU, contributing to the achievement of its objectives under the Lisbon strategy. As an integrated, open and competitive area, it in fact promotes mobility, competitiveness and innovation, interacting in particular with the EU sectoral policies. To ensure that everyone, citizen or business, can make the most of the advantages of the single market, the EU concentrates on dismantling barriers still impeding its operation.

It seeks to harmonise legislation in order to improve its response to the challenges of globalisation and to adapt to advances, such as the new technologies. The European Union is working towards further simplification of the regulations which still prevent citizens and businesses from making the most of the advantages of the single market⁸.

4. Regional policy and new economy

A central objective of European regional planning and policy is a balanced socio-economic development of the regions. Regional planning influences both sector policies and local governments, but planning varies from country to country. Coordination and implementation in sector policies for regional planning purposes tends to be problematic as it complicates decision-making. Complexity in regional planning implementation is a major obstacle as it presumes very good administrative capacity, cooperation ability as well motivation (to work harder). In the case of redistributing regional planning administration will act as a redistributor of finances, but for the effective arrangement of regional development policy local willingness and ability of development the region are required: to initiate and carry out projects, especially in cooperation with the private sector.

If regional statistics are to be comparable, the geographical areas need to be of comparable size in population terms. Their political, administrative and institutional arrangements should also be specified. Where applicable, the non-administrative units must reflect economic, social, historical, cultural, geographical and environmental considerations.

⁸ http://europa.eu/legislation_summaries/internal_market/index_en.htm

Territorial units⁹ are defined in terms of the existing administrative units in the Member States. An 'administrative unit' marks out a geographical area for which an administrative authority has power to take administrative or policy decisions in accordance with the legal and institutional framework of the Member State.

The NUTS level to which an administrative unit belongs is determined on the basis of population thresholds as follows table nr. 1.

Level	Minimum population	Maximum population
NUTS 1	3 million	7 million
NUTS 2	800 000	3 million
NUTS 3	150 000	800 000

Where the population of a Member State as a whole is below the minimum threshold for a given NUTS level, the Member State itself constitutes a NUTS territorial unit of that level. If, for a given level in the classification, there are no administrative units of an adequate size in a Member State, that level is to be established by aggregating an adequate number of smaller neighbouring administrative units. The resulting aggregated units are to be known as "non-administrative units".

To strengthen the consistency of the criteria for identifying European regions set to benefit from the Structural Funds and regional state aid in the interests of more targeted and more consistent Community action in granting the financial support available.

According to the definition of regional policy, in the EU, one of the objectives is to reduce regional differences. As far as regional differences do not disappear within the market economy, many countries have implemented regional policies to a larger or a smaller extent. Main causes of regional problems are changes in economic structure: a new industry tends avoid old industrial area¹⁰. Regional policy assists economy restructuring of the region: it has an impact on market regulation by either

⁹ The NUTS classification divides up the economic territory of the Member States, including their territory outside regions as such. The latter comprises parts of the economic territory that cannot be assigned to a given region such as air space, territorial waters and the continental shelf, territorial enclaves (embassies, consulates and military bases), or resource deposits located in international waters and exploited by units residing in their territory.

¹⁰ Hall, P. (1988), *The geography of the fifth Kondratieff*. In: D. Massey, J. Allen. *Restructuring Britain. Uneven Re-development: Cities and Regions in Transition*. London: Hodder and Stoughton, pp. 6-47

offering direct (tax) incentives to new companies or creating indirect prerequisites such as infrastructure (educational system, roads etc).

Discussions regarding on sustainable development

The concept of sustainable development implies a dialogue about the future in the next 20-50 years. In this regard an active participation of citizens in the debate for necessity and usefulness of sustainable development was encouraged. After an intensive public discussion an interesting bridge between citizens and decision makers, helping to identify critical branch points for sustainable future was settled literature¹¹ based on the debate and the conclusions of the debate. Sustainable development has been defined in many ways, but the most frequently quoted definition is from *Our Common Future*, also known as the Brundtland Report¹².

“Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:

- *the concept of **needs**, in particular the essential needs of the world's poor, to which overriding priority should be given; and*
- *the idea of **limitations** imposed by the state of technology and social organization on the environment's ability to meet present and future needs”.*

In this extensive discussion and use of the concept since then, there has generally been recognition of three aspects of *sustainable development*¹³:

1. **Economic:** An economically sustainable system must be able to produce goods and services on a continuing basis, to maintain manageable levels of government and external debt, and to avoid extreme sectoral imbalances which damage agricultural or Industrial production.
2. **Environmental:** An environmentally sustainable system must maintain a stable resource base, avoiding over-exploitation of renewable resource system or environmental sink functions, and depleting non-renewable resources only to the extent that investment is made in adequate substitutes. This includes maintenance of biodiversity, atmospheric stability, and other ecosystem functions not ordinary classed as economic resources.

¹¹ the Brundtland report.

¹² World Commission on Environment and Development (1987), *Our Common Future*.

¹³ Holmberg ed. (1992), *Making Development Sustainable*, Chapter 1; Reed ed. (1997), *Structural Adjustment, the Environmental and Sustainable Development*, Chapter 2.

3. **Social:** A socially sustainable system must achieve distributional equity, adequate provision of social services including health and education, gender equity, and political accountability and participation.

These three elements of sustainability introduce many potential complications to the original simple definition. The goals expressed or implied are multidimensional, raising the issue of how to balance objectives and how to judge success or failure. For example, what if “green” sources of energy are more expensive than others and the consumers are poor, which goal will take precedence?

The definition of sustainable development as will be used: *‘sustainable development is the human capacity to obtain social and economic development in harmony with the nature’*.

The definition above is based on the previous models as: the Brundtland report, the three pillars approach, the four capitals approach, the integrative approach, the resources maintenance approach, the Agenda 21, the sustainable development principles, the ecological modernisation, the strong and weak interpretation, and the two and three corridors models.

If people can use their knowledge and capacity to satisfy their needs by taking into consideration all the limitations and innovations that they can benefit, they can become more responsible and more human; people can work for people and be united into complexity made by diversity.

In this new context they can try to use all achievements to develop the community social and economic by acting in harmony with the nature. Also the EU SDS sets out an approach to better policy-making based on better regulations and on the principle that sustainable development is to be integrated into policy-making at all levels. This requires all levels of government to support, and to cooperate with each other, taking into account the different institutional settings, cultures and specific circumstances in Member States.

Understanding sustainable development linkages and achieving the required policy trade-offs across the environmental, economic and social spheres requires novel methodologies based on new types of statistical approaches.

The challenge in measuring sustainable development lies in developing new indicators and combining these through accounting frameworks, decoupling methods, global approaches and composite indices.

5. Conclusion

The European Union may be one of the richest parts of the world; however there are big internal disparities of income and opportunity between its regions. Through its regional policy, the EU transfers resources from affluent to poorer areas. The aim is to modernize backward regions so that they can catch up with the rest of the Union. The cohesion policy for the programming period 2007-2013 is targeted on the EU' s strategic priorities¹⁴, especially the Growth and Jobs Strategy, and funding is focused on areas such as innovation. But, the need to promote balanced development by reducing the gap between the different regions and helping the most backward to catch up was recognized, for the first time, it was mentioned in the preamble to the Treaty of Rome as early as 1957. The Treaty already provided for the ESF, to promote employment and improve the mobility of workers within the Community and the **European Investment Bank** (EIB). The other instruments designed to assist development in the Member States were introduced as the building of Europe progressed and new Member States joined.

The enlargement of the EU to 27 Member States increased geographical disparities within the Union, with many more of our fellow citizens living in disadvantaged regions. Bridging these gaps will inevitably be a long-term process, which is why the least-developed regions are the top priority for cohesion policy. At the same time, however, virtually all regions are confronted with the need to restructure, modernise and foster continuous knowledge-based innovation in order to meet the challenge of globalisation. Cohesion policy is, therefore, based on a broad vision, recognising the need to reinforce the competitiveness of all regions in the Union so that they can contribute to the Lisbon strategy of growth and jobs.

For the 2007-2013 programming period of regional policy, a more strategic approach based on European priorities frames the process of implementation at EU level of cohesion policy at the national level and from there down to the regional¹⁵ and local level. This should contribute to increased economic effectiveness, as well as increasing transparency and facilitating political accountability.

¹⁴ www.inforegio.ro

¹⁵ www.regioadrbi.ro

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LABOUR MIGRATION INSIDE THE COUNTRY AND ABROAD

Nina MOCĂNAȘU*, Mihai COVACI**

***Abstract.** People want a perceptible improvement of the level of their life and they want that as soon as possible. Under the old regime employees remained at their first place of employment throughout their working life, but now the labour mobility is necessary in a market economy for a better and better improvement of the social life and therefore the individual conscience.*

Migration has existed since the beginnings of mankind, because of nomadic peoples. The phenomenon has not stopped in time, but has made changes and acquired new forms. Migration processes take place simultaneously and are growing in many countries. One of the long-term results of this development could be the nascence of multicultural societies, tending towards new concepts of citizenship or national state.

Most developed countries have become diversified societies and multiethnic due to migration, and those who have not yet reached this level, turned decisively in this direction. Migration phenomenon has socio-economic and demographic implications for both the exporting country and in the importing one, with just as many dilemmas. It is increasingly clear the discrepancy between the sovereign right of states seeking to protect domestic labour market and the fundamental rights of the man that is forced to migrate or chooses to migrate in order to find a workplace.

***Keywords:** mobility, process migration, multicultural societies, citizenship, national state, labour market*

1. Introduction

Migration is a phenomenon that represents the movement of crowds of people from one area to another, followed by a change of address and / or employment in a form of activity in their arrival area¹.

Migration phenomenon has always been characterized by transhumance, invasion, colonization, or caused, most often, by the attractions exerted by the richest regions upon the poorest populations.

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¹ Cătălin Zamfir, Lazăr Vlăsceanu (1993), *Dictionary of Sociology*, Babel Publishing House, Bucharest, p.355

Migration causes were diverse, ranging from the economic causes to the social and political ones. People either left the area in order to find some development opportunities and a better socio-economic level, or took refuge in another area after disasters, wars, religious or political persecution.

Over time, this phenomenon has acquired new dimensions. People used to migrate to change their workplace and living conditions. Typically, individuals or families emigrated in search of jobs but most migrants were unskilled and therefore were employed for physical labour, heavy or unhealthy.

2. Labour migration inside the country

In case of domestic migration changes were visible from rural to urban areas; this phenomenon was characteristic for all societies under the industrialization phase.

Evolution of current migration has a very different causality and it trains also other population groups.

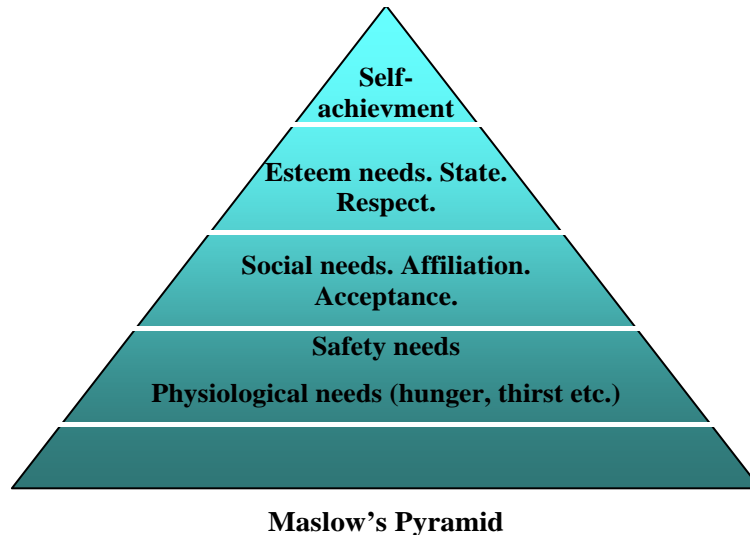
If we take into account Maslow's² theory (which is perhaps the simplest theory of human motivation), human action is based on motivation and on that basis we need to meet certain biological and basic necessities. Those who do not have made minimum of resources and these basic necessities are not satisfactory will tend to satisfy them by migrating to areas that can provide that minimum comfort considered necessary to their existence.

It is known that the needs are unlimited, but the available resources are limited. Thus, started from Maslow's needs, the man can satisfy five categories of needs when he claims remuneration as a result of his work:

- physiological needs as food, clothing, place for living;
- safety needs that can be met only through a secure job (health insurance, pension insurance);
- social needs, that can be met by making the organization a climate in which an individual feels good, because he needs social relationships also beyond family and friends;
- esteem needs – the more he works and he is more efficient, the more likely the individual may be moved up to a better position with a better salary;
- need of self-achievement, growth and development as a man.

² www.leadershipcenter.ro

Hierarchy of needs depends on personality, social-cultural environment and previous successes or failures of the individual.



Personal factors influencing job satisfaction are: age, seniority and personality. A number of studies have shown that age and seniority are positively associated with favourable attitudes towards the job. Generally the attitude improves with age. The lowest one is reported by young employees. For this situation several explanations have been proposed. Usually, as people accumulate experience they move to positions involving more responsibility. Age and seniority usually get more power.

Labour migration as economic, social and political phenomenon presents a number of features. These include the fact that immigrants develop activities that are not in accordance with their education, skills and qualifications obtained in Romania. Labour migration often has negative effects on families and particularly on children's education. Thus the marriage rate and fertility decrease, while the divorce rate increases.

In the present period, work has become rather more than a necessity, a mean of existence a way of self-achievement or a way of solving an own interest.

Regarding the domestic migration, the trends are fairly stable. Since 1995 the North-East Area lost the largest number of people and this was confirmed in 2005.

Migration Flux by Region in 2005³

Regions	Out	In	Balance	%
North-East	47.150	43.430	3.720	-54,92
South-East	35.248	34.408	876	-12,9
South-Muntenia	40.517	39.333	1.184	-17,5
South-West Oltenia	29.848	29.168	680	-10,0
West	23.849	25.638	1.789	+26,4
North-West	28.742	28.426	316	-4,7
Centre	27.902	28.093	191	+2,8
Bucharest-Ilfov	39.312	44.108	4.796	+70,8

The Bucharest-Ilfov, West and Centre have attracted people because of high living standards and opportunities.

Net Internal Migration

Symbol: Mnx
 U.M.: persons
 Aggregation level: national, residence, age groups

Years	2000	2001	2002	2003	2004	2005	2006	2007	2008
Urban	-34938	-9490	-24696	-23485	-39554	-20537	-18649	-38002	-46157
0-5 years	-3573	-445	-1551	-745	-1704	-726	-636	-1229	-1586
6-14 years	-7321	113	-1045	602	-1389	-626	-397	-1313	-2283
15-19 years	-2645	-1595	-2168	-1891	-1853	-1021	15	-682	-717
20-24 years	1387	3261	855	925	-533	637	2719	1357	1142
25-29 years	3979	6643	4617	3964	1595	1780	2998	1035	-306
30-34 years	-682	2696	899	2221	441	1339	1359	-83	-2802
35-39 years	-3362	-1806	-2447	-1958	-3391	-1687	-1487	-2432	-3429
40-44 years	-6255	-4962	-5620	-5274	-5677	-3057	-2814	-3712	-4498
45-49 years	-5858	-5194	-6923	-7512	-8533	-5200	-5271	-6179	-5754
50-54 years	-4561	-4268	-5861	-7042	-8428	-5531	-6261	-8338	-8731
55-59 years	-2645	-2084	-2804	-3584	-4861	-3261	-4603	-7257	-7895
60 years and over	-3402	-1849	-2648	-3191	-5221	-3184	-4271	-9169	-9298
Rural	34938	9490	24696	23485	39554	20537	18649	38002	46157
0-5 years	3573	445	1551	745	1704	726	636	1229	1586
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35-39 years	3362	1806	2447	1958	3391	1687	1487	2432	3429
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³ Source: Statistical Yearbook of Romania, 2006.

Years	2000	2001	2002	2003	2004	2005	2006	2007	2008
45-49 years	5858	5194	6923	7512	8533	5200	5271	6179	5754
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60 years and over	3402	1849	2648	3191	5221	3184	4271	9169	9298

People with a greater willingness to migrate are usually young, working-age population, who migrate to urban areas in search of better jobs and a more attractive social life. It's usually about the young people aged between 20 and 39 years. It should be noted that while there is a phenomenon of migration to rural areas, specific to the population of 40 years and over and that affects the entire country.

Generally, that is the case of people that after the restructuring of state companies have failed to change their profile and thus were forced to return to rural areas where they can develop subsistence.

In the period of 2000-2005 domestic migration was dominated by urban-rural flows (557,091 people), followed by urban-urban flows (482,772 people) and rural-urban ones (476,319 people).

Urban population is more dynamic compared with the one in rural areas: 1,039,863 people left urban areas, going either to rural areas or to other cities, compared with 855,966 persons who have left rural areas.

3. Labour migration abroad

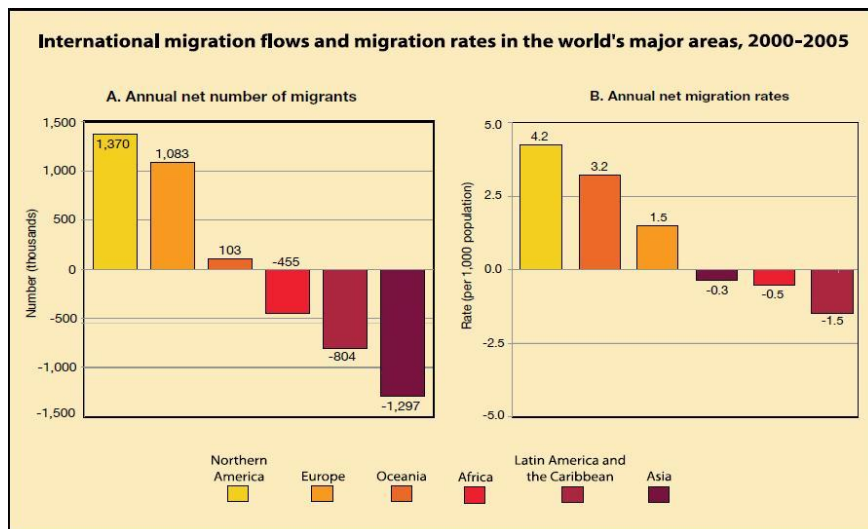
Migration has existed since the beginnings of mankind and it represents a more and more important component for fostering markets globalization, for corporatism and it is beneficial as a mean of regulating the labour market imbalances. The phenomenon has not stopped in time, but has made changes and acquired new forms.

Migration processes take place simultaneously and are growing in many countries. One of the long-term results of this development could be the nascence of multicultural societies, tending towards new concepts of citizenship or national state. Most developed countries have become diversified companies, multiethnic, and those who have not yet reached this level, turned decisively in this direction.

For researchers in the field of migration it has become clear that this phenomenon must be regarded as a normal and structural element of the human society throughout history. An important feature of population is the movement from one place to another. The right to move has been recognized worldwide for over half a century through the Universal Declaration of Human Rights.

Currently, the provisions of the Treaty on European Community stipulate the right of every EU citizen to move and freely establish residency on the territory of Member States, under the conditions laid down in the Treaty of Rome.

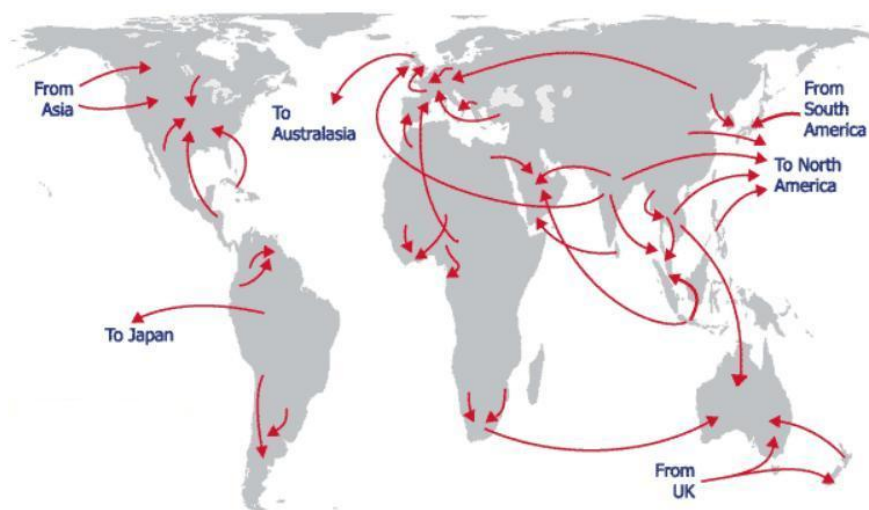
Increasing international migration began after the Second World War along with the possibilities of using high-speed transport and the development of international markets involving notably Europe and the U.S.A. This was the period of relative growth of migration from developing countries to the developed and the emergence of the phenomenon of „guest workers“. In the decades 1970 and 1980 global trends have favoured the controlled movements of temporary workers, immigrants' access being limited to those highly gifted professionally or those whose families had already been living in the country of destination. Globalization, trade liberalization and economic integration have encouraged labour mobility. Also, this trend has been and is supported by the gap in living standards between rich and poor countries; the type of mentality adopted and developed cultural forms. The publication World Migration 2003 of the International Organization for Migration, estimates that 2.9% of world population, ie one person out of 35, are migrants motivated by the desire of improving the lives economically. The highest level of migrants was in Oceania (19.1%) and the lowest one in Latin America (1.1 %) ⁴. The status of immigrants in 2005 was between 185-192 million people.



International representation of the migration rate

⁴ http://publications.iom.int/bookstore/free/WMR_2003.pdf p. 29.

Some sources estimate that in 2010, the number of people with legal immigrant status internationally reached 214 million and in 2050 will increase to 450 million⁵. To those ones they added the 19 million refugees and at least 10 million illegal immigrants. One of the major causes of such migration is the increased and diversified offer of employment.



Areas of main trends of international migration

4. Labour migration in the European Union

A new economic study quoted by BBC explains that rich Western European countries have benefited from open borders to skilled immigrants. Thus, 26,500,000 people in Europe have the status of immigrant workers representing about 4% of the total workforce⁶. Some economists have calculated the impact of migration from East to West jobs in the EU enlargement. In a report it has been indicated that the West income and production will increase, not decrease as many fear. On the other hand, economists warn that the poor area in Southern Europe will suffer most⁷.

In the European Union labour migration has stimulated policies that led not only to a high level of employment, but also to improve and modernize the existing social security systems and the creation of a Community system to ensure social protection of migrant workers.

⁵ http://publications.iom.int/bookstore/free/WMR_2010_ENGLISH.pdf p. xix

⁶ <http://www.ilo.int/public/english/dialogue/sector/papers/health/wp245.pdf> p. 10.

⁷ http://www.umar.gov.si/fileadmin/user_upload/konference/06/20_marques.pdf p. 21.

Free movement of persons, in particular workers, has clear advantages for both the old EU Member States – mainly in countries of destination for migrant workers – and for new and future member states. It is possible for the crises effect to reconfigure to some extent these advantages. It is clear that the migration of skilled labour will increase living standards. Such findings are in contradiction with the statements of politicians and other economists. Authorities in rich countries have long supported free migration of labour in certain key sectors such as healthcare or education. On the other hand there were many others who debated this policy for fear of the effects that the unlimited labour migration would have on workers in destination countries. Major companies will invest in countries that can provide highly skilled workforce since these industries – technology, pharmaceuticals, telecommunications etc. – are dependent on human capital. As some economists estimate the income from rich countries in Northern Europe will rise to 5.6% if labour migration from east to west is allowed⁸.

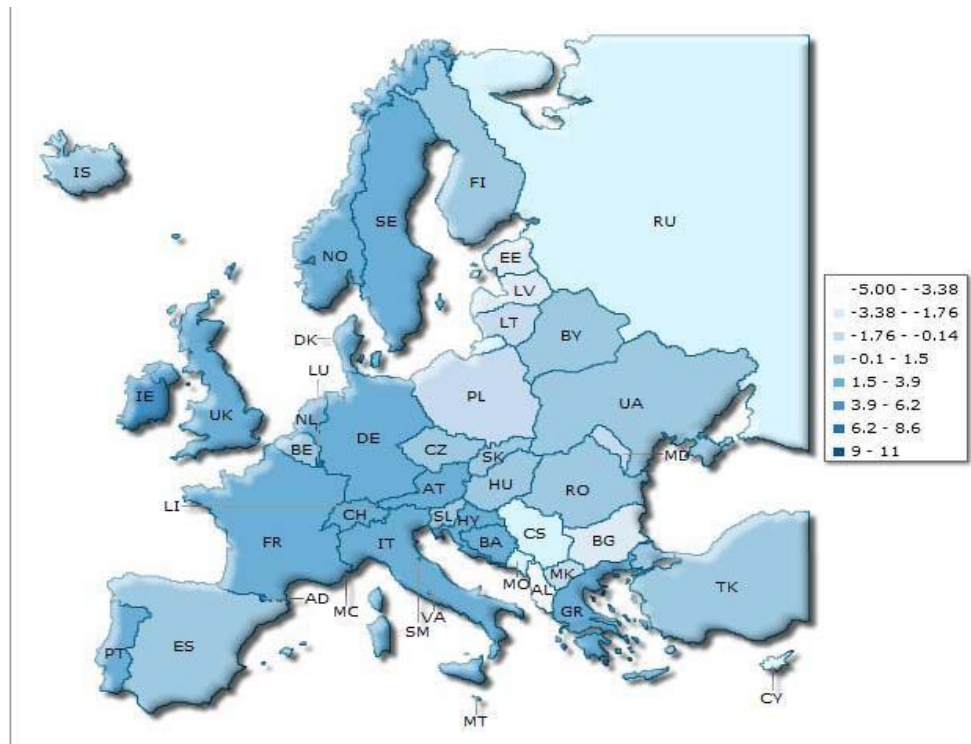
However, Southern Europe will suffer. Industries in Spain, Italy and Greece tend to have a lower and lower value and the priority of the companies investing here is rather the cost and not quality jobs. Increased presence of highly skilled labour force will affect the local companies business. At the same time, the workforce tends to go to Northern Europe, which has a rapidly expanding economy. Overall result, according to that study, there could be an income decrease of up to 8.7%. Consequently, the priority of immigration policy after EU enlargement would be to strengthen the economies of the Southern region and not raise barriers to labour flow to the North.

In addition to this, it should be taken into account also the immigration of unskilled workers on a large scale which will help „unpretentious” employment in rich countries and that can have values that could be hardly verified or controlled. Unlike the scenario used until now, an influx of unskilled labour does not necessarily mean economic growth, but may be considered by some analysts as an increased cost and problems associated with the periphery.

The immigrant workers are on average younger than the rest of the workforce and are distributed in a wide range of activities in the economy: agriculture, construction and civil engineering, light industry, tourism, hotel and catering sector, household chores or various services including computer.

⁸ http://www.umar.gov.si/fileadmin/user_upload/konference/06/20_marques.pdf p. 33.

Aliens have a much higher share in some sectors than in the total workforce. Typically, this over-representation occurs in the secondary sector. In Germany and Italy, for example, less than a quarter of the foreign workforce is employed in mining and industrial sector. In Austria, Belgium, France and Southern European countries, foreigners are mostly in construction field.



This entry includes the figure for the difference between the number of persons entering and leaving a country during the year per 1,000 persons (based on midyear population). An excess of persons entering the country is referred to as net immigration (e.g., 3.56 migrants/1,000 population); an excess of persons leaving the country as net emigration (e.g., -9.26 migrants/1,000 population). The net migration rate indicates the contribution of migration to the overall level of population change. High levels of migration can cause problems such as increasing unemployment and potential ethnic strife (if people are coming in) or a reduction in the labour force, perhaps in certain key sectors (if people are leaving)⁹.

⁹ <http://www.indexmundi.com/map/?v=27&r=eu&l=en>

In general, aliens are more vulnerable to unemployment than nationals. Also, aliens are affected differently by unemployment, depending on their nationality. These differences are due to economic trends, but also to the nature of the activities of foreigners. The same influences have foreign population and demographic structure of migrants when they arrived in the host country. The employment rate of migrants is determined by their profiles.

Unemployment varies by age, sex, nationality, category of migrants (refugees, a family member or worker), skills, experience and length of stay. Knowledge of host country contributes significantly to employment and integration into society.

The European Union countries consider that there is desirable an integrated and comprehensive approach for a better management of migration. Member States should establish the exact conditions under which citizens of other countries may enter and reside in their territories, rights and obligations of such persons and ensure access to information for people concerned and functional control mechanisms.

Current foreign policies and programs of the European, in support of human rights, strengthening democracy, reducing poverty, creating jobs and improving the overall economic situation of countries involved in the labour movement in migration, are essential instruments that can reduce the migration pressure. The use of these tools will need to be more effective to give a lasting effect propagation results.

5. Conclusions

In conclusion, people work because they expect a reward for their work, a raise, a promotion, experience, desired performance and even their overcome. To receive that reward they are willing to migrate to areas where there are opportunities for moral and financial reward but also to achieve desired performance. In recent years, these opportunities represent targets both for women and men.

For this reason, domestic migration and labour mobility increased continuously after 2000 until 2004. In 2005 Romania registered a migratory flow of 272,604 people or 1.3% of the total population of the country.

At the regional level net migration source regions are Northeast, Southeast, South, Southwest and Northwest, while the West, Centre and

Bucharest-Ilfov are collectors of these flows. In all regions there is an increase in migration to rural areas where subsistence farming is practiced. This can be considered a worrying situation in Romania, considering that a major part of the workforce is employed in agriculture and labour productivity in this sector is low.

Attracting and use of human resources from other geographical areas, however, creates other problems, both social and economic. The balance is broken both in the area of origin of this workforce and also in the relocation area. The impact is both at the individual level, by forcing adaptation to another culture and social organization, but also at the macro level of society where they are inserted in and of the society of origin.

The impact of national migration represents the affecting of some sectors (construction, services, manufacturing) that faced with a shortage of labour until the last quarter of 2008, and currently the unemployment is alarming at the national level as a result of the crisis that had a strong effect upon various sectors (construction, retail, banking).

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ROLE AND PARTICULARITIES OF NATIONAL FISCAL POLICIES FROM THE EURO AREA

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***Abstract.** The fiscal policies of different European countries is undoubtedly the subject of numerous controversies, starting from the effective use of fiscal policy as a means of acquiring money and resources, and aiming at meeting the social or collective needs.*

In this context, the performance itself requires multiple approaches due to the optimal currency area criteria and their application in the countries included in this space or due to the complex functions of the fiscal instruments within the euro area, namely the role of the national fiscal policies within the euro area.

The single market correlated with the euro currency generates a process of redefinition of the fiscal policy without ignoring its special features, but pinpointing the adjustment of common monetary policies to the national fiscal policies.

Therefore, the purpose of this study is to identify and argue the difficulties, the effectiveness as well as the consequences of a fiscal union based on "the role and features of the national fiscal policies in the euro area".

***Keywords:** the euro area, optimum currency area, fiscal policy, budget deficit, inflation*

1. Introduction

The vision on European integration and on Europe in general, as conceived by Jean Monnet, presupposes the fact that Europe becomes an area which has to respect the freedom and identity of all its peoples.

Once the Maastricht Treaty has come into force, there is a new stage which can be considered a highly superior means of economic collaboration among the member countries as an answer to the complex and different problems that the states of the world are facing, with deeper international interdependencies which require adequate economic collaboration. We can say the fact that this process does not equal in the consequences of national individuality loss but the finality of the economic progress in each country.

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In order to come to the finality of the economic progress, the economies have to converge, aiming at obtaining the best performances regarding inflation, interest rates and deficit, becoming thus the logical consequences of the measures implemented for the creation of the new entity called „Euro area”.

2. The concept of Euro area

During time there has been formulated a series of definitions regarding the implications of the Euro area, considered optimal monetary zone.

In this context, there can be noticed the contribution brought by Robert Mundell, who elaborated a series of studies and analyses regarding the optimal monetary dynamics in general. In his vision, the optimal monetary zone is presented as „a set of regions with high migration tendency in order to ensure the full occupation when one of the regions is under a state of shock”².

Other experts in the field have analyzed this aspect from different criteria such as the mobility of capital, regional specialization and existence of a common fiscal system.

In Frankel’s opinion – researcher who studied this concept – the optimal monetary area (OMA) represents „the optimal region for the existence of sole currency and monetary policy. Frankel was also the one who supported the theory of endogeneity of the OMA, saying that „a monetary unification can lead to the synchronization of economic cycles, elimination of exchange risks and transaction costs and thus an optimal monetary area offers numerous advantages for the adherent countries to a monetary union”³.

Nevertheless, the analyst who succeeded in defining the concept in a correct and real manner was Mckinnon. He defines the optimal monetary area as „the area where sole currency and flexible currency exchange constitute the best solution in reaching three major objectives: full occupation, balance of payments equilibrium and stability of intern prices”⁴.

² M. Sebea, A. Ionescu, *Realization of the Economic and Monetary Union and the need of convergence*, IER study collection, no. 18, Bucharest, 2006, p. 8;

³ M. Sebea, A. Ionescu, *Realization of the Economic and Monetary Union and the convergence need*, IER studies collection, no. 18, Bucharest 2006, pp. 8-9;

⁴ R. I. Mckinnon, *Optimum Currency Area*, American Economic Review, 53, 1963, Cited by coord. Cerna S., „International monetary and financial economy”, Universitatea de Vest Printing House, Timișoara 2005, p. 120;

From the analysis derived of the researchers' opinions, we can understand the fact that the inclusion of the optimal monetary area within the process of monetary integration presupposes to respect the properties necessary for the existence of the optimal monetary union and the establishment of efficiency of national fiscal policies from the Euro area evaluated according to the facile degree, fiscal pressure degree (comparing the public income to the gross domestic product), in a context where they can be considered an instrument for the adjustment of economic shocks.

3. The role of national fiscal policies in the Euro area

After successfully following the necessary stages for the adhesion to the Euro area which involves both following the Maastricht criteria and planning and elaborating a set of measures at state, private and population level, it has become the „socio-economic test”.

In order to determine „the role” played by the fiscal policy in the Euro area, this area has been analyzed in most cases from the public finances approach (and fiscality in general) on one hand and public budget on the other hand. The public budget is considered the main intervention instrument for the state in economy.

Thus, the existence of instable fiscal policy in the Euro area determined a re-acknowledgement of full engagement of the European Council regarding the sustainability of public finance. Within this context, anti-cyclic fiscal policy is desired. It must have as consequence a reduction of the existing deviations in the national economies of the Euro-system states.

The action of the automate balancer, financial assistance for national authorities and the further measurements adopted until present day are a major burden for public finances in numerous countries of the Euro area. As a result, all these measurements have to be reversed in due time in order to promote equity in the field of public income, imposition techniques and prevention of subjectivism regarding taxpayers and reduction of „fiscal sacrifice”. In other words, there is the elimination of „fiscal pressure” and encouragement of „fiscal competition” without deepening the „feeling” of fiscal relaxation and increment of public debt and without compromising the trust in public finance sustainability and decrease fiscal stimulus efficiency.

As a result, we have to highlight the influence of fiscal pressure over gross domestic product per inhabitant as a result to the question: To which extent does the increment of fiscal sacrifice and pressure depend on the fiscal policy measures underdone by the governors?

The analysis of fiscal pressure over GDP/inhabitant in some countries of the Euro area (table 1) highlights the fact that the highest value is recorded in Luxembourg, Germany, Belgium and Holland.

Table no. 1
Fiscal influence over GDP/inhabitant

COUNTRY	FISCAL INFLUENCE OF GDP/INHAB. (%)
Austria	58,67
Belgium	61,26
Cyprus	–
Finland	51,47
Estonia	–
France	57,93
Germany	64,1
Greece	30,0
Ireland	75
Italy	55,77
Luxembourg	≈70
Malta	26,57
Holland	60,55
Portugal	27,94
Spain	40,68
Slovenia	23,5
Slovakia	10,68

Data source: Popescu C., Ciucur D., Raboaca G., Iovan D., *Modeling of Economic Growth under Fiscal Impact*.

There are also highlighted:

- the Euro area countries with low GDP per inhabitant that have a fiscal policy with a high degree of fiscality and which, as a result, cannot be considered a constraint for economic growth;

- the Euro area countries that exercise a fiscal policy based on integration vision regarding the relationships between general objectives and fiscal means used or possibly used.

According to economic theory, the incidence of fiscal instruments follows the examination of the „means on which the fiscal burden and its effects over labor, economy, prices, stocks, production and consume are divided”⁵. In this respect there can be noticed the importance of the fiscal mechanism characteristic to Euro system which refers to methods, techniques and instruments which ensure the dimension, arrangement and perception of taxes, income taxes and social contributions.

Thus, within the Euro area there can be distinguished the following fiscal instruments:

- the use of a low number of identification both for direct and indirect taxes, regarding the means of identification for payments and taxes (Austria, Holland, Spain, Germany, Greece). This method offers a series of advantages amongst which there can be mentioned: a simple and easy means of identification of business partners from different states of the Euro area and beyond this area; it does not create confusion in the fiscal practice and there can be underdone an immediate distinction of the existing taxpayers in the community area as different from those of the countries beyond this area.

- the level of administration of major taxes, income taxes and social contributions types is determined by using the mechanism of cumulative deduction without tax. This system is functional in countries such as Austria, Germany, Ireland, Italy, Luxembourg, Holland, Slovakia, Cyprus and Slovenia;

- the existence of a system based on non-cumulative deduction functional in states as Belgium, Greece, Portugal, Spain and Malta.

„The main reflection instrument of fiscal policy is the public budget. Its role is that of means of carrying out a bookkeeping-like accounting system for the estimated income and authorized expenses”⁶. The means of budgetary approach and practice acknowledge a major evolution, resulting in a multilateral nature of the budget and budgetary policy.

At European Union level, the major financing source of the budget is a resource based on gross domestic product of the member states which exceeds the other sources such as custom taxes; value added tax and

⁵ P. A. Samuelson, W. D. Nordhaus, *Political economy*, Teora Publishing House, Bucharest, 2000, p. 386;

⁶ A. Duca, *Miraculous taxation triangle*, ASE Publishing House, Bucharest, 2007, p. 71;

agricultural takeoff. In 1988 the source of the gross domestic product represented 11% of the European Union financing by comparison to the 28% deriving from custom taxes and agricultural takeoffs and 57% VAT. In 2013 there is estimated the fact that NGI (national gross income) will represent 74% of the European Union financing by comparison to 13 % deriving from custom taxes and agricultural takeoffs and 12% deriving from the resource of VAT⁷.

From the analysis of the general budget construction, from the point of view of income and expenses between 2000-2009, there are highlighted a series of aspects⁸, amongst which:

a) the extent of the general budget income in GDP is superior in the countries from the Euro area but close to the average budget in the European Union 27, oscillating to the value of 45%, with a reduction tendency after 2006 and much more evident in 2009, as a result of financial crisis;

b) the extent of the general budget expenses in GDP is superior in the countries of the Euro area but close to the average budget of the European Union 27, oscillating between 45%-51% with two minimal levels in 2000 and 2007 and a maximum level in 2009 as an effect after the financial crisis.

From this point of view, at the level of the member states there have to be taken a series of measures with a sole objective of reducing and maintaining the public deficit of 3% of GDP in current prices by using fiscal and budgetary instruments with the purpose of extending the Economic and Monetary Union.

It is necessary to enforce these measures due to the economic crisis in the European area. Thus, „after 2008 several countries have recorded maximum levels in the growth of public debt (Greece 126,8%; Italy 116%, France 78,1%, Germany 73,4%; Hungary 78,4%; Portugal 76,1% etc.), which made the average Euro areas reach a peak level of 79,2% in 2009, while the average level in EU reach a level of 74%, much more than the Maastricht criterion”⁹.

⁷ Commission of European Communities, *Budget reform for a changing Europe*, public consultation paper regarding the budget revision 2008/2009, Bruxelles, 2.09.2007, http://ec.europa.eu/budget/reform/issues/article_5959_ro.htm;

⁸ E. Pelinescu, C. N. Stănică, *Evaluation of the fiscal policy role in fighting economic-financial crisis and ensuring the conditions imposed by the integration to the Euro area*, PIM Publishing House, Iași, 2011, pp. 70-73;

⁹ E. Pelinescu, C. N. Stănică, *Evaluation of the fiscal policy role in fighting economic-financial crisis and ensuring the conditions imposed by the integration to the Euro area*, PIM Publishing House, Iași, 2011, p. 78; A

For the Euro area countries, the European Economic and Social Council proposes that „in the short term, immediately and until the economic convergence between the member states, there has to be used a double system, with descending and ascending systems in order to consolidate and complete the efforts meant to reestablish budgetary sustainability in the Euro area (highly affected by recession) by introducing the flexibility necessary elements in a planned and well regulated way”.

The convergence accomplishment has to be based on:

- the obligation of assumption for the Euro area countries for avoiding excessive debt and deficit by rapport to the deficit value of 3% from GDP and maintaining a cog of 60% from GDP for the public debt;
- highlighting annual budgetary equilibrium which considers debt as an indicator for long-term fiscal sustainability;
- the need of detailed macroeconomic evaluation and evaluation of structural disequilibrium which has a negative impact over competitively¹⁰;
- the growth of public finance quality by evaluating the structure and efficiency of public expense.

Without a sustained effort for the accomplishment of these „reference values” from every state belonging to the Euro area, the budgetary convergence is harder and harder to accomplish although there is desired a rapid convergence between of the countries. This convergence is highlighted by the budgetary equilibrium at national level, the equilibrium of specific needs for restructuring and/or growth of investments as means for growing budgetary resources, even if these operations need to be supported by budgetary interventions.

Regarding the fulfillment of the criterion for the inflation rate, which must not exceed 1,5 average percentage of the three countries with the lowest inflation rate, it involves a high degree of convergence of monetary policy and is strictly interdependent with the „role and particularities of national fiscal policies of the Euro area”, as it can be considered the cause of the existing common fiscal policy and the reason for the decline in performance in the fiscal field within the Euro area.

This macroeconomic phenomenon has deep implications regarding the development and stability of the economic and social environment, a major monetary-real disequilibrium, materialized in a glut of the circulating currency and general growth of prices.

The causes that may generate inflation are multiple starting with the existence of ungrounded salary policy based on economic criteria, the rapid

¹⁰ Regulation proposal of the European Parliament and Council regarding executing measures in order to correct excessive macroeconomic disequilibrium in the Euro area;

amortization of permanent capital, growth of public debt costs and ending in excessive fiscal pressure.

In some Euro area countries, the fiscal system regards the taxation of nominal and not real capital. In this situation there is recorded an acceleration of inflation with consequence in the growth of nominal interest rate and diminution of real income obtained from savings, after taxation.

As a result, „the high inflation rates” have negative consequences on the remaining real income after taxation due to disequilibrium. This fact triggers a series of monetary, fiscal and budgetary measures with the purpose of reducing inflation and their elimination.

In order to recognize the value and to reduce the negative consequences of inflation, the economic practice and theory have tried to establish its quantity using the consumption price index. This index was used by all member states of the European Union and called the harmonized index of consumption prices (HICP).

In this respect, HICP represents the instrument for inflation measurement used by the Council of governors in order to define and establish prices in the Euro area as a whole in quantity measurement.

According to the latest data, the monetary tendency in this field supports the idea according to which inflation pressures and risks are going down in the Euro area (figure no. 1).

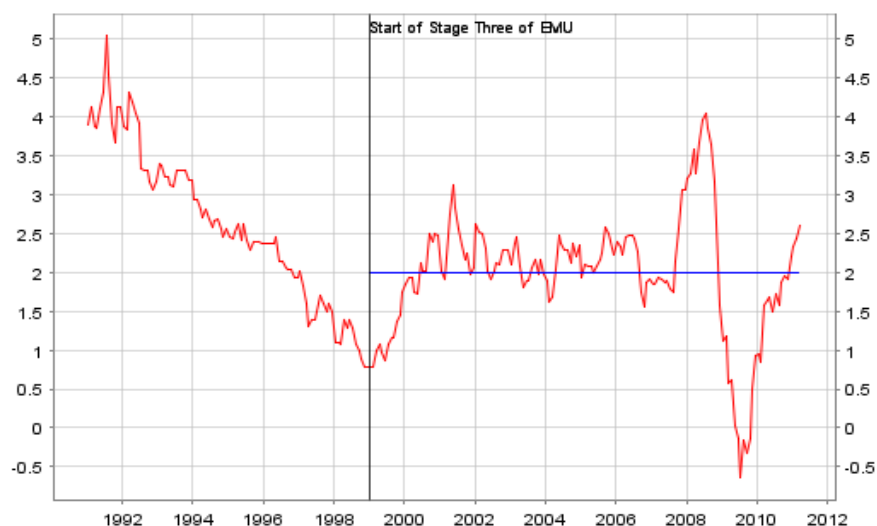


Figure 1. Inflation in the Euro area.

Source: Euro-stat. Data before 1996 are estimated without taking into account a harmonized national base of consumption price index.

The analysis of the graphic form figure 1 highlights the fact that in 2010 inflation maintained fewer than 3%, as it has been imposed by the convergence criteria. The inflation criterion recognizes the importance of this phenomenon in modern economies and the fact that the insurance of price stability represents the most efficient means of supporting – by monetary and fiscal policies – the general desiderate of the long run economic growth.

The maintenance of these limits has been underdone using monetary, fiscal and interventional measures in order to extinguish this phenomenon. Some of these measures were: maintenance of a balanced salary level, growth of direct taxation in parallel to the reduction of indirect taxation, the reduction of public expenses, limitation of the circulating currency, etc.

An index which highlights the impact of fiscal policies over inflation and its role is the fiscal animus. According to the opinion of the Romanian National Bank, the positive value of this index coincides with a relaxing fiscal policy with effects on inflation „in a situation when deficit is descending”¹¹.

4. Conclusions

The analysis of the role and particularities of national fiscal policies from the Euro area leads to the following conclusions:

– the process of fiscal integration of the Euro area countries represents an example of total integration by the means of which the different national economies desire to form a new economic identity, vaster and more equilibrated, substituting the component elements¹²;

– after the economy support measures, especially during the crisis period, there have been discussed the limitations of the Euro area where the monetary and fiscal policies are not integrated. In this respect, one can notice the need for a unitary fiscal policy as in the case of the monetary policy.

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¹¹ <http://www.bnr.ro>

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GENERAL ANALYSIS OF THE ECONOMY BEHIND *DDoS* ATTACKS

Ciprian Andrei TAIS*

Abstract. *Distributed Denial of Service (DDoS) attacks are large-scale, coordinated attacks on the availability of services of a victim system or network resource, launched indirectly through many compromised computers on the Internet, forming a massive botnet. DDoS attacks and botnets have become an increasing security concern in today's Internet and cost the economy world-wide billions of dollars. This paper focuses on DDoS attacks, solutions for protection against them, strategies and economical implications that these attacks have and the botnet structures that are being constructed in order to initiate DDoS attacks. We have focused on the economical aspects of botnets, as well as the underground economy that has emerged to support the building, selling and buying of botnet attack tools, an economy that was named botconomics.*

Keywords: *Distributed Denial of Service attacks, Internet, Security, Botnets, Botconomics.*

1. Introduction

Distributed denial of service (DDoS) attacks first appeared in the news in February 2000 and have maintained a high media profile ever since – a fact made evident by the following headlines:

“Amazon.com, eBay, Yahoo Crippled by DoS Attacks” – February 2000

“Massive DDoS Attack Hits Internet DNS Root Servers”– October 2002

“MyDoom Becomes the Internet's Fastest Spreading Worm Ever”– January 2004

“Top Threats in 2006: SQL Slammer & Blaster Worm”– October 2006

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“Storm Worm Rages Through Internet Over the Weekend”– January 2007

“Cyber Attacks on Estonia”– May 2007.

Victims of these crippling and widespread Internet-based attacks include Internet service providers (ISPs), enterprises and broadband subscribers alike. To make matters worse, Internet service subscribers are often unknowing participants in the proliferation and execution of many such attacks. This occurs when hackers covertly pirate subscribers’ high-speed connections and compromise their PCs – turning them into zombies that form a huge army of malicious botnets. Remotely controlled by hackers, these botnets wreak havoc throughout the Internet by executing all kinds of malware and DDoS attacks. According to recent studies made by different security organizations [1], botnets and DDoS attacks are the top concerns of today’s Internet services providers. Together with large-scale malware, these threats can severely compromise an ISP’s core equipment, resources and business-critical IP services.

Emerging technologies introduce additional vulnerabilities that put today’s networks at even greater risk of security threats. Service providers around the world, eager to obtain the operational and competitive advantages of new technological innovations, are accelerating their deployment of networks built on high-speed fiber optics and IP-based services, such as MPLS, IPTV, VoIP and VPN. Although there clearly is a broad range of benefits available from these new networks and services, there is an equally broad range of security threats that can seriously curtail or even wipe out those benefits. Service providers recognize that if they are to realize the promise of next-generation IP-based services, they must understand the nature and power of their cyber-enemies. Armed with this knowledge, providers can deploy the necessary solutions designed to defend their networks and services from the threats that are out there today – and the ones that surely will emerge in the future.

2. Strategies and economic implications of DDoS attacks

The primary aim in a DoS attack is to render the target system completely useless. This is usually done using one of two strategies. The first strategy, a flood attack, involves flooding the target with spurious

traffic and overloading it. Consequently, any legitimate traffic, which becomes a fraction of the total traffic, is denied service. For example, a legitimate buyer may not be able to complete a transaction at Amazon.com because the Amazon servers are too busy processing illegitimate information requests. The second strategy, a logic attack, exploits known software bugs on the target system in an effort to take it offline. Some common names given to flood attacks include ICMP attack, SYN attack, Smurf attack and Fraggle attack. Some common logic attacks are known as Ping of Death, Teardrop, Land and Chargen. Clearly, these Internet-based attacks are not only limited to commercial enterprises but could easily cripple any communications infrastructure that uses the Internet for its operation. A DDoS attack has the same impact on a target as does a DoS attack. A DDoS attack differs in that the spurious traffic originates from multiple machines on the Internet versus originating from a single machine as in a DoS attack. Consequently, DDoS attacks have a much quicker impact and are more difficult to fight. From an implementation perspective, the attacker generally hunts for insecure user computers and impregnates them with either “zombie software” or “handler software.” Both pieces of software enable the attacker to take control of the impregnated computers at a later time. Zombie software is used to directly attack the target, while Handler software is used to control the zombies. This complete process – from initial search for insecure computers to their transformation into handlers and zombies – can be highly automated. How Big Is the Impact? One method to gauge the impact of DDoS/DoS attacks is to look at the financial damage caused by such attacks. Financial losses from a 24 hour outage at a brokerage firm are estimated at \$156 million. Clearly, as organizations become more dependent on the Web for revenue generation, the financial stakes will continue to grow higher. Consider the rate at which the recent Code Red worm spread. Taking advantage of vulnerability in Microsoft’s IIS product, these worms had infected more than 350,000 computers worldwide within 14 hours. If these worms were recruiting zombies, within 14 hours the hackers would have had an army of 350,000 slave computers – sufficient to successfully launch a devastating DDoS attack against any known network. Another approach to estimate the potential impact is to understand how widespread these attacks are. In 2000, 36 percent of the respondents to CSI/FBI annual surveys indicated experiencing DDoS/DoS attacks, up from 27 percent in 1999. The first academic study on this subject [2] suggests that as many as 4,000 DDoS attacks happen across the Internet each week. What’s more alarming in this study are the estimated attack rates. Studies have shown that an attack rate

of 500 packets per second is enough to overwhelm a commercial server. When specialized firewall designs are used to resist such attacks, a flood of 14,000 packets per second can disable the server. Forty percent of all attacks in the Moor, Voelker and Stefan study had estimated attack rates of 500 packets per second or higher, and 2.4 percent of all attacks could break through highly tuned/optimized firewalls. Until now, we have talked about the impact of such attacks only on the commercial sector. Numerous civil and federal communication systems are equally vulnerable to such attacks.

3. Statistical data of DDoS attacks

Deliberate attacks on service provider networks are – and will continue to be – a major headache for ISPs and their customers. The U.S. Federal Bureau of Investigation (FBI) estimates that computer crime costs American companies alone a staggering \$62 billion a year.

According to data received from a survey [13], there has been a 140 percent increase in the size of the largest detected DDoS attack over the last three years. In 2006, the largest observed sustained attack was 24 Gbps, compared to 17 Gbps in 2005. Thirty-six percent of the surveyed ISPs reported that they had observed attacks of over 1 Gbps in 2007. This is significant because most Internet backbone links are 10 GB and enterprise circuits are multi-gigabit in size.

The charts below (Fig. 1 and Fig. 2) were taken from the “Worldwide Infrastructure Security Report” [1].

The figure 1 shows the sustained attack size of the largest attacks from 2001-2006. As seen, the attack size is increasing exponentially in time because the magnitude of the attacks is also increasing considerably. Both the biggest largest attacks (22 and 24 Gbps) made in 2006 reported to have been DNS reflective attacks, which is a newer trend in DDoS attacks. This issue shall be discussed later in this paper as a type of a “degradation of service” attack, rather than the normal “denial of service” attack.

The figure 2 shows the largest attacks observed in the last 12 months. One can easily distinguish two peaks rising above 20% of the total number of attacks which classify the DDoS attacks in two big categories depending on the target of their attack: small attacks usually targeting local ISPs or routers which have a size of less than 100 Mbps and the big attacks that usually target commercial sites and global ISPs that jump to a scale of one to four Gbps.

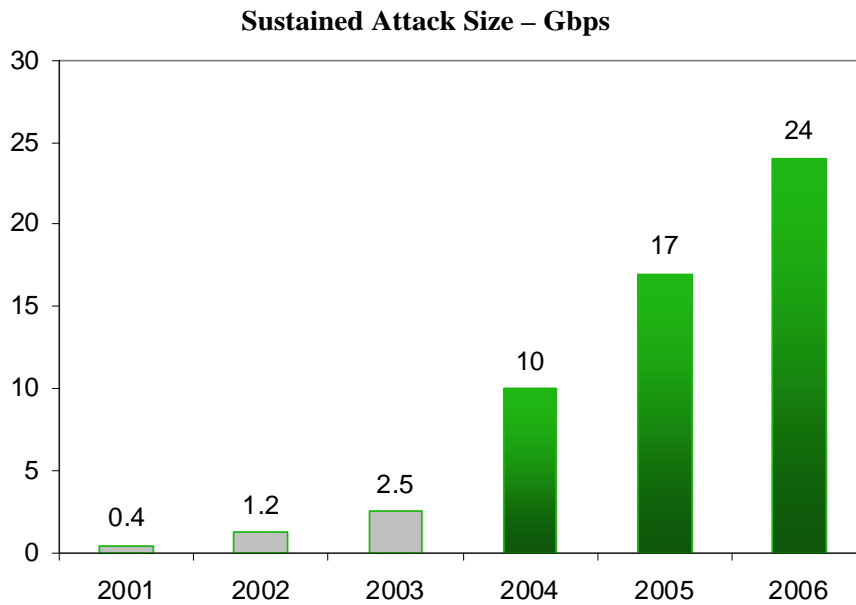


Figure 1. The largest botnet attacks from the 2001-2006 years.

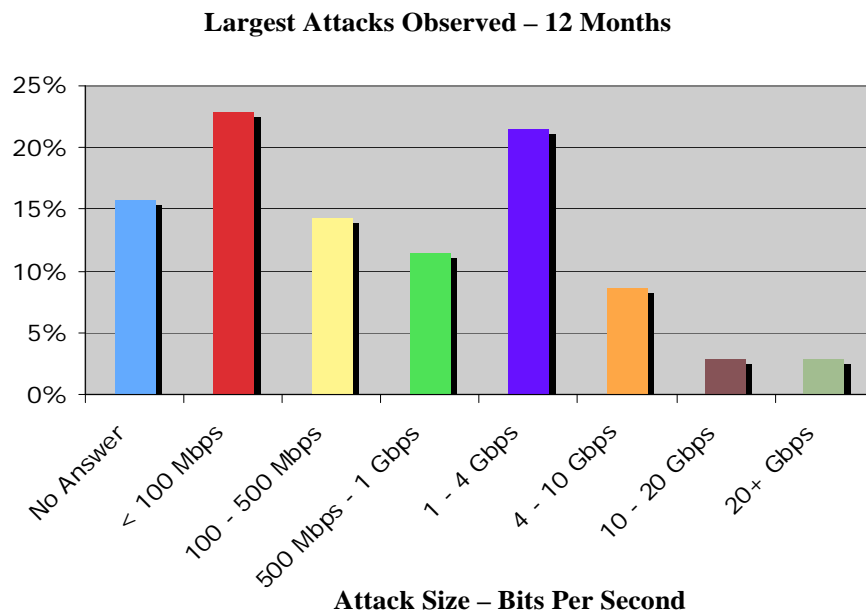


Figure 2. The largest botnet attacks observed during 2006 year.

Additionally, Arbor research conducted from September 2006 through August 2007 [1], a period of 321 days, revealed that there were 362,394 DDoS attacks – an average of 1,128 attacks per day.

4. Botnet Patterns

Botnets, a major problem identified by ISPs, continue to plague the Internet. In fact, botnets are considered a growth sector within the attacker underground, with new code bases, uses and operators frequently appearing. For ISPs and network operators, botnets represent a multi-faceted threat. First, they remain a major source of DDoS attacks. Secondly, they have become a serious source of spam email traffic, which burdens the email processing infrastructure of all providers. Finally, the scanning and attack activity of a large botnet can disrupt normal network operations and cause outages. For all these reasons, most ISPs are concerned with large-scale malware, most commonly embodied in botnets.

ISPs observed that botnets were used for:

- DDoS attacks (71 percent);
- Sending spam (64 percent);
- Parts of phishing systems (37 percent);
- Open proxies (34 percent);
- Storing ID theft information (16 percent);
- Other (6 percent).

According to survey respondents, these new botnets exhibited the following characteristics:

- They were smaller but more targeted, effective and organized.
- They employed protected and deployed encryption, peer-peer and MD05 SHA-1 [14] counter reconnaissance.
- They were distributed in nature, making the attacks more complicated and the location of the master controller more difficult.

Recent ASERT research [13] shows that botnet server lifetimes fall into a very specific pattern commonly referred to as a long-tailed distribution. The data from this research clearly indicates that most botnet servers – nearly 65 percent – are found and disabled within the first day of their operation. This suggests that there are very effective networks for gathering information about new botnets and sharing it with the right network or system operators. It is this communication that leads to disabling the host with the botnet IRC server. Overall, if a botnet is able to make it past the first day, it has a fair chance of surviving for several months or more. Research also shows that some botnets remain active for nearly a year. The fact that known botnets can operate for this long should be a call-to-arms for all ISPs.

Apart from a few bursts of activity, between 10 and 20 new botnet servers are found every day. Factoring in the number of such servers disabled daily, approximately 1500-1800 botnet servers are currently active – a number that is slowly rising. This trend is likely to continue as the number of IRC botnet servers keeps growing for the foreseeable future.

5. Botconomics: The Underground Economy of Botnets

There are many reasons for a miscreant to initiate a botnet attack. Some attacks have religious or political motivation behind them. Some are simply ego-driven as professional hackers or script kiddies compete to see who can cause the most damage by infiltrating the biggest and most secure sites. With that said, the most serious attacks usually have financial goals in mind. Extortion, stealing money from compromised online bank accounts, luring innocent users to phishing sites, the illegal use of stolen credit cards – these are common results of botnet attacks. In fact, there is an underground economy emerging to support the building, selling and buying of botnet attack tools, an economy that Arbor Networks has coined “Botconomics”.

Botconomics is fueling the rapid growth of the botnet world. The simple motivation behind the rise in botnets is money. Years ago, hackers had to be technically savvy and know how to write code to initiate an attack or create a botnet. Today, they can buy and sell that code in online markets, which are likened to traditional underground markets. In fact, there are such online communities available to anyone who earns their trust usually demonstrated by getting a certain quantity of stolen credit cards, bandwidth or email addresses to build street credibility. ASERT [13] has uncovered numerous sites which boldly market their botnets and booty. Here are some examples of common advertisements and related costs: Often these disreputable sites advertise their botnets via discreet email campaigns. A recently discovered email [15] touted botnet servers that provided excellent ping and uptime, rotating IP addresses, different ISPs, intuitive user interface [16][17] and online technical support:

- .net Domain Names: 0.05 \$
- nasa.gov Domain Names: 0.05 \$
- Proxies: 0.5-3 \$
- Credit Cards: 0.5-5 \$
- Email Passwords: 1-350 \$

- Email Addresses: 2-4 \$/MB
- Compromised UNIX Shells: 2-10 \$
- Social Security Numbers: 5-7 \$
- Mailers: 8-10 \$
- Scams: 10 \$/week
- Full Identity: 10-150 \$
- Bank Accounts: 30-400.

6. The Next Generation of attacks

While the Internet community is still struggling with DoS and DDoS attacks, the hackers are busy creating even smarter versions. Consider new types of DoS attacks that do not result in denial of service but cause degradation of service. These attacks are even more difficult to find because the target server is never shut down completely but is “always slow”. The server owner notices increased bandwidth cost for the increased traffic, without any accompanying increase in revenues. Another version of the attack involves “pulsating zombies” [8], which are active only on a periodic basis in short bursts versus normal zombies that are always on. It is much harder to detect them because the pulsating zombies are never active for sufficiently long durations. Yet another new type of attack involves “reflectors”, which are essentially IP hosts that return a packet in response to a packet being sent to them. For example, the sent packet could be a SYN packet and the returned packet could be a SYN acknowledge packet. All Web servers, DNS servers, and routers are reflectors. In this attack, the zombies (a couple of hundred) send packages to reflectors (hundreds of thousands) after spoofing the victim’s source address. The reflectors think the packets are coming from the victim (because the victim’s source address was spoofed) and end up sending reply packages to the victim. These attacks are more potent because they can be massively scaled-up by using ubiquitous network devices (routers, Web servers, DNS servers etc.) versus regular attacks that require more effort at spotting zombies and handlers.

In the figure 3, taken from McAfee Avert Laboratories [3], a normal and legitimate client contacts his local DNS server and requests him the IP for bob.com. The local DNS server does not have this IP, so he interrogates the “.com” DNS server asking him about bob.com’s IP. The “.com” server responds, giving him the bob.com DNS server. Knowing all this procedure,

an illegitimate attacker could pretend to be bob.com DNS server and, when the local DNS server requests the bob.com IP from its own DNS server, the attacker sends a false message before the bob.com DNS server's response, giving the local server a false IP for bob.com. Therefore, the DNS server returns to the client the attacker's false IP, and so, bob.com has been spoofed by the attacker. The client could then contact the attacker believing it is bob.com, and more of it, if the attacker has an identical visual web page as bob.com had, which in most of the cases it does happen, the client will give his identification to the attacker. In this kind of attack, the client has done nothing wrong and, therefore, the "fault", if we could find a "fault" at someone, would be on the local DNS server's side, and the client could theoretically accuse the DNS server of not giving him the right IP address. Therefore, these kinds of attacks are harder to spot than normal attacks because it involves more than the security of a single machine or server.

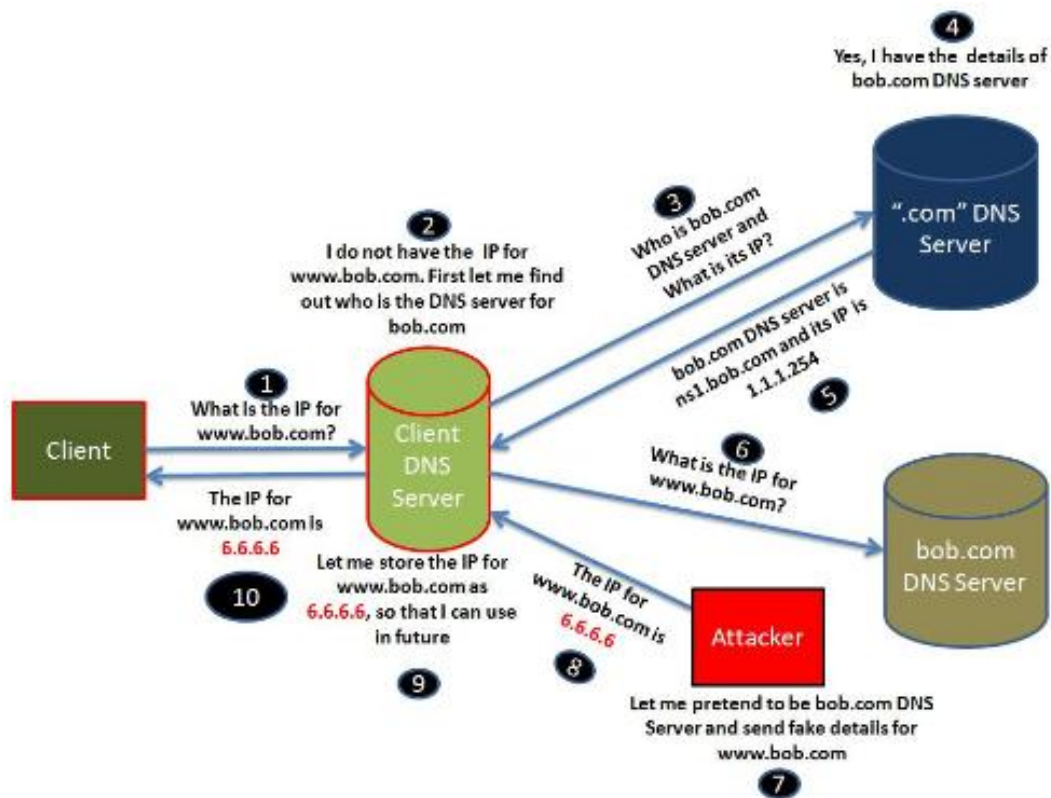


Figure 3. A very simple DNS attack scenario where a client is trying to look for the IP address of bob.com.

7. Tackling DDoS

There are three aspects to tackling DDoS: detection, identification of the source, and solution. The toughest part of reliable detection is separating normal traffic from spurious traffic. Several algorithms are used for detection, including signature analysis (comparing traffic against a known attack signature), protocol anomaly analysis (looking for traffic that is stepping out of an expected behavior pattern), and trend analysis (e.g., abnormally high traffic in the middle of the night). Identification of the source involves backward tracing the path of attack and identifying the key devices (routers, servers etc.) that are responsible for the spurious traffic. The solution aspect is multidimensional and may involve filtering the traffic and/or the complete/partial shut down of a certain network path. Commercially available solutions take similar approaches to this problem [4][5][6][7]. In-line or sampled data are usually gathered from multiple points on a network, followed by a detailed analysis of these data. The analysis may deploy signature and/or anomaly-based techniques, deep packet analysis, forensic analysis, or correlation analysis to identify attacks. Counter measures focus on assisting network administrators to tackle the problem as quickly as possible. The assistance could come in the form of simple notification of attack, automatic filtering of suspect traffic, or complete shutdown of connection to a network segment. As coordination among network owners increases, the counter measures will likely move toward a higher degree of automation.

8. Conclusions

Clearly, DDoS attacks could result in billions of dollars in lost business within hours. Not surprisingly, the VC community has supported DDoS solution vendors with enthusiasm. Over the past 18 months this sector has attracted more than \$60 million in venture capital. Prominent pure play DoS/DDoS solution providers include Arbor Networks [1], Asta Networks [9], Captus Networks [10], and Mazu Networks [11]. Given the distributed nature of the problem, for a higher degree of success, most of these vendors support and recommend a distributed version of their solution. Clearly, this requires highly-coordinated efforts across multiple

networks and may involve several infrastructure owners (backbone operators, ISPs, and carriers). The current level of security-related coordination among the infrastructure owners is relatively low. Consequently, there is no shared incentive for network owners to open their networks for a coordinated effort against DDoS attacks – an effort that will only directly benefit the end customer. We believe that as DDoS attacks become more prevalent, large customers such as Amazon will force their hosting partners or ISPs to fortify their systems against DDoS attacks [12]. Such catalysts have the potential of triggering a network effect, forcing the keepers of Internet infrastructure to take preventive measures. While it is too early to predict which technology and company will ultimately succeed against DDoS attacks, one thing is for sure: DDoS and other hacker attacks, irrespective of their place of origination (within or outside the national boundaries), are enjoying a big popularity through federal investigations and military departments conducted by the U.S. Congress.

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INTERCULTURAL NEGOTIATIONS

Daniela ȚĂRANU*, Șerban Alexandru ȚĂRANU**, Robert CHIRA***

Abstract. *The concept of culture in international negotiations is basic, without it the outcome may be invalid or insufficient. Culture shouldn't be seen as a barrier, but not as a superficial notion, easy to analyze and assimilate. A good negotiator is the one who will know to understand the various elements of a culture, to respect and adapt his negotiation techniques to them. Culture was not and is not an obstacle in a negotiation with a foreign partner. A superficial knowledge of a culture doesn't necessarily imply failure. But a deeper knowledge can be an advantage and can significantly contribute to a better result than holding vague information about that country.*

Keywords: *national culture, intercultural communication, intercultural negotiation, cultural diversity, cultural values.*

JEL Classification: *M21, F23, F51.*

1. Introduction

An important element that we must consider when negotiating important business with other nations is culture. Cultural differences between parts, is the factor that is always present in an international negotiation and absent in a domestic negotiation.

Culture “influences the way people think, communicate, their behaviour, and also the ways in which transactions are concluded.” [1]

Culture comes from the Latin “cultura” which is linked to “cultus” (cult, worship). In Latin, cult means to live or to worship, the suffix -ure from culture signifies the result. Before the Second World War in Europe, he was used primarily to support social and racial superiority of certain groups over others.

Culture, “is a strength and protection core from all forms of interference or external aggression.” [2]

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2. Intercultural Negotiation

Perhaps more than any other field, the international negotiation is the prerequisite of cultural diversity. The approach to international negotiations must have as its starting point the recognition of cultural differences, finding common points and the acceptance of those limits. “Intercultural negotiation confronts different partners trying – even at the risk of stereotype – to identify and play with these differences, in case of any possible divergence of interests or goals”.[3]

Differences may occur not only at the nation or region level, but at the group of people, department, and organization level too. They concern the behaviour and the skills and have the quality of being observable and known by the negotiators. But at the same time there are differences of values, attitudes, beliefs and identities that cannot be noticed except by direct contact with another culture and who are usually hidden.

The common points can be an important advantage to be exploited in negotiation. Finding them requires a good knowledge of a culture. Also we must respect the limits until they can be used, to avoid the violation of the principle of cultural diversity. A mistake often made by inexperienced negotiators is considering their negotiation partner as equal in terms of cultural values.

In dealing with cultural diversity in terms of negotiation, can be defined three geographical areas (H. Bloom, R. Calori, Ph. De Woot, *Euromanagement, The Euro Business Publishing Network*, 1994):

Europe. European cultural differences are a natural aspect of human civilization for Europeans that must be addressed globally by its integrating in the current business activity.

Japan. Japanese businessmen have difficulties in negotiations with a large multinational culture, because the lack of diversity of the Japanese society.

U.S. Americans not only that aren't trying to adapt to other cultures, but also export their culture through what they call the American lifestyle.

The cultural factor in international negotiations shouldn't be regarded as an inhibiting one; diversity can be a stimulus for creativity, once we overcome the mental barrier due to fear of diversity. Therefore, the cultural factor is of major importance not only in choosing the negotiation strategies, but also in choosing the team and especially the team leader. Attitudes and personal values as part of culture have significant consequences when the negotiation outcome depends on the team. Some authors

consider the cultural element as “a problem-solving tool that enables a group of individuals to survive in a particular situation”. [4]

A good negotiator will always take into account cultural differences in choosing the negotiation strategies and techniques. These have to be adapted to the partner’s country of origin. For example: the Germans prefer direct and strict talks on the subject of negotiation; the French are more inclined to opportunity and flexibility, do not like strict rules; in negotiations with the Chinese, prudence and patience are the key words.

Culture, as a set of values, customs and traditions, is an important element not only in the preparation phase, but also during the negotiations. Therefore, it is preferred that negotiations to be conducted under the sign of mutual respect, while keeping the values and habits related to their own culture. A negotiator who respects the partner’s values and at the same time manifests itself in accordance with his values will be more appreciated than another negotiator who doesn’t meet at all or, on the contrary, adopts them. “... National culture plays a key role in the conceptions and behaviour of the international negotiator.” [5]

An important cultural element, considered as the closest to this, is the language. The knowledge of partner’s language, in addition to being an advantage in negotiation, is an approach factor between the two partners, by sharing the same attitudes and values.

One of the forms that characterize large companies today, with profound implications in terms of their management, is the multinational corporations. The management of multinational corporations requires a broadening of the concept of competitiveness and an improvement in the perception of other cultures. Culture and subculture are the most important aspects of international management.

3. Special Features of International Negotiations

When two people from different cultures are negotiating, there is a buffer zone in terms of their behaviour. The parts will not react as they do it in their own culture area. The agreement between the two partners depends on the compliance or the violation of the specific conditions for each of the cultures in contact. As a general rule, once located on foreign soil, the negotiators will respect the “law of the place” (*lex loci*).

“For a negotiator to succeed in an intercultural negotiation, he has to understand others and use this understanding to turn negotiation into a win-win situation” [6].

There are certain features of the negotiation and intercultural communication, which, if unknown, can lead to misunderstandings and even the failure of negotiation. Among these are:

Men-women relationship. In Western Europe, there aren't differences in behaviour and etiquette in relation to sex. In the U.S., may be a risk to gaze a woman too much, you may end up with a charge for sexual harassment. In the East, as a rule the women are looking down and in the West, the men.

Respect. It can be shown through gifts, specific gestures, silence, by respecting the distance, of the siesta or prayer hours, by posture, etc..

Business etiquette. In Europe or America, if you are invited to dinner is rude to get up and leave immediately after you finish eating. In Saudi Arabia and other Arab countries, on the contrary, it is rude not to get up and leave before the dinner ends.

Time, space. Mainly the time problem regards punctuality and the arrival order for business meetings. The Latinos care less about this, while the Germans and the British put more emphasis on punctuality. Space is the physical distance that must be respected between partners belonging to different cultures. The Americans need a large personal space; the Arabs can negotiate better cheek by jowl.

Taboo-s. These are various prohibitions with a sacred character, expressions, offensive words and gestures, different from one culture to another. Pork is taboo in Islamic countries. In England, striped ties are not offered as gifts (usually men are wearing their club tie). In Argentina, are not made as a gift, knives, they symbolize a desire to break the relationship.

Another issue here is the timing for starting discussions. Europeans and Americans can start right after the first exchange of words. For Arabs, this would be an indecency. First, it is required the exchange of favours and gifts, with a tea or coffee offering. For the Arabs, typically the discussions take place before a meal and for the Europeans after a meal.

Non-verbal message. Gestures may have different meanings for different cultures. The gesture of tossing one's head from top to bottom, means NO for the Bulgarians, and shaking one's head from left to right means YES. The Turkish signal NO by leaning back the head, with closed eyes.

Clothing. As a general rule, the best choice is an everyday/common outfit. Don't do this in a country where it can be considered dangerous or offensive. In the Western business environments is required the business attire.

Language and interpreter. For the international negotiations, this issue is inevitable, especially when we don't speak our partner's language for tactical reasons, we do not want to speak it. Naturally, it will be made the option for a common spoken language or will be called the translator.

Argumentation. "Argumentation is a speech composed of words, concepts, ideas, and judgments. Its role is to highlight the advantages offered by a negotiator towards the other's demand." [7] They are closely related to the importance of certain subjective factors in intercultural communication. In a relationship with an Arab fundamentalist, we cannot easily pass over the religious reasoning. Bringing those into question may be a tactical mistake.

Political and religious environment. It's something that has to be taken into account in the proposed agenda. There should be considered the prayer or siesta hours and other habits that are found not only in the Arab world but also in Europe. In Spain and Germany, Easter is not for business, with only one exception for the small street commerce/trade.

Courtesy closing formula. In European countries, we use two signatures, which one is of the supervisor/superior. In North America, it is sufficient one signature. The French and the Americans use fast the first name as a sign of friendship and trust, but for the Germans can be as a sign of contempt. In Germany a sign of respect is using the title and family name.

A negotiation with a foreign partner requires a careful study of the culture it belongs for choosing those strategies and tactics that are best adapted to it. Also, the understanding and respect for traditions and values of foreign partner's and the behaviour during negotiation are important elements to achieve a profitable and long-term agreement.

Cultural differences may block the negotiations in several ways, namely: "creates difficulties not only on understanding the words, but also on the interpretation of actions." [8]

When they ask something or make a proposal the Westerners expect a firm answer, while the Japanese time it out to respond. Therefore, for U.S. negotiations with the Japanese are often interrupted by periods of silence, those becoming annoying, painful. Periods of silence are something normal for the Japanese, giving them time to reflect on what was said, and when negotiations are conducted in a language other than home language, the period of reflection on the response is greater. The Latino-Americans, who have a greater fluidity of speech, tend to answer questions quickly. They

can respond on an issue as soon as they understood it, while the other part has not finished speaking – “misunderstandings in communication.” [9]

If during a negotiation between the Americans the response to the other’s proposal is “It’s difficult”, then there is still availability for discussion, which means that the other part must improve its offer. Asians are reluctant to say “No” firmly and directly, even if it is their intention, therefore when Japanese says “It’s difficult”, a proposal cannot be accepted. – “it influences the form and substance of a business negotiation”. [10]

In Thailand, workers are motivated by the desire to please the boss, instead he must always be aware of their personal problems and to help them. In Australia for example, employees do not expect nor want that leaders to be involved in their personal problems. In this respect, “an Australian project in Thailand, have to be changed regarding of employee relations, because of local culture.” [11]

5. Conclusions

The culture can influence the negotiating style, the way people interact in different cultures throughout negotiations. “Negotiation practices differ from one culture to another.” [12] Culture can influence how people conceive the nature and function of the negotiations themselves. People from different countries have different ways of evaluating things, attitudes and different experiences, symbols and gestures that don’t have the same meaning. In a foreign country, to prepare a negotiation we should consider the understanding of the social and personal environment where we are and the understanding of its dynamics. It’s easy to see that certain layouts, symbols and even some techniques are more adapted to some culture than other. The idea of comfort is not realized in the same way in all cultures and all countries. Even colour can have different meanings from a group of people to another.

The negotiator experienced in international negotiations aims, not to imitate, but to know a maximum of information that enable him to avoid the mistakes and misunderstandings. Maintaining behaviour in accordance with his own values and traditions, respecting the culture and traditions of the partner will provide a solid and efficient framework to conduct the negotiations and to reach a satisfactory agreement for both parts.

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CONCEPTUAL APPROACHES ABOUT INTERNATIONAL NEGOTIATIONS

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Abstract. *Negotiation is the art of making someone think how we want. Almost every day, anyone of us can persuade or be persuaded. Everyone has an opinion and we have something to exchange with others. We negotiate with the boss of carrying out a project, with the supplier we can negotiate the terms for a contract, with the customer the payment terms. We can negotiate at any time, anything and with almost anyone. The negotiation is present in all aspects of our existence, in many forms, is done in a variety of areas and is also known as locally, nationally and internationally.*

Keywords: *negotiation, negotiators, communication, diplomacy, international business.*

JEL Classification: M20, F23, F53.

1. Introduction

In their specialised book “*Export - International Trade Practice*” the authors present the negotiation as a decision process, in which the partners are seeking to obtain by agreement a better result than if they would use other means of decision.[1]

“Above all the negotiation is a form of communication: to negotiate means to communicate with the hope to sign an agreement” [2]. The negotiation is a way of communication between partners, an exploratory process, with talks, views exchanges, in order to achieve an agreement. For this purpose, the essential premise of the talks is to maintain the openness of communication, providing a work and cooperation environment between the parties.

”Negotiation is inseparable from human communication and is inevitably based on dialogue” [3].

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In trade negotiations, this process is defined as an action facing supply and demand in order to reach a mutually beneficial agreement, which means the signing of a sale contract. Such a process is the action that harmonizes the interests of participants by seeking the mutually beneficial solutions, materialized by signing a contract. “Negotiation is the process by which two or more parts interact with the aim of arriving at an acceptable position compared to their divergent positions.” [4] The negotiator is a high-class professional, both in business and diplomacy.

Everywhere and in all ages the people haven't absolutely unilaterally imposed their will, but looked for joint solutions, i.e. negotiated solutions.

2. Conceptual approaches for international negotiations

“Our world is a giant negotiating table in which each of us, whether we like it or not, is a participant”.[5] Almost every day we get in conflict with those around us and the way we approach the problems will lead to harmonization of interests. The negotiation may be defined as a complex of processes, activities, consisting of meetings, consultations, negotiations held between two or more partners in order to achieve the conventions, agreements or other arrangements.

In “Business Negotiation” the author, Toma Georgescu, writes that “the negotiations between partners, start with a need to establish contract prices based on characteristic world prices, internationally imposed objectively by the value law action, in the supply and demand confrontation”[6]. Therefore the world price is standard in the negotiations that are going to determine the contract price. It is not produced and sold what is possible, but what is required by the global trade market. When negotiating contracts, the author affirms that each side wants them, from a juridical point, to be under the commercial law rules of the countries they belong. If this conflict situation appears it is resolved with the enforcement of the international commercial law and the international practice accepted by the states participating in international trade, established by INCOTERMS 1990. Also in this paper, the author says that in international trade you get nothing for free, based on the “DO UT DES” (I give you if you give me). Therefore, any negotiator need to start from the principle to give something and receive something in return and bear in mind that any material concession beyond the limits of commercially reasonable compromise, has a definite material purpose, and pursue a present or future unilateral advantage. Therefore, any free delivery or service should be seen

as apparent sacrifices that pursue compensatory advantages and other benefits.

In his bestseller book “You Can Negotiate Anything” Herb Cohen considers that, “the real world is a huge negotiations table” and whether we like it or not, we are participants. [7] He considers that marriage is a “win-win” collaborative negotiation where husbands are negotiating with their wives and wives with their husbands. The most common and most frustrating negotiations in a family occur when parents or children are engaged in some activities. The author confirms once again in this paper that every day we negotiate with our bosses, subordinates and peers. We negotiate with customers, suppliers, bankers, sellers, and with government agencies. Negotiate for a higher budget, for larger autonomy, for a job transfer. Because we are negotiating so often, we have to learn to negotiate. In every negotiation, with aimed diplomatic problems or sales-purchases of material goods are always present three essential elements: information, time and power. The author says that our ability to negotiate decides if we can influence or not the environment. The ability, gives us the feeling of being the owners of our lives. It is not about cheating and intimidation of an unauthorized target. It is about the analysis of information, time and power to influence the behaviour, the needs, and to make things happen as we want.

Stefan Prutianu in “Business Communication and Negotiation Handbook” places a particular emphasis on the interpersonal relationship, which defines as “an invisible connection beyond spoken words and information content of interpersonal communication”. [8] In a relationship are transmitted unconscious signals of harmony or dissonance, attraction or repulsion, proximity or distance, comfort or discomfort, friendship or enmity, domination and submission, appreciation or contempt etc. In a way difficult to realize, the interpersonal relationship explains love and hatred, acceptance and rejection, agreement and disagreement. A good relationship is the kind of interpersonal empathic contact where the partners are relatively synchronous and harmonious, communicate easier and deeper. The author is also defining the interpersonal relationship as a climate of openness, trust and confidence established between interlocutors having the same “frequency”, who live right near the same feelings and use almost the same verbal and nonverbal language. In our lives we are compelled to relate with very different people that we need to gain their trust. The ability to communicate and build interpersonal relationships is often the key to success and the safer way to achieve our goals. The people agree to

negotiate precisely because there are needs and common interests, which bring them together face to face, to the table. They also have to negotiate because beyond their common needs and interests there are others more or less contradictory. The existence of divergent goals, make the entry positions in negotiation to be different from one to the other negotiating party. If the parties will reach an agreement, then the exit negotiation position will be (one and) the same for both sides. Therefore, the author considers that the negotiation become possible when both parties assume more or less flexible negotiation entry positions. If they adopt rigid entry positions and keep them during the entire course of talks, there can be no negotiation.

Following the performed analysis, the author concludes that only properly understanding of your own needs and interests and those of your partner you can get a clear representation on the negotiating positions that will face at the negotiating table.

Ioan Popa in “Foreign Trade Transactions” considers negotiation as “a central factor in international commercial transactions”. [9] Compared to the negotiations performed in other areas, political, social, diplomatic, etc., the author considers that the international economic negotiation presents a series of specific characteristic features, both in terms of content and conduct, and on strategies and tactics used. The author writes that, conceptually, the international trade/commercial negotiation is an organized process of communication between companies, which aims to progressively adapt their interests related to the subject of negotiation for achieving a mutually acceptable business arrangement, materialized in the international contract. According to the author, the negotiation process assumes the existence of distinct parts, an object of negotiation and a certain context. The complexity of the international trade negotiating process resides in the specific of the negotiators’ personality, in their communication ability and their professional competence, as in the objective and subjective reasons which animate them.

The power balance between the negotiators is determined by several factors: the relative power of the parts involved in negotiations, the holder position, the image in the business world, the negotiator’s position in the company, his hierarchic authority, competence and professional experience in negotiations; the natural ascendant of the negotiator, the ability to influence and the professional charisma. The author says that in negotiations the power balance is not static, but dynamic, continuously changes, being able to have it tilt to one side or another. In the international trade

negotiations, the power balance tends to be subordinated to the economic interdependence between parts.

Ion Popa considers that for the existence of negotiation three basic conditions are required to be fulfilled: the parts to be animated by the desire to achieve a result; to have a common goal and a manoeuvre margin for each of the partners, and the parts to have different positions. The difference in positions is an expression of each part's interests. They negotiate for harmonizing positions and reaching a result (parts with identical positions don't have a negotiation subject). Beyond these differences, negotiation is possible only if the parts are manifesting a genuine commitment to reach an outcome and to complete the negotiations/talks. As each of the parts follow some targets, and the negotiators have a certain mandate to complete negotiations, it is required that their objectives and mandates to be compatible in some degree, thus to create a negotiation space.

In the opinion of the author, the trade negotiation differs from other types of negotiation (diplomatic, social, etc.) by its subject – making a business or a lucrative activity – and by the type of relationships established between the parts. The trade negotiation requires a previous contact between parts with a prospect action, or a letters exchange (in traditional or internet version).

The author considers that in performing of the negotiation process it is required the compliance of the ethical norms for the initiation of a business, of the assumed obligations and of the professional conduct, etc. Usually the negotiation is a formal process that assumes a prior preparation, an objective, well-defined strategies and tactics, a professional negotiations team, a timetable for progress, a program agreed between partners, ending with the conclusion of protocols or contracts.

In “Management and Negotiation in International Business”, Constanța Chițiba, considers that the negotiation occurs both in the private and state sectors, national or international. This defines the international trade negotiation international as “an act undertaken by two or more parts, having their own goals, in a dynamic process of adjustment and harmonization of the various ideas and arguments through discussions between them or in an exchange of letters in international economic relations, aiming to reach a mutually advantageous agreement”. [10]

The author claims that unlike domestic trade negotiations, international trade negotiations presents a greater difficulty arising from the complexity of the structure and of the characteristic phenomena for the

international business environment: the extremely strong and qualified competition, the conflicts between domestic and international prices, the differences between the various national legislation systems, currency fluctuations, various protectionist measures etc.

The international trade negotiation, in the current context, is associated with the rating of trade diplomacy, forming with it an indivisible whole. The author defines “the international trade diplomacy as the art of negotiating in an elegant and convincing form, amplifying the self importance, even solemnity, of mutual respect between partners, so that to reach agreements that can be implemented in the mutual benefit of the parts. The international trade diplomacy implies culture, fairness, understanding and dignity. The negotiation without trade diplomacy becomes obscure, free of the horizon and can generate the phenomenon of antipathy and rejection between partners.

The negotiation of disputes arising from implementation of legal instruments and contracts of governmental trade politics and of international trade agreements is done, in the author’s opinion, in order to find the ways to resolve them amicably/friendly, and if it fails to go the way the way of recourse to an international arbitration court. The part that rushes to resort to international arbitration services, until it didn’t exhaust by negotiation all the dispute settlement ways proves incompetency and incompatibility with the position of negotiator.

Dorel Mihai Paraschiv and Cătălin Ploae in the paper “International Affairs. Negotiation” presents negotiation as omnipresent in the social existence, manifesting in the relations between states, in the life of an organization or company and in the personal life of the individual [11].

Negotiation is considered by authors as a necessary way for any project, which cannot be under any form undertaken and brought to an end, free of intervention by one or more partners. It can happen (but the situation is very rare) that those interested to have a quasi-total identity of the interests, concerns, expectations and objectives. In this case, we are not in front of a negotiation, but to solve a problem together in the same way that two college students in a non-competitive situation join their efforts to present a joint exercise.

The refusal to open or participate in a negotiation is motivated by authors thru the perception created by one of the parts on the expected global outcome of negotiations. This perception may relate to a real situation, or may be entirely subjective, not always being easy to distinguish between these two cases. Therefore you should avoid issuing a

venture value judgment, because the negotiation refusal can be based on rational or legitimate foundations. Undoubtedly, in this case we have to use a kind of pre-negotiation to persuade the other part to enter a collaborative relationship.

The authors consider that the negotiation's relativity as a way to solve disputes or conflicts is underlined by the whole negotiation techniques. Despite the popularity of the materials on negotiations inducing belief that "everything is negotiable", there are many cases where it is necessary or preferable other solution than negotiation. We cannot negotiate the faith and values, even if the negotiation often leads to their acceptable change.

Negotiators should realize that solving these difficulties can be achieved only through their joint involvement, no one having the power to solve them alone, thus being necessary, in one form or another, the contribution of the negotiation partner. This is what the experts call "double veto", each part has veto right over the actions of the other, having sufficient power to force the latter to take into account their own reality.

In "*Supply and Sales Management*", George Bășanu and Mihai Pricop, consider that the negotiation in economic activity represents an important moment for all of their activities, negotiation always assuming at least a double participation of the supplier and the consumer, of the seller and the buyer [12]. In their opinion, the negotiation is a talks process where partners are in competition and aims through certain forms, to achieve a transaction or a business. The action is completed if they reach a concord, an agreement, convention, contract, etc. with legal value. In its essence the negotiation represents the totality of actions and documents prepared by partners, leading to the completion of a transaction, a business.

The authors consider that the team participating in the negotiations/talks has an important role in the negotiation process and for obtaining good results for each partner. The team may consist of the company's representatives with limited or full powers. This is based on: the importance of business for the company, the representation of speakers and the number of participants from partner, the subject of negotiation, the professional structure, the functions and other qualities of the composition of the negotiating team that represents the partner's strategy adopted for developing the negotiations. [13] In author's opinion, forming good negotiating skills requires knowledge accumulations during the preparatory process and by active participation, in this way the necessary practical experience is achieved.

After Harold Bloom, in "*Negotiation Principles and Techniques*", "the professional negotiation is a means by which a seller and a buyer,

using a specialized communication, reach an agreement on the approaches of a contract that have to reflect a balance between the interests of both parts”. [14]

Due to the fact that people are the ones who carry out and they also appreciate the negotiations by their subjective thinking, we believe that a negotiation has to be a process in which everyone involved can be winners. Any desire and any need that involves satisfaction – as long as they do not exclusively depend on the individual – turns into a process of negotiation, and the success of the negotiation is different depending on the behaviours and reactions of each individual.

3. Conclusions

“Negotiation is equally an art by native talent of the negotiator and a science gained by experience and learning”.[15] The negotiation is based on the fact that each part has needs, direct or indirect interests that wants to satisfy. Always when the partners have had regard tacitly to their mutual desires, the negotiation has been concluded successfully and could continue the contracts. When a part’s needs weren’t ignored and the negotiation wasn’t a simple game with the Victor and the defeated, the results are in the form of transactions that typically must be mutually beneficial. [16] Negotiation is a specialized communication that requires learning, experience, talent and essentiality. „ Negotiation is a form of communication which involves a dynamic adjustment process for agreement in the event of a conflict of interest, where two or more parties, prompted by different goals and their own objectives mediate their positions to reach a mutually satisfactory understanding”.[17]

Although used since ancient times, nowadays the negotiations have been established as the most appropriate way to solve problems arising in the relations between states. In this sense, contemporary international law places negotiations on the first place in the framework of peaceful settlement of international disputes, this requirement being stated as such by the United Nations Charter itself.

The negotiation must be imposed as one of the most precious attributes of contemporary civilization; ultimately it is the life buoy of this civilization which, unfortunately, is in many of her sequences in a serious confusion.

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INITIATING LOCAL PUBLIC-PRIVATE PARTNERSHIPS IN POLAND – SELECTED ASPECTS

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Abstract. *Joint action of many entities in the current market economy is essential. The dynamic development in many areas urges to take up activities that are not always possible to be achieved alone. Thus, it is necessary to establish cooperation between organizations having a common goal – the socio-economic development. This is especially important at the local level where the lack of financial resources is blocking the implementation of many projects. Establishing cooperation with relevant partners can therefore contribute to greater social integration and effective problem-solving as well as being able to assist in moving away from fragmented and often uncoordinated activities undertaken by different entities in the same areas. Projects implemented in partnership will also facilitate significantly establishing cooperation between institutions and organizations representing different stakeholder groups. The aim of this paper is to show the role played by public-private partnerships in Poland in the era of market uncertainty.*

Involvement of social organizations such as associations and foundations, as well as private entities in accomplishing tasks which fall into competence of public administration bodies and local governments is one of the determinants of democracy. It enables extensive civic participation in public initiatives, thus contributing to social sustainable growth as well as establishing civic society. In addition, it enhances mutual confidence among institutions representing specific sectors and awareness of shared responsibility for the citizen's quality of life.

The objective of this study to provide an overview of practical methods for establishing partnerships as well as identification of problems faced by local governments and enterprises being in partnership.

Keywords: *public-private partnership, organization, local partnership, cooperation, EU legislation.*

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1. Formal and legal authorization conferred to the partnership – introduction¹

In accordance with the Act on public-private partnership (PPP) – it is based on the cooperation agreement, made between a public entity and a private partner, intended to implement a public project, pursuant to which a private partner will bear or arrange, in full or in substantial portion, financial costs for completion of a specific project being the object of cooperation. Public-private partnership may be an implementation form for a specific venture within the scope of public assignments, in accordance with and on the conditions specified in the Act on PPP², only provided that this form brings benefits for the public interest which surpass those delivered by other methods of performing the public task or project.

PPP is a project accomplished pursuant to a long-term agreement, conducted between a public entity and a private entity, aimed at establishing infrastructure components which enable provision of public services. The groundwork for this definition is constituted by a community of activities performed by public and private sectors – founded to facilitate both partners in best pursuing their goals to which they are committed. A public partner is obliged to provide public services by law, whereas a private partner is expected to conduct business and achieve profits³.

An opportunity to combine operations by local government units with private companies was laid out in the Act on public-private partnership (PPP) of 19 December 2008⁴ and in Article 28a of the Act on principles for pursuing the development policy⁵ of 6 December 2006, being in force since 20 December 2008. This provision defines general principles for accomplishment of partnership projects and principles for selection of partners from outside the public finances sector by project promoters from within the public finances sector.

At the EU level a crucial legislation deed regulating the principles for partnership is the Council Resolution (EC) No. 1260/1999 of 12 June 1999⁶. The provisions included are general and they fail to specify the

¹ A study on the basis of the Guide for cooperation issued by the Voivodeship Labour Office in Szczecin, Szczecin 2005.

² Abbreviation: Public-Private Partnership.

³ http://www.partnerstwopublicznoprywatne.info/ustawa_ppp.php [access date: 2010.05.28]

⁴ Public-private partnership law of 19 December 2008 (Dz.U of 5 February 2009)

⁵ Law on principles of pursuing the development policy of 6 December 2006, Art. 28a, Dz. U. Nro. **216**, item 1370.

⁶ Council Resolution (EC) No. 1260/1999 of 12 June 1999.

manner of entering into partnerships or the scope of activities performed by individual partners. Having in mind the need to specify more thoroughly the principles for operations of partnerships whose projects are co-financed from EU funds the following document was drawn up “Scope of implementation of partnership projects” which determines⁷:

- Basic requirements for partnerships;
- Assignment of partnerships among units of the public finances sector;
- Appointment of partnerships among units in the public finances sector with units from outside the public finances sector;
- Partnership with the entity failing to comply with statutory definition of the beneficiary;
- Partnership established in the course of accomplishing the project – changes in partnership;
- Financial issues in partnership projects, including the template for a partnership agreement for the benefit of the Project.

2. Types of local partnerships

There is a wide range of forms and models for partnership functioning – especially local ones, having different structures and task allocation. Their type frequently depends on a leader, who due to his leadership, on many occasions imposes his concept of the partnership. Taking into account a leader’s nature we may differentiate three categories of local partnership initiatives:

The first is a grassroots partnership comprised of local partner groups. It is set up by local social organizations and individuals. These partnerships are distinguished by great flexibility in undertaking actions. By representing local communities they may efficiently respond to all irregularities and ongoing changes occurring there. Being aware of the needs and problems they may, above all, take initiatives that favour the community. Such partnerships, however, entail numerous negative features. The basic problem is a lack of structuring and systemizing jobs by specific partners. For example, social organizations are reluctant to take up office service as assignments for partnership. Without an organizational scheme the decision making process is increasingly difficult and the way of representing the partnership outside is undefined. Local partnerships which are often created spontaneously, ad hoc, repeatedly exaggerate in idealizing

⁷ MRR “Scope for accomplishing partnership projects specified by the Managing Institution of the Operational Programme Human Capital”, Warsaw, 23 April 2009.

their activities and when confronted with the apparent deficiency of their own benefits, they cease to exist.

Another form of local partnership which most commonly comes into being in areas with a strong sector of private business, include partnerships created on the initiative of local business communities. Such partnerships operate efficiently and effectively as they have well organized internal structures as well as a rigid allocation of work responsibilities. Their activities deliver benefits to both the local community as well as the partnership as a whole. Negative factors underlying these initiatives chiefly refer to a desire to gain a bigger impact on economic issues in a given community. Partnerships geared to accomplish economic projects often see profitability as their priority. Therefore, all activities undertaken are assessed with regard to costs and as a result are not performed, even though they could have been beneficial for a local community.

A third form of local partnership with regard to type of entities comprising it includes partnerships initiated by local authorities or public sector. Partnerships of this type emerge in those areas where a local authority assumes the role of leader. It is distinguished by an excellent internal organization. It has an efficiently functioning administrative infrastructure. They are capable of implementing projects which serve the purposes of the whole local community. Though as a result it is generally viewed as an extension of the office and carries a real danger that cooperating entities may degenerate from partners to “applicants”.

Another criterion for division of partnerships is their formal and legal status. According to this criterion there are two distinct forms for functioning local partnerships. The first embraces formally organized partnerships which assume a form of business entity such as a foundation or an association. Whereas the second form refers to partnerships with an informal structure. These partnerships facilitate establishing better bonds between partners.

Partnerships are divided in terms of task accomplishment. To execute the projects jointly partnerships called clusters are formed. These are collections of independent groups which by their cooperation they create a complete entity.

Partnerships are also distinguished with regard to their manner of accomplishing projects. These are coordinating and executive partnerships.

Coordinating partnerships may accomplish numerous projects simultaneously in diverse areas and fields. Individual projects are implemented by separate operational teams. Their operations are managed and administered by project coordinators while the whole is supervised by a leader.

Coordinating partnerships must possess efficiently operating structures for information transfer, which to a large extent determines the efficient working of all operational teams. Operations conducted by local partnering teams may cover various areas of social and business environment.

Executive partnerships when operating focus only on execution of a single project or single initiative at a given time. In such partnerships all energy and resources are devoted to performance of this single, individual project. Partnerships are characterized with a simple system for management and information transfer. It is unnecessary to build an extensive and highly systemized organizational structure. Negative factors which accompany such a “team” involve, above all, the fact that local partnerships may exclusively pursue a single project at that time. Effective activities performed by these teams are solely constrained to a single area, and thus their operations are incomplete and fragmentary⁸ in nature.

3. Basic principles for building public-private partnerships

Establishment of the partnership requires a range of actions intended to specify all activities to be undertaken to ensure a rewarding cooperation among partners. Among others, they include compiling a list of potential partners, analysis of opportunities, potential and impact of partners on a local community. Also, consideration of the motivation of potential partners behind the drive to participate in the accomplishment of the common project should not be downplayed⁹.

In each case the first, critical measure to create a partnership is conducting an analysis of advantages and losses which may be possibly incurred by partners. It is necessary to agree on a common vision and value for the partnership. Additionally, all likely sources of financing should be investigated¹⁰.

⁸ *Local partnership. Guide for cooperation*, Voivodeship Labour Office, Szczecin 2005, p. 27.

⁹ Ministry of Labour and Social Policy, Labour Market Department, *Through cooperation to success. Local partnership on the labour market* (edit.) A.Sobolewski, R. Krzewicka, G. Och, J. Olszowska-Urban, J. Piekutowski, G. Podławiak, T. Sobolewski, Warsaw, 2007.

¹⁰ *Local partnership. Guide for cooperation*, Voivodeship Labour Office, Szczecin 2005, p. 27.

3.1. Identification of problems and formulating the objectives

The first principle when identifying problems and formulating the objectives for local partnership initiatives is a necessity to act at a local level. The principle determines and narrows the scope of interests and activities for local partnerships. It has a decisive bearing on the functioning of the partnership almost over the whole time of its operations.

According to this principle it is necessary to formulate a schedule for actions, given the situation of the area, its resources, potentials and weaknesses. The actions to be taken jointly have to respond to real needs of the given region, even though these needs may, at the beginning, seem to be prosaic, banal or trivial. The initiatives that do not meet local expectations should not be planned, projected or performed as they are doomed to fail. Also, it is of little significance how “momentous” these initiatives are, if they do not correspond to reality they are redundant and even harmful. After all, they do not solve any problem of the local community (as unidentified problems are unknown, therefore actions taken cannot serve as countermeasures), conversely, they may create new problems and threats. One of key issues in the process of establishing and building the local partnership is therefore – according to the principle “we act locally” – conducting the analysis of the situation prevailing in a given local environment, and then selection of such targets, mechanisms, scheme and tools for activities undertaken so that initiatives accomplished by the partnership are a real, not only superficial or promotional, means of resolving problems and threats. At this juncture another issue should be emphasized. Each partnership initiative taken as a countermeasure against local grievances and troubles, having their origins in the analysis of the predominant situation in the local social and economic environment, should be a driving force behind local growth in the community. To achieve these goals, the activities have to be viable across a specific community. So it is not enough to design an exceptionally “bombastic” project which will ideally respond to the needs and eradicate problems faced by the specific community. Unless the project in its assumptions takes into consideration local determinants prevailing in the specific area, in practice it may prove to be unviable. Thus, at that point it is necessary to explore all resources and potentials possessed by the local community. It is equally important while scheduling partnership activities to keep in mind the potential weaknesses and threats inherent in the local community which may exert a significant influence on the nature and scope of the initiative undertaken. It may appear that activities and initiatives pursued by the

partnership are totally divorced from the socio-economic reality in the territory (e.g. activities that promote professional training in an area with a high rate of unemployed with similar educational background, where there are no vocational schools and where eventually there is no demand for employees with such education on the labour market)¹¹.

In this case the partnership will break, through its activity, one of the fundamental and crucial directives for functioning local partnerships, which is conducting operations for the benefit of local communities. Instead of acting for the benefit of the community it will only benefit itself, and more precisely (some) partners centred in that area. The local community may cease to recognize it as a useful entity committed to the interests and development of the local social environment, and perceive it as a formation set up for the purposes of securing the interests of its members.

People involved in the partnership are its core value. They as well as their engagement decide whether a planned initiative delivers expected results. At the very beginning of creating the partnership it is crucial to keep in mind that all partners have to receive benefits from participation in the venture. At the inception of partnership and while accepting new entities motives driving all partners ought to be clearly specified. It is remarkably important with regard to appropriate identification of common objectives. Only on the basis of shared expectations is it possible to establish cooperation among diverse entities. All dissenting views should be identified during the phase of creating the partnership and not when accomplishing specific assignments. The significance of shared goals and expectations, which enhance partners' involvement into the project should be emphasised. On the level of building partnership, at its initial phase, it is necessary, apart from explicit motivation, to identify so-called "tacit goals" pursued by at least some participants in the partnership. They may be best identified by an external expert who is not involved in the partnership and with the use of research he discloses both tacit as well as motives driving the participants.

To achieve the best outcome, partners need to have a common goal, a similar approach to problem solving and support each other. The more similarities that exist among partners, the bigger the chance of reaching an understanding. There is a high probability that two non-governmental organizations (e.g. dealing with unemployed persons) will find a common path to achieve a goal.

¹¹ Based on MRR „Scope for accomplishing partnership projects specified by the Managing Institution of the Operational Programme Human Capital”, Warsaw, 23 April 2009.

It should be emphasized that too great a disparity among partners may hinder the accord; however in the case when these dissents come to the surface it is vital to make it possible to verify (or defend) their own conviction, views and methods applied. It is worthwhile working with a partner which imposes a superior standard in terms of management or work quality, and at the same time to ensure that the standard is possible to attain. While working the partnership a system of strong bonds and relationships among individual partners should be developed. A characteristic feature of effective partnerships is engagement in their works of various partners that are committed to the local social community in diverse areas. It appears important that the partnership involves representatives of various sectors: local self-government administration (alongside its organs being in charge of policy), institutions, companies and employees as well as NGOs and education. Potential partners should be intentionally and adequately selected from among institutions genuinely convinced of the usefulness of the founding partnership. Partnership cannot be coercively imposed by virtue of enforced decision. Institutions “coerced to partnership” will never become partners, and they may turn into adversaries. Individual partners have to be convinced of benefits coming from participating in the partnership and these benefits cannot be weaker than those achieved as a result of being outside the partnership and operating “on one’s own account”. To deliver this objective, it is necessary to define precise principles for functioning partnerships and guidelines for recruiting potential new partners. In this case it is useful to draw up agreed regulations/declaration of cooperation which should be approved by all partners¹².

A Partnership should be headed by a charismatic leader, being capable of managing and administrating all projects carried out. With regard to his position a leader is obliged to represent partnership outside. On most occasions it is an institution that holds the position of the leader.

When concluding the partnership agreement the following should be specified:

- Objective of partnership;
- Responsibilities of the project leader and partners towards third parties for liabilities incurred by partnership;

¹² Ministry of Labour and Social Policy, Labour Market Department, *Through cooperation to success. Local partnership on the labour market*, (edit.) A. Sobolewski, R. Krzewicka, G. Och, J. Olszowska-Urban, J. Piekutowski, G. Podławiak, T. Sobolewski, Warsaw 2007, p. 32.

- Tasks and obligations of partners with respect to implementing the project, arising from the agreement to subsidize the project, entered into between a beneficiary and a relevant institution;
- Financial plan allocating expenses to all partnership members and principles for financial management, including cash flow and settling accounts;
- Guidelines for communication and information transfer in partnership;
- Principles for decision making process in partnership (principles for joint managements);
- Power of attorney or authorization to represent partners;
- Manner of internal monitoring and oversight of project accomplishment.

Despite documents listed above it is recommended to implement procedures which should be applied within the partnership (among others: with regard to risk and conflict management, problem identification) as well as methods for solving issues in respect to decision making and assuming the role of the leader in the partnership. Such procedures may constitute a part of the partnership agreement. In the case of the partnership involving more than three partners the description of procedures is mandatory and it should constitute a part of the partnership agreement¹³.

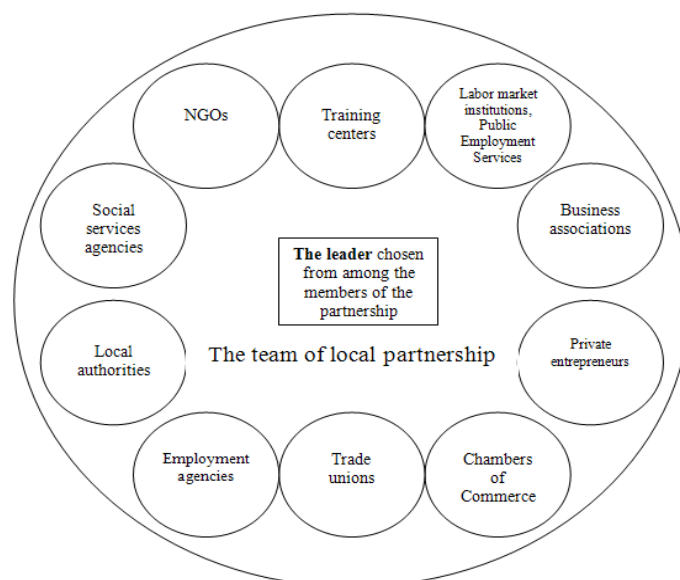


Figure 1. Potential partners gathered in a local partnership.

Source: *Local partnership. Cooperation Guide*, PARP, Szczecin 2005.

¹³ *Ibid.* p. 32.

3.2. Formulating the strategy for activities performed by public private partnerships

A strategy is closely connected with initiatives projected for implementation by the partnership.

An analysis of possibilities and limitations clearly shows “for” and “against” the potentials possessed and indicates the areas of activities where the partnerships have no chance to interfere. The areas of activities and strategic objectives set out the direction for operations of the partnership. A significant element of the strategy – information and promotion policy are related to the impact of the partnership on the external environment. Adequately determining a target group or environment for partnership initiatives, taking into consideration environments unfavourable towards the partnership, as a consequence, allows creation of an appropriate image for the partnership.

First, elementary and one of the critical initiatives undertaken following the establishment of the local partnership is to conduct a factor analysis for its functioning. Other stages of the initiative may be carried out after completing this phase. A factor analysis and drawn conclusions determine the entirety of objectives and activities scheduled for the partnership. There are a few factors behind the extreme significance of the analysis:

First, it marshals knowledge of individual partners about themselves; it points out the potentials and exposes their weak and strong points. Furthermore, the analysis enables precise recognition of the scope and manner of partners’ cooperation. It also makes possible gathering of information on potential possible platforms for cooperation.

Second, it enables formulation of a system of objectives which are intended to drive the partnership. The objectives are realistic so that they are likely to be fully implemented as they are backed by the resources of the partnership. The analysis prevents establishing unrealistic objectives that are not viable from the partners’ perspective.

Third, the analysis allows to accurately identifying the area of activities that might be accomplished by the partnership. It indicates the connections between activities planned with resources and potentials possessed by partners. It determines their viability according to the principle “look before you leap”.

Fourth, it helps to avoid chaos as the activities are carried out on the basis of the schedule which incorporated analysis results.

Fifth, it permits prediction of effects resulting from the activities undertaken.

Sixth, it reveals factors which may obstruct the activities planned and it suggests methods for liquidating and preventing their negative impact.

The analysis may be conducted with regard to individual partners separately, as well as to the partnership as a whole. An optimal solution is conducting an individual analysis at the initial phase and then a collective one. The results gained in this way are most reliable. The process of the analysis alone should be carried out in an open fashion. It is crucial that each partner has an equal right to present its views and ideas. Critical judgment as a constructive element is allowed at the phase of systemizing the analysis results for the whole partnership.

3.3. Financial issues in the partnership

The funds for the project may be allocated to partners by a beneficiary (leader), unless a partner is state budget unit. Funds finance the costs incurred by partners with regard to executing tasks specified in the partnership agreement; they are not delivering services for the benefit of the beneficiary (leader). They may be allocated in the form of an advance payment or as reimbursement of the expenses borne. All the payments made in connection with project implementation between the beneficiary (leader) and partners, are made by the use of the beneficiary's bank account opened for the project. The basis for money allocation between public partners may be e.g. an understanding (or letter of intent). If the understanding refers to transferring the assignment to another entity, not defined in legal provisions for this entity, transferring the assignment is followed by allocation of funds for its financing. If the understanding pertains to a joint implementation of the public assignment, then the costs are borne by all parties to the understanding. The provisions of the public finances law permit the assignments executed jointly by local government units to include own assignments of these units as well as assignments undertaken pursuant to the understanding.

Arising from Article 124(11) of the Public finances law¹⁴, revenues and costs related to accomplishing joint assignments by virtue of agreements or understandings between local government units are placed in the budget of the local government units which were awarded with accomplishment of these assignments. In the case of the commune which

¹⁴ Public finances law of 27 August 2009, Dz. U. No. 15, item 1240.

accomplishes public tasks included in the understanding, then it assumes the rights and obligations of the remaining communes – parties to the understanding, with regard to the tasks awarded, and communes – parties to the understanding are obliged to participate in the costs of the assignment. But if the communes set up an association with the goal of jointly completing the assignment, the association executes the public tasks in its own name and on its own responsibility, within a statutory objective to which it was brought into existence, as it possesses a legal personality. On the day when the association's charter is announced, rights and obligations of the communes involved in the association, with respect to accomplishing assignments awarded on the association, pass over to the association which conducts the financial operations on the terms and conditions specified by the public finances law for the financial operations conducted by communes.

In the case of units from the public finances sector financed from the state budget, the public finances law does not provide for such restriction, which arise from Article 124 for local government units¹⁵ – parties to such understanding may agree on partial financing of the task by the budget of each entity involved.

It is necessary to identify areas of activity and intervention undertaken by the partnership so that they are in compliance with the resources and financial potentials. Activities should be taken in favour of the project, notwithstanding it. The goals for specific actions should be accurately set out so as to evaluate their completion degree with the use of objective and measurable indices. The goals must be established so as to ensure complementary and comprehensive exploitation of all resources. Equally important is to devise a procedure for resignation from the partnership which secures the integrity of the partnership in such a way that departure of one or more partners does not initiate a domino effect and ultimate collapse of the partnership. The members of the partnership should be recognized for high professional qualifications and experience, as lack of adequate competence to works connected with project execution may, in consequence, lead to losses, including financial losses. Therefore it is recommended to engage specialists of local partnerships into the partnership activities.

All persons creating the partnership should be aware of the goal and take responsibility for their contribution and involvement. It should be kept in mind that there is a shared obligation to be concerned about benefits, as

¹⁵ *Ibid.*

the lack of them may trigger a debacle¹⁶. The parties to PPP determine their financial contribution in the agreement. Despite the financial contribution (cash) partners, both public as well as private, make in-kind contribution. Any settling accounts between the parties ought to be included in the partnership agreement.

Launch of the project in the form of public-private partnership requires a relatively long preparatory period necessary for drawing up essential documentation¹⁷.

4. Conclusions

Social and economic growth entails initiating actions that have direct impact on its condition both in Poland as well as in individual regions of the country. Adequate identification of the problems in local environments enables selection of means which perfectly address the problems and facilitate achieving the goals. One appropriate, but at the same time very challenging solution is establishing partnerships – between a public entity and private partner, for the purpose of accomplishing public assignments.

Partnerships whose type, structure and division of tasks frequently rely upon a leader, depending on the choice of the form and model of functioning, as a result may deliver advantages or losses for local communities.

Given the complex nature of the issue, establishing partnership implies embarking on initiatives intended to specify all activities to be taken in order to ensure a rewarding cooperation between partners. Beginning from the introductory negotiations through selection of partners, analysis of possibilities, identification of problems, exploring the potentials, allocation of assignments to oversight and accomplishment of tasks – to deliver objectives required which lead to social and economic growth of the local community. Pursuant to requirements for drawing up necessary documentation, the launch of the project in the form of PPP demands a relatively long preparatory period. This time should be devoted to intricate specification of details regarding cooperation as in each case of establishing a partnership; a guiding and essential objective is conducting operations for the benefit of local communities. It must be highlighted that

¹⁶ Cooperation guide 2004-2008, Coordination Office for Personnel Education, Foundation “Cooperation Fund”, Warsaw 2005.

¹⁷ M. Gasz, *Public-private partnership as an instrument for completion of public projects*, [in:] R. Przygodzka (edit.), *Public sector in present-day economy*, Białymstoku University, Białystok 2008, p. 251.

PPP comprising a public entity and private partner is charged with securing the interest and promoting growth of the local community.

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