The Hominization of the Economy

"I couldn't be happy if I did not believe that, finally,
the results of our work will be used,
one way or the another, for improving the life of the common man."
Ragnar Frisch

Distortions in the typologization of Economics originate in the explicative sufficiency of modernism. The fixation in rationality, which gave birth to the exclusive competition for performance as a legitimizing recipe of the effort, has pulled Economics from the realm of human sciences. The fleeting benevolence with which it was classified as a social science was nothing but a failed project of ideological visions.

The Sisific attempts by the postmoderns of – from a structuralist perspective – resuscitating Economics as a social science adds to the series of distortions. The excess of techniques and of methods of calculus, as an infallible foundation which to verify economic truth, has more consistently highlighted and not masked the false.

Prefiguring a reproductive science of performance is compatible with a dream of the Enlightenment: the idea of progress. What complicated the perception in the case of the progress' dogma is the dilemmatic fact of whether it has transcendental force. Meaning, simply put, the solution to what progress means must be found beyond the material order of an artificial type.

If the reasoning of the economy is limited to the material order, to the lucrative act in the restricted universe of human condition – seemingly sustained by the founding assumption of Economics originating in Smithian thinking, then progress takes a sense of quantitative cumulativeness. Which, it must be said, means a reduction of Economics to a common technology, unavoidably apt to accept the substantial senses of progress.

In this situation Economics is not a human science. It is, at most, a craft for the creation of wealth. This is where the source for the present tragedy of Economics can be identified: in the name of rationality it sacrifices man! In order to stay attached to the idea of progress Economics had to operate with hypotheses with exclude man and reduce him to the middle-condition of his own necessities.

When Economics speaks of progress it instrumentalizes man and make his necessities mechanic. The ideological change in flavor from the individualist visions to the collectivist ones does not anthropologize Economics. At most it can be a Caudine passing from de-humanization to a-humanization. Meaning from a reasoning without primal cause to a reasoning with no final reason.

Building Economics on progress has reached its limits. The present pluriform economical crises are increasingly clear signs of reaching the end.

In an ultimate way, Economics must retrace a path of hominization. The scapegoat is, obviously, the materialism of progress. The place of the order of the competition for material performance which excludes (destroys) mother-nature and human nature must be taken by the cooperative order of survival, until de reinvention of humanization as a source of performance.

The universal key of this openness (in essence the first opening of the economy towards the human nature, overcoming the comfortable captivity of the sciences which manipulate the human condition) lies in the annulment of the founding referentials which have been derived from adversity. As long as Economics legitimizes assumptions on exclusion (externalization), as the logic of competition, it cannot avoid the crisis as a redeeming consequence. The tragic part of Economics is that any of its consequences has man, the humane and humanity on the receiving end.

Without interpretational exaggeration, it is exactly because Economics has a tragic underlay that we can talk about the need for the reconstruction of this human science.

Economics as a science of the humane supposes not just the overcoming of the abstract formula of microeconomics or the mecanicist formula of macroeconomics, but also the overcoming of the ideological perverting of socio-economics. In fact, to answer to this challenge, Economics must reinvent itself as a science of the empire of necessity in conjunction with the empire of liberty.

The workable hypothesis which opens the way to success is for Economics to renounce the idea of progress and to reload the ideas of competition and economic growth with different meanings.

The path followed by economics, other than the alignment to the imperative of reason and its Enlightenment expression – rationality, means the relinquishing of the separation of opposites in order to cease the single-criteria computation of the efficiency of action. The only choice for breaking the deadlock is the re-focusing on man and on the human nature of the economy, closing the selection loop of the human condition and stopping, at the same time, the centrifugal mechanism.

Materialist reductionism, overflowing methodologically in caeteris paribus and axiologically in quantity, has generated too many deviations on the path of Economics as a human science. The next temptation can only be the anthropic perspective. Otherwise, it would only be nihilist revelation.

Sic absconditur altitudo et manifestadur profunditas!

Marin Dinu

Contents

Tendencies in the Regional Industry and Specialisation in Romania during the Transition Period
■ Tudorel Andrei, Liviu Bogdan Vlad, Monica Nedelcu 3

The Estimation of the Structural Budgetary Deficit for Romania in the Context of Accession to the Euro Zone
■ Aura-Gabriela Socol, Bogdan Chiriacescu 13

Malmquist Index, an Alternative Technique for Measuring Credit Institutions Productivity
■ Nicolae Dardac, Iustina Alina Boitan 29

Sustainability and Dissipative Systems
■ Emil Dinga 37

Perspectives of Collective Investment Undertakings Market
■ Gabriela Anghelache, Cosmin Păunescu 61

Optimization of Management Decision by Network Method used for Chipboards Manufacturing
■ Viorel Lefter, Ivan Cismaru, George Bobeică 69

Intellectual Capital and Intangible Assets Analysis and Valuation
■ Ion Anghel 75

International Migration and its Effects on Family
■ Maria Constantinescu, Cornel Constantinescu 85

Notă: Autorii sunt responsabili de clarificarea dreptului de utilizare a informațiilor cuprinse în articole.

Revizie text: Gabriela Ochiană
Tehnoredactare computerizată: Nicoleta Bobocea
Grafică: Alexandru Ion
Difuzare și abonamente: Viorela Petrici (021/312.22.48 – int. 24)

Indexări în baze de date:
Research Papers in Economics (RePEc)
http://www.ideas.repec.org
Directory of Open Access Journals (DOAJ)
http: //www.doaj.org
CNCSIS categoria B+

www.economieteoreticasiaplicata.ro; www.ectap.ro
Recepție texte: economia.ta@edeconomica.com

Tendencies in the Regional Industry and Specialisation in Romania during the Transition Period*

Tudorel Andrei
Ph.D. Professor
Liviu Bogdan Vlad
Ph.D. Lecturer
Monica Nedelcu
Ph.D. Senior Lecturer
Academy of Economic Studies, Bucharest

Abstract. *This article intends to present tendencies in the regional industry and specialisation in Romania during the transition period. The authors present the main tendencies in the analysis of concentration and specialisation and industry developments by electoral cycles as well. An econometric model for the analysis in time of concentration and specialisation in Romania during the transition period is also presented.*

Key words: *regional geography; regional development; regional specialisation; industry concentration; econometric models.*

* This article was written within the *PNII–National Complex Research Projects Programme*.

1. Tendencies in the analysis of concentration and specialisation

Regional specialisation and geographic concentration are important domains of economic research. The study that defined the new directions of the regional specialisation and concentration research is that of Krugman, P. (1991). Comparative studies of regions in the United States and in the European Union, such as Krugman (1991), revealed a higher degree of concentration in the processing industries in the US, as compared to Europe. *Unlike theoretical literature, the empirical analysis of the economic integration impact on industry regional specialisation and geographic concentration is at an incipient stage* Bode (2004).

The transition of the countries belonging to the former socialist block to the market economy and the enlargement of the European Union generated new research in the fields of regional specialisation and concentration, Hanson, G. H. (1996a, 1996b).

Regional specialisation can be defined as the distribution of a certain sector (industry) share *i* in the total economic activities (processing industries) in a certain region (county) *j* (Aiginger 1999b). A region *j* is considered to be specialised in a certain branch of industry *i*, if the respective branch has a high share among the population occupied in the processing industries in region *j* (Traistaru, 2002). This study will use the concept of specialisation as defined above.

The structure of the processing industry in a region *j* is highly specialised if a small number of industries hold a high share in the total processing industries. Specialisation can be measured using the occupied population, the production (the gross added value) or export data. One of the main difficulties in treating this topic quantitatively lies in ensuring data bases containing data series unaffected by various slope or level fractures. To that effect the Krugman, Herfindal, Gini indices, and others, can be used. The Andrei (2003) study presents such statistical measurements in Romania. The decision on choosing the most adequate measurements of regional specialisation and sectorial concentration depends to a large extent on the purpose of the research, considering though the available data and the specific properties of the respective measurements [(Bode E., Krieger – Boden K., Siedenburg F., Soltwedel R. (2004)].

Geographic concentration is defined as the distribution of the shares of a region (county) in a sector of the economic activity (industry) *i.* An industry *i* is highly concentrated if a large part of production is obtained in a small number of regions (counties) (Traistaru, 2000).

Regional specialisation and geographic concentration can be investigated at a sectorial level (economic activity sectors) and at an industrial level (the processing industry. Molle (1996), for instance, analyses sectorial specialisation for 96 NUTS1 and NUTS2 regions, using data from the period 1950-1990. The main findings of

the study are: the existence of a high convergence of the regions' production structure and a high degree of specialisation of periphery regions in 1990. Another study on regional specialisation is by Hallet (2002). The study uses the added value for 119 NUT1 and NUT2 regions for the period 1980-1995. Its findings indicate the decrease of specialisation, due to the tendency of the analysed regions production structures to move towards the European average. Cornett (2002) proposes the alternative concept of cohesion, based on an outline of the characteristics of inter-regional specialisation, measured by means of intra-industry, inter-state trade. From this perspective, the study analyses EU policy on its future enlargement and the impact of this process on its balance. Recently, Ezcurra *et al.* have examined regional production specialisation in the period 1977-1999. Their analysis for that period has confirmed the positive spatial auto-correlation in European regional specialisation, which had a decreasing tendency. The study emphasises the idea that the 1977-1999 convergence process in production specialisation will not continue indefinitely and, consequently, regional disparities will continue to be directly linked to the sectorial composition of the economic activity.

In Romania, several interesting studies have been carried out by Traistaru (2002), Andrei and Iacob (2003), Russu, Mitrut and Constantin (2006). Andrei (2003), for example, makes an econometric analysis of the time model regarding regional specialisation and geographic concentration at the NUTS II and NUTS III levels The study shows that, on average, during the period 1991-1999, regional specialisation fluctuated between -0.4% and 1.4% per year at the NUTS II level, while at the NUTS III level it increased by 0.5% per year. As for geographic concentration, at the NUTS II level, during the above-mentioned period, it was shown that it is not dependent on the time factor and it remains stable; also, using data for the NUTS III level, it was shown that it grew, on average, by 0.2% per year. The econometric analysis of the relation between regional specialisation and regional growth showed that, at the NUTS II level, during the period 1993-1998, the results of the estimation of the regional specialisation influence on economic growth were statistically insignificant for all specialisation indices. For all specialisation indices, per capita public expenditure had a significant, negative influence on economic growth. We obtained a significant, positive coefficient for the per capita GDP for all specialisation indices and for all model types, which means that there is a regional divergence of regional, per capita GDP. At the NUTS III level, for the period 1993-1998, the results of the estimation of the regional specialisation influence on economic growth were statistically significant only for the Gini and Krugman index, showing that there is a negative relationship between the two variables. The structural variables which had a considerable influence on economic

growth were the percentage of population in the working age groups (15 to 65), as well as the number of individual working people per 100,000 inhabitants.

A number of studies deal with the impact of the EU integration process and with the consequences of globalisation on global development. Thus, several studies have been published on regional disparities. Such studies have been made for countries like Bulgaria – Spiridonova (1995, 1999), Hungary – Nemes-Nagy (1994, 1998), Romania – Constantin (1997), etc. The main findings of these impact studies are that: (i) the globalisation and structural change process tends to favour Western and metropolitan regions, as well as regions with a strong industrial base (Petrakos, 1996); (ii) at a macrogeographic level, the transition process will lead to the increase of disparities at the European level, favouring the countries situated near the frontier between East and West (Petrakos, 1999); (iii) due to the economic integration process, the share of transportation costs in total production costs becomes less significant. In an empirical analysis, these transportation costs can be evaluated by the distance between the county capital city and the country capital city. The relocation of production has consequences on the pay structure at the regional level. Studies based on this theoretical approach have been carried out for Mexico. Thus, Hanson (1996b, 1997), using data on salaries in the Mexican processing industry, at a regional level, before and after liberalisation, verified the hypothesis that nominal salaries, as well as their structure at a regional level, decrease along with transportation costs to industrial centres (Mexico city and the regions on the United States border), approximated function of the distance to those locations.

A special place in the studies on activity specialisation and placing in development regions is held by the characteristics of the foreign investment localisation process, the regional influence on firm characteristics and the role of foreign investment in regional development. In Romania, a study was carried out to assess regional influences on newly established firms (Traistaru, 1999). Using the *new economic geography* approach, Altomonte and Resmini (1999) investigated the effect of direct foreign investment on regional specialisation modelling in the countries engaged in the integration process.

2. Industry evolution by electoral cycles

The industry has incurred serious losses during the transition period, because of the legacy bestowed upon it by the period of planned economy: excessive dimensions, lack of adaptation to the global market requirements, outworn technology and uneconomic territorial distribution. The transition period has brought about significant economic changes. Despite these efforts, though, after almost 20 years of transition, the Romanian economy displays the image of a country still affected by the inherited structural distortions.

The number of industrial employees decreased by 1,696,487 persons between 1991 and 2004. Thus, there were 3,188,055 persons employed in industry in 1991, while in 2004 there remained 1,491,568, which meant a fall of 53.2%. The highest annual drop occurred in 1992: a drop of 13.8% on the previous year. This decrease is followed by the 13% one in 1999. Considerable reductions of industrial staff also occurred in 1993 (-5.8% on the previous year), 1994 (-6.4%), 1995 (-9.5%), 1998 (-6.1%), 2000 (-6%), 2004 (-5.7%). During the period under investigation, increases in industrial staff occurred only in 2001 (1.9% on the previous year) and in 2002 (0.2% on 2001), but they were totally insignificant as compared with the decreases in previous periods.

The transition process in industry has caused a considerable decrease of industrial staff in all development regions. The most affected ones are those based predominantly on the extraction and heavy industries.

The table below presents staff reduction in relative figures during the above-mentioned period, in the eight economic regions. The most considerable reductions occurred in regions 1 and 8, amounting to approximately 60%. The smallest one was in region three, but it still was one of 40%.

Table 1 data shows that staff reduction, both in absolute and relative figures, was much more acute in the prevailing industry branches at the beginning of the 90's. The most significant decrease, of 79.7%, occurred in industry branch I10, which employed no less than 18.28 of the total industrial staff. In branch I2, which had the highest share, 19.8%, there was a drop of 43.2%. The smallest drop (14.2%) occurred in branch I4, which employed only 2.74 of industrial staff in 1991.

These results prove that Romania was insufficiently adapted to open market competion and that during the planned economy period industrial branches were over-dimensioned.

Regional staff reduction between 1991 and 2004, by electoral cycles (%)

Table 1

		R1	R2	R3	R4	R5	R6	R7	R8	Total
1991-2004	r	-59.81	-50.84	-56.06	-53.13	-39.17	-44.94	-53.78	-60.48	-53.21
	$\bar{r}$	-6.77	-5.32	-6.13	-5.66	-3.75	-4.49	-5.76	-6.89	-5.68
1991-1996	r	-33.98	-31.89	-28.47	-35.47	-33.39	-31.20	-29.79	-38.49	-32.64
	$\bar{r}$	-7.97	-7.39	-6.48	-8.39	-7.81	-7.21	-6.83	-9.26	-7.60
1997-2000	r	-23.57	-21.88	-29.93	-22.57	-12.51	-18.81	-23.11	-27.89	-23.22
	$\bar{r}$	-8.57	-7.90	-11.18	-8.17	-4.36	-6.71	-8.39	-10.33	-8.43
2001-2004	r	-18.01	-4.52	-6.15	-0.04	4.55	-1.72	-11.14	-4.74	-6.19
	$\bar{r}$	-6.40	-1.53	-2.09	-0.01	1.50	-0.58	-3.86	-1.61	-2.11

r - change rate in each period, $\bar{r}$ - average annual change rate in each period

3. Econometric model for time analysis of specialisation and concentration

In order to follow the evolution of concentration and specialisation during the transition period, the following three regression models were considered. For the estimation of parameters the data from 1991-2004 were used. The development region GDP has been calculated and reported on by the National Statistics Institute only beginning with 1998. Consequently, in order to calculate the two categories of indicators, the regional GDP share in the national value is estimated through the region's share of occupied population in the national occupied population. For the analysis of aspects regarding the two characteristics we use three regression models defined for data of the panel type. We use the Hausman test to see whether there are significant differences between the models. Next, we will present the three models and the application rules of this statistical test.

The common-constant regression model for specialisation is defined by:

$$\log(\mathrm{SPECH}_j(t)) = b + a \times t + \varepsilon_{jt} \qquad (1)$$

where:

j is the index for the development region, with values from 1 to 8, and *t* is the time variable. R^2_{CC} is the common-constant regression model coefficient.

The fixed-effect regression model is different from the former one because the independent term is different from a region to another:

$$\log(\mathrm{SPECH}_j(t)) = b_j + a \times t + \varepsilon_{jt} \qquad (2)$$

R^2_{EF} is the fixed-effect regression model coefficient.

In order to test whether the two models are equivalent we use an F test, through which we verify whether the independent terms of the models are significantly different. The statistics of the test is defined on the basis of the relation below:

$$F = \frac{(R^2_{EF} - R^2_{CC})/(m-1)}{(1-R^2_{EF})/(T \times m - m - 2)} \rightarrow F(m-1, T \times m - m - 2) \qquad (3)$$

If the calculated statistic value is higher than a table value, then we can say that the fixed-effect model is more preferable than the common-constant one, because there are significant differences between the regions.

In the random-effect regression model the independent term is decomposed into a deterministic component and a random one. Therefore, we shall write that $b_j = b + u_j$. We shall define the random-effect regression model as:

$$\log(\mathrm{SPECH}_j(t)) = b + a \times t + (u_j + \varepsilon_{jt}) \qquad (4)$$

R^2_{EA} is the random-effect regression model coefficient.

The Hausman test[1] is used to establish whether there are significant differences between the two models, the fixed-effect one and the random-effect one. This test is aimed at verifying the efficiency and the inconsistency of estimators in the two models. $\hat{a}_{EF}$ is the vector of the estimators in the first model, while $\hat{a}_{EA}$, the vector of the estimators for the random-effect model. The two hypotheses of the test are thus formulated:

H_0: the two estimators $\hat{a}_{CC}$ and $\hat{a}_{EF}$ are consistent, but is inefficient

H_1: $\hat{a}_{CC}$ is consistent and $\hat{a}_{EF}$ efficient, but is inconsistent.

The statistics of the test is defined on the basis of the relation below:

$$H = (\hat{a}_{EF} - \hat{a}_{CC})(var(\hat{a}_{EF}) - -var(\hat{a}_{CC}))^{-1}(\hat{a}_{EF} - \hat{a}_{CC}) \rightarrow \rightarrow \chi^2 \quad (5)$$

If the statistic value is higher than a table value, then the null hypothesis is rejected and the second model is deemed much more appropriate.

The table below presents the characteristics of the three regression models defined for the regional specialisation variable.

Characteristics of regressions for the analysis of regional specialisation

Table 2

	Common-effect model	Fixed-effect model	Random-effect model
Independent term	**-0.932526** (0.011200)	**-**	**-0.932526*** (0.017352)
Slope coefficient (a)	**0.002261***** (0.001315)	**0.002261**** (0.000975)	**0.002261**** (0.000970)
b_1	-	-0.862331	0.065868
b_2	-	-0.876381	0.052684
b_3	-	-0.943424	-0.010226
b_4	-	-0.979146	-0.043746
b_5	-	-0.936210	-0.003457
b_6	-	-0.942096	-0.008980
b_7	-	-0.960310	-0.026071
b_8	-	-0.960310	-0.026071
R^2	0.26167	0.499337	0.470172
n	112	112	112

Note: *, **, *** are siginificantly different from zero, i.e. for 1%, 5% and 10%.

The three regression models are defined in a similar manner for the analysis of the industry concentration level function of the number of employees $CONCH_i(t)$, $i = 1,...,n$, $t = \overline{1991,2004}$. The results of the estimations are presented in the table below.

Characteristics of regressions for the analysis of industry concentration

Table 3

	Common-effect model	Fixed-effect model	Random-effect model
Independent term	**-0.804780*** (0.008455)	**-**	**-0.804780*** (0.014725)
Slope coefficient (a)	**0.000411** (0.000993)	**583×10^{-6}** (248×10^{-6})	**0.000411** (0.000478)
I_1	-	-0.893617	-0.085951
I_2	-	-0.858003	-0.050986
I_3	-	-0.754253	0.050874
I_4	-	-0.775510	0.030004
I_5	-	-0.756739	0.048434
I_6	-	-0.783539	0.022122
I_7	-	-0.831053	-0.024527
I_8	-	-0.826975	-0.020522
I_9	-	-0.862617	-0.055516
I_{10}	-	-0.818067	-0.011778
I_{11}	-	-0.717189	0.087263
I_{12}	-	-0.795825	0.010060
I_{13}	-	-0.805539	0.000523
R^2	0.9	0.782501	0.768259
n	112	112	112

Note: *, **, *** are siginificantly different from zero, i.e. for 1%, 5% and 10%.

In order to choose between the three models for regional specialisation analysis we use the two tests presented above:

(i) For the first two models we use the F statistics; in this case, the statistic value is 13.77. From the F statistics table the value of 2.72 is calculated for a significance threshold of 5%. Thus, the null hypothesis is rejected and the fixed-effect model is accepted for the analysis of regional specialisation;

(ii) In order to choose between the fixed-effects model and the variable-effects ones, we calculate the statistics of the the Hausman test; in this case, we obtain the value of 42,579.11.

After the application of the two tests, it results that the most appropriate model for the analysis of regional specialisation if the random-effect one. We therefore state the following conclusions: (i) at the beginning of the transition period there is no significant specialisation of the economic development regions; (ii) during the analysed period there was a specialisation effect only in regions 1 and 2. In the other regions it occurred a reduction of this phenomenon. The data in Table 4 show that there was no concentration change rule for Romanian industry branches during the transition period.

Note

(1) We recommend, for a detailed presentation of this test: Hausman, J., Specific Tests in Econometrics, Econometrica, 46, 1978.

References

Aiginger, K. et al., „Specialization and (Geographic) concentration of European Manufacturing", *Enterprise DG Working Paper No 1.* Background Paper for The competitiveness of European Industry: 1999 Report (1999a), Brussels

Aiginger, K., „Do Industrial Structures Converge? A Survey on the Empirical Literature on Specialization and Concentration of Industries", *WIFO-Working papers,* (1999b)

Aiginger, K., „Trends in the Specialization of Countries and the Regional Concentration of Industries. A Survey on Empirical Literature", *WIFO-Working Papers,* (1999c)

Amiti, M., „New Trade Theories and Industrial Location in the EU: A Survey of Evidence", *Oxford Review of Economic Policy* 14 (2), 1998, pp. 45-53

Andrei, T. (2003). *Statistică și econometrie*, Editura Economică, București

Barro, R.X., Sala-I-Martin. X., „Convergence", *Journal of Political Economy*, 100 (2), 1992, pp. 223-251

Cornett, A. (2002). *Regional Cohesion in an Enlarged European Union*, in J.R. Cuadrado-Roura, M. Parellada (Eds), *Regional Convergence in the European Union. Facts, Prospects and Policies*, Springer-Verlag, Berlin

Ezcurra, R., Pascual, P., Rapun. M., „Regional Specialization in the European Union", *Regional Studies*, 40 (6), 2006, pp. 601-616

Frankel, J.A., Rose, A.K. „The endogeneity of the optimum currency area criteria", *Economic Journal*, 108, No. 449, 1998, pp. 1009-1025

Fujita, M., Krugman, P., Venables, A. (1999). *The Spatial Economy*, MIT Press, Cambridge

Fujita, M., Thisse, J.F. (2002). *Economics of Agglomeration*, Cambridge University Press, Cambridge

Hallet, M. (2002). *Regional Specialisation and Concentration in the EU*, in Cuadrado-Roura, J. R., Parellada, M. (Eds), *Regional Convergence in the European Union. Facts, Prospects and Policies*, Springer-Verlag, Berlin

Hanson, G.H., „Economic integration intra-industry trade and frontier regions", *European Economic Review*, 40, 1996a, pp. 941-949

Hanson, G.H., „Localization economies. Vertical organization and trade", *American Economic Review,* 87, 1996b, pp. 1266-1278

Hanson, G.H., „Increasing returns trade and the regional structure of wages", *Economic Journal,* 107. 1997, pp. 113-133

Hanson, G.H., „Market potential increasing returns and geographic concentration", *Working Paper No. 6429*, National Bureau of Economic Research, 1998

Hausman, J., „Specific Tests in Econometrics", *Econometrica*, 46, 1978, pp. 1251-1271

Heckscher, E., „The Effect of Foreign Trade on Distribution of Income", *Economisk Tidskrift*, 21, 1919, pp. 1-32

Kim. S., „Expansion of markets and the geographic distribution of economic activities: the trends in US regional manufacturing structure. 1860-1987", *Quarterly Journal of Economics*, 70, 1995, pp. 881-908

Kriegen-Boden, C. (2002). EMU and the Industrial Specialisation of European Regions, in Cuadrado-Roura, J. R., Parellada, M. (Eds). *Regional Convergence in the European Union. Facts, Prospects and Policies*, Springer-Verlag, Berlin

Kriegen-Boden, C., Morgenroth, E., Petrakos, G. (2008). *The Impact of European Integration on Regional Structural Change and Cohesion,* Routledge

Krugman, P. (1991). *Geography and Trade*, MIT Press, Cambridge

Krugman, P., „What's new about the new economic geography?", *Oxford Review of Economic Policy*, 14, 1998, pp. 7-17

Longhi, S., Nijkamp, P., Traistaru, I., „Economic Integration and Regional Structural Change in a Wider Europe:Evidence from New and Accession Countries", *Journal for Institutional Innovation Development and Transition*, Volume 8, 2004, pp. 48-55

McCann, P. (2001). *Regional and Urban Economics*, Oxford University Press, Oxford

Molle, W. (1996). The Regional Economic Structure of the European Union: an Analysis of Long-Term Developments, in K. Peschel (ed.) *Regional Growth and Regional Policy within the Framework of European Integration*, Physica-Verlag, Heidelberg, pp. 66-86

Negrescu, D., „Un deceniu de privatizare în România", în *Tranziție economică în România. Trecut, prezent și viitor,* Ruhl, C., Dăianu, D. (1999), The World Bank și Centrul Roman de Politici Economice, București, 1999, pp. 520-543

Ohlin, B. (1933). *Interregional and International Trade*, Harvard University Press, Cambridge

Cocean, P. (2002). *Geografie regională*, Cluj-Napoca: Presa Universitară Clujeană

Pons-Novel, J., Tirado-Fabregat, D.A., „Specialization and Asymmetries in Macroeconomic Fluctuations: Evidence for European Regions", *Regional Studies*, 40(7), 2006, pp. 695-706

Traistaru, I., „Regional patterns of private enterprise development in Romania", *Working paper,* Center for European Integration Studies, University of Bonn, 1999

Traistaru, I., Iara, A., Pauna, C.B., „Regional structural change and growth în România", *42nd Congress of the European Regional Science Association, Dortmund, 27th -31st August 2002*

Traistaru, I., Nijkamp, P., Longhi, S., „Regional specialisation and location of industrial activity in accession countries", *42nd Congress of the European Regional Science Association, Dortmund, 27th -31st August 2002*

Traistaru, I., Nijkamp, P., Resmini, L. (2003). *The Emerging Economic Geography in EU Accession Countries,* Ashgate Publishing, Ltd.

Sala-I-Martin, X., „The classical approach to convergence analysis", *The Economic Journal*, 106, 1996, pp. 1019-1036

Verbeek, M. (2000). *A Guide to Modern Econometrics*, John Wiley & Sons. Ltd.

The Estimation of the Structural Budgetary Deficit for Romania in the Context of Accession to the Euro Zone

Aura-Gabriela Socol
Candidate Ph.D.
Bogdan Chiriacescu
DOFIN Masterand
Academy of Economic Studies, Bucharest

Abstract. *Romania is preparing to enter a superior stage of integration - the admission in the euro zone. In this context, the study estimates the structural budgetary deficit, considering it as being one of the most relevant indicators to evaluate the performance of the fiscal management, as well as the degree to which the Romanian fiscal policy is ready to act as a single instrument capable of stabilizing the national economy after the Euro zone admission. The paper is structured as follows: (i) estimating the potential GDP and the output gap by the production function approach and by using the Hodrick-Prescott filter; (ii) estimating the budgetary cyclical deficit based on the sensitivity of the deficit (using the elasticities of government revenues and expenditures in relation to GDP) and the level of the output gap and, afterwards, the structural budgetary component; (iii) conclusions and recommendations.*

Key words: Potential GDP; output gap; elasticities of revenues and expenditures in relation with GDP; the production function approach; Hodrick-Prescott filter; cyclical budgetary deficit; structural budgetary deficit.

Introduction

When joining a monetary union, a country renounces at one of its two macroeconomic instruments – the monetary policy, but maintains complete control of the second – the fiscal policy. In the case of asymmetric shocks – identified by the optimal monetary zone theory as being the main source of costs in a monetary union, the fiscal policy remains the sole macroeconomic instrument available.

The European Monetary Union (EMU) is underpinned by a complex set of economic policies, formed by an unique monetary policy as well as by national fiscal ones, applied independently and decentralized. Fiscal policies of the member states of the Euro zone are national, but they should comply with the Stability and Growth Pact (SGP), considered an instrument of fiscal coordination. Its objective is the consolidation of public finances inside the Euro zone, sustaining thus the achievement of the objective of price stability, assumed by the Central European Bank.

All these suppose, though, the coordination of fiscal policies in order to assure the macroeconomic stability of the whole. This is due to the fact that fiscal policies of one country could be in the benefit or in the damage of the others. In such a case, when a country makes a decision, it cannot ignore its effect on its partners, and vice versa, taking into consideration the policies of other countries. If a member state of a monetary union has problems regarding the sustainability of the budgetary deficit, then this generates negative externalities inside the monetary union. In the situation that a country allows a raise of the current budgetary deficit so that the interest rate for the governmental debt exceeds the rate of economic growth, then this state will have to make use of capital markets inside the monetary union more often, thus generating pressure that raises the level of interest rates. However, the increase of the interest rates enlarges the burden of the debt for the other countries inside the monetary union. If the governments of these countries decide to stabilize the ratio between debt and GDP, they will be obliged to adopt restrictive fiscal policies.

As a result, the unsustainable increase of the budgetary deficit for some countries forces the others from the monetary union to follow deflationist policies, the latter being those countries that sustain the necessity of having a mechanism of control that restricts the dimensions of budgetary deficits.

Another possible externality of the unsustainable budgetary deficits affects the central bank inside the union. The countries affected by the increase of the interest rate may pressure the central bank to relax its monetary policies. By these means, the unsustainable fiscal policies promoted by the national governments may enter into conflict with the monetary policy that covers the entire union.

One of the most used indicators in the analysis of the measures of short and medium term fiscal and budgetary policies

– especially for the EMU member states, that have to comply with the conditions of the Stability and Growth Pact (SGP)[1], but also for the countries that prepare to enter the Euro zone – is the structural budgetary deficit[2] (deficit measured at the level of the potential GDP).

SGP considers that current budgetary deficits are excessive when they are around 3% of the GDP. With the purpose of leaving a margin of maneuver so that the automatic stabilizers play their role, SGP stipulates that the participants to the monetary union action for a medium term budgetary position "of equilibrium or surplus". By "medium term" we understand a period of around 3 years. By the reform of 2005, the revised SGP has not only a corrective component – the reduction of the current budgetary deficit under 3% of the GDP, but also a preventive one, that envisages assuming a medium term objective by member states in relation with public finance stability[3].

In this context, every member state commits itself on the medium term to maintain a budgetary position as close as possible to the equilibrium, or even an exceeding one. This would allow the automatic stabilizers to function, when the case, during the entire lifecycle of the business, without surpassing the reference value of the budgetary deficit of 3%. Due to the fact that the Stability and Growth Pact does not mention the precise meaning of "as closer to the equilibrium as possible", it was hence implicitly considered that the decomposition of the budgetary component in two parts is imposed: a structural one – due to the adopted fiscal measures, and, respectively, the cyclical one – due to the economic fluctuations (Hagemann, 1999). For the economies that have not consolidated enough their public finances, the revised Stability and Growth Pact has established a target of 0.5% annual growth of the ratio structural budgetary balance in GDP.

Romania has been accepted in the European Union (EU) on January 1, 2007. In 2003, the European Council stated that the EU would accept Romania entering the European Union providing that it would respect the admission criteria. After years of hesitation, the performance of Romania has improved, managing to fulfill the imposed criteria and to be accepted in the "club". EU requirements regarding the candidate states were based on the conclusions of the European Council in Copenhagen (1993), where the admission conditions have been set for the future members[4].

For the time being, Romania is preparing to enter the final stage of its integration, the Euro zone. The convergence criteria of the Economic and Monetary Union represents the economic test for the evaluation of the degree to which an economy is prepared to enter this union. The Maastricht treaty does not stipulate a strict calendar for the adoption of the Euro currency, leaving this process at the latitude of each country, after having consulted the European Commission and the Central European Bank[5]. The Treaty stipulates that *only the states that prove the achievement of a durable convergence* can participate at

the final stage of the Economic and Monetary Union.

Our study estimates the cyclical and the structural budgetary deficit for the Romanian economy by considering this indicator the most relevant for the evaluation of the Romanian fiscal management, as well as the degree to which the fiscal policy is prepared to take action as an independent instrument capable of stabilizing the national economy after having entered the Euro zone.

In the process of evaluation of the fiscal and budgetary policies, the current budgetary deficit is an indicator with a very limited utility. We have taken into consideration on one hand that these policies cannot be analyzed based on short-term indicators (a year), and on the other hand that an indicator such as the current budgetary deficit cannot detect the fiscal "burden" that is to come for the future generations.

The output gap is a measure of the cyclical position of a country, the percentage difference between the actual and the potential GDP: a negative gap shows an underperforming economy, one that operates beneath its potential. The structural budgetary deficit (cyclically adjusted) represents an estimation of what this balance would be for a certain year if the output gap was null.

By these means, the structural deficit can be seen as a measuring indicator for the degree of discretion manifested at the level of adopted fiscal and budgetary policies. In other words, the changes in the budgetary deficit should not be treated as effects of the economic fluctuations but rather as their cause (Muller, Price, 1984).

If the government did not ever modify the fiscal policy, the adjusted cyclical budgetary balance would remain constant. In other words, the changes of the structural budgetary deficit represent actions of discretionary policy. In the last years the adjusted cyclical budgetary deficit is decreasing when the output gap become lower, a sign for the success of the anti cyclical actions, but in the other years this deficit is improving when the gap is diminishing, a sign of the pro cyclical action (Baldwin, Myplosz, 2006).

Numerous studies that analyze the sustainability of fiscal and budgetary policies promoted by the European Union member states are using in this sense the indicator of structural budget deficit, and an interpretation as accurate as possible of the information transmitted by the indicators that measure the size of the budgetary misbalance presents a considerable importance. When the budgetary deficit is considered the cause of phenomena such as the inflation or the "crowding-out" effect it is very important to know which deficit is to be blamed (the actual deficit, the cyclic deficit, the structural deficit), as well as the way in which the size of this budgetary balance has been quantified (Boskin, 1987, Eisner, 1989).

In order to remove the influence of short-term fluctuations and also to evaluate the real performance of fiscal policies, institutions such as the European Commission (EC), International Monetary Fund (IMF) or the Organization for Economic Co-operation and Development (OECD) estimate the structural budgetary

deficit. In this context, the current budgetary component is delimited under its two components: the cyclical and the structural one.

Computing this variable is necessary because the budgetary balance shows both the influence of cyclical factors (temporary) and structural ones (permanent). The cyclical component refers to the variations generated by the cyclical evolution of the gross domestic product (GDP), as long as the structural component takes into consideration the changes of the budgetary balance, if the economy produced at the level of the potential GDP (Leeuw, Holloway, 1985).

Another vision upon the influences of economic fluctuations on the size of the budgetary deficit is through fiscal and budgetary policies promoted by the public authorities. It is considered that the connection between the budgetary deficit and the cyclic nature of economic activities can be observed through the perspective of: (i) discretionary modifications due to the adopted fiscal and budgetary policies and (ii) modifications brought by fluctuations in the economic activities (Braconier, Holden, 1999). Also, Dornbusch and Fisher (2006) consider that the link between the current budgetary deficit and the cyclic nature of the economic activity could be seen through the perspective of discretionary modifications due to adopted fiscal and budgetary policies and to the changes brought by the fluctuations of economic activities.

In the case of an unsustainable growth of public debt induced by an increase of the budgetary deficit, fiscal and budgetary policies measures are imposed in order to improve the situation. Fluctuations in the size of the structural budgetary deficit offer information regarding the degree to which the aggregate demand is stimulated through policies of public finances, as well as information related to the degree of fiscal consolidation (Giorno et al., 1995).

Empiric evidence shows that different computation methodologies conduct to different results, which suggests that there is no such thing as a standard, "perfect" method for estimating the structural budgetary deficit (Bradner et al., 1998, Bouthevillain et al., 2001). The methodology used by the European Commission is the one described by the IMF and OECD (Hagemann, 1999) – procedure used by this study in order to estimate the structural deficit for Romania.

The methodology used

The estimation of the structural deficit is realized in three stages: (1) estimation of the gap between effective GDP and potential GDP (output gap); (2) estimation of the cyclical deficit on the basis of the output gap and the elasticities of budgetary revenues and expenditures in relation to GDP; (3) estimation of the structural deficit by eliminating the cyclical component from the actual budgetary deficit (Hagemann, 1999).

Due to the fact that potential GDP is an unobservable variable (it cannot be taken directly from statistical data), estmating its level is one of the main difficulties in calculating the structural deficit.

For the Romanian economy we were confronted with the next problems: statistical data on GDP are published with delay and are often revised afterwards; Romanian economy suffered during the analyzed period numerous structural changes that affect the results, regardless the estimation method used; moreover, even though we used quarterly data the size of the sample can be considered as low(6).

In this paper potential GDP and the output gap for Romania has been measured using two methods: the production function approach(7) and by using an econometric filter (Hodrick-Prescott).

Calculating the structural component of the budgetary deficit means identifying the cyclical component first. To estimate the last one we used the elasticities of budgetary revenues(8) and primary current expenditures with respect to GDP; having done that we have then calculated the sensitivity of the deficit(9).

This paper is structured as follows: first section contains the estimation of the potential GDP and the output gap for Romania using the production function approach and the Hodrick-Prescott filter; second part contains the estimation of the cyclical budgetary component using the sensitivity of the deficit (calculated on the basis of budgetary revenues and expenditures with respect to GDP) and the output gap determined using the two methods and, finally, the structural budgetary deficit; last section contains the conclusions of the paper and the suggestions of the authors.

The analyzed period is 1999-2007 (third quarter) and the source of the statistical data is the Ministry of Economy and Finance, National Institute of Statistics, National Bank of Romania and the Eurostat database.

A.1. The estimation of the potential GDP and the output gap by the production function approach

Because the potential GDP is not statistical observable, in order to have it made operational, the concept of the potential GDP has been extensively defined in the economical literature.

We define potential GDP to be the level of the real GDP that can be obtained in the economy without generating inflationist pressure. On the medium term, the real GDP can temporarily oscillate from its equilibrium value on the long-term, the potential GDP. On the long-term, the level of the potential GDP depends on the production capacity of the economy. The production capacity depends on the total factor of productivity(10), the rate of capital growth and of the labor force. That means that the potential GDP offers information regarding the capacity of production in a non-inflationist growing economy.

The output gap is calculated as a percentage difference between the real effective GDP and the potential GDP, representing a sintetical aggregate indicator of the inflationist pressures in the economy (BNR working papers, no. 20, 2007).

To estimate the potential GDP using the production function approach (methodology described by Denis et al 2006) we have used quarterly data for the 1999-2007 (third quarter) period. The

main advantage of this method is the fact that it also reflects the aggregate supply part of the national economy.

For the real GDP we have used quarterly data in SDDS format (Special Data Dissemination Standard), units million Ron, 2000 medium prices, for the 1999-2007 period, published by the National Institute of Statistics. The seasonal adjustment of data was made using TRAMO-SEATS method. Figure 1 shows real GDP and seasonally adjusted GDP.

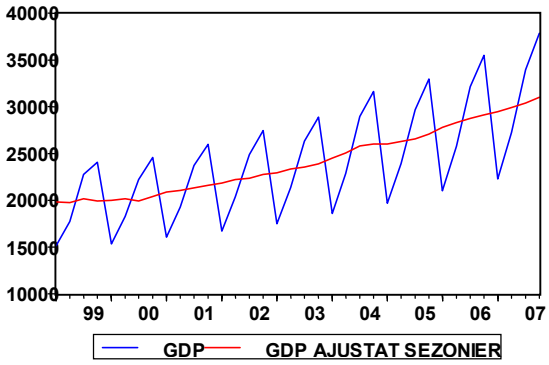


Figure 1. *Real GDP and seasonally adjusted GDP*

Estimating the potential GDP using the production function approach supposes following the next steps (Denis et al, 2006): (i) determining the form of the production function; (ii) estimating the parameters of the production function; (iii) determining the input of the production factors; (iv) calculating the total factor of productivity (PTF); (v) determining the potential GDP.

Considering the lack of data for the Romanian economy, and also the considerable use in the economic literature of a Cobb-Douglas production function, we have also chosen to use such a function, with constant scale output and decreasing factorial output, supposing the coefficient for the capital to be 0.35 and for the labor 0.65[11].

Following the methodology described by Denis et al (2006), the Cobb-Douglas production function presents the GDP as a combination of labor force(L) and capital (K), corrected for the degree of excess capacity (U_L, U_K), and adjusted for the level of efficiency (E_L, E_K). Potential GDP is calculated using the formula:

$$Y = (U_L LE_L)^{\alpha} (U_K KE_K)^{1-\alpha} = PTF \times L^{\alpha} \times K^{1-\alpha}$$

where:

PTF contains both the degree of excess capacity and the adjusting for the level of efficiency.

Having considered that, the Cobb-Douglas production function on the Romanian economy has the next form:

$$Y = PTF \times L^{0,65} \times K^{0,35}$$

Regarding the labor input (L), in Romania the data series for the working population contains important changes – structural breaks – in the fourth quarter 2001- first quarter 2002 period, which appears as a result of the change in the methodology of INS. Due to these results, we have used as labor input the number of employees[12]. Figure 2 shows the structural breaks in the series for the labor force[13].

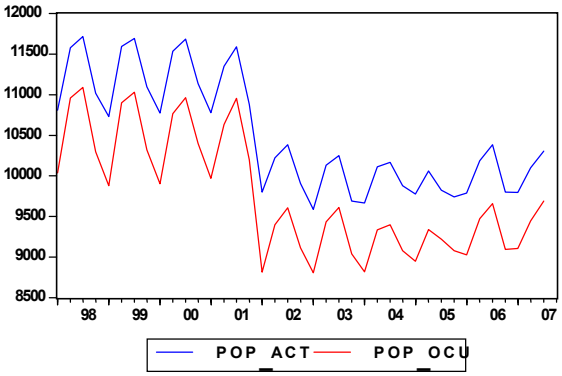


Figure 2. *Active and working population*

We have calculated the total factor of productivity (PTF) with the formula:

$$\ln PTF = \ln Y - (\alpha \times \ln(L) + (1-\alpha)\ln(K))$$

The relation to determine the potential GDP is:

$$Y = PTF^{pot} \times L^{pot\ \alpha} \times K^{pot\ (1-\alpha)}$$

The potential values of the factors that make up the potential GDP are the trend components of these factors filtered Hodrick-Prescott. Having calculated that, the output gap is determined using the next relation (real GDP – potential GDP)/ potential GDP. Figure 3 shows the output gap using the production function approach.

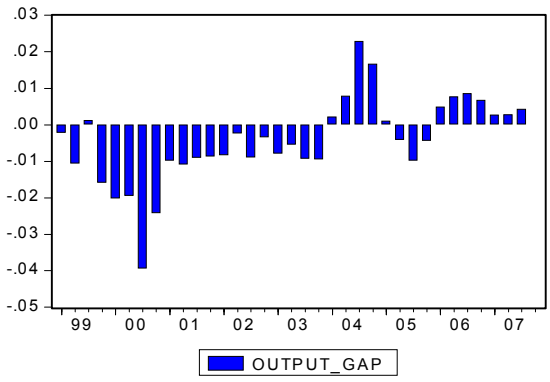


Figure 3. *Output gap using the production function approach*

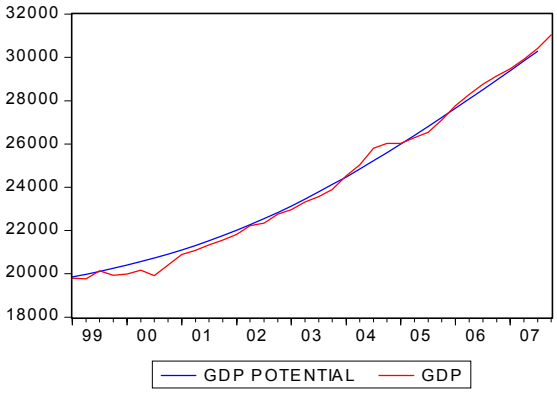


Figure 4. *Potential GDP by production function approach and real GDP*

A.2. Estimating the potential GDP using the Hodrick-Prescott filter

Hodrick-Prescott filter is the most used method of determining the potential GDP in the econometric studies. Despite being often criticized in the economical literature, it is the most frequently used instrument in empirical studies and policy analysis to identify the trend component in time series data.

Hodrick and Prescott have proposed in 1980 a procedure having the objective to determine the trend of a time series (potential level of the real GDP), so as to minimize the squared deviations of the series from the trend (volatility gap) taking into account the rate of change in the trend. The compromise between the two objectives is realized through a multiplier, l, which sets the relative weight of the two. Hodrick-Prescott filter determines the trend as a minimum solution of the next equation:

$$\underset{y_t^p}{\text{Min}} \sum \left[\left(y_t - y_t^p\right)^2 + \lambda \left[\left(y_{t+1}^p - y_t^p\right) - \left(y_t^p - y_{t-1}^p\right) \right]^2 \right]$$

where:

y_t and y_t^p are the natural logarithm of GDP and potential GDP;

$\left(y_t - y_t^p\right)^2$ is the sum of the squared deviations of the real GDP from the trend;

$\lambda \left[\left(y_{t+1}^p - y_t^p\right) - \left(y_t^p - y_{t-1}^p\right) \right]^2$ is a function that penalizes the squared deviations in the rate of growth of the trend component.

In order to estimate the potential GDP we considered $\lambda = 1600$, value that is recommended for the quarterly series. For annual data $\lambda = 100$ is more appropriate.

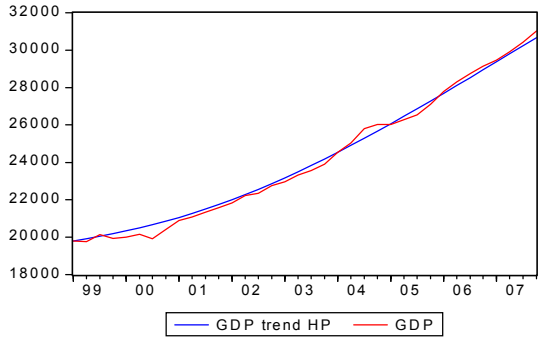


Figure 5. *Potential GDP by Hodrick-Prescott filter*

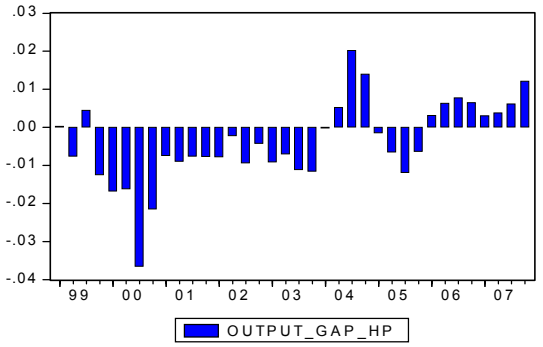


Figure 6. *The Output gap by Hodrick-Prescott method*

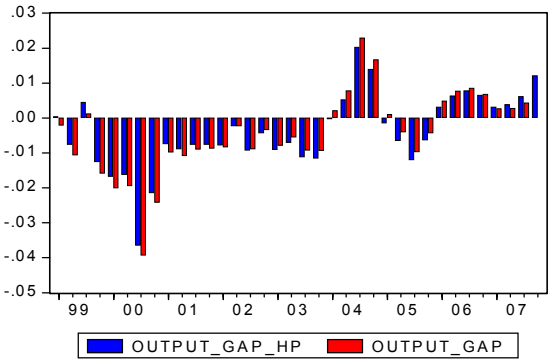


Figure 7. *The Output gap using the two methods*

B. Estimating the cyclical and structural budgetary deficit

The structural budgetary component is the actual budgetary deficit minus the cyclical component of the budgetary deficit. The cyclical deficit is determined using the sensitivity of the deficit and the economic fluctuations. Actually, the sensitivity of the deficit with respect to the cyclical economic fluctuations is the percentage variation of the budget when the output gap changes by a percent.

The structural component of the budget is determined as the difference between the actual budgetary deficit and the cyclical component, as in the next formula:

$$CAB_t = B_t - B_t^C = B_t - \sum_j B_{t\ j}^C$$

where:

CAB_t = structural components of the budget (adjusted cyclical component);

B_t = actual budgetary balance;

B_t^C =cyclical budgetary components on revenues and expenses.

The formula used to calculate the cyclical component is:

$$B_{t\ j}^C = B_{t\ j} \times \alpha_j^{PIB} \times output_gap_t$$

The cyclical component of each category of revenues and expenditures ($B_{t\ j}^C$) is calculated using the output gap and the elasticity with respect to GDP (α_j^{PIB}). The sensitivity of the budgetary deficit with respect to the GDP (noted ϕ - is in fact the first differential of the actual budgetary deficit (B_t) with respect to GDP ($\phi = B_{t\ j} \times \alpha_j^{PIB}$)) is calculated as the difference between the sensitivity of total budgetary revenues (ϕ_v) and total budgetary expenditures (ϕ_G) with respect to the change in internal production.

$$\phi = \phi_v^{(14)} - \phi_G^{(15)}$$

To estimate the elasticity of budgetary revenues (on categories of revenues) ((α_V) and of primary current expenditures (α_G), and also the deficit sensitivity we have used the OECD and EC methodology, described by van den

Noord (2000) and Girouard (2005). The aggregate elasticity of revenues (income tax, profit tax, social contributions, indirect taxes), the elasticity of primary current expenses and the deficit sensitivity are presented in the next table:

The obtained results obtained by OECD and EC methods

Table1

Quarter	Revenues Elasticity	Expenditure Elasticity	Sensitivity of the Deficit
1998Q1	0.938	-0.122	0.33
1998Q2	0.937	-0.081	0.28
1998Q3	0.926	-0.090	0.24
1998Q4	0.954	-0.123	0.28
1999Q1	0.931	-0.108	0.36
1999Q2	0.936	-0.109	0.31
1999Q3	0.940	-0.115	0.28
1999Q4	0.934	-0.100	0.27
2000Q1	0.938	-0.084	0.34
2000Q2	0.932	-0.088	0.31
2000Q3	0.935	-0.090	0.25
2000Q4	0.944	-0.083	0.27
2001Q1	0.927	-0.063	0.33
2001Q2	0.928	-0.062	0.29
2001Q3	0.924	-0.062	0.244
2001Q4	0.928	-0.076	0.236
2002Q1	0.927	-0.071	0.329
2002Q2	0.928	-0.069	0.288
2002Q3	0.933	-0.073	0.250
2002Q4	0.935	-0.064	0.232
2003Q1	0.937	-0.080	0.325
2003Q2	0.937	-0.082	0.291
2003Q3	0.946	-0.081	0.245
2003Q4	0.940	-0.084	0.236
2004Q1	0.941	-0.092	0.360
2004Q2	0.947	-0.090	0.300
2004Q3	0.950	-0.087	0.242
2004Q4	0.944	-0.111	0.234
2005Q1	0.925	-0.116	0.346
2005Q2	0.930	-0.118	0.304
2005Q3	0.926	-0.129	0.246
2005Q4	0.925	-0.135	0.238
2006Q1	0.921	-0.117	0.342
2006Q2	0.926	-0.119	0.300
2006Q3	0.924	-0.132	0.260
2006Q4	0.925	-0.142	0.261
2007Q1	0.912	-0.112	0.327
2007Q2	0.932	-0.118	0.327
2007Q3	0.928	-0.132	0.267

Source: authors calculus.

Note: The elasticity of budgetary revenues is a weighted average of the four main categories of revenues (income tax, profit tax, social contributions, indirect taxes) the weight of each category being the proportion in the total budgetary revenues. In the same time, out of the primary current budgetary expenses only the transfers towards the unemployed are considered to be sensitive to the variation in production. Indirect tax elasticity has been considered as 1.

The output gap was determined using the two methods: the production function approach and the Hodrick-Prescott filter. In the next table we have the values for the output gap.

Estimated Output gap for Romania

Table 2

Year	Output-gap (%)	Output-gap HP (%)
1999	-2.75	-1.55
2000	-10.34	-9.13
2001	-3.86	-3.19
2002	-2.32	-2.40
2003	-3.23	-3.92
2004	4.93	3.90
2005	-1.74	-1.67
2006	2.78	2.37
2007	2.19	2.21

Source: authors calculus.

The cyclical component is calculated as the product between the sensitivity of the deficit previously determined and the output gap. The next table shows the cyclical budgetary deficit for Romania for the period 1999-2007 (third quarter), having used the output gap estimated through both the methods described earlier in the paper.

Cyclical Deficit in Romania (%GDP)

Table 3

Year	Cyclical Deficit (production function approach)	Cyclical Deficit (HP filter)
1999	-0.79	-0.43
2000	-2.94	-2.58
2001	-1.07	-0.88
2002	-0.64	-0.66
2003	-0.87	-1.05
2004	1.25	0.95
2005	-0.43	-0.70
2006	0.79	0.66
2007	0.29	0.38

Source: authors calculus.

By subtracting the cyclical component from the actual budgetary deficit we obtain the structural budgetary deficit. The results are shown in Table 4.

Structural Deficit for Romania (%GDP)

Table 4

Year	Structural Deficit (production function approach)	Structural Deficit (HP filter)
1999	-1.05	-1.41
2000	-1.04	-1.40
2001	-2.15	-2.34
2002	-1.96	-1.95
2003	-1.35	-1.17
2004	-2.43	-2.14
2005	-0.45	-0.78
2006	-2.07	-2.35
2007	-3.29	-3.54

Source: authors calculus.

The output gap is a measure of the cyclical position of a country, the percentage difference between real GDP and potential GDP: a negative output gap shows the economy is producing below its potential level, or is underperforming; a positive output gap, on the contrary, suggests the economy is producing above the potential level. From this point of view, the Romanian economy had an interesting evolution: between 1999 and 2003 the output gap was negative, except one quarter in 1999, when it was slightly positive. The output gap is consistently negative in 2000, after that it starts decreasing, tough remaining still negative. The output gap becomes positive in 2004, but then again in 2005 falls negative, so that in 2006 and 2007 rises and remains positive.

The structural deficit (cyclical adjusted deficit) is an estimation of what the actual deficit would be in a particular year if the output gap is zero (the budgetary deficit for the level of the potential GDP).

The structural budgetary deficit is calculated to observe the character of the fiscal policy (restrictive or expansionist). In other words, if the promoted fiscal policy is expansionist, then the structural budgetary deficit will increase. If, on the other hand, we have a restrictive fiscal policy, then the structural component of the deficit will decrease. If the government would never change its fiscal policy, budgetary deficit would stay at the same level, would be constant. Then, this means that changes in the cyclical adjusted budgetary deficit are nothing but actions of discretionary fiscal policies. Considering that, the structural deficit can be seen as an indicator that measures the degree of discretion that is at the level of fiscal and budgetary polices.

On the other side, fiscal policy is considered pro-cyclical if it is restrictive whilst the production output gap is recessionary (negative) or expansionist whilst the production output gap is inflationist (positive). An anti-cyclical fiscal policy is one that tries to stop the recession and slow down the expansion of the economy (Baldwin, Wyplosz, 2006).

Looking closer at the Romanian economy, we can observe the strong expansionist character of the fiscal policies for the years 2005-2007 (structural deficit has increased considerably from -0.45% back in 2005, to -2.07% in 2006 and -3.29% in 2007

with the production function approach, and from -0.78% in 2005 to -2.35% in 2006 and -3.54% in 2007 using the HP filter). So considering the Romanian economy is preparing to enter the Euro zone, firstly having to be admitted[16], and then having to follow certain imposed regulations[17], we consider it is highly necessary to implement a *restrictive fiscal policy,* which will be capable of reducing both the actual budgetary deficit and the structural component.

Moreover, the output gap for the year 2006 and 2007 in Romania was positive, which is another indicator that imposes the necessity of a restrictive fiscal policy in the Romanian economy. From this point of view, we can say that for this period we had a pro-cyclical fiscal policy.

Analyzing the nature of the Romanian fiscal policy based on the evolution of the structural deficit, we observe that for the years 1999-2001 it was an expansionist policy, for the years 2002-2003 a restrictive one, again expansionist in 2004, and then restrictive in 2005. Based on the output gap, we had an anti-cyclical policy between 1999-2001 and pro-cyclical for the 2002-2004.

Though Romanian economy has offered and is still offering "signs" of the necessity of a restrictive fiscal policy, we can also take the example of developed countries from the European Union, that for several years have promoted restrictive policies, in the context of the output gap being still slightly negative. As a consequence, the structural deficit has decreased in the Euro zone from -2% in 2005 to -0.8% in 2007.

Conclusions

When a country is admitted to a monetary union, it has to renounce to one of the two macroeconomic instruments that can make use of – the monetary policy, but in the same time maintains full control on the second one – the fiscal policy. In the case of asymmetrical shocks – identified by the theory of the optimum monetary zone as being the main source of costs in a monetary union, the fiscal policy remains the sole macroeconomic instrument available.

Our working paper estimates the cyclical and structural budgetary deficit for the Romanian economy, considering this to be the most significant indicator in evaluating the performance of the fiscal management, and also considering the way in which the fiscal policy is ready to act as the sole instrument capable to stabilize the national economy after acceding the Euro zone.

The estimation of the structural budgetary deficit has been done in three stages: (1) estimation of the output gap; (2) estimation of the cyclical deficit based on the output gap and the elasticity of revenues and expenditures in relation to the GDP; (3) estimation of the structural component by eliminating the cyclical component from the actual budgetary deficit.

Analyzing structural budgetary deficit shows very clearly the lack of efficiency of polices regarding the public finances in establishing a more advantageous fiscal position. In certain periods there can be observed a

determination in the process of fiscal consolidation, though the evolution of the structural budgetary deficit in Romania in the considered period (1999-2007) reveals inconsistency in the way budgetary and fiscal policies were applied.

Taking into account that Romanian economy is preparing to accede the Euro zone, which means first it has to be admitted, and then will have to obey the rules of the union, we consider necessary the implementation and sustainability for at least a few years of a restrictive fiscal policy, capable of decreasing both the structural and actual deficit. In order not to generate negative consequences, the government should not adopt expansionist discretionary policies, but to continue the process of fiscal consolidation.

Notes

(1) (i) maintaining the budgetary deficit of maximum 3%, (ii) maintaining a medium term balance as close as possible to "the equilibrium", or registering an exceeding balance.

(2) We need to mention that for the countries facing transition, that implement structural reforms, a more relevant indicator is the core deficit – a variant of the structural budgetary deficit. This indicator eliminates not only the effects of the cycles in economy, but also the temporary shocks, such as the arrears, temporary taxes, postponement of paying the salaries; starting from the premises that the transition countries might face perturbations that could seriously influence the GDP size.

(3) The pact recognizes that serious recessions beyond the governmental control can easily conduct to profound deficits. Trying to maintain low deficits during recessions implies adopting a restrictive policy that can deepen the recession, with potential disastrous consequences. Consequently, the pact defines the exceptional circumstances for those situations when its provisions are automatically suspended. A deficit exceeding 3% is considered exceptional when the GDP of a country for a certain year diminishes with less than 2% and no more than 0.75%. In the case that a country can/could demonstrate that the recession is exceptional from the point of view of the slope or compared with the former trends,

the situation is also exceptional. If the output falls with less than 0.75%, no exceptional circumstance can be solicited.

(4) Copenhagen criteria are: the political criterion (stability of the institutions that guarantee democracy, integrity of the state, human rights and minorities protection); the economic criterion (the existence of a functional market economy and its capacity to face the pressure of competition and of the European Union market); technical criterion (the capacity of assuming the obligations as a member state, including those regarding the adhesion to the objectives of the political, economic and monetary union – the implementation of the acquis communautaire).

(5) The European Commission is not to allow any permanent derogation regarding the switch towards the unique Euro currency, as it was the case of Great Britain and Denmark.

(6) For example, it doesn't even cover a whole economical cycle.

(7) Data regarding the evolution of potential GDP for Romania were included for the first time in the study "Calculating potential growth rates and output gaps – a revised production function approach" , Denis et al.(2006); the estimations for the EU-27 member states are made using the production function approach.

(8) The following groups of government revenues were taken into consideration: income tax, profit tax, social contributions and indirect taxes.

(9) For more details see the methodology described by Van den Noord (2000).

(10) We denote the total productivity factor with PTF, capital with K and labour with L.

(11) The coefficients represent a mean of those used in other studies where the potential GDP is estimated for the Romanian economy: the coefficients of Dobrescu (2006): 0.65 and 0.35; BNR working paper, no. 20: 0.67 and 0.33; Denis et al.: 0.63 and 0.37. For low variations of this coefficients the obtained results are approximately the same.

(12) In addition regardless the methodology described by Denis et al.(2006) we consider that for Romanian economy we cannot use the number of hours worked because on one hand, we don't have concrete data on quarterly hours worked, and on the other hand, the efficiency of an hour worked by a neurosurgeon for example is not comparable with that of an unqualified worker. As a result the uncertainty degree of final estimation would significantly raise. Moreover, in Romania the working population is composed by "all persons over 15 that have conducted economic activities producing goods and services for at least one hour in the base period (…)", according to the computation methodology used in statistics.

(13) Due to the absence of official statistical data regarding the amount of fixed assets in Romania, these have been estimated using the PIM method recommended by OECD (estimated within the consultancy project "Consultancy services for improving the capacity of analyzing the polices for elaborating the forecasts inside the Ministry of Economy and Finance") – consultants prof Moisă Altăr (ASE, Bucharest) and prof Ali Bayar (Free University of Brusells).

(14) $f_v = \alpha_V \times$ ratio of total revenues in GDP.

(15) $f_G = \alpha_G \times$ ratio of current primary expenditures in GDP.

(16) Maastricht Treaty criteria.

(17) Regulations from the Stability and Growth Pact.

References

Baldwin, R., Wyplosz, Ch. (2006). *Economia integrării europene*, Editura Economică, București

Bouthevillain, C., Courthimann, P., Van den Dool, G., Hernández de cos, P., Langenus, G., Mohr, M., Momiglianoand, S., Tujula, M., "Cyclically Adjusted Budget Balances: An Alternative Approach", *European Central Bank*, *Working Paper*, No. 77, 2001

Braconier, H., Holden, S., „The Public Budget Balance – Fiscal Indicators and Cyclical Sensitivity in the Nordic Countries", *NIER WP* 67, 1999

Bradner, P., Diebalek, L., Schuberth, H., "Structural Budget Deficits and Sustainability of Fiscal Positions in the European Union", *Oesterreichische Nationalbank Working Paper*, No.26, 1998

Denis, C., Grenouilleau, D., McMorrow, K., Roger, V., "Calculating potential growth rates and output gaps – A revised production function approach", European Economy, *European Commission Economic Papers*, no. 247, 2006

Dobrescu E., (2006). *Macromodels of the Romanian Market Economy*, Editura Economică, București

Dornbusch, R., Fischer, S., Startz, R. (2007), *Macroeconomie*, Editura Economică, București

Eisner, R., "Budget Deficits: Rethoric and reality", *Journal of Economic Perspectives*, vol. 3, nr. 2, 1989

Gălățescu, A., Rădulescu, B., „Copaciu, M., Estimarea PIB potențial în România", *Caiete de studii BNR*, nr. 20, 2007

Giorno, C., Richardson, P., Roseveare D., van den Noord, P. "Potential output, output gaps and structural budget balances". *OECD Economic Studies* 24, 1995

Girouard, N., André, C., "Measuring Cyclically-adjusted Budget Balances for OECD Countries", *Economics Department Working Papers*, No. 434, OECD, Paris, 2005

Gujarati, D. (2003), *Basic econometrics*, Ediția a patra, Mc Graw Hill, New York

Gunaydm, E., Ulku, U., "Cyclically adjusted primary balance: the case of Turkey", *Economic Research Department*, Turkish Treasury, 2003

Hagemann, R., "The Structural Budget Balance The IMF's Methodology", *IMF Working Paper* nr. 55, International Monetary Fund (IMF); National Bureau of Economic Research (NBER), Iulie, 1999

Leeuw, F., Holloway, Th., "The measurement and significance of the cycllicaly adjusted federal budget and debt", *Journal of Money*, Credit and Banking, Vol 17, nr. 2, 1985

Muller, P., Price, R., "Structural Budget Deficits and Fiscal Stance", *OECD Economics Department Working Papers*, nr. 15, 07/1984

Romer, D (2006). *Advanced Macroeconomics*, Ediția a treia, Mc Graw Hill Irwin, New York

van den Noord, "The Size and Role of Automatic Fiscal Stabilizers in the 1990s and Beyond", OECD WP, nr. 230, 2000

Malmquist Index, an Alternative Technique for Measuring Credit Institutions Productivity

Nicolae Dardac
Ph. D. Professor
Iustina Alina Boitan
Candidate Ph.D. Assistant
Academy of Economic Studies, Bucharest

Abstract. *The present study tackles the banking system's productivity in a more complex manner, that integrates multiple input, multiple output variables, abdicating from the reductionist perspective of clasical methods, which imposed limits in the number of variables, in the process of productivity measurement and interpretation. The advantage of Malmquist productivity indexes consists both in a quantitative evaluation of the global productivity of a credit institution over a specified period of time, and in the decomposition of productivity, in order to underline how much of its change is due to the catch-up effect, and, respectively, to the implementation of new technologies.*

The results obtained revealed that credit institutions placed on the first three places in the banking system, according to assets value, maintained constant their productivity level during the analysed period, meanwhile the other institutions in our sample registered a slowly improvement in productivity, determined, mainly, by technological changes.

Key words: efficiency score; distance function; Malmquist productivity index; technical efficiency; technological efficiency.

Introduction

Economic literature outlines two main methods for productivity measurement: the clasical one and the index method. *The clasical method* assumes the building of productivity ratios as output variable on the unit of input. Input variables are represented by human ressource, capital, materials and other ressources. The most frequent used ratios are:

- partial productivity

$$PP = \frac{O}{L(sau\,M, C, r)}$$

- factor productivity $TFP = \frac{O}{L + C}$
- total productivity

$$TP = \frac{O}{L + M + C + r}$$

where:

O = output variable;
L = labor, human resource;
M = materials;
C= capital;
r = other resources.

Partial productivity PP reflects the influence of a single input. Its main advantage consists in accesibility in understanding and measuring the productivity. *TFP indicator* integrates the influence of two inputs: labor and capital. It is considered more accurate than the precedent indicator, but it is also more difficult to measure. *Total productivity TP* includes all input variables.

The productivity index method. These indexes synthetise the tendency observed in an entity's productivity during a specified time horizon, and allow the identification of causes that have generated productivity changes.

In order to quantify the productivity change for a group of five credit institutions during december 2003- december 2006, we have chosen the Malmquist index approach[1], because they don't assume the definition of a functional relationship on the structure of production technology and don't need informations concerning the input and output prices. Moreover, they can be computed under the assumption of multiple inputs, multiple outputs and allow the productivity's decomposition in two components: technical efficiency change and technological change.

1. Methodological aspects

To determine Malmquist indexes one must compute the distance functions. Empirical studies have revealed a series of techniques that can be employed in order to quantify these functions. In the present study we have chosen one of the most frequently used technique, called Data Envelopment Analysis, proposed by Fare (1994). In consequence, the distance functions value is given by the individual efficiency scores estimated by means of DEA, and those credit institutions whose function value is equal to one are considered technically efficient.

To compute Malmquist index we have used the formula proposed by Caves, Christensen, Divert (1982)

because it is adapted for the output oriented models (one of the assumptionsof our study).

$$M_{t,t+1}(y^t, y^{t+1}, x^t, x^{t+1}) = \\ = \left[\frac{D^t(y^{t+1}, x^{t+1})}{D^t(y^t, x^t)} \times \frac{D^{t+1}(y^{t+1}, x^{t+1})}{D^{t+1}(y^t, x^t)} \right]^{1/2} \quad (1)$$

where:

$M_{t, t+1}$ = Malmquist productivity index for a time period between t and t+1;

y^t, y^{t+1} = output vectors at moment t, respectively t+1;

x^t, x^{t+1} = input vectors at moment t, respectively t+1;

D^t, D^{t+1} = distance function at moment t, respectively t+1.

First ratio represents the Malmquist index computed for moment t, and measures the productivity change during the t, t+1 period, using as reference point (benchmark) the technology in t period. The second ratio reflects the Malmquist index value at t+1 moment, having as benchmark the technology of t+1 moment. A value bigger than one for the index suggests an improvement in productivity level, meanwhile a value smaller than one indicates a deterioration. If M=1, there is no change in the productivity level. Humphrey (1991) argues that, even in the case of a reduced, sometimes negative productivity of a credit institution, the users of banking services benefit from an improvement in the quality of services supplied. The author believes that there is a reallocation phenomena of advantages offered by productivity between customers and credit institutions.

According to Fare (1989), an equivalent manner for writing the Malmquist index, in order to accentuate the two components, is the following:

$$M_{t,t+1}(y^t, y^{t+1}, x^t, x^{t+1}) = \\ = \frac{D^{t+1}(y^{t+1}, x^{t+1})}{D^t(y^t, x^t)} \times \\ \times \left[\frac{D^t(y^{t+1}, x^{t+1})}{D^{t+1}(y^{t+1}, x^{t+1})} \times \frac{D^t(y^t, x^t)}{D^{t+1}(y^t, x^t)} \right]^{1/2} \quad (2)$$

where:

$\frac{D^{t+1}(y^{t+1}, x^{t+1})}{D^t(y^t, x^t)}$ represents the technical efficiency change and illustrates how much varies the distance between the observed production and the maximum potential production during the period t, t+1. It is also known as the *catch-up effect.*

$$\left[\frac{D^t(y^{t+1}, x^{t+1})}{D^{t+1}(y^{t+1}, x^{t+1})} \times \frac{D^t(y^t, x^t)}{D^{t+1}(y^t, x^t)} \right]^{1/2}$$

reflects the technological change and indicates the *production frontier shift*, as a consequence of improved technology.

2. Interpretation of results

To compute the Malmquist indexes we have applied initially a simpler model, build on the premise that a credit institution produces only two outputs: *total volume of credits* and *net income from other activities*, by using two inputs: *customers deposits* and *other financing sources*. Subsequently, we extended the analysis by employing a more complex, adequated model to

measure efficiency, in order to observe if the model's specification influences the credit institutions productivity. The model includes as input variables customers deposits, other financing sources, operational expenses and loan loss provisions. Output variables are represented by total volume of credits, net income from other activities, net interest income and off-balance sheet activities. To catch the changes in productivity, we proceeded to the computation of Malmquist indexes, following the next steps:

STAGE 1: computation distance function D 2004 (y 2003, x 2003)

DMU	Score	Deposits {I}{V}	Other financing sources {I}{V}	Customers credits {O}{V}	Net income other activities {O}{V}
{X} DMU 1 2003	100.00%	0	1	1	0
{X} DMU 2 2003	100.00%	0	1	0	1
{X} DMU 3 2003	100.00%	0	1	0.3	0.7
{X} DMU 4 2003	100.00%	1	0	0.8	0.2
{X} DMU 5 2003	100.00%	1	0	0	1
DMU 1 2004					
DMU 2 2004					
DMU 3 2004					
DMU 4 2004					
DMU 5 2004					

STAGE 2: computation distance function D 2005 (y 2004, x 2004)

DMU	Score	Deposits {I}{V}	Other financing sources {I}{V}	Customers credits {O}{V}	Net income other activities {O}{V}
{X} DMU 1 2004	100.00%	0	1	0.3	0.7
{X} DMU 2 2004	100.00%	0	1	0.7	0.3
{X} DMU 3 2004	100.00%	1	0	0	1
{X} DMU 4 2004	100.00%	1	0	0.3	0.7
{X} DMU 5 2004	100.00%	1	0	0.7	0.3
DMU 1 2005					
DMU 2 2005					
DMU 3 2005					
DMU 4 2005					
DMU 5 2005					

STAGE 3: computation distance function D 2006 (y 2005, x 2005)

DMU	Score	Deposits {I}{V}	Other financing sources {I}{V}	Customers credits {O}{V}	Net income other activities {O}{V}
{X} DMU 1 2005	100.00%	0.5	0.5	0	1
{X} DMU 2 2005	100.00%	0	1	0.8	0.2
{X} DMU 3 2005	100.00%	1	0	0.4	0.6
{X} DMU 4 2005	100.00%	1	0	0.5	0.5
{X} DMU 5 2005	100.00%	1	0	0	1
DMU 1 2006					
DMU 2 2006					
DMU 3 2006					
DMU 4 2006					
DMU 5 2006					

STAGE 4: computation distance function D 2005 (y 2006, x 2006)

DMU	Score	Deposits {I}{V}	Other financing sources {I}{V}	Customers credits {O}{V}	Net income other activities {O}{V}
{X} DMU 1 2006	100.00%	0.1	0.9	1	0
{X} DMU 2 2006	100.00%	0	1	1	0
{X} DMU 3 2006	100.00%	0.9	0.1	0.9	0.1
{X} DMU 4 2006	100.00%	0	1	0.8	0.2
{X} DMU 5 2006	100.00%	0	1	0.2	0.8
DMU 1 2005					
DMU 2 2005					
DMU 3 2005					
DMU 4 2005					
DMU 5 2005					

STAGE 5: computation distance function D 2004 (y 2005, x 2005)

DMU	Score	Deposits {I}{V}	Other financing sources {I}{V}	Customers credits {O}{V}	Net income other activities {O}{V}
{X} DMU 1 2005	100.00%	1	0	1	0
{X} DMU 2 2005	100.00%	1	0	1	0
{X} DMU 3 2005	100.00%	0.8	0.2	1	0
{X} DMU 4 2005	100.00%	0	1	1	0
{X} DMU 5 2005	100.00%	1	0	0	1
DMU 1 2004					
DMU 2 2004					
DMU 3 2004					
DMU 4 2004					
DMU 5 2004					

STAGE 6: computation distance function D 2003 (y 2004, x 2004)

DMU	Score	Deposits {I}{V}	Other financing sources {I}{V}	Customers credits {O}{V}	Net income other activities {O}{V}
{X} DMU 1 2004	100.00%	0.8	0.2	0.3	0.7
{X} DMU 2 2004	100.00%	1	0	1	0
{X} DMU 3 2004	117.17%	0.7	0.3	1	0
{X} DMU 4 2004	105.64%	0.7	0.3	1	0
{X} DMU 5 2004	100.00%	1	0	1	0
DMU 1 2003					
DMU 2 2003					
DMU 3 2003					
DMU 4 2003					
DMU 5 2003					

STAGE 7: computation distance function D 2003 (y 2003, x 2003)

DMU	Score	Deposits {I}{V}	Other financing sources {I}{V}	Customers credits {O}{V}	Net income other activities {O}{V}
DMU 1 2003	100.00%	0.2	0.8	1	0
DMU 2 2003	100.00%	0	1	0	1
DMU 3 2003	100.00%	0	1	0.9	0.1
DMU 4 2003	103.40%	0.7	0.3	1	0
DMU 5 2003	100.00%	1	0	0	1

STAGE 8: computing distance function D 2004 (y 2004, x 2004)

DMU	Score	Deposits {I}{V}	Other financing sources {I}{V}	Customers credits {O}{V}	Net income other activities {O}{V}
DMU 1 2004	100.00%	0	1	0.5	0.5
DMU 2 2004	100.00%	0.2	0.8	0	1
DMU 3 2004	100.00%	0	1	0.5	0.5
DMU 4 2004	100.00%	0.7	0.3	1	0
DMU 5 2004	100.00%	1	0	0	1

STAGE 9: computing distance function D 2005 (y 2005, x 2005)

DMU	Score	Deposits {I}{V}	Other financing sources {I}{V}	Customers credits {O}{V}	Net income other activities {O}{V}
DMU 1 2005	100.00%	1	0	0.5	0.5
DMU 2 2005	100.00%	0	1	0.5	0.5
DMU 3 2005	100.00%	1	0	0	1
DMU 4 2005	100.00%	0	1	0.8	0.2
DMU 5 2005	100.00%	0.7	0.3	0	1

STAGE 10: computing distance function D 2006 (y 2006, x 2006)

DMU	Score	Deposits {I}{V}	Other financing sources {I}{V}	Customers credits {O}{V}	Net income other activities {O}{V}
DMU 1 2006	100.00%	0.9	0.1	0.5	0.5
DMU 2 2006	100.00%	0	1	0.5	0.5
DMU 3 2006	111.23%	1	0	0.7	0.3
DMU 4 2006	100.00%	1	0	0.8	0.2
DMU 5 2006	100.00%	0	1	0	1

STAGE 11: computing Malmquist indexes

DMU 1	1
DMU 2	1
DMU 3	1.14
DMU 4	1.01
DMU 5	1

As can be observed from the last results of the analysis, credit institutions 1, 2 and 5 obtained a Malmquist index equal to one for the entire period 2003-2006, which means that there weren't significant productivity changes during the specified period. Institutions 3 and 4 have attained a slowly improvement in productivity. We have continued the analysis to reflect the annual fluctuation in the productivity of each institution, the results obtained being presented in table 1.

Malmquist indexes computed on an annual basis

Table 1

	DMU 1	DMU 2	DMU 3	DMU 4	DMU 5
2003-2004	1	1	1,08	1,01	1
2004-2005	1	1	1	1	1
2005-2006	1	1	1,05	1	1

The results indicate an insignificant improvement in productivity during 2003-2004 and 2005-2006 years for credit institutions 3 and 4. To identify the component that contributed to this evolution in Malmquist indexes, we have computed the technological and technical efficiency change, the results being presented in table 2.

Technological and technical efficiency change

Table 2

Technical efficiency change	DMU 1	DMU 2	DMU 3	DMU 4	DMU 5
2003-2004	1	1	1	0,96	1
2004-2005	1	1	1	1	1
2005-2006	1	1	1,11	1	1
Technological change	**DMU 1**	**DMU 2**	**DMU 3**	**DMU 4**	**DMU 5**
2003-2004	1	1	1,08	1,05	1
2004-2005	1	1	1	1	1
2005-2006	1	1	0,95	1	1

During the period 2003-2004 credit institution 4 faced with a decrease of its production potential concerning output maximization of 4%, compensated by a technological improvement of 5%. For the same period, the productivity improvement of institution 3 was due to technological progress, which registered an increase of 8%. During 2005-2006 years, the total productivity index of the institution 3 increased with 5%, being determined by an increase of technical efficiency with 11%, meanwhile technological fluctuations exerted a negative influence, of -5%. The influence of new technologies materialised not only in a diversification of financial services supplied to customers (electronic payments, internet banking, self banking), but also into an improvement of back-office activity, by using economic and statistical models to evaluate the credit and market risk, by modern, rigorous scoring techniques and discriminant analysis to evaluate the credit demands.

The productivity growth due to the implementing of new financial and software technologies[2] reflects mainly into the quality of the service rendered, into a diminuation of the time of waiting for an operation to be executed, into the degree of satisfaction attained by customers, and implicitly, into their loyalty, but there is extremely difficult to reveal and measure it. Moreover, the costs concerning the implementation and utilisation of software techniques are beared, usualy, by credit institutions, because of pressures exerted from competitors.

The computation of Malmquist indexes has been extended also for the complex model, with four input variables and four output ones, but all credit institutions obtained values equal to one for the entire period analysed, which indicates a maintenance of productivity. It can be observed that there are no significant fluctuations in the value of indexes across the two models. We can therefore conclude that it is enough to analyse the main specific elements of the intermediation activity, to estimate the productivity of a credit institution.

Conclusions

A priority of the top management of a credit institution must be the maintenance of an internal climate that allows for an increase in productivity level. In this context, human ressources and technology represent key elements of this desideratum. Personal's productivity should be analysed related to the volume of operations realised in a certain period of time (the number of new deposit accounts at the end of a day, the volume of new supplied credits etc.). Also, it must be monitored the frequency in using those banking services that integrate new technologies (internet banking, self banking, smart card etc.).

The productivity growth reflects itself in the improvement of quality of services supplied, diminuation of production costs, increase of profitability and market share. Productivity appears, therefore, as being equivalent to a comparative advantage.

Notes

(1) Malmquist S., in the study "Index numbers and indifference curves " (1953), proposed for the first time the computation of an index as ratio between the distance functions, index that bears its name.

(2) The typology of the new financial and software technologies and their impact on banking system's productivity had been described in the study of Berger A.N., "The economic effects of technological progress: evidence from the banking industry", *Journal of Money, Credit and Banking*, vol. 35, no. 2, 2003

References

Berger, A.N., "The economic effects of technological progress: evidence from the banking industry", *Journal of Money, Credit and Banking*, vol. 35, no. 2, 2003

Caves, D.W., Christensen, L.R., Diewert, W.E., "The economic theory of index numbers and measurement of input, output and productivity", *Econometrica*, 50, 1982, pp. 1393-1414

Coelli, T., Prasada Rao, D.S., Battese, G.E. (1999). *An introduction to efficiency and productivity analysis*, Kluwer Academic Publishers USA

Drake, L., "Efficiency and productivity change in UK banking, *Applied Financial Economics*, 11, 2001, pp. 557-571

Fare, R., Grosskopf, S., Lindgren, B., Proos, P., "Productivity development in Swedish hospitals: a Malmquist output index approach", *Southern Illinois University Carbondale*, Department of Economics Discussion paper, 89(3), 1989

Fare, R., Grosskopf, S., Norris, M., Zhang, Z., "Productivity growth, technical progress and efficiency change in industrialised countries, *American Economic Review*, 84, 1994, pp. 66-83

Goddard, J.A., Molyneux, Ph., Wilson, J.O.S. (2001). *European banking:efficiency, technology and growth*, John Wiley & sons, ltd. England

Humphrey, D.B., "Productivity in banking and effects from deregulation", Federal Reserve Bank of Richmond, *Economic Review*, march/aprilie, 1991

Kirikal, L. (2005). *Productivity,the Malmquist index and the empirical study of banks in Estonia*

Kirikal, L., "Stabilisation period and Malmquist index of productivity change: an empirical study of estonian banks", *4-th International Symposium of DEA*, Aston Bussines School, 2004, UK

Sustainability and Dissipative Systems

Emil Dinga
Ph.D. Professor
Romanian Bankar Institute, Bucharest

Abstract. *The paper is concerned on the important issues of the causal or structural relations between the sustainability of the whole Universe and the dissipative systems in our bubble of Universe. Based on the gap between the general entropy velocity and the entropy velocity inside the dissipative systems, a taxonomic criterion for identifying the classes of dissipative systems is captured and operated. In this context, the correlation between the entropic sustainability and the dissipative systems is examined and concluded. The paper argues for the necessity (in the logic order) to pass from the optimal rationality to the sustainability rationality, based on the entropy conclusions and predictions (in the matter, three types of social rationality are identified and logically characterized*[*]*. In addition, the paper analyzes the arguments to assert that the complementary environment of a done dissipative system is complementary only in a relative way. This relativity is examined from the perspective of the Prigogine's principle of the minimum production of entropy (for the mentioned principle, the paper aims to provide a sui-generis demonstration), by proposing the concept of the minimum entropic gradient as anchor of the entropic interaction in the Universe. All these results or observations could be used by other researchers to apply them to the economic systems which are, of course, dissipative systems.*

Key words: dissipative systems; entropy; sustainability; rationality.

JEL Classification: B41, Q01, Q57

1. Extracting a sustainability criterion in a dissipative univers

The presence of a dissipative system could be, as result, identified simply by detection of the entropy acceleration in the Universe 1[1]. We want to try, further of our study, to propose a general typology of "available" dissipative systems, as potentialities and, on this base, to discuss some species of the impact of dissipative systems arising on the entropy acceleration inside the complementary environment of these dissipative systems.

1.1. A possible typology of the dissipative systems

The criterion we would want to propose in order to identify the possible classes of the dissipative systems will be the relative ratio between the entropy velocity inside the dissipative system and the natural entropy velocity (that is, λ_N [2]) in the Universe 0. Thus, if we will note with $\lambda_{\overline{N}}^{i}$ the entropy velocity inside the dissipative system "i", we can theoretically have the following situations:

a. dissipative systems of rank "-1"[3], with the condition: $\lambda_{\overline{N}}^{-1} > \lambda_N$ [4]. As it is already pointed out, such systems constitute a logical impossibility, because their arising would signify a low entropy "pumping" to the complementary environment, that would mean (to perform it) a low entropy consumption from…the complementary environment[5]. However, the arising of such dissipative systems is marked by the arising of an entropic heterogeneity but…of opposite sign. So, the dissipative systems of rank "-1" are impossible rather inside the today theoretical framework concerning the entropic phenomenon; we would say that the dissipative systems of rank "-1" are ambiguous dissipative systems or, better, observationally (that is, theoretically) contextualized dissipative systems[6];

b. dissipative systems of rank "0"[7], with the condition: $\lambda_{\overline{N}}^{0} = \lambda_N$. It is obvious that such dissipative systems are indiscernible from the complementary environment, because, as is pointed out before, the identifying of a dissipative systems is equivalent with detecting of an entropy acceleration in the global environment; but, the fact that no entropic heterogeneity appears is sufficient to know that no dissipative system is born in the Universe 0[8]; we will say that such dissipative systems are not authentic dissipative systems or, to maintain the above terminology, they are observationally (that is, theoretically) non-discernible dissipative systems[9];

c. dissipative systems of rank "1", with the condition $\lambda_{\overline{N}}^{1} < \lambda_N$. This category of dissipative systems is the first that introduces an "orthodox"[10] entropic heterogeneity in the Universe 0. As we understand, here could be identified two sub-categories of dissipative systems:

c.1) *dissipative systems of rank "1α"*, that is, of non-human type, with the condition $0 \le \lambda_{\overline{N}}^{1\alpha} < \lambda_N$. We understand by this category those dissipative systems that appeared in the Universe 0 and that remain, essentially, natural. Although they constitute, of course, an

entropic heterogeneity, this heterogeneity maintains the time arrow orientation but reduces its "scalar" inside the membrane of the dissipative system, paying the price, as showed above, of the global entropy velocity increasing. The "natural" dissipative systems are represented by any structures (mineral, vegetal, and animal[11]) appeared based on a certain causality (on this causality we do not discuss anything here; we would prefer to accept the hypothesis of spontaneity in arising of such an entropic heterogeneity);

c.2) *dissipative systems of rank "1β"*, that is, of human type, with the condition $0 \le \lambda_{\overline{N}}^{1\beta} \le \lambda_{\overline{N}}^{1\alpha}$. The gap $\varepsilon_{\overline{N}}^{1} = \lambda_{\overline{N}}^{1\alpha} - \lambda_{\overline{N}}^{1\beta}$ is greater as the sophistication level of the human society is greater (as result of arising of such social activities as: medical, economic, cognitive, artistic, political etc.). In the incipient development periods, this gap was very small, it being, at limit, null (in the case, for example, of very primitive human groups).

In an absolute similar way with that in which a superior limit of the light velocity was been postulated (by the special theory of relativity), it is possible to postulate here, for the case of the entropic theory of evolution, an inferior limit of the entropic velocity, namely: this velocity *is never negative*.

1.2. Dissipative systems and entropic sustainability

It is obvious that these categories of dissipative systems can simultaneously exist, and, historically, seems must be accepted even an evolution from the dissipative systems of rank "1α" to the dissipative systems of rank "1β". A question is arising here: there is, really, a necessary "evolution" from the dissipative systems of rank "1α" to the dissipative systems of rank "1β" or, rather, we only see a contingent evolution along this way[13], that is observed only in our corner of the Universe and/or only inside our temporal life? To put differently, once arisen an entropic heterogeneity in the Universe 0[14] will it necessarily follow the "way" of permanent and continuing reducing of the entropic velocity inside its membrane?[15]. We opt for an intrinsic (that is, "natural") rationality of the generic Universe that, simply, creates its entropic heterogeneities in order to reach its "objective" – the thermal death; so, we accept, as being a necessity, the dissipative systems emergence, observed by intermediation of reducing the local entropy velocity, and, as result, of increasing the global entropy velocity[17].

We would now want to come back to the sub-typology of the dissipative systems of rank "1". We can observe that both the dissipative systems of rank "1α" and of rank "1β" can reach the same entropy velocity (that is, $\lambda_{\overline{N}}^{1\alpha} = \lambda_{\overline{N}}^{1\beta}$). This is not possible, accordingly to our previous considerations, than is the case of a single membrane for the two dissipative systems. Since such a situation is absurd, inside the logic of the present study, it results we have to accept a conceptual distinction between *interior*

membrane and *exterior membrane*[18]. To put differently, from this point of view, could exist a class of dissipative systems that ensure the entropy conservation. We could say, in this case, that we have a class of entropic stationary dissipative systems[19]. This class can be populated with non-human dissipative systems (for instance, a population of vegetables or/ and animals as well as with human dissipative systems (for instance, an urban, or national or even world community), as well as with a combination of the two mentioned categories of dissipative systems (that is, with a mixed eco-system). In Figure 1 is synoptically indicated the configuration of the class called *mixed dissipative systems entropic stationary* (MDSES):

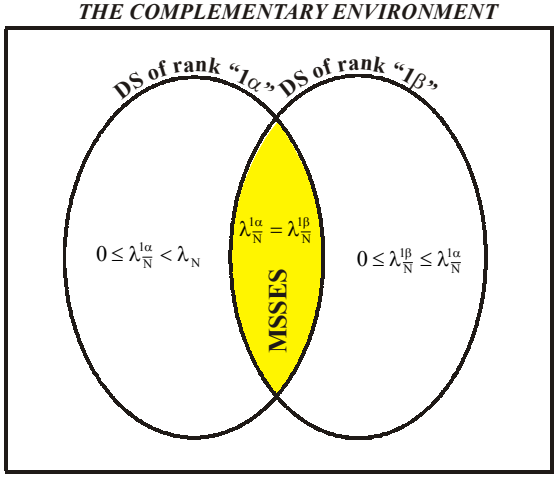


Figure 1. *Genesis of mixed dissipative systems entropic stationary*

In fact, that we must call as *sustainable systems*[20] addresses just this class of mixed dissipative systems (of human and non-human type) that are stationary from the entropic point of view [21]. But, really, the dissipative systems of rank "1α" could they constitute, by themselves, mixed dissipative systems entropic stationary[22] (that is, what we above called as sustainable systems)? Essentially, it is obvious that is possible. In other words, the genesis of the entropic sustainable systems does not necessarily require the presence of a dissipative system of rank "1β"; by the contrary, it requires the presence of a dissipative system of rank "1α". Terminologically, we prefer, however to make here a certain distinction.

If we would consider the complementary environment in the Universe 1 as an anti-dissipative system[25], then we will say that any quasi-mixed dissipative system entropic stationary must be considered rather a *durable system*, while any mixed dissipative system entropic stationary must be considered properly a *sustainable system*. To put differently, the quasi-mixed dissipative systems entropic stationary cannot generate sustainable systems, properly speaking, that is, the sustainability must be always associated with the presence of the antropic factor. Why must we consider as justified such a terminological distinction proposal? To defend our proposal, we will say that the presence of the subjective (antropic) factor inside the DMSES could generate gaps (accidental or deliberatively) from the null velocity of the entropy, on short run, often cyclically but of permanent nature[27, 28], while in the case of the quasi-mixed dissipative systems entropic stationary, this phenomenon does not appear or, in the opposite case, it is singular (reaching of certain value of the entropic velocity will maintain sine die this value,

destroying irrevocably the stationarity of the system). As result, the irreversible[29] feature of the state of the durability, compared with the reversible feature of the state of sustainability leads us to accept the above mentioned terminological distinction. To defend the utility of this terminological distinction we will say that we frequently meet expresses as "durable development" or "durable growth" related to the economic activity, that make these expresses, in the context discussed here, to be inadequate; we more correctly we believe must use expresses as "sustainable development" or "sustainable growth"[30].

2. Rationality and sustainability[31]

The above considerations on the concept of sustainability (more exactly, on the concept of mixed dissipative system entropic stationary) could be used to analyze the evolution of the human society rationality along the history.

It obvious that maintaining of the stationary state of the economic systems (more generally, of the social systems) accelerates the entropy increasing in the environment, because the mentioned maintaining implies a reducing (at limit, stopping) of the entropy increasing inside the economic stationary system, with the price of consuming of low entropy from the complementary environment. Let's note with $\Delta E(N) = d\gamma$ the natural increasing of the universal entropy, in the lack of any dissipative structures. The maintaining of the stationary state for the dissipative systems must counteract, locally, this general increasing of the entropy. To this end, the dissipative systems will take out from the environment a quantity of low entropy of size: $-d\gamma \times (1+\upsilon)$[32]. This is equivalent with "injecting" into the environment an equal quantity of high entropy, i.e. $\Delta R_C = d\gamma \times (1+\upsilon)$; this means that the total entropy of the complementary environment will increase with $\Delta E(R_C) = d\gamma \times (2+\upsilon)$. This rationality could be called *the rationality of first order* (the rationality of local stationarity). In turn, the rationality based on optimality (that is, on maximizing/minimizing, in one word, on optimizing, of the established objective in the framework of a system of restrictions) seems lead to a supplementary acceleration of the entropy, compared with the case of maintaining of the stationary state of the economic systems. Indeed, if it is needed to optimize an objective-function, then it is needed not only to maintain the entropy at the actual level (that is, to ensure a null acceleration for the local entropy increasing[33]) but it is needed that this velocity be decreased accordingly with the "ambition" of the optimizing. So, the dissipative system will need for an additional quantity of low entropy from the complementary environment, let's say: $d\varphi$. If we note with σ the low entropy needed to be consumed in order to obtain the comprehensive and methodological ability to perform the optimizing (projecting the objective-function, establishing the restrictions

equations, identifying the technical tools to optimize etc.), then the increasing of the low entropy (compared with the stationary state) needed by the dissipative system to perform the rationality based on the optimality will be: $\Delta R_O = d\varphi \times (1+\sigma)$. So, the entropy in the complementary environment will increase, in the case of a dissipative system performing the rationality focused on the optimality, compared with the case of a dissipative system that follows a rationality based on the stationarity, with: $\Delta E(R_O) = d\lambda \times (2+\varepsilon) + d\varphi \times (1+\sigma)$. If it is noted: $d\varphi / d\gamma = \rho$, we have: $\Delta E(R_O) = d\gamma \times$ $\times (2 + \upsilon + \rho + \rho \times \sigma)$. This rationality could be called *the rationality of second order* (i.e., rationality of local optimizing). In this situation, the entropy acceleration in the presence of dissipative systems having a rationality of second order, compared with the natural situation will be: $\Delta E(R_O - N) = d\gamma \times (1 + \upsilon + \rho + \rho \times \sigma) = \omega \times d\gamma$ [34], where with ϖ is noted the acceleration coefficient. The rationality based on the sustainability (that we will call *the rationality of third order*, that is, a rationality of local sustainability), accordingly to those above mentioned, is nothing else than a rationality of the stationarity also but, because it is "occurring" after the rationality of optimality, we called it as a rationality of third order. Properly speaking, it is probable that never occurred, really, a rationality of the stationarity in the mixed dissipative systems, because the genuine economic behavior is always based on certain optimizing criterion – for instance, the minimizing of the opportunity cost. It is obvious that, as the human society has became more complex, the optimization has became more complex itself, especially under the instrumental aspect, which led to iterative and cumulative accelerations of the global entropy. So, it is necessary to come back to a rationality comparable with the rationality of first order; thus, the coefficient σ does not work anymore (it is no needed anymore to know how could we perform the principle of the rationality of second order) and will be replaced by another coefficient, let's note with μ, that signifies the low entropy consumption from the environment, in order to know how must we perform a local circular economic process[35]. This means that the expression $\upsilon + \mu$ [36] signifies the new added entropy inside the complementary environment, because, as showed before, the increasing of the neg-entropy inside the dissipative systems is the same with the increasing of the entropy outside the dissipative systems (ignoring, of course, the low entropy necessary to acquire the knowledge and practical skills for every type of rationality). So, the passing from the rationality model based on optimality to the rationality model based on sustainability will lead to a reducing of the global entropy acceleration with: $\Delta E(R_S - R_O) = \upsilon + \mu - \upsilon - \rho - \rho \times \sigma = \mu - \rho -$ $-\rho \times \sigma < 0$ [37]. We obtain that the "price" (on global entropy acceleration basis) paid by every type of rationality of the dissipative systems is described by the following order relation:

$$\Delta E(N) < \Delta E(R_C) < \Delta E(R_S) < \Delta E(R_O)$$

or, if we will note with R_0 the "natural rationality", we can write: $R_0 \succ R_I \succ R_{III} \succ R_{II}$, where the "$\succ$" signifies "is preferred[38], from the entropic point of view, to". But, as we know, the real history of the humanity followed another road of the rationality (Figure 2):

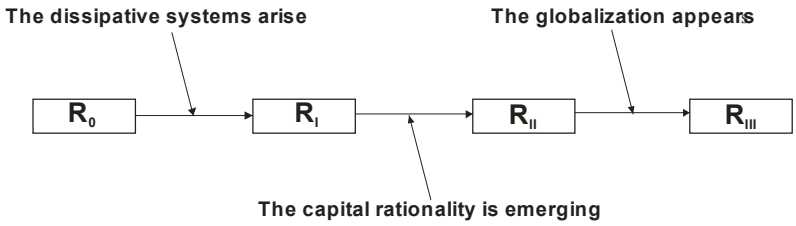


Figure 2. *Logic of social rationality models emerging*

Because R_0 is not relevant in the presence of the dissipative systems, we see that the humanity performs a "non-rational skip", inside the entropic logic point of view, from R_I to R_{II}, by ignoring the better rationality of R_{III}[39]. It is of hoping that the effectiveness and stringency of the problems put by the globalization process, as well as the epistemological progresses inside the sciences studying the fields where evolutionary processes occur (among them, probably, the pioneer is biology, followed by economics), will generate, for all the humanity, the necessity to choose the rationality of third order, that is the rationality based on local sustainability[40]. This way, the human dissipative system will deliberatively verify the principle of the minimum entropy production.

3. On relativity of the complementary environment concept

The subject announced in the title of this paragraph is of the most importance in order to a more analytical building of a "theory" concerning the causality implied in the "dissipative system – entropy" binomial, but in this study we only intend to enounce some possibilities for future analyses hoping, this way, certain reactions from the specialists in the matter, in order to generate a larger polemics that could be profitable, eventually, for the science generally.

As we mentioned, partially, previous as well, in the situation in which inside the Universe 0 simultaneously appear more many dissipative systems (of course, this set of dissipative systems can be constituted not only concomitantly but successively as well, of importance being that, at a given moment, inside the Universe 1 to exist more many such systems, of rank "1α" as well as of rank "1β"), the concept of complementary environment become, to so say, multi-relative (it anyhow was relative even in the situation of a single dissipative system, as showed before, and as the open reader can immediately observe). This means that, given a dissipative system, be A, another dissipative system, be B, will become a relative anti-dissipative complementary environment

for A[41]. If so, a question could arise: how will develop the entropy inside the dissipative system B, given a certain development of the entropy inside the dissipative system A? To put differently, the question is: there is an entropic impact of a dissipative system on other dissipative system[42]. As we understand, to answer the above mentioned question, it is necessary to postulate that the dissipative systems "recognize" at the level of membrane (i.e., at its borders), the entropic gradient between themselves and the complementary environment[43]. Once this ability supposed, how really "choose" the dissipative systems to perform "the entropic change" (that is, to take out low entropy in exchange for high entropy)? Expressed like that, the question is: a certain dissipative system will "prefer" to perform the entropic exchange with the complementary environment (where, as it is clear, are included all the other contemporary dissipative systems) at the maximum or at the minimum level of the entropic gradient? Probably we must postulate, here, a principle similar with the principle of the minimum distance in physics[44], namely *the entropic exchange is performed always at the level of the minimum entropic gradient*[46]. This principle, once accepted, just generates the relativity of the complementary environment, and, on the other hand, generates, as well, a necessary matrix (here, the concept of "necessary" has its logical signification) of entropic interactions. This means that, if we would have a "map" of the entropic gradients in the Universe 1, we could exactly say (the informed reader will find here a pure laplaceanism) which entropic interactions will occur[47, 21]. So, the complementary environment cannot be defined than in the multi-relative way (in fact, we can say, "in a contextual way" and even, as it seems for us, rather "in a practical mode than in a theoretical one").

The "chain" of entropic interactions based on the choice of the minimum entropic gradient indicates a necessary acceleration of the global entropy in the Universe, namely an auto-catalytic acceleration: more many dissipative systems there are, more accelerated global entropy is. Moreover, more advanced the dissipative systems are (in the entropic sense, that is, lower the entropy velocity is inside them), greater the impact on the increasing of the global entropy velocity is. But, as we tried to show, the dissipative systems have a necessary propensity to entropically develop. So, we can to summarize as follows: a) any variation of the local entropy velocity is equivalent with an inverse variation of the complementary environment entropy velocity; b) the principle of choice of the minimum entropic gradient in order to perform the entropic exchange inter-dissipative systems supplementary accelerates the global entropy. But, the last supposition needs for a specific argumentation: suppose we are inside a Universe 1 where there are two dissipative systems, A, with the local entropy velocity $\lambda_{\overline{N}}^{A}$, and B, with the local entropy velocity $\lambda_{\overline{N}}^{B}$, so $\lambda_{\overline{N}}^{A} < \lambda_{\overline{N}}^{B}$. We will note the entropy velocity of the

complementary environment, relative to the two dissipative systems, with $\lambda_C^{A,B}$ (the way of noting is aimed at to indicate the fact that the arising of the two dissipative systems led to an increasing of the entropy velocity inside the complementary environment – accordingly to all said far now – so $\lambda_C^{A,B} > \lambda_N$). Obviously, $\delta_A^B = \left|\lambda_{\overline{N}}^A - \lambda_{\overline{N}}^B\right| < \left|\lambda_{\overline{N}}^A - \lambda_C^{A,B}\right| = \delta_C^N$ (where δ signifies the entropic gradient), so the entropic exchange aimed at to more reduce the entropic velocity inside the dissipative system A, will occur between A and B[48]. Taking into consideration the order relation between the local entropy velocity in the two dissipative systems, the entropic exchange will be materialized by taking out by the dissipative system A of a certain quantity of low entropy from the dissipative system B, and vice versa, by taking out by the dissipative system B of a certain quantity of high entropy from the dissipative system A. Now we see the basic significance of the choice criterion of the minimum entropic gradient: by this choice criterion is ensured a minimum transfer of low entropy from the dissipative system less entropic advanced to the dissipative system more entropic advanced. Indeed, it seems be enough obvious the fact that, in order to reach a certain differential of the local entropy velocity, the dissipative system A should consume more low entropy from the genuine complementary environment than it should consume from the dissipative system B[49].

Here is appearing a last question which we want to discuss in the study: is the principle of choice the minimum entropic gradient in order to perform the entropic exchange between the dissipative systems, really consistent with the prigoginean principle of the minimum entropy production? If we would take into consideration as argument the behavior of the natural systems (quasi-mixed systems by terminology used here), we should answer yes[45, 50].

Synoptically, we could represent the above considerations as in the Figure 3:

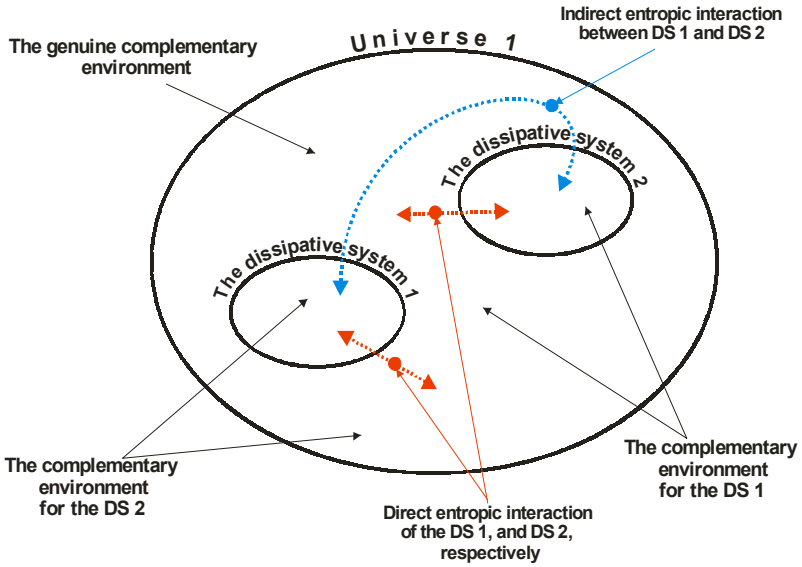


Figure 3. *The logic of direct/indirect entropic interactions*

We now will try to formalize the mechanism of the entropic interaction in a Universe 1 "endowed" with more than one dissipative system.

Suppose there are "n" dissipative systems, every having own[52] local entropy velocities, which verify the ordinal relation: $\lambda_{\overline{N}}^{1} < \lambda_{\overline{N}}^{2} < ... < \lambda_{\overline{N}}^{n}$. Accordingly to the choice criterion of the entropic interaction (obviously, the principle of the minimum entropic gradient can be alternatively formulated as the principle of proximate entropic interaction), mentioned above, the entropic development of the "n" dissipative systems will necessarily implies as the dissipative system 1 must interact with the dissipative system 2, in order to take out low entropy from the last, the dissipative system 2 must interact with the dissipative system 3 in order to take out low entropy from the last, and so on. The dissipative system "n" will interact with the genuine complementary environment (that will be noted as a "n+1" system) in order to take out low entropy from the last. Let's note with θ_j^i the quantity of low entropy transferred from the dissipative system "j" to the dissipative system "i", and with κ_j^i [53] the consumption of low entropy inside the dissipative system "j" to realize the transfer of low entropy from the dissipative system "j" to the dissipative system "i". The quantity of low entropy transferred from the dissipative system "j" to the dissipative system "i" is an increasing function depending on the entropic gradient[54], that is, $\theta_j^i = h(\delta_i^j)$ [55], where $h_\delta^{'} > 0$. So, as a result of the interaction between the dissipative systems "i" and "j", in the dissipative system "j" we have an "increasing" of low entropy of size: $dE_j^i = h(\delta_i^j) + \kappa_j^i$, j=i+1, for j=2,…, n+1, and i=1,2,3,…,n (we remember that, with "n+1", it is noted the genuine complementary environment). If we note the rate of supplementary consumption of low entropy related to the transfer of low entropy as π, then: $dE_j^i = h(\delta_i^j) \times \left(1 + \pi_j^i\right)$[56]. As the entropic interaction between two dissipative systems[57] modified the local entropy velocities inside the two dissipative systems, we understand that the following interaction (between the dissipative system which "pumped" low entropy and the dissipative system which is in the entropic proximity – from the point of view of the entropic gradient) will suffer some modifications under the aspect of the quantity of low entropy needed for the entropic interaction. Let's organize the complete process of the entropic interactions as in Table 1 (we will note with η a functional way, for instance, a multiplicative way, of the dependence of the variation of local entropy velocity in a dissipative system on the entropy increasing inside the dissipative system involved[58]).

We note with ϖ a *global entropy increasing divisor* (GEID), which will be determined as a mathematical ratio between the total variation of the entropy in the case of the logical entropic

interactions (based on the principle of minimum entropic gradient) and total variation of the entropy in the case of interactions between every dissipative system, on one hand, and the genuine complementary environment, on the other hand. So, formally, we have:

$$\varpi = \frac{\sum_{k=1}^{n} h\left(\delta_k^{k+1}\right)}{\sum_{k=1}^{n} h\left(\delta_C^k\right)}$$

It is immediately obvious that $\varpi \leq 1$ [59], because the numerator will be less than the denominator, based on the fact that h is an increasing function on the entropic gradient.

For instance, if we consider the h of a multiplicative type, say $h = \psi \times \delta$, where ψ signifies a constant coefficient of low entropy transfer per capita of entropic gradient (so, the average transfer of low entropy generated by the entropic interaction) then we can write successively:

$$\sum_{k=1}^{n} h\left(\delta_k^{k+1}\right) = \psi \times \sum_{k=1}^{n} \delta_k^{k+1},$$

$$\sum_{k=1}^{n} h\left(\delta_C^k\right) = \psi \times \sum_{k=1}^{n} \delta_C^k,$$

$$\delta_C^k = \chi_k \times \delta_k^{k+1},$$

where χ_k signifies a coefficient that links the entropic gradient generated by the entropic interaction between any pair of dissipative systems (based on the principle of minimum entropic gradient) to the entropic gradient generated by the entropic direct entropic interaction between any dissipative system and the complementary environment. The row series (χ_k), for $k \in N$ is real, infinity, and increasing, with $\chi_1 = 1$, and $\chi_k > 1$ for any $k = 2,3,...,n$.

Then, we can be written:

$$\varpi = \frac{\sum_{k=1}^{n} \delta_k^{k+1}}{\sum_{k=1}^{n} \chi_k \times \delta_k^{k+1}} \leq 1.$$

So, we obtained the conclusion that by "verifying" of the principle of minimum entropic gradient for choose the entropic interaction, is also verified the principle of the minimum entropy production, that clear indicates the consistence between the two mentioned principles[60]. This result could also be assessed as a sui-generis demonstration of the principle of minimum entropy production (which is a non-intuitive principle) based on a much more intuitive postulate[62] which requires that, always, the next entropic interaction occurs between those dissipative systems which have the minimum entropic gradient between.

Dissipative systems in interaction	The initial entropic gradient (before entropic interaction)	The entropic gradient alter the logically anterior entropic interaction[63] (based on the principle of minimum entropic gradient)	The total entropy variation in the case of direct interactions between every dissipative system and the genuine complementary environment	The total entropy variation in the case of logic entropic interaction (based on the principle of minimum entropic gradient)
$1 \leftarrow 2$ [64]	δ_2^1	-	$h(\delta_C^1)\times\left(1+\pi_1^C\right)$ [65]	$h\left[\left(\delta_1^2\right)\times\left(1+\pi_2^1\right)\right]$
$2 \leftarrow 3$	δ_3^2	$\delta_3^2\times\left\{1+\eta\times\left[h\left(\delta_1^2\right)\times\left(1+\pi_2^1\right)\right]\right\}$ [66]	$h(\delta_C^2)\times\left(1+\pi_2^C\right)$	$h\left[\left(\delta_2^3\right)\times\left(1+\pi_3^2\right)\right]$
$3 \leftarrow 4$	δ_4^3	$\delta_4^3\times\left\{1+\eta\times\left[h\left(\delta_3^2\right)\times\left(1+\pi_2^3\right)\right]\right\}$	$h(\delta_C^3)\times\left(1+\pi_3^C\right)$	$h\left[\left(\delta_4^3\right)\times\left(1+\pi_3^4\right)\right]$
. . .	. . .	. . .	. . .	. . .
$(n-1) \leftarrow n$	δ_n^{n-1}	$\delta_n^{n-1}\times\left\{1+\eta\times\left[h\left(\delta_{n-2}^{n-1}\right)\times\left(1+\pi_{n-1}^{n-2}\right)\right]\right\}$	$h(\delta_C^{n-1})\times\left(1+\pi_{n-1}^C\right)$	$h\left[\left(\delta_{n-1}^n\right)\times\left(1+\pi_n^{n-1}\right)\right]$
$n \leftarrow (n+1)$	δ_{n+1}^n	$\delta_{n+1}^n\times\left\{1+\eta\times\left[h\left(\delta_{n-1}^n\right)\times\left(1+\pi_n^{n-1}\right)\right]\right\}$	$h(\delta_C^n)\times\left(1+\pi_n^C\right)$	$h\left[\left(\delta_n^{n+1}\right)\times\left(1+\pi_{n+1}^n\right)\right]$
Total of Universe[67]	-	-	$(1+\pi)\times\sum_{k=1}^{n}h\left(\delta_C^k\right)$	$(1+\pi)\times\sum_{k=1}^{n}h\left(\delta_k^{k+1}\right)$

4. Some conclusions

The arising of the dissipative systems breaks the entropic symmetry of the Universe, leading to two generic structures: the dissipative system, on the one hand, and the complementary environment, on the other hand. This entropic heterogeneization generates a redistribution of the entropy "mass" and separates a low entropy (i.e., a superior degree of complexity) inside the membrane of the dissipative system, face to a high entropy (i.e., an inferior degree of complexity) inside the complementary environment. But the complexity increasing decreases the own (specific, depending on the process) time tact inside the dissipative system, that is, increases the entropy velocity (generates the entropy acceleration). *The principle of invariance of the global entropy velocity* (which is an effect of an implicit principle of invariance of the global entropy, and is based on the *principle of invariance of the total simplicity* of a dissipative system) is valid in the case of taking into a consideration of a simple redistribution of the entropy between the dissipative system and the complementary environment (that is, in the case of taking into a consideration only of the *compensation entropy*). The "birth" itself of the dissipative system requires a supplementary consumption of low entropy inside the complementary environment or (that is logical equivalent) requires a supplementary high entropy production inside the complementary environment, that is what we called *heterogeoization entropy*. Thus, between the two sub-structures of the Universe 1 (the dissipative system, and the complementary environment) appears not only a relative difference of the entropy velocity (because the inadequate

measuring, with the clock time, of the two velocities[68]) but appears also an absolute difference in the entropy velocities. This absolute difference leads to the acceleration of the global entropy (for both the dissipative system and the complementary environment). This means that the process of dissipative systems[69] birth modifies, in fact, absolutely, the global entropy velocity.

Theoretically, three categories of dissipative systems could exist, of ranks, respectively: "-1", "0", and "1". While the dissipative systems of rank "-1" are logically impossible, and those of rank "0" are observationally indiscernible (based on the accepted criterion of identification of the dissipative systems: the accelerating of the entropy inside the complementary environment of the involved dissipative system), in turn, the dissipative systems of rank "1" are those of theoretical and empirical interest. The partition of the dissipative systems of rank "1" into two sub-categories: dissipative systems of rank "1α" (non-human dissipative systems) and of rank "1β" (human dissipative systems) leads us to the concept of *mixed dissipative systems entropic stationary* (MDSES), which is a concept capable to generate many theoretical constructions on the entropic sustainability.

The above considerations could lead us to a very important conclusion on the rationality dynamics of the human society: from the stationarity rationality to the optimality rationality, and, today, from the optimality rationality to the sustainability rationality. The principles of the entropy (theoretical argument) as well as the emergent challenges of the globalization process (pragmatic argument) lead to the necessity to reject the actual paradigm of optimality, and to take over the paradigm of the sustainability.

The entropic interaction occurs based on the principle of the minimum entropic gradient (if the number of dissipative systems in the Universe 1 is more than 1) and this principle is consistent with the principle of minimum entropy production, proposed by Prigogine, although this demonstration of consistence could be assessed as well as a proper demonstration of the principle of minimum entropy production.

At the same time, the above considerations and conclusions generate, in turn, o set of questions which here remained unanswered or, in the best case, without a decisive answer.

For our colleagues in the field of entropy theory or, larger, in the field of the economic epistemology, we think could be useful to enumerate some of these: a) is it for any importance the age[71] of the Universe 0, for the moment of arising of dissipative systems? How is exerted this influence (if any), from the point of view of the velocity and acceleration structures and dynamics?; b) is it possible a dissipative system which have a negative local entropy velocity, that is, which have an entropy decreasing[72]? What could be the signification of such a case, from the point of view of the time arrow?; c) is it of any importance if inside the Universe 0

appears a single dissipative system or many such dissipative systems appear? How influences this on the global entropy velocity?(73); d) how "knows" a given dissipative system how much low entropy must take out from the complementary environment (or, indirectly, from other dissipative system, accordingly the principle of entropic interaction logics)? Except the dissipative systems of rank "1β" (in which case we could use the concept of a neg-entropic deliberative program), what can we say about the other cases?

Our considerations, proposed in this study (including the questions arisen by these considerations themselves) have not only an academical or philosophical (even metaphysic) signification. The globalization and its problems (generated or highlighted), that constitute pragmatic issues (involving the social practice), as well as, for Romania case, the process of integration into the European Union and, later, the process of integration in the euro area, indicate the necessity of these preoccupations on the "complementary environment" that is created by the human dissipative systems (for the moment in the under-moon world), that is on the artificial complementary environment (composed by the artefactual "objects" of the human society). Probably, the most important such artefactual "objects" are the social institutions. They constitute sui-generis principles, more exactly: they are replicas to the natural (i.e., entropic) principles, and, consequently, they should be analyzed from an entropic perspective as well(74).

Notes, comments, and bibliographical references

Notes

* The author has recently discovered a fourth type of such rationality, i.e. the rationality of viability, based on the logically vivid system concept and on moral presuppositions.

(1) It remains, of course, to be solved the crucial question of measuring (or, at least, of quantifying) the variation of the entropy velocity. We believe, however, that this question is rather a practical question than a theoretical one. Consequently, we put it into (Husserlian) parentheses.

(2) Remember that, by definition, : see our article *About some Entropic Aspects of Dissipative Systems*, Theoretical and Applied Economics, 2006, Volume 10(505), Issue 10(505), p. 33-40.

(3) The fact we note with "-1" the rank of such dissipative systems indicates, metaphorically, that they are (logically) impossible or, that is the same, they constitute an inverse heterogeneity in the Universe 0 (or, as remembered, this type of heterogeneity was been postulated and demonstrated as impossible). However, see further some suggestions to use this impossibility in order of a possible construction of a dynamic (more exactly, oscillatory) entropic model of the Universe.

(4) In all ordinal relations which are used to obtain the typology of the dissipative systems, we have in front of eyes both the compensation entropy and the heterogenization entropy.

(5) To be noted the fact that such dissipative systems could be formally described by the logical contradiction (that is, by a necessary contradiction).

(6) Here appears a logical problem that is of extreme interest. As the situation is before described, in the Universe 0 is arising, however, an entropic heterogeneity. But, the arising of an entropic heterogeneity is a token (even in the semiotic sense) for the assigned referential, that is, for the dissipative system. So, we cannot logically reject the fact that a dissipative system is born. The impasse is emerging, in our opinion, from the fact that we already "choose" what we understand as being a dissipative system (i.e., the "content" of a membrane that has a complexity degree higher than the "content" of the outside of the membrane), as well as, what we understand as being the complementary environment (the opposite situation). But, this choice is absolutely arbitrary or even…anthropomorphic. Indeed, a cognitive subject inside the complementary environment could believe that it is his own membrane (the same we ourselves observe, but from inside of that we call dissipative system) that separates a dissipative system, from where results that a dissipative system is a "content" that has an entropic velocity higher (i.e., a complexity degree smaller) than the "content" in outside of this membrane. Although we (which make this analysis) are, certainly, one of the two cognitive subjects, unfortunately we cannot say which of them we are; our structural position is indiscernible (in the lack of absolute framework of reference) related to the position of the alter ego. To put differently, are possible, simply, two theories concerning the entropic phenomenon: one that believes that the time arrow is indicated by the entropy increasing, and other that believes the contrary, that is, the time arrow is indicated by the entropy decreasing. We will come back to this problem, because it could be a starting point for the time arrow debates.

(7) The fact we note with "0" the rank of such dissipative systems indicates, metaphorically, that they do not constitute a heterogeneity in the Universe 0.

(8) It is easy to remark that the Universe 0 can be moved, from the methodological point of view. Thus, if at the moment t_0 a real (that is, of strictly positive rank) dissipative system arises, then we could consider that, in order to analyze the arising of a second real dissipative system (at the moment t_1, where $t_1 > t_0$, and the moments are measured with the clock time, that is, with the cosmological time), the Universe 1, generated by the arising of the first dissipative system, could be assimilated with a new Universe 0, with the condition, of course, that $\lambda_C^{\overline{N}} \equiv \lambda_N^{(1)}$, where $\lambda_N^{(1)}$ signifies the new "natural" entropy velocity, after the arising of the first real dissipative system.

(9) If, however, such dissipative systems would be observed (by intermediation of a certain entropic consequence, that is, by intermediation of a cognitive innovation), this means that our identification criterion for the dissipative systems arising in the Universe 0 is not working.

(10) In the sense that it establishes us in a privileged position face to our symmetric "companion" (observer or knowing subject), placed in the complementary environment. See, for details about the explanation paradigm based on the symmetric companion (the "twin earth"), the work of Hilary Putnam, *Raţiune, adevăr şi istorie*, Editura Tehnică, Bucureşti, 2005 (especially chapter 1).

(11) Any of the three mentioned examples (mineral, vegetal, and animal) must be considered, in the integral context of the study, as vivid systems examples(12).

[12] It seems be quite excessive to consider as vivid system any dissipative system, but we have for our "defense", two arguments: a) forming of the membrane (inherent to the entropic heterogeneity arising), as well as the maintaining, inside the membrane, of a entropy velocity less than outside the membrane (remember that this capacity is an auto-poietical capacity) constitutes the two basic conditions for a logically vivid system; we have here a *conceptual argument*; b) the formula of the equivalence between the vivid system and the dissipative system ensures an indisputable logical coherence, which is very difficult to be achieved in the lack of this equivalence; we have here a *methodological argument*.

[13] Which is valid, nota bene, only in the hypothesis of accepting the evolutionary doctrine on the species and, implicitly, of rejecting of the creationist doctrine in the matter.

[14] Remember that the Universe 0 is that Universe about we discretionary establish that it (logically and chronologically) is in the antecedent of a Universe (called Universe 1) where follows to appear an entropic heterogeneity (that is, a dissipative system or, as we pointed out before, a vivid system).

[15] It is easy to remark that the question could be formulated even in more radical terms, namely, if we should accept a "rationality" of the Universe 0, and if yes, in which way could we describe such a "rationality"? If we would accept such a rationality (we ignore the quotation marks, because we are discussing here just in anthropomorphic terms), then the Universe 0, certainly, would has as "target" the homogenization (so, the re-homogenization) of the Universe 1, because the basic principle of the evolution of the Universe is the principle of the road to thermodynamic equilibrium. In this context, it results not only that the arising of the authentic dissipative systems (i.e., of rank "1") constitutes an accident but, in addition, it results that the "improvement" of the accident (the entropy velocity reducing or achieving of a negative[16] entropy velocity inside the dissipative systems) constitutes a "second order accident", so forbidden as well by the principle of permanent increasing of the global entropy. However, we could develop a contrary demonstration as well: taking into account that the "target" of the generic Universe is to reach the thermodynamic equilibrium, the arising of the dissipative systems (and how much more so, their entropic development by decreasing of the entropy velocity inside the membrane) constitutes "vectors" just for the mentioned "target". So, if we would accept a sui-generis rationality of the Universe 0, then, inside this rationality, the arising of the dissipative systems constitutes "strategies" extremely efficient, because the dissipative systems accelerate the entropy (as explained before).

[16] We repeat, although probably with too much insistence, that this supposition is much too complicated to be discussed inside the limited ambitions of the present study, it implying difficult considerations on the inversion of the local time arrow, as the phenomenon is proposed by the entropy theory. It is possible that the special theory of relativity (which accepts only a positive values for the time, associated with the superior limit of the light velocity) be only a particular case of the evolution in the Universe, and, consequently, the entropy theory could develop this evolution theory including the negative values for the clock time, that is, the negative values for the entropy velocity. For the moment, we are acting in the same way as in the special theory of relativity, namely we postulate an inferior limit for the entropy velocity – this cannot be negative.

[17] Of course, if somehow the thermal death of the Universe is the God's target, then we

could remove the spontaneity from the arising of the dissipative systems and could transfer the "decision" to initiate and, then, to develop these systems, on the transcendent divinity; to be observed the fact that, if the divinity is immanent, then itself must be considered as the first dissipative system in the Universe 0 although, in this case, the problem of the spontaneity in arising of the dissipative systems is again resuscitated (it was been rejected only by postulating the transcendent nature of the divinity; it is true that such a resuscitating is opposable only to the arising of the first dissipative system, which is just the birth of the God himself). If we do not accept the hypothesis of the spontaneity in arising of the entropic heterogeneity called God, then we must (logically) accept a God of… the God and so on, ad infinitum (in addition, the perspective of a God of the God is a few impolite face the divinity which, many times, serve us, with kindness, as useful hypothesis in our cognitive works).

(18) In the same way, approximately, in which the European Union has a common commercial policy (for instance, a common external tariff) – that is, the exterior membrane but, at the same time, there are also national commercial regulations (especially non-tariff kind) – that is, interior membranes. Of course, in the biological world, such examples are much more abundant.

(19) It is, we hope, obvious the reason for which we do not call these dissipative systems as entropic static systems (because, between these systems and the complementary environment there is substance, energy and information exchange, that is, metabolism, so the mentioned dissipative systems are dynamic but not static).

(20) Although it is obviously the case of entropic sustainability, we are very doubt it is possible to talk with certain signification (scientific signification) on another category of sustainability, except the case of very punctual demarches, where the notion of sustainability is considered rather in a metaphorical sense (fiscal sustainability, social sustainability etc.)

(21) To be noted another important issue, here: the entropic gradient has not only a scalar but also an algebraic sign: the entropic exchange will occur so that the low entropy will "flow" from the system that has higher entropy to the system that has lower entropy, never inversely. This assertion must be, however, funded. Our argument is: we "have established" that the finality of the Universe 0 (so, of any possible Universe 1) is to reach the state of thermodynamic equilibrium. As the arising of the dissipative systems (far from equilibrium systems) accelerate this process, "results" that the dissipative systems arising is "rational". Now, if we would suppose that the entropic exchange, in the case of an entropic given gradient, would get so that from the higher entropy-system to the low entropy-system would flow the high entropy, then, accordingly the above mentioned, low entropy should be consumed in the higher entropy-system. In order to perform the entropic exchange; but, this will create high entropy in the system that just "delivered" high entropy, that would nullify, for instance (or would reduce, in any case), the entropic "gain" generated by the high entropy "export". This result is not consistent with the above mentioned rationality. As consequence, the entropic exchange will occure exactly in an inverse sense: the high entropy-system will "pump" low entropy to the low entropy-system, and this will consume supplementary low entropy in the high entropy-system. This time, the result is consistent with the "rationality" of the Universe.

(22) As is showed at *Notes, Comments and References*, no. (23), in order to ensure the terminology unity, we must talk, in this case,

about quasi-mixed dissipative systems entropic stationary (QMDSES), i.e., about sustainable natural eco-systems.

(23) Here appears an important problem: the membranetical differentiation: indeed, every dissipative system of rank "1" has a membrane face the complementary environment; for instance, a dissipative system of rank "1β" has a membrane (the same) that separates it from the complementary environment as well as from the dissipative systems of rank "1α" (we do not extend the discussion to more analytical distinctions, as those among different dissipative systems of rank "1β", although the anthropologists or the sociologists are discussing the important differences among different human communities, related to the natural environment – that is, related to the dissipative systems of rank "1α" – where there is a given proximate among the respective dissipative systems). In this case, we must admit that the membranes of the dissipative systems (no matter their rank) have certain capacities to recognize the rank (or, even the sub-rank, if we want to make more analytical differentiations based on sociological, anthropological, geographical, economical, cultural etc.) of a given dissipative system that interact with. Based on these recognizing capacities, the mixed dissipative systems are possible, as we talked about above(24).

(24) It is absolutely obvious that the analysis must be extended as well to the quasi-mixed systems (to call them so) which are formed among the dissipative systems of rank "1α": for instance, between the vegetable system and the animal system. There is, otherwise, a consecrated notion for such entropic interactions: the eco-systems, but the discussion must be developed, in our opinion, around the concept of entropy and of entropy velocity.

(25) The anti-dissipative system is the system which has he "quality" to have an entropic velocity greater than of the dissipative system entropic velocity (or, that is logically equivalent, the system which takes over the high entropy from the dissipative system and, simultaneously, transmits low entropy to the dissipative system). To be mentioned that this "definition" is valid only in the particular case in which we have in the Universe 1 a dissipative system only; at once of the second dissipative system, at least, is born, for any given dissipative system, the anti-dissipative system will be constituted by the genuine complementary environment and all the dissipative systems having an entropy velocity higher than the analyzed dissipative system (but, as we pointed out in the framework of discussion on the "rationality" of the Universe 1, all the dissipative systems tend to reduce their velocity) (26).

(26) How could we in this case, however, to highlight the complementary environment if the Universe 1 is densely populated with dissipative systems? We should consider, for every dissipative system, as outside environment, the all content that is not comprised by the membrane. But, taking into account the fact that, in the case of a high density of dissipative systems, the membranes have the capacity to recognize the other dissipative systems (and, of course, to recognize the genuine complementary environment), probably we should to distinguish (for every given dissipative system) between two categories of complementary environments: a) the dissipative complementary environment or the relative anti-dissipative complementary environment (the set of the other dissipative systems that have a higher entropy velocity than the analyzed system); b) the absolute anti-dissipative complementary environment (that remaining after the methodological separation of all the existing dissipative

systems). But, this generates the problem of the "communication" among the dissipative systems (to which we will shortly refer next).

(27) See, for instance, the paradigms of the economic growth, based, in majority of cases, on the hypothesis of cyclicity of economic activity. But, the cyclicity implies, by definition, variations of the complexity degree (for instance, of the organization degree or, that is the same, of the internal connectivity degree); these variations are directly "translated" into variations of the entropic velocity. The variation of the entropic velocity, in turn, destroys the stationarity of the dissipative system in the case.

(28) To be observed that the sustainable systems, as were defined here, immediately lead to the concept of the evolutionary economics which, in opposition with the neo-classical economics, accepts more than one equilibrium. By an analogy which cannot be too audacious, on could say that the durable systems are described by the neo-classical economics, and while the sustainable systems are described by the evolutionary economics. The link between the evolutionary economics and the entropy theory is obvious if we remember that the both theories admit the qualitative changes, that is, such changes which cannot be always described by the analytical (that is, of dynamic type) equations.

(29) For certain fine distinctions between the irrevocability and the irreversibility (in a statistical key, however) see Nicholas Georgescu-Roegen, *Legea Entropiei și Procesul Economic*, Editura Expert, București, 1996. But, for our discussion here, these distinctions are not indispensable.

(30) See also our study, *Surse sustenabile de finanțare – aspecte de metodologie generală*, published in Oeconomica, no. 3/2006, where some more analytical considerations in the matter are offered.

(31) This part of the study is inspired and adapted (including some effective takings over) from our previous study *Modelul entropic al procesului economic*, published in Oeconomica, no. 2/2006. The concepts and notations used in the mentioned study were been modified or specified, to be consistent and coherent with the goal, terminology and logics aimed at in the present study.

(32) Accordingly the Nicholas Georgescu-Roegen's analysis, in the above mentioned *The Entropy Law and the Economic Process*, in the margin of discussion on the Maxwell's demon, it seems that the information needed by the dissipative structures in order to "know" how much low entropy must they take out from the environment to maintain their stationarity, implies a new quantity of low entropy to be consumed from the environment (see also the Loschmidt's argument). This supplementary low entropy consumption was been added by intermediation of our coefficient υ.

(33) It is easy to remark that null entropy acceleration is equivalent with an invariance of the entropy velocity.

(34) Using of the word acceleration can be justified as follows: the difference between the entropy change in the case of presence of dissipative structures and the entropy change in the case of lack of dissipative structures, give us a change of the change of the entropy, which leads us to the concept of acceleration (if we would use the continuing type of differential equations, we would have the second derivative of the entropy related to the time, so the acceleration).

(35) Here is arising a problem: once the dissipative system functioned inside the rationality of second order, the afferent low entropy for the σ was been already consumed (that is, was been "pumped", into the complementary environment, a quantity of high entropy of "size": $d\gamma \times \rho \times \sigma$. This increasing of the entropy will never be

"recuperated". The significance of the symbolic reasoning is only that, *from now further*, the global entropy increasing generated by the maintaining of the knowledge necessary to perform the principle of the rationality of the second order will not occur anymore (obviously, the "forgetting" of the knowledge and skills to optimize an objective-function in the framework of certain given restrictions, cannot create "neg-entropy", that is, low entropy, although the attainment of this knowledge and skills created high entropy before; so, we have not here a symmetrical behavior concerning the passing among the rationalities types, from the point of view of entropy dynamics, which is perfectly consistent, of course, with the condition of non-positivity of the entropy velocity).

(36) We deliberatively avoid saying we have to minimize the expression: $\upsilon+\mu$, because we have the steady conviction that the rationality based on the sustainability should be independent on any attempt to optimize. However, it is very difficult to non-equivocally demonstrate the fact that the rationality based on sustainability is independent on any optimization criterion (and this demonstration should constitutes a challenge for all the experts in the matter). To be mentioned, at the same time, that in the present study as well as in other studies, of other authors, on this subject (see, for instance, the principle of minimum entropy production, pointed out by Prigogine) some optimization principles are still applied. The nature itself seems to have any obvious reticence face to optimizations (at least as trend, should not say we that the road of the Universe to the thermodynamic equilibrium could be assessed as an optimizing principle?). Despite these controversial aspects, we "feel" that the sustainability should be assessed by other principles than the optimizing principles or, at limit, by principles based on… other way to understand the optimizing process.

(37) It is obvious that: $\mu<\sigma$, because the necessary knowledge to ensure a circular economic process is smaller than the necessary knowledge to ensure an optimizing of the economic process. As result,

$$\Delta E(R_S - R_O) = \sigma - \phi - \rho - \rho\times\sigma =$$
$$= -\rho - \sigma\times(1+\rho) - \phi < 0$$

because $\rho>0$ and $\phi>0$.

(38) It is impossible do not feel the anthropomorphic discomfort of this signification. Probably, the most appropriate explanation, that is, in a more conformity with the general context of present discussion, would be the following signification "generates an entropic acceleration less than".

(39) As many analysts in the matter suggest, it seems that the capitalist type of economic paradigm generated this "non-rational skip"; today, as we are seeing on the globalization problems and on economic integration processes, is emerging a necessary "back-skip" of rationality, inside the entropic perspective, namely from R_{II} to R_{III}. The locution "back-skip" should be considered from the logical point of view, because, from R_{II} the R_{III} ordinal point of view, R_{III} is „before" R_{II}. But the locution is inappropriate from the historical point of view because, under this aspect, R_{III} is „after" R_{II}.

(40) From the macrocosmic point of view, the humanity "disposes of" a limited environment for the human (or mixed) dissipative system which is based, for the moment, on the rationality of second order: the mother-planet. As consequence, the entropic acceleration in the environment of its dissipative system is incomparable greater than it would be if the technological contact of the humanity with the cosmic space (i.e., with low entropy resources) would be larger (obviously, an enlargement of the dissipative system of the humanity, that is, a relative reduction of the entropic acceleration in the new environment is not impossible in the future; the question is, if

this future is enough proximate so the humanity continue to perform the rationality of second order).

(41) It is clear that "A" and "B" are interchangeable, without the reasoning be modified, although, as we will see, it is possible to become necessary that the membranes of the dissipative systems be endowed with the ability to recognize the entropic gradient between involved dissipative systems and the complementary environment (of course, in this last complementary environment will be included other dissipative systems having different entropy velocity, as well).

(42) We take into account only the case of "contemporary" dissipative systems. The alternative case, where the dissipative systems are not contemporary can be logically derived from the first case because any dissipative system marks the complementary environment with an "entropic trace"; this entropic trace will influence the new non-contemporary dissipative system under the aspect of the entropy level and velocity (the Universe is brought to "zero" again and again).

(43) Among the "functions" of the demon which substitutes, here, the Maxwell's demon, will be, obviously, that of "calculation" this entropic gradient between the dissipative system and its genuine complementary environment (or between the involved dissipative system and other dissipative systems).

(44) As it is known, for instance, the light always follows the minimum distance between two points (generally, the minimum distance between two points is the way which follows the geodesic generated by the space-time curvature, as is indicated by the non-Euclidian geometries and the general theory of relativity, respectively). But, as showed before, the dissipative systems generate, on their turn, a sui-generis "entropic curvature", although in another sense than in the physical space-time. More exactly, the dissipative systems generate "geodesics" which indicate that the entropic interaction will occurre between the dissipative systems having the minimum entropic gradient (this principle is verified, as well, in the particular case in which inside the Universe 1 there is a single dissipative system: indeed, in this case, there is a single entropic gradient – between the dissipative system and the anti-dissipative complementary homogeneous genuine environment – so, it is the minimum entropic gradient)(45).

(45) For the case of the economic dissipative systems (obviously, mixed dissipative systems) there could be defined specific gradients (that is, difference of "potential") (see, for a proposal in the matter, based on inertial considerations on the economic process, the author's book, *Fenomenul inerțial în procesul economic*, Editura Economică, București, 2001 – for instance, p. 99).

(46) The principle is otherwise suggested by our under-moon experience (and, until the opposite evidence, we should consider this experience as valid for the entire Universe, so should make a translation, under the sanction of the popperian falsiability, from the contingent to necessary) concerning, for instance, the trophic chain in the genuine nature: the carnivorous animals, which are on the peak of this trophic chain, do not take out the low entropy directly from the vegetable environment, but they "prefer" to do this indirectly, by consuming the herbivorous animals. But this means that the entropic exchange "choice" is made based on the principle of minimum entropic gradient.

(47) Of course, this enthusiasm for the determinism should be substantially moderated by the fact that, instrumentally, for the moment it is impossible to quantify these entropic gradients. To be observed that, epistemologically, we exactly have here the same problem which has arisen in economics, in the matter of the cardinal utility (fortunately, in the last case, we have,

however, the "solution" of recurs to the ordinal utility theory, which is generating, in its turn, so much inconsistence between the predictions and their actualizations).

(48) Logically, once at least two dissipative systems appeared in the Universe 1, do not anymore occurs direct entropic exchanges with the genuine complementary environment, but only between the two dissipative systems, based on the choice principle of the minimum entropic gradient. It is obvious, at the same time, that the indirect entropic exchange occurs between the two dissipative systems, and then, based on the same principle of the minimum entropic gradient, the dissipative system having the entropy velocity nearer the entropy velocity of the genuine complementary environment, will perform the direct entropic exchange with the complementary environment.

(49) We could discuss here about a kind of entropic "productivity", defined as the quantity of low entropy needed to increase with a given magnitude the entropic differential between two dissipative systems (or between a dissipative system and the complementary environment, in the case in which in the Universe 1 there is a single dissipative system). So, the principle of the minimum entropic gradient to choose the entropic interaction could be expressed also in the form (logically equivalent) as: the principle of maximum productivity to vary the entropic gradient. Here, as we think, a suggestion for the economists involved in the global factor productivity question, could be find: maybe, beside the Solow residual, we should consider another residual (with a negative sign) generated by the entropic processes in the economic activities; so, we will have not only a global factor productivity but a total factor productivity also.

(50) For instance, in the case of economic systems, the arising of the specialization, based on the productive advantage (absolute or relative), that led to the economic exchange, pushes the commercial flows to follow specific "geodesics" that are generated by the economic development degree. In this sense, we could say (remaining, of course, that this assertion be developed in a more complete and coherent way) that the economic flows (of merchandises or of production factors) follow a kind of minimum gradient of the economic development (this degree could be measured by the competitiveness, productivity, opportunity etc. (51)

(51) It is possible that more talented analysts find, here, some suggestions to replace the actual criteria of the national specialization (absolute or relative advantage, endowment with production factors, the average level of the national productivity, the niches etc.) by a more general criterion: the…economic geodesic. A preliminary approach in the matter can be seen, as above already mentioned, in the author's book, *The Inertial Phenomenon and the Economic Process*, Politică Publishing House, Bucharest, 2001, p. 99.

(52) To be mentioned that in the following demonstration we use the clock, inappropriate time, because otherwise (by using the own time, assigned to the entropic process and dependent on it), as the reader which followed us far now can immediately observe, we have not differences of relative velocity, at the level of the set of considered dissipative systems.

(53) Obviously, $\kappa = f(\theta)$ but, for the moment, the features of this functionally dependence will be ignored.

(54) This direct dependence is not arbitrary, but it is the logical implication of the anterior postulate concerning the fact that the dissipative system "choose" to transfer a minimum of low entropy to reach the "target" of reducing of the local entropy velocity. As the entropic gradient is maximum when the dissipative system interacts with the genuine complementary

environment (and when, of course, it should take out a maximum of low entropy), the above mathematical conclusion is obviously.

(55) To simplify, we could consider this dependence, quantified by h, be uniform (that is, independent on the dissipative system). This means that h is not specified distinctively on the pair "i,j".

(56) We will suppose, in addition, that the entropic interaction between any two dissipative systems (based on the principle of minimum entropic gradient) does not modifies, by itself, the initial ordinal relation among the local entropy velocities for the "n" dissipative systems (even if a variation of the relative local entropic velocities occurred, these variations maintain the initial ordinal relation among the entropic velocities). This is a simplifying hypothesis which does not change the validity of the reasoning.

(57) The hypothesis that the dissipative systems interact two by two, while the other dissipative systems "wait" to be finished the actual interaction in order to "see" which is the new map of the minimum entropic gradients, is quite simple. It is most probable (we do not understand here by the concept "probable" nothing related to the theory of probabilities, but we consider the mentioned concept in its "civil" signification) that the dissipative systems interact in the network way. But, this last hypothesis requires analytical developments which are not intended by this study.

(58) For simplicity, we could consider that this dependence, measured by η, is uniform (independent on the dissipative systems).

(59) It is easy to observe that $\varpi = 1$ is verified only in the particular case in which in the Universe 1 there is a single dissipative system.

(60) We could ask, of course, why the Universe does not block the arising of the dissipative systems (In fact, of importance is to block the arising of the first dissipative system), and it only "strives" to verify the principle of entropic interaction based on the minimum entropic gradient, that leads to minimizing the entropy production, after the arising of the dissipative systems. This solution is, evidently, less efficient, and the rationality that we have cognitively projected on the Universe 0 has to suffer. But, as we repeatedly showed along the study, the arising of the first dissipative system is the result of a spontaneous "act" to appear an entropic heterogeneity. If we accept this "non-rational" spontaneity, then the arising of the second dissipative system (and the rule could be applied, ad infinitum) is logically necessary, just to verify the principle of minimum entropy production. After the arising of the first dissipative system the Universe 1 behaves "rational" (In fact, of importance is to block the arising of the first dissipative system.)(61).

(61) From reasons of terminology unity, we could say that, in the context of spontaneously arising of the first entropic heterogeneity (that is, of arising of the first dissipative system), the Universe 0 behaves a-rational (not non-rational).

(62) To be not forgotten that, epistemologically, the comprehensiveness requires the intuition, while the knowledge simply requires the rationality (logical demonstration). But, essential is that the intuitivity be ensured in the premises (as we proceeded, by postulating of the minimum entropic gradient as choice criterion for the entropy interaction, see also(46), and(50)), so, the demonstration or argumentation could be simply transferred to a logical automat.

(63) We don't know if the logic order coincides with the chronological order (accordingly the clock time, it must exist such a correspondence; for the moment, we do not need for the own time of the dissipative systems).

(64) The graphical arrows indicate, here, the sense of low entropy flow.

(65) It is sufficient to measure the succesive increase of the entropy in the genuine complementary environment.

(66) It is sufficient to measure the entropy variation only inside the "entropic donor" dissipative system.

(67) To simplify the calculus, we could accept the invariance for π_j^i, that is, $\pi_j^i = \pi$, for any „i" and „j".

(68) While, by measuring with appropriate clocks (based on the own time tact of every such structures), we have a verification of invariance of entropy velocity principle.

(69) Logically, the arising of the dissipative systems is equivalent with the entropic "improvement" of the dissipative systems, under the aspect of entropy deceleration compared with the actual global entropy velocity, because the impact on the heterogenization entropy is the same in the both cases(70). Here, it could be developed a nice theorem of invariance, similar, from the certain points of view, with the Miller-Modigliani invariance in the investment financing field.

(70) It is worthy of note that a dissipative system could be in the following "entropic situations": a) entropy velocity inside its membrane is equal with the global entropic velocity (that is, we have not variations of the entropy velocity related to the entropy velocity in the complementary environment); b) the entropy velocity decreases under the global entropy velocity (we have a low entropy consumption from the complementary environment, of heterogeneization entropy type, in order to ensure this velocity differential); c) the entropy velocity become zero, the system become stationary from the entropic point of view (we have a low entropy consumption from the complementary environment, of heterogeneization entropy type, in order to ensure that stagnation of the entropy velocity); d) the entropy velocity become negative, that is, the system increases its complexity degree (not only that we have a low entropy consumption from the complementary environment in order to perform this "target", but also appears the delicate problem of the time arrow (The question of the time arrow is here put, of course, from the perspective of the clock time, that is, from an inappropriate time).

(71) It is easy to remark that the age of the Universe 0 is linked to the degree of the entropization of the Universe 0 (the Universe is "Universe 0" for any new dissipative system). A supplementary question is here: really, is there the chance (please, do not see any allusion to the theory of probabilities, here) of arising of the dissipative systems dependent on the entropization degree of the Universe (that is, is this arising "catalyzed" by the entropization degree) or it is independent on it? This question is of great importance for the entire our discussion.

(72) To be observed that here it intervenes the important distinction between the non-human dissipative systems (which "walk" until a null entropy velocity, in principle), and the human dissipative systems (which, especially by the social construction, seems to reduce the entropy, so, seems to reach negative entropy velocities). Curiously, from the perspective of the clock time, does not appeared, far now, any existential anxiety about the time arrow inversion. It is possible, however, that the above fact implies not only logical considerations, but psychological aspects as well.

(73) Here we only outlined an answer just by our demonstration about the principle of minimum entropy production principle. We mention, however, the question since we believe it could generate new developments and simplifications of the entropy theory.

(74) It is well understood, of course, that the thermodynamic sense of the entropy must be completed by an informational one or even by an institutional one (in context, the above mentioned concept of complexity could help to "translate" the concept of entropy from a sense into another).

Perspectives of Collective Investment Undertakings Market

Gabriela Anghelache
Ph.D. Professor
Academy of Economic Studies, Bucharest
Cosmin Păunescu
Expert
Romanian National Securities Commission

Abstract. *The paper presents the main characteristics of the collective investment undertakings, in accordance with the European standards, as well as their prospective evolution in Romania. New elements, appeared post-accession, are highlighted, referring to the structure and management of the collective investment undertakings. Local market is described compared to the European market, with focus on the factors which have impact on its development. Risk management, disclosure and investor protection are the main terms of reference in the management of the collective investment undertakings.*

Key words: investment funds; collective investment undertakings; financial instruments markets; investment policy; market risk; fund assets; portfolio.

On the developed financial markets, the collective investment undertakings (CIU) represent one of the main possibilities for investing and saving, both for individuals and for companies. The following factors had a significant influence on the development of the sector: ways of efficient management of the available financial resources of trading companies, professional management for uninitiated investors, access to the hardly approachable financial markets, elimination of the effort to analyze markets for individual investors, fiscal facilities.

Irrespective of the reasons for creating these investment vehicles, a developed collective investment undertakings sector positively influences exchange markets. Institutional investors' presence generates new financial instruments. For example, we can talk about the re-financing of credit institutions through capital market, about initial public offers or capital accruals by new issuances, but we must notice that such operations cannot end up successfully without an available capital on the market.

Moreover, we must not disregard the role of the collective investment undertakings in the development of other sectors/areas of financial markets. Insurance societies (on their own or through their products) and pension funds find in collective investment undertakings an attractive investment instrument in the long term. At the level of banking groups, in the context of a low rate of interest, which does not encourage deposits, financial resources can be efficiently attracted and maintained by the development of collective investment undertakings. For investment firms, collective investment undertakings represent the clients with the largest turnover.

Besides, the setting up of private collective investment undertakings may be beneficial to the trading companies which were taken over for management, by implementing management projects strictly oriented to their organic growth.

1. Legal impact on the sector development

Current regulations in the domain of the collective investment undertakings have as main reference Law no. 297/ 2004 on capital market, which, for the first time, made the following classification:

- undertakings for collective investment in transferable securities – UCITS (open-end investment funds and investment companies), harmonized with Directive no. 85/ 611/CEE for coordination of legal and administrative papers regarding certain undertakings for collective investment in transferable securities – UCITS Directive;
- other collective investment undertakings (closed-end investment funds and closed-end investment companies).

According to the investment policy, there are four main categories of open-end funds. The criteria for this categorization are set out by the European Fund and Asset Management Association (EFAMA):

- equity funds (66% permanent minimum exposure of portfolio);
- fix income instruments funds (with a portfolio made up of bonds, maximum weight of shares 10%);
- monetary market instruments funds (with a portfolio made up of fix income instruments and money market instruments, with a maximum period of 1);
- diversified funds (with a portfolio consisting in different classes of financial instruments).

Obviously, the use of the name of the category one UCITS belongs in its documents makes it more transparent and facilitates the work of selection of the potential investor.

The institutionalization of this classification or of a similar one may, however, have an undesired impact for managers, who will have to rewrite the propositions in the prospects referring to the investment policy.

UCITS Directive created a common regulatory frame for all entities from Member States. We must consider that UCITS are designed for all types of investors, including those without experience on financial markets. Consequently, the building of the European legislation to the following principles:

- diversification of the portfolio on the risk spreading principle;
- continuous issuance and compensation of participation titles;
- multiple levels of supervision: depository, financial auditor, competent authority;
- the role of the depository as custodian of the financial instruments from the portfolio;
- high level of transparency/disclosure through regular reports;
- a simplified prospectus, as a means to facilitate the distribution;
- free distribution in all the Member States based on the authorization delivered by the Home Member State;
- supervision carried on by the competent authority from the Home Member State.

Even if, legally, the setting up of investment firms, built as joint-stock companies with variable capital, is feasible, there are in Romania only open-end investment funds.

The period 2004-2005 marked the alignment to the European standards through re-authorization of the collective investment undertakings in order to respond to the requirements of the UCITS Directive.

As a result, Romanian open-end investment funds may invest on the regulated markets of member states or of non-member states. As the area of investments enlarges, we can witness the issuance of Romanian products, specialized on geographic areas or economic sectors, fact that offers to open-end funds the character of "gate" to a larger investment horizon. In fact, many small investors preferred to enter directly the stock market, encouraged by the growing trend of the last years. The maturity of the local stock exchange and the gain by

the listed issuers of rates that may lead to price multiples will encourage the population to address to the experts of the domain. Therefore, investors will be equally attracted by investment firms which trade on several markets and offer a professional analysis to their clients and by investment funds.

Another new way, which must not be ignored by the management companies, is represented by the possibility of the free distribution of open-end funds on other markets, based on the authorization granted by the Romanian National Securities Commission. In the near future, the local stock exchange will offer good developing opportunities, based on the developing economy. The rhythm of growth of the economy is superior to that of member states, being reflected in the financial results of the listed companies. Romanian funds can therefore compete successfully with funds with longer tradition.

One very important segment of the funds market is represented by the other collective investment undertakings (AOPC). In fact, every Member State has its own AOPC system, the national legal framework being tailored to the local market's tradition and to the needs of national investors.

In Romania, this system began to take shape clearly after the adoption of Law no. 297/2004.

Until that date, we could only talk about investment firms, functioning with respect of the Law no. 133/1996 for transforming Private Property Funds in investment firms and about risk venture funds regulated by the Government Ordinance no. 20/1998 regarding the setting up and functioning of the risk venture funds.

From their beginning, investment firms played a central role on the Romanian capital market. By their very goal – the transfer of the public property to private property, investment firms proved to be an essential element in the development of a healthy market economy. Investment firms represent important providers of liquidity at the Bucharest Stock Exchange, as well as significant shareholders which can lead to an increase in the number of traded firms, through the listing of the firms from the portfolio.

The legal framework did not encourage the development of risk venture funds.

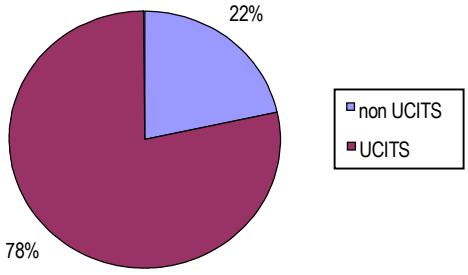
The changes of the regulation in 2004 represented the starting point for the creation of an AOPC system, similar to that from the developed countries. Resources can be collected both through public offer and through private call. Consequently, an AOPC is an attractive investment instrument for the persons who want to take a higher risk. Due to their permissive investment policy, AOPC can actively take part in the management of the firms from the portfolio and adopt long-term investment strategies, with potential high efficiency. The adoption of such strategies can generate a low level of investment liquidity in AOPC. The legal framework is flexible and allows the collective investment undertaking to fix compensation data.

CNVM encourages the development of a strong collective investment undertakings market. Due to the secondary regulation in 2004-2005, new AOPC were created, classified according to their investment policy: diversified, permissive, for qualified investors, restrictive, moderate, guaranteed, specialized in the multiple classes of financial instruments.

2. Size and structure of local and european market

Regarding the structure of the collective investment undertakings market in the EFAMA member states, the most important part is played by UCITS. The explanation is that they address mainly to retail investors and in the European Directives that allow free distribution.

On 30.09.2007, the total volume of collective investment undertakings' assets of the EFAMA member states was of 8115 billion Eur.



Source: www.efama.org

Figure 1. *Structure of collective investment undertakings market in EFAMA member states: non UCITS and UCITS*

At the end of 2007, UCITS assets were of 257,84 mil. Eur; AOPC (except investment firms) had total assets of 49,19 mil. Eur, and the 5 investment firms - 3108 mil. Eur.

Except investment firms, the local market structure is similar to that of EU member states. The main explanation is that AOPC strongly developed after the adoption of the legal framework during 2004-2005.

The situation reverses if we take into account the assets of investment firms.

The Romanian market is still at an incipient level of development; the activity of collecting financial resources through these investment vehicles is not yet at its true potential.

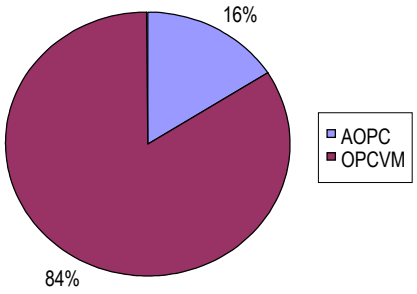
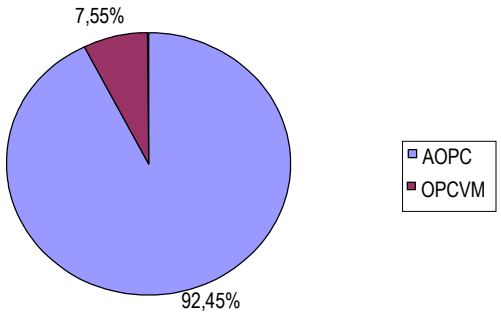


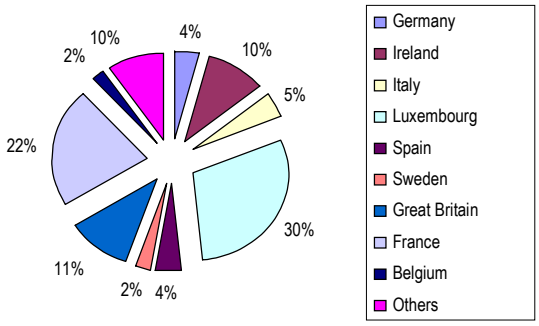
Figure 2. *Structure of Romanian collective investment undertakings market (except investment firms): UCITS (OPCVM) and other collective investment undertakings (AOPC)*



Source: www.unopc.ro

Figure 3. *Structure of Romanian collective investment undertaking market (including investment firms): OPCVM and AOPC*

In order to analyze the possibilities and the means of growing of the local UCITS market, we must notice the structure of the European market.



Source: www.efama.org

Figure 4. *UCITS market structure:*

The country's area and its economic development do not necessarily represent the main factors for the development of collective investment undertakings. Ireland, for example, is surprising with 10% - market share and Luxembourg with 30%.

Luxembourg is an example of success in the field. The first collective investment undertaking was founded in 1959. The national regulation anticipated UCITS Directive, because since 1983 the necessary background for investment firms was created (SICAV). Through rapid implementation of the Directive, Luxembourg brought a competitive advantage for authorized UCITS which had access to free distribution before UCITS from other Member States. From the fiscal point of view, SICAV do not have to pay taxes on capital gains, being imposed only an annual tax which varies between 0.01% and 0.06% out of their assets.

Due to fiscal advantages and expertise accumulated in the field, Luxembourg is the country which attracted the most the establishment of UCITS from many Member States. Management delegation or distribution facilitation systems are used, like, for example, transfer and payment agencies, with the role of keeping investors' evidence in the states subject to the distribution.

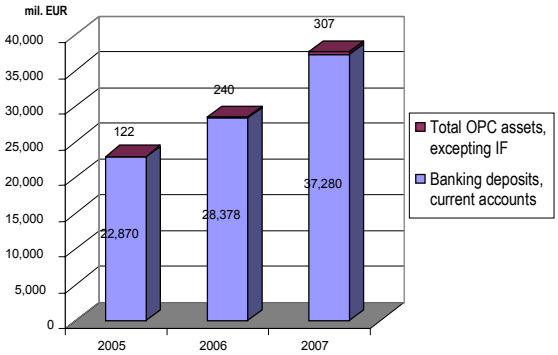
Ireland is a country with a remarkable evolution in the domain of collective investment undertakings. Fiscal regulation exempts non-resident investors from profit tax or capital gains for investments in UCITS.

The perspectives of the Romanian Collective investment undertaking market are tightly connected to the creation of an unique, functional market.

3. The potential of local market

The potential of local market can be illustrated comparing the total assets of collective investment undertakings and the total value of banking deposits, deposit certificates and current accounts to credit institutions.

Collective investment undertakings' assets are less than 1% of the total savings kept in credit institutions. As development rhythm, the growing of the investment in funds surpassed that of the savings through credit institutions, in 2006 as compared to 2005 (97% compared to 24%), but the tendency was not in the same direction in 2007 (27% as compared to 31%). We cannot talk yet about a reorientation of investments from banking deposits to funds' market.



Source: www.unopc.ro, www.bnro.ro

Figure 5. *Total assets of collective investment undertakings, except investment firms and banking deposits*

The growing potential is reflected by the index Total assets/PIB. If we consider Poland, Hungary and Czech Republic we can say that the doubling of the assets of the collective investment undertakings is an easily reachable goal. An argument in this sense is represented by the evolution of the developed countries during 1996-2006. In 1996, the indicator was 35% in France, 16% in Great Britain, 19% in Germany.

Table 1

Country	Total assets/GDP (%) 2006
Romania	2.97
Czech Rep.	5.40
Poland	14.19
Hungary	14.32
Germany	47.37
Great Britain	48.32
France	91.96
Ireland	482.00
Luxembourg	6531.43

Source: World Bank (GDP), EFAMA (Fund Assets), UNOPC.

4. Possible evolutions of the regulatory framework at european level

The Directive regarding financial instruments markets (MiFID), that standardizes different types of requirements: operations of intermediaries, execution of transactions, categorizations of clients according to their investment experience, as well as disclosure and reporting post-transaction requirements excludes from its field the UCITS. UCITS are mentioned according to their quality by clients of an intermediary, so they are classified as eligible counterparty (therefore they can choose a higher level of protection). UCITS are mentioned as well as regarding the relation between client and intermediary. In order to provide portfolio management services or investment advice, the investment firm draws up an adequacy test to its client. Information is obtained about: investment objectives, financial state, knowledge and experience. The denial of the client to transmit the information will lead to the non-providing of the investment service or to the limitation of the advice given by the investment firm.

In the situation of the services of buying and selling of financial products, the investment firm makes an appropriateness test, which evaluates the way how the client understands the risks he assumes by entering a transaction. Many participation titles issued by UCITS are non-complex financial products; in this case, the test is not necessary.

For the management of individual accounts, the investment firms are applied a series of provisions regarding the relation with their clients, the execution of transactions and reporting.

The UCITS Directive brings a series of provisions which must be concretely implemented in the national legislation. One of the most important provisions is that referring to risk management, resulted from the transactions with derivatives. The recommendation of the European Commission no. 2004/383/EC contains a series of principles of uniform evaluation of the market risk. As regards the UCITS with a sophisticated investment policy, we recommend to apply the VaR method, which sets the maximum loss in a period of time, with a certain assumed degree of trust. Besides, stress test measures the effects of the extreme movements of the market.

At this time, we cannot talk about a unification of the methods of risk assessment of the investments made by UCITS at European level. However, risk management represents a complex and actual issue and a means of investor protection and improvement of trust in this type of investment.

A series of changes in the European regulations will reconfigure the current structure of the European market: the replacement of the simplified prospectus with a standardized document (Key Information Document), the management by a management company of authorized UCITS in different Member States. The possibility of using the mechanism of the private investment for cross-border distribution of participation titles issued by other collective investment undertakings is also considered.

In our opinion, the development of Romanian collective investment undertakings can be influenced by a series of factors, as follows:

- the introduction of a fiscal regime, favorable to the investment in such vehicles;
- the identification of legal and operational mechanisms that allow for the delegation of the management firms' functions (like, for example, back-office activity), in order to improve costs;
- the use of the free distribution of UCITS in Member States;
- the enlargement of the investment geographic area of collective investment undertakings;
- the development of financial products related to the funds evolution: unit link, structured deposits;
- the introduction of new types of collective investment undertakings (for example real estate).

Last year's increase in the number of collective investment undertakings proves the growing investors' confidence in their capacity to assure similar performance to other investment opportunities.

References

Anghelache, Gabriela (2004). *Piața de capital. Caracteristici, evoluții, tranzacții*, Editura Economică, București

Anghelache, Gabriela, Nan, S. Badea, D., Ioacără, A. (2005). *Reglementări actuale pe piața de capital*, Editura Economică, București

A consumer's guide to MIFID – Investing in financial products, CESR februarie 2008

Comisia Națională a Valorilor Mobiliare, Raport de activitate 2006

Council Directive of 20 December 1985 on the coordination of laws, regulations and administrative provisions relating to undertakings for collective investment in transferable securities (UCITS) (85/611/EEC)

Commission Recommendation 2004/383/EC of 27 April 2004 on the use of financial derivative instruments for undertakings for collective investment in transferable securities (UCITS)

White Paper on enhancing the single market framework for investment fund, Comisia Europeană 2006

www.bnro.ro

www.cnvmr.ro

www.unopc.ro

www.efama.org

Optimization of Management Decision by Network Method used for Chipboards Manufacturing

Viorel Lefter
Ph.D. Professor
Academy of Economic Studies, Bucharest
Ivan Cismaru
Ph.D. Professor
George Bobeică
Candidate Ph.D.
Transilvania University, Brașov

Abstract. *The paper presents a method of an economic analyses through which the bases of the management decision may be set in order to optimize the chipboards manufacturing activity. The method is focused on the national and efficient capitalization of raw materials, as network rate assortments, and depending on the stocks situation within the store, to establish momently the optimal recipe to be implemented according to the manufacturing expenses and the profit implicitely, this recipe being variable in time depending on the supply possibilities.*

Key words: management decision; efficient caiptalization of raw materials; manufacturing expenses; profit.

1. General elements

Chipboards manufacturing represented and represents the technical and technological solution for wood recovery – generally wood with no industrial uses as timber or veneers – related to the low quality small-sized wood, neglected by industry and set as fuel for combustion – source of thermal energy.

The design and introduction within the economic area of the chipboards manufacturing technology mainly ensured the wood recovery from branches, splitwoods, slabs, sawdust, etc., randomly rated, but sometimes influencing the boards quality (example: excessive use of small-sized branches with high bark content or sawdust).

The recipes applied in industry refer to the simultaneously use of many raw material assortments as rates, with no influence upon the product quality and the manufacturing costs, and thus the profit to be reduced under the company expected limits.

Under these conditions, a real analyses of the recipes applied by other chipboards manufacturing companies is imposed, in order to design other possible recipes that can represent the base of the management decision optimization, after performing some attentive economic tests.

2. Study of case - a chipboards manufacturing company

The analyses of the industrial activity for chipboards manufacturing was performed at PAMOF Company – Curtea de Arges for 8 months. The output and assortments are presented in Table 1.

Output and assortments at PAMOF Company

Table 1

Thickness / Month	8 mm	12 mm	16 mm	18 mm	22 mm	25 mm	28 mm	Total
January	18	128	823	276	61	9	29	1344
February	46	77	817	277	66	0	52	1335
March	19	186	1135	450	184	0	0	1974
April	0	52	402	298	68	21	24	865
May	111	240	912	288	0	0	23	1574
June	0	199	800	415	88	0	83	1585
July	127	158	781	358	0	24	64	1512
August	32	52	1021	466	0	0	0	1571
I-VIII	353	1092	6691	2828	467	54	275	11760

The achievement of this production, both quantitative and qualitative, was performed by using different raw material assortments.

When analysing the situation of assortments recovery within an aleatory system, depending on the „current store amount" during 8 months, the following situation presented in Table 2 resulted.

The situation of wood assortments recovery for chipboards manufacturing at PAMOF Company

Table 2

Nr	Month	Consumed wood mass m^3	Beech splitwood (%)	Softwood splitwoods (%)	Diverse splitwood (%)	Beech wastewood (%)	Softwood wastewood (%)	Beech sawdust (%)	Cost/m^3 wood mass (lei)
1	January	2198,80	28	8	2	56	-	6	37,40
2	February	2230,80	20	2	-	62	7	9	33,82
3	March	3220,00	73	-	25	20	-	5	47,85
4	April	1422,00	-	-	-	90	-	10	27,91
5	May	2650,50	47	-	-	42	-	11	40,27
6	June	2580,00	41	-	5	50	-	4	43,25
7	July	2522,00	44	7	35	38	-	8	43,46
8	August	2566,00	47	-	-	43	-	10	43,57
9	Average	2423,77	41,5	2	8,37	46,4	0,8	7,7	40,84
10	Total units (m^3)	19390,16	8043,44	397,05	313,94	8993,25	156,15	1486,33	

Table 2 pointed out that the raw material assortments were used as high rates within the networks, as follows:

- Beech splitwoods – 20 ÷ 73%
- Softwood splitwoods – 2 ÷ 8 %
- Diverse species splitwoods – 2 ÷ 35%
- Beech wastewoods – 20 ÷ 90%
- Softwood wastewoods – max. 7%
- Beech sawdust – 4 ÷ 10%.

The wide use domain of different assortments within the networks had as a result a high profit fluctuation, as resulted from Table 3.

When simultaneously analysing table 2 and 3, it resulted that the influence of the used recipe upon the profit can not be concluded. As pointed out from February, some looses and a profit are recorded, although the rate of beech splitwoods is about 20% and that one of beech wastewoods is about 62%, comparing to March, when a profit is achieved, but the rate of beech splitwoods is about 73% and that one of beech wastewoods is of about 20%, knowing that the price of beech splitwoods is almost double than that one of beech wastewoods.

Recipe-profit situation achieved at PAMOF Company

Table 3

Month	January	February	March	April	May	June	July	August
Total incomes (lei)	381695,51	387537,46	582556,97	254178,82	497552,49	476463,58	477301,18	454992,42
Total expenses (lei)	365440,43	389977,33	574566,73	253674,47	448086,81	465772,17	438862,89	445568,53
Profit (lei)	16255,08	-2439,87	7990,25	504,35	49465,68	10691,41	38438,29	9432,89

Under these conditions, with respect to the recipes practiced by PAMOF Company during 8 months and knowing that no definite interaction between recipe and profit can be achieved, the idea of networks optimization depending on the profit was followed out, in order to apply the recipe for maximum profit shifted with any store situation.

3. Recipe-profit correlation

After the previously mentioned conclusions, the design of some rate assortment recipes was pursued and the cost of raw material integrated within the final product unit (m^3) was established as well.

Table 4 presents a recipe structure, proposed within the paper, with the estimate elements that finally define the cost of integrated raw material.

Economic analyses under comparativ system for different types of composites with synthetic and mineral binder.

Similarly with recipe 1 already presented in Table 4, other recipes were synthetically presented in Table 5.

Chipboard with hardwood exclusively used – Recipe 1

Table 4

Used wood assortment	Partici-pation rate (%)	Wood amount integrated within the product (m^3)	Medium efficiency m^3 wood/m^3 product	Wood volume integrated within the product (m^3)	Unit price of raw material integrated within the product (lei/m^3)	Cost of raw material integrated within the product (lei/m^3)
0	1	2	3	4	5	6
Round wood	30	0,3		0,492	150	73,8
Splitwoods	20	0,2		0,328	200	65,6
Slabs and techno-logical wastes	40	0,4	1,64	0,656	120	78,72
Sawdust	10	0,1		0,164	100	16,4
TOTAL	100	1		1,64		234,52

Structural synthesis of the proposed recipes

Table 5

Recipe	R1	R2	R3	R4	R5	R6	R7
Round wood (%)	30	20	10	30	30	20	20
Splitwoods (%)	20	20	20	30	40	30	40
Slabs and technological wastes (%)	40	50	60	30	20	40	30
Sawdust (%)	10	10	10	10	10	10	10
Cost of raw material integrated within the product (lei/m^3)	243,52	229,6	224,68	247,64	260,76	242,72	255,84

When analysing data from Table 5, it results that the cost level of raw material integrated within the product unit depends on the recipe, ranging from 224,68 lei/m^3 to 260,76 lei/m^3.

In order to achieve an efficient and positive action, a complex analyses was performed, resulting the wood use factor for each recipe, depending on the chipboard market prices and according to the boards thickness, as resulted from Table 6.

It is noticed from Table 6 that the wood use factor (as ratio between the market product price and the raw material price) distinctly depends on the boards thickness and the used recipe.

Within the industrial reality, the thicknesses are produced based on orders of different rates from one month to another and, consequently, these may not set as base for the decision optimization, but the recipe may be the element used for establishing the management decision related to the manufacturing optimization.

Data recorded in Table 5 are graphically represented as shown in figure 1.

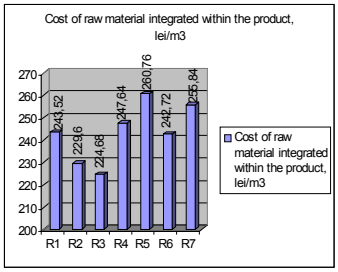


Figure 1. *Cost of raw material integrated within the product*

Use factors of wood recovery depending on the boards thickness

Table 6

PAL assortment mm	Porduct value		The value of wood material integrated and the recovery factor													
			Recipe 1		Recipe 2		Recipe 3		Recipe 4		Recipe 5		Recipe 6		Recipe 7	
	Euro/m^3	Lei/m^3	Value	Use factor	Value	Use factor	Value	Use factor	Value	Use factor	Value	Use factor	Value	Use factor	Value	Use factor
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
8	114	399		1,70		1,74		1,78		1,61		1,53		1,64		1,56
12	102	357		1,52		1,55		1,59		1,44		1,37		1,47		1,40
16	80	280	234,52	1,19	229,6	1,22	224,68	1,25	247,64	1,13	260,76	1,07	242,72	1,15	255,84	1,09
18	74	259		1,10		1,13		1,15		1,05		0,99		1,07		1,01
22	71	248,5		1,06		1,08		1,11		1,00		0,95		1,02		0,97
25	56	196		0,84		0,85		0,87		0,79		0,75		0,81		0,77

When analysing figure 1 and Table 5 it results that the recipe has direct, visible, and quantified influences upon the profit and it can be used as element for the economic optimization of the product manufacturing.

Certainly, the seven proposed recipes are not exclusive, an improved and meticulous study can be performed using a special software in order to define the best solution depending on:

- the situation from the store related to the raw material assortments;
- the supply prognosis;

- the period of activity on the operation line;
- assortment structure of the manufacturing according to the backing of orders;

2. Conclusions

The idea launched within the framework of the paper, to decide managerial the chipboards manufacturing recipe depending on the situation of the raw material stocks, under the terms of some minimum manufacturing costs and a maximum profit achieved, present a series of advantages such as:

- it can be processed through a permanent report on the situation of stocks into the store and with the recipes program introduced within the decisional block the manufacturing process can be checked, establishing rapidly and in real time an optimal manufacturing network for a given moment;
- it can be defined the recipe application time, depending on the stocks from the store and the consumption, according to the recipe;
- it can be anticipated the next recipe if no changes on stocks occur caused by the supply;
- it can be rapidly changed the recipe depending on the rhythm of supply with raw material and the change of stocks, thus the manufacturing remaining up to the maximum efficiency;
- it can be anticipated the supply with raw material depending on the optimal recipe to be practiced;
- it can be rapidly assessed the economic effect of a recipe use, achieving „active economic analyses", in real time, supporting managerial decisions;
- it can be rapidly calculated the profit and looses depending on the used recipes and it can be decided the maintenance in activity, the tehnological process restriction or stop, until the stocks are complete, in order to use efficient recipes;
- it can be established the store dimensions depending on the optimal manufacturing recipe;
- it can be established the current chapter size, monthly, for supply with raw material assortments, depending on the optimal manufacturing recipe;
- the software can be completed and extended (respecting the proposed method) in order to establish the effects of any recipe where the assortments combination is performed (with lower variation limits);
- optimization of the manufacturing recipe is achieved depending on the minimum stock (as recovery time) – for the raw material assortments under analyses and after the moment that one assortment from the recipe under study was finished.

The method proposed can be used by any company specialized in chipboard manufacturing, but connected to a computer system that must correlate data from:

- the raw material store, in order to supply the amount situation of stocks;
- the supply situation, with the schedule dynamics of assortments amount;

- the cost situation for the assortments supplied and introduced into the store.

The problem of supplied assortment costs is very important because these costs can be different and they can strongly influence the cost per product unit, depending on the recipe participation rate. It can be increased or decreased and thus it influences the product.

The permanent introduction of the supply costs for the raw material assortments arrange the recipes from the point of view of the manufacturing economic efficiency, and thus, mentioning the decision action under the uprightness area, the product and company under the maximum profitability (depending on the supply juncture complexity).

References

Bobeică, B., „Metoda de analiză, aplicate la produsele compozite pe bază de lemn, prin valorificarea lemnului de mici dimensiuni", referat de doctorat, Brașov, 2004

Bobeică, B. „Analiza comparativă a producției, consumului și comerțului de produse compozite pe bază de lemn în contextul aderării la UE", *Conferința Națională „Cercetare-dezvoltare în domeniul lemnului,* București 16-17 iunie 2005, ISBN 973-635-521-7

Bularca, M. (1996). *Fabricarea plăcilor din așchii și fibre de lemn – Tehnologii moderne,* Editura Tehnică, București

Cismaru, I. (2005). *Proiectarea tehnologică în industria lemnului*, vol. I, Editura Universitatea Transilvania Brașov, Brașov, ISBN 973-635-530-6

Cismaru, M. (2005). *Fizica lemnului și a materialelor pe bază de lemn*, Editura Universitatea Transilvania Brașov, Brașov, ISBN 973-635-219-6

Curtu, I., „Cercetări experimentale privind rezistența unor compozite lignocelulozice". *Simpozionul Academiei Militare București,* 1994

Gay, D. (1990). *Materaux composites*, Editura Hermes Paris

Planckett, D., „Composite processing. Procedings IUFRO", Tampere-Finlanda, 6-13 august 1995

Intellectual Capital and Intangible Assets Analysis and Valuation

Ion Anghel
Ph.D. Senior Lecturer
Academy of Economic Studies, Bucharest

Abstract. *Today the intellectual capital is a key factor in company's profitability. Two major forces have driven the high performance workplace over the past two decades: globalization and increasing in technological changes. In this environment, the intellectual capital and intangible assets is fundamental to success. In the new economic competition, knowledge assets provide a sustainable competitive advantage. The measurement is fundamental to support management decision in allocation investment and investor's decision regarding the value* versus *price. In our research we consider a group of Romanian listed companies on Bucharest Stock Exchange and analyze the importance of intangible value into the total market value of the equity. From accounting point of view the importance of intangible assets is very low but from the market evidence was indicated 47% importance of intangible value in total market value for the Romanian listed companies.*

Key words: intellectual capital; intangible assets; analysis and valuation; valuation methods.

1. Introduction

Intellectual capital consists of the stock and flow knowledge available to an organization. These can be regarded as intangible resources which together with tangible resources comprise the market value of a business.

Bontis (1998) defines intangible resources as the factors other than financial and physical assets that contribute to the value-generating processes of a company and are under its control.

Today the intellectual capital and intangible assets are the key factor in company's profitability and success. In actual economic competition there are two major trends:

1) Globalisation is probably the most important force affecting the contemporary world: people, cities, companies, markets, economies etc. In this context there are new opportunities (or threats) for businesses:

a) *New markets.* Today cross border activities and transactions are commonplace. The internationalisation of finance processes or geographical decentralization of production continues to grow ("des-industrialization of the West").

b) *New products and new services.* Increasing flows of peoples and ideas across space, development of multinational corporations etc. affect the products boundaries.

2) The second trend is the major increasing of technological change, emerging the new information and communication technologies. This has resulted in a decline in the price information and in the rapid growth in international electronic networking.

The intangible point of view looks at the economy or individual entity as a combination of three ingredients: resources, flows and transformations of resources. Resources could be tangible, financial or intangible.

The intangible perspective stressed on resources that are not material and considered the importance of this hidden wealth for companies and the national economy.

Drucker (1993) considers that intangible assets induced a process of transformation of the society. His process has created a society in which the major resource is knowledge. In the "knowledge society" values are created not by the allocation of capital or labour but by innovation.

In accordance with Drucker (1993) there are three phases in the development toward the "knowledge economy":

1. Industrial Revolution (1750-1880), companies used knowledge to produce tools and products;

2. Production Revolution (1880-1956), companies used knowledge to improve labour processes;

3. Management Revolution (after 1945), companies use knowledge to improve knowledge.

2. Intellectual capital definition

In the 1990s was developed the concept of intellectual capital, when people realized that two problems regarding the company's management

and valuation are only two sides of the same coin:

- what you want to manage you have to measure;
- what you can measure you could manage.

Intellectual Capital represents the fusion between these two streams of though (Roos et al., 1997).

Today the (intangible) economy is based on intellectual capital and the prime commodities are knowledge and information.

Markets of all types require information in order to function. Investors must know what sellers are offering and what is the price in comparison with value. A couple of studies observed increasing the importance of IC and intangible value 60-75% in corporate value (Lev, 2000).

On the other hand intellectual capital management has been found to be significant for the firm's long-term success. Firms managing their IC outperform other companies (Brennan, Connell, 2000).

The intellectual capital of an organization is formed by its human capital (the know-how of its employees) and by "*its structural capital (its organization and its intellectual property)"* (Encyclopédie de la gestion et du management, 1999, p. 110).

Analyzing this definition we can see that the central point of the intellectual capital theory is given by a new approach, which considers knowledge (human or organizational) as a specific resource, and even as a capital, with all the related consequences, for the individual or for the firm. Marshall, for instance (cited by Nahapiet, 1998, p. 245), considers that "*capital consists in a great part of knowledge and organization…Knowledge is our most powerful engine of production*", this being, in fact, the economists' point of view on the issue. The management science has brought, afterwards, many contributions on the topic (Stewart, Kogut & Zander, Nonaka & Takeuchi, Spender etc.).

The emergence and fast development of the intellectual capital concept have also touched, in the most pragmatic ways, the accounting and finance fields. Therefore, it is a real challenge to measure and valuate the intellectual capital of a firm, especially due to the fact that financial reporting has not yet developed an accurate set of tools in order to disclose it to its beneficiaries. "*We easily admit the importance of immaterial issues, but at the same time we omit to make the efforts justified by their importance*" (du Montcel, 1997, p. 1722), this referring to accounting measurement, recognition, disclosure and normalization.

The concept has a strategic importance for the business valuation, and the specialists are looking for practical means to properly valuate this key element for the firm, especially in the present economic context, characterized by an increasing number of mergers and acquisitions (with two main consequences – determining the value of the business and determining the post-transaction strategy of the firm). Guillard and Roussel consider that the great loss

of the HP-Compaq titles after 2001 (a loss of value of 7.6 %, in a growth context for the market) is due to the improper management of the intellectual capital and especially of the human capital, after the '99 gigantic merger (Guillard, Roussel, 2005, p. 401).

3. The structure of intellectual capital

The roots of he intellectual capital concept run deep. The economist John Keneth Galbraith developed the term "Intellectual Capital" in 1969 and Peter Drucker spoke about "knowledge workers'".

"Intellectual capital is intellectual material – knowledge, information, intellectual property, experience – that can be put to use to create wealth" (Stewart, 1997).

The intellectual capital of an organization is formed by its human capital (the know-how of its employees) and by its structural capital (its organization and its intellectual property).

The major components of intellectual capital are human capital (which is the potential of company's intangible value) and intellectual assets and intangible properties.

Human capital is the knowledge residing in the heads of employees that is relevant to the purpose of the organization. A good human capital management could create intangible value for the company.

Intellectual capital and its major components

Table 1

Potential intangible value	Intangible value	
Human capital	**Intellectual assets**	
➢Experience ➢Know – How ➢Skills ➢Creativity	• Programs • Invention • Databases	• Methodologies • Documents • Drawings, Designs
	Intellectual property • Patents, Copyright • Trademarks, Trade Secrets	

In the context of business valuation it is important to understand the value of the entire company like a sum off all assets (tangible and intangible). In this context we could classify the company assets in:

a) Generic assets

This class includes things that are generally not differentiable, such as land and buildings, other fixed assets (machinery and equipments), cash, receivables, inventories etc.

b) Unique assets

Represent an unique set of assets. No other company has exact set of skills, abilities, knowledge, innovations, patents, trademarks, copyrights or secret process.

These assets are not only unique but are also difficult to duplicate. If another firm wished to duplicate them it would take a considerable amount of time and resources to do so.

c) Differentiable assets

This class of assets is often not unique. It includes assets such as manufacturing and distribution, which while similar to those found in competing firms are different in some ways from those of competitors. For example, although all companies in the steel industry have fabrication facilities, no

two are alike. They differ in size, shape, complexity, production rate, cost structure.

In the Figure 1 we present the market value of the company between the liquidation value of the generic assets and market value of generic assets plus intangible assets market value.

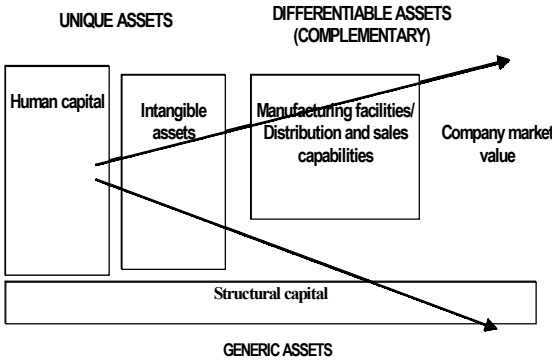
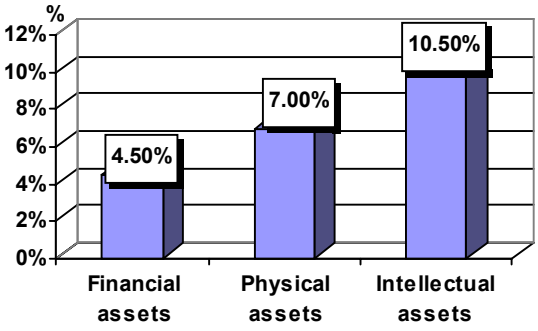


Figure 1. *Assets structure of company*

In the actual economic context the role of the management is to create a company value over the value of generic assets. Today the success of the company depends on the management ability to change human capital (the potential value) into an intangible assets of the company (like as brand, patent, trade secrets, copyright etc.).

4. Intellectual capital valuation. Romanian listed companies intangible value – case study

Intellectual capital valuation is a new and provocative issue in the last two decades. Today investments in intellectual assets are more profitable than investments in physical and financial assets. Based on Lev (2000) investments in intellectual assets represent a 10.5% return in comparison with 7% return on investments in physical assets return or 4.5% return in financial assets.



Source: Baruch Lev, New York University.

Note: return on investments in financial assets is based on 10-year average return on US treasury bonds; return on investments in physical assets is based on average ROE for all companies with physical assets and inventories; return on investments in intellectual assets is based on average ROE for the computer software and biotechnology industries.

Figure 2. *Average after tax returns on financial, physical and intellectual assets*

In accordance with Petty and Guthrie (2000) point of view, there is no generally accepted theoretical model for understanding and measure IC. On the last 25 years several models have been developed:

Economic Value Added (EVA™)

EVA™ method of value measurement has its bases in the traditional accounting. As defined by Stern Stewart, EVA™ is the difference between a company's net operating income after taxes and its cost of invested capital (equity plus debt).

The goal in calculating EVA™ is to arrive at earnings that are close to cash and compare with the return on invested capital.

EVA™ is not a very new concept because it is an economic term related with income and capital concepts. In 1890 the economist Alfred Marshall defined economic profit as total net gains less the interest on invested capital at the current rate.

Market Value Added (MVA™)

MVA™ method, similar to EVA™ derives from the Alfred Marshall concept of "economic profit". MVA is the difference between actual market value of the company (invested capital) and the present value of invested capital. In other words MVA™ is the difference between "cash out" or what investors could get by selling at the present conditions of firm and market, and "cash in" or what investors contributed over the years from the beginning of the firm.

Tobin's Q Ratio

Named *Q ratio* or *q* this is the market value of invested capital relative to assets replacement cost (Tobin, 1969). The economist Tobin, a Nobel Prize winning, developed it as a measure to help predict investment decision independent on macroeconomic factors such as interest rate. Tobin's Q ratio was not developed as a measure of intellectual capital, but former Federal Reserve chairman Alan Greenspan has noted that high Q and market to book ratios reflect the value of investments in technology and human capital (Stewart, 1997).

Norton and Kaplan's Balance Score Card (BSC)

BSC was created by Robert Norton and David Kaplan to help managers to transform organization's strategy into a reliable set of performances. This will provide the framework for a strategic measurement and management system. The BSC was developed considering the ability of a company to mobilize and develop its intangible assets.

BSC suggests a view of the firm from four perspectives: Customer, Financial, Internal Business Process and Learning plus Growth (Kaplan and Norton, 1996).

Skandia's IC Navigator

The IC navigator was developed by the Edvinsson and Malone into a Swedish financial services firm named Skandia (Edvinsson, Malone, 1997).

The presumption in this method was that the difference between market and book value of the company represent the value of intellectual capital.

The concept in Skandia IC Navigator was that the market value of a company is equal with Financial Capital plus Intelectual Capital.

Market Value = Financial Capital + Intellectual Capital

Market Value = Financial Capital + (Human Capital + Structural Capital)

Sveiby's Intangible Assets Monitor (SIAM)

Sveiby considers that financial statements are not a good measure of a company's wealth and most of the value of a firm is in "invisible knowledge-based assets".

In accordance with Sveiby, the market value of a company consists of its visible equity and three kinds of intangible assets (Sveiby, 1997).

The visible equity is represented by the book value of the assets and intangible assets are:

- external structure: brands, customer relations;
- knowledge capital: internal structure with management system, legal structure, R&D, software etc.;
- knowledge capital: individual competences with education and experience of the people from the firm.

The Brooking Methodology

Brooking (1998) developed a model to consider the value of the IC belonging to a company.

In accordance with Brooking point of view the components of intellectual capital are:

- market assets: brands, distribution channel, customers relationship;
- intellectual property: copyrights, patents, trade secrets, etc.;
- human centred assets: education and work related knowledge and competences;
- infrastructure assets: management processes, networking, information system.

MVA, EVA and Tobin Q Ratio do not directly measure IC, they were response to the fact that book value of assets of the firm was lacking in valuable information. For our research purpose will calculate Tobin Q ratio and also the gap between market value and asset value (similar with MVA™ methodology).

For analysing the Romanian listed companies intangible value we considered a sample with 14 Romanian listed companies. There are the major Romanian firms with the following illustrative figures for the period 2004-2005:

Data for 14 Romanian listed companies sample

Table 2

mil.Euro

Indicator	2004	2005	%
Total assets	8.716	13.175	51,2%
Total equity	4.165	5.910	41,9%
Operating revenues	3.074	4.034	31,2%
Profit Before Tax	82	770	841,6%
Market value (capitalization)	5.604	11.003	94,9%

Note: values in Euro based on average exchange rate (flow indicators) and end of the year exchange rate (stock indicators)

Our research follows two major objectives:

1. If the book value of intangible assets is important considering the financial reports for sample companies;

2. If the intangible value is important or if the market value exceed the net asset book value (Tobin Q ratio).

Considering the first issue we observe that the importance of intangible assets book value was very low and with a decreasing trend: from 0.4% intangible asset value in 2004 to 0.2% in 2005.

Intangible value ratio

Table 3

mil. Euro

Indicator	2004	2005	%
1. Intangible assets book value (sample figures), mil.Euro	135	32	-76.3%
2. Intangible/ Total assets value	0.4%	0.2%	-50.0%
3. Total equity market value (capitalization)	5.604	11.003	94.9%
4. Net asset (book value)	4.256	5.810	36.5%
5. Indicated intangible value (not recorded in balance sheet)	1.348	5.193	274.0%
6. Indicated intangible value/equity market value	24%	47%	91.8%
7. Tobin Q (Market Value/Asset Value)	1.33	1.89	42.8%

Considering the companies from the sample we observed a decreasing in book value of intangibles from 135 to 32 mil. Euro.

The maximum value of this ratio is 2.9% in case of BRD Company which acquired bank software in 2004. After that, because of amortization, the intangible value of BRD dropped from 340 mil. RON (2004) at around 30 mil. RON (2005).

The minimum value of this ratio is 0% in case of SIF Oltenia in 2004.

It this case it's obvious that from accounting point of view that Romanian listed companies has a small intangible book value. We consider this is due to internal creation of intangible value, and in this case, in accordance with IAS 38 – Intangible assets the company will not record the intangible value.

The second question was related with the existence of intangible value in the total market value of the companies.

We estimate the market value of the equity like average price multiply with number of share issued by the company and after that we deduct the book value of net assets. The difference represent indicated intangible value not recorded in the balance sheet.

Considering data from the sample we have the follow conclusions:

- The market value of the equity (14 companies) increasing with 95% in 2004-2005, from 5.604 mil. Euro to 11,013 mil. Euro;
- The book value of assets (most of them tangible assets) increasing with 37% in 2004-2005, from 4,256 mil. Euro to 5,810 mil. Euro;
- Indicated intangible value is the difference between total equity market value and net assets book value and recorded a large increase from 1,348 mil. Euro in 2004 to 5,193 mil. Euro in 2005;
- The average indicated intangible value growing up from 24% to 47% in equity market value.

The figures from the table 3 help as to observe increasing the gap between the market value of the equity and net asset value in case of the Listed Romanian companies. This is a trend that explains increasing in the importance of intangible value near the value reported for other developed markets (average intangible value is 60-75% in accordance with Lev 2002).

On the other hand there is a small amount of intangible value recorded in the financial reports. We consider that is because of undeveloped market in terms of mergers and acquisitions operations. In accordance with IAS 38 – Intangible Assets and IFRS 3 – Business Combination when intangible assets were internal created could be recorded only when are confirmed by a transaction (merger or acquisition).

5. Conclusions. Further research

In the new economic competition, knowledge assets provide a sustainable competitive advantage. The measurement is fundamental to support management decision in allocation investment and the investor's decision regarding the value *versus* price.

In our research we considered a group of 14 Romanian listed companies and we have trying to understand the importance of intangible value into total market value of the equity.

From accounting point of view the importance of intangible assets is very low (only 0.2% intangible asset in total assets value in 2005).

From the market evidence there is an important gap between market value of equity and the accounting indicated importance of intangible value. Based on our sample the intangible value in total market value is near the figures reported in different research studies for developed countries (47% in 2005 for the Romanian companies versus 60-75% in developed economies).

The trend of the growing importance of intangible resources is obvious. The intellectual capital community and also the financial and accounting community are the movements than can explore this uncharted territory. Possible further intellectual capital research: measuring the value of intellectual capital, describing and explaining the company's success from the IC perspective, methods to diagnose firms problems using IC perspective etc.

References

Andriessen, D. (2004). *Making Sense of Intellectual Capital*, Elsevier Inc

Brennan, N., Connell, B., „Intellectual Capital: current issues and policy implications", *Journal of Intellectual Capital,* 1(3), 2000

Bontis, N., "Intellectual Capital: an exploratory study that developes measures and models", *Management decisions,* no. 36, 1998, pp. 63-76

Brooking, A. (1998). *Intellectual Capital: core asset for the Third Millenium Enterprise*, International Thomson Business Press, London

Copeland, T. et al. (1990). *Valuation: measuring and managing the value of companies*, John Willey & Sons, New York

Drucker, P.(2003). *Post-capitalist society*, New York: Harper Business

Edvinson, L, Malone, M. (1997). *Intellectual Capital: realizong your company's true value by finding its hidden brainpower*, Harper business, New York

Lev, B., "New accounting for new economy", 2000, *available at www.stern.nyu.edu/~blev/*

Lev, B. (2002). *Respons to your questions concerning my testimony before your committee*, New York University, Leonard Stern School of Business

du Montcel, H.T.(1997). *Investissement immatériel*, Encyclopédie de gestion, Economica, Paris

Nahapiet, J., Ghosal, S., "Social Capital, Intellectual Capital, and the Organizational Advantage", *The Academy of Management Review*, Vol. 23, No. 2 (Apr. 1998), pp. 242-266

Nakamura, L. (2003). *A trillion dollar a year investment and the New York Economy*, in *Intangible Assets: values, measures and risks*, New York: Oxford University Press

Petty, R., Guthrie, J., "Intellectual Capital literature review: Measurement, reporting and management", *Journal of Intellectual Capital,* Vol. 1(2), 2000

Reilly, R., Scweihs, R. (1999). *Valuing Intangible Assets*, Mc Graw-Hill, New York

Roos, J. et al. (1997). *Intellectual Capital. Navigating the new business lanscape*, Mcmillan Business, London

Stan, S., Anghel, I. et al. (2006). *Capitalul intelectual al întreprinderii*", IROVAL, București

Stewart, Th. (2001). *The Wealth of Knowledge*, *Currency Doubleday*, New York

Stewart, Th., "Intellectual Capital: The New Wealth of Organization", *Currency Doubleday,* 1997, New York

Sveiby, K., "Methods for measuring intangible assets", 2002, available at www.sveiby.com/articles/IntangibleMethods.htm

Tobin, J. "A General equilibrium approach to monetary theory", *Journal of Money, Credit and Banking,* Vol. 1(1), 1969

*** International Valuation Standard Committee (2007), *GN 4 – Intangible assets*, available at www.ivsc.org

*** International Accounting Standard Committee (2005), *IAS 38 – Intangible Assets, IFRS 3 – Business Combination*, available at www.iasc.org.uk

The list of analysed companies

Name	ALRO SLATINA	ANTIBIOTICE IASI	BANCA COMERCIALA CARPATICA SIBIU	SC BIOFARM SA
Symbol	ALR	ATB	BCC	BIO
Industry	Metal	Health	Financial	Medical
Fiscal Code	1515374	R1973096	R11447021	R341563
Web address	www.alro.ro	www.antibiotice.ro	www.carpatica.ro	www.biofarm.ro

Name	BRD - Groupe Societe Generale Bucuresti	IMPACT BUCURESTI	OTELINOX TARGOVISTE	OLTCHIM RM VALCEA
Symbol	BRD	IMP	INX	OLT
Industry	Financial	Construction	steel	Chemical
Fiscal Code	361579	1553483	921641	1475261
Web address	www.brd.ro	www.impactsa.ro	www.otelinox.ro	www.oltchim.ro

Name	SIF BANAT CRISANA ARAD	SIF MOLDOVA BACAU	SIF TRANSILVANIA BRASOV	SIF MUNTENIA BUCURESTI
Symbol	SIF1	SIF2	SIF3	SIF4
Industry	Financial services	Financial services	Financial services	Financial services
Fiscal Code	2761040	2816642	3047687	3168735
Web address	www.banat-crisana.com	www.sifm.ro	www.transif.ro	www.sifmuntenia.ro

Name	SIF OLTENIA CRAIOVA	SC PETROM SA
Symbol	SIF5	SNP
Industry	Financial services	Oil
Fiscal Code	4175676	1590082
Web address	www.sifolt.ro	www.petrom.ro

International Migration and its Effects on Family

Maria Constantinescu
Ph.D. Senior Lecturer
Cornel Constantinescu
Ph.D. Senior Lecturer
University of Pitești

Abstract. *The crises period that still cross Romania explain, between others, the apparition and development of international migration, after 1990. In a world marked by globalization, migration can not disappear, contrary, it grows bigger ant it remains an interesting subject in future.*

A study about migration consequences on family, specially on children's personality left in the country, is justified because migration is a present phenomena in Romanian space at the beginning of the XXIth century.

We try to analyse the effects of this phenomenon on family. Related to these goal we offer the conclusions obtained from a research realized in Campulung Muscel municipality, Arges county, on a lot of pupils that have parents left in foreign countries and the results to the investigation made in Pitesti municipality. The research showed that it is a relationship between children's marks at school and parent's leaving; children's perceptions on parent's leaving; identifies school's interest level in diminution of the low school performance effects caused by this socio-economical phenomena.

Key words: international circulating migration; clandestine migration; school circumstance; family circumstance; school performance.

1. Migration: definition, meaning, types

A study about migration consequences on family, specially on children's personality left in the country, is justified because migration is a present phenomena in Romanian space at the beginning of the XXIth century. In a world of globalization, migration has no chance to disappear, contrary, it grows bigger ant it remains an interesting subject in future.

Any type of migration means the same thing: disappearing on a period (that can be permanently) on a individual in space. At this general level, any type of migration can be associated with any type of effects. International migration is a very complex phenomenon because it has many forms and characteristics with an emphatic dynamic. Defining international migration as a permanent displacement from a state to another is not enough and it covers only a part from this phenomenon. Different process associated with globalization had emerge to accentuate the movement in the international space; as a proof to this fact is the number of persons involved in international displacement, and countries, as a destination or derivation, have appeared on emigration map.

In Romania international circulative migration is a growing phenomen. In a national test realized in May 2001, 18% from the interwiewed persons stated the intention of departures to work in a foreign country (Serban, Grigoras, 2000, p.31).

But, migration is not a hazard. Migration projects are associated with work projects. This are caused from unemployement and low income (Sandu, 2000).

The job and money are the primary objective of the temporary émigré in a foreign country.

Migration project is always related with family-person life situation, migration experience, community region context and available capital. Related to all this, migration project is internal or external orientated to turism, work, education or residence changing. Romania entered, after 1989, in international migration circuit "the type of trip has an accentuated dinamic: from etnic migration at the beginning of the 90's to frequent trips for trades, migration for work arise at the beginning of the 90's as a prevalent type. The limitation constaited by European countries developed surreptitious migration. Same, destinations rearenge: from countries to Central Europe to the ones from South Europe". In the year 2000, the facilities related to the acces in Schengen space influence the period of the trip."Romanian state in intensifying the efforts related to managing migration and fighting against surreptitious component " (Constantinescu, 2006, pp. 296-297).

Migration based on work contract, characterized by legally terms of leaving the origin country and living on destination country during the job contract and by sanction in case of infringement from contract terms; permanently migration to traditional states of migration; migration for studies, migration for family reunion, changing

place of a family is made, only legally, surreptitious migration for work, repeated changing place on a short period, for trade in near countries can give some of Romanians migration characteristics.

Surreptitious migration for work develops migration networks concentrated on different territories. If, at a national level, we talk about some migration instalment based on adding changing of places specially in some areas.

As a consequences, in those areas there will be released a number of jobs, diminishing number of unemployee. The fact that are pointed out in different areas with a big rate of migration suggests that it will be employee in other areas or it will appear temporar migration or commutation, or the employer will move his activities where is no pressure of growing the salary (Constantinescu, op. cit.).

In circulated migration there is the possibility that the émigré to be reorientated to native county. Keeping contact with native county they can be informed by the new opportunities.

It can appear new types of migration by changing the values that the émigré gives to the places between he moves. If the temporary destination takes positive valence, not only at economical point, but to socio-cultural, it is possible that if the émigré doesn't have a family to native country, temporary migration, to become permanently migration (Sandu, 2000).

Related to all this, we can talk in areas of migration concentration about a diminution of unemployement on a short and medium perioud, but not about increasing the salary.

Younger men are envolved in international departures, so ageing the labour is obvious.

Request of labour is not a homogeneous: it is marked by polarization of overqualified, top areas/ secondary segment of labour. Surreptitious migration is the one who refers to secondary segment and departures based on a work place on both segments. In Romania it has appeared a deficit in some jobs, for example in construction field.

The offer of jobs wich requires a high qualification has the effect "migration of brains". In this situation is offered support for insertion in new society. From the point of view of native country, this type of departures are a lot because the native country doesn't take advantages from investition in education of those people.

On a long term this type of departures affects the capacity of development to native society "wich is privated by it's capable people".

To analyse a research of the effects in economical aspect generated from money that émigré sends to native country, it is necessary to underline that not any type of migration is associated with behavior of sending money from foreign counties. There are associated with sending money: surreptitious migration for work, migration to a secondary segment of labour. There are not associated with sending money; permanently migration of high qualified, neither migration for study or migration for family reunion.

Semnification (positive or negative) to sending money in native country by émigré is connected to economical framework. This can contribute to improvement of currency reserve. This money can be, as weel, a source of inflation. All depends of money spending patterns, on a long term and native state'a ability to influence it (Constantinescu, op.cit).

In generraly, it can be observed that money proceeded from migration are used more for consume than to investments to generate profit. In Romania this kind of money are invested in home reconstruction, or in long terms properties, as cars or electronics. Reorientation of financial resources provided by migration to activities that generates profit can take place after acquisition of all the above properties and it is realized, for example, in acquisition of agricultural instruments in rural areas.

Economical effects on a short term refers to improvement of family life that has emigrated. On a long term, migration can induce economical dependence related to receiving money and migration fluctuation.

There are some opinions which sustain that the ones who beneficiated from received money from foreign countries are not migrants, but the one who provide services and produces proprieties that migrants are buying. Low percentage of investments in activities that generates profit can be explained with existence in native county of some circumstances that hinders investments development. Another factor refers to the fact that migration for work in secondary segment with or without contract doesn't allow to accumulate a large sum of money and migrants' tendency to invest money in proprieties that are considered secure (homes, cars).

Going to a legal status in destination country, associated with a more secure position and bigger income, can generate favorable conditions for family migration.

Above economical implications, migration generates another effects category: at family level. "Growth of migration can be a factor which can generate an increasing of divorce, specially when migration is accompanied with low social control of behaviors and produces social unbalance" (Mihailescu,1999, p. 108)

Migration encourage divorce on many ways generating family disfunctions and conflicts when a husband is missing long period from home, by cultural shocks that appear in families where husbands are coming from different family mediums, by difficulties to adapt of some migrants to new residential conditions, by lower local social control on family behaviors. Departures of one of family member for a period in a foreign country can bring some new rols and functions in family; one of the member that remains home takes head's family role. "Family members to fullfil obligations of the departured one is often felt in a negative manner" (Serban, Grigoras, 2000, p. 52).

Although, migration's effects are always interacting, we can caught some categories: effects on individual who migrates, effects on family, effect above communities, effects above native county.

2. Migration influence on family and children's school performance

In modern society, familie's functions, structure and rol acquaire new valencies. During family history, significant changes have record in economical function, almost in every dimension of it.

Present day society, based on work zone between it's members and on theirs specialisation, drives onto a lots of changes in economical sector, diminuting it's traditional components (Constantinescu, 2004, p. 44).

The XXth century and XXIth century, by their industrialisation, modernisation, social, mobility, migration process have changed individuality's work place, translocating him from inner part of family to external part of family.

Working outside residence makes difficile comunication between husbands, parents and children.

Lack of comunications (a simple exchange of ordinary informations), generates family breachs and misunderstandings, including conflict between generation.

Some problems have been surprised in a study that investigated migration influence on family (one or both parent departure) and children's school performance cast-off into the country.

To analyse factors which influence school performance is revealed D. Potolea's typology (1989). The subject who is at school to study is in permanently interaction with a school teacher and with different conditions of pedagogical process. There are three types of factors which influence pupil's school performance: school medium where pupils are and the way they reports to this (didactic strategy characteristics, teacher's pedagogical ethos, pupil's motivation for learning, anterior school screw plate, pupil's personal characteristics-age); social medium assimilated pedagogical in school (didactical-material school base, socio-moral climate in class, relation pupil-pupil, relation pupil-teacher), social media individually introvuted.

Every person has a social position defined by the provenience medium and the way he interacts to with others. We take into consideration pupil's social provenience medium, pupil's familial provenience medium, parent's interest about school.

The three types of factors influence in different ways pupil's school performance. Theirs effects are cumulative because factors we've talked about works together. The measure of control is changeable. Some of them can be controlled by teacher (didactic strategy, educational style), other less or not at all (provenience media or anterior school channel). In this conditions when they are analysed, school performance is invocated as a determinant of school performance, the control practiced on instructive factors, and as a source of success of uncontrollable factors. That's why, one of the request of growing school performance is extending the control over as many factors as it is possible. For this, it is necessary to know all those factors. School performance is quantified by marks.

The research was realized during 1.02.2006-28.02.2006 and have the hypothesis that parents departure for work in a foreign country generates a diminution of children's school performance during period they are in a foreign country.

Investigation's objective are: to identify the influence that family's departure to work in a foreign country has on children's school performance; to analyse children's perceptions on parent's departures; identifying rate of interest that school has for diminution the effects that this socio-economical phenomena has on pupil.

Investigated population it is represented by a group of 35 pupils from grade school (Vth-VIIIth grades) from Campulung Muscel, Arges County. It has been used the simple fortuitous sampling method. From the investigated subjects, 12 are in grandparent's care, 7 in parent's care who stayed home, one child in ant's care; in 12 cases just father is left, in 4 only mother and in 4 cases both parents left.

Parents departure in foreign country has as a goal professional obligations in the next field: constructions – 4 persons, agriculture – 11 persons, health care, house keeping – 7 persons. One person works as a designer and another one as a doctor. Countries for destination are: Spain, France, Italy, Czech Republic.

Investigation was made based on a questionnaire split in 3 dimensions: first dimension analyses pupil's perceptions to this phenomenon, the second dimension reflects the influence of family's departure on children's school performance, and the third dimension analyses the interest that school gives to pupils in this situation.

It has been analysed school records to compare pupil's school markets before and after their family departure. In this comparative analyse we've took into consideration the fact that modification of this medium, as a progress or regress, is determined by the notified factors and other ones. At the VIIIth classroom, for 51% subjects, results has grown considerable, for 37% the result diminish and for 12% remains unalterable (constant). At VIIth grade school results have diminish for all investigated pupil and at VIth grade for 95,3% subjects the results remains unalterable, in generally.

Analysing the average for the education discipline for VIth grade school and VIIth, we found that an influencing element is the appearance of new discipline, chemistry and physical science, where averages are low, for most of the subjects, generating a diminishing of general average.

At Vth grade school results are unalterable and have grown very little.

As a hole, we can say that for 29% pupils, school results remains unalterable or have grown very little, and for 71% school results diminish more or less significantly besides results they had before parent's departure. Only for 8% results have diminish significantly.

Analysing the result from those two different situations for subjects that had a regress in this period, we found that 51% are children that had low markets, only 20% from them are pupils with good marks.

First dimension of investigation realized with questionnaire refers to pupil's perception on migration phenomena. 60% pupils said that theirs parent should live the country only if it is strictly necessary, 23% said that they would agree with parents departures only for a short period, 13% don't agree with parents departure, 4% are completely in agreement with their parents departure.

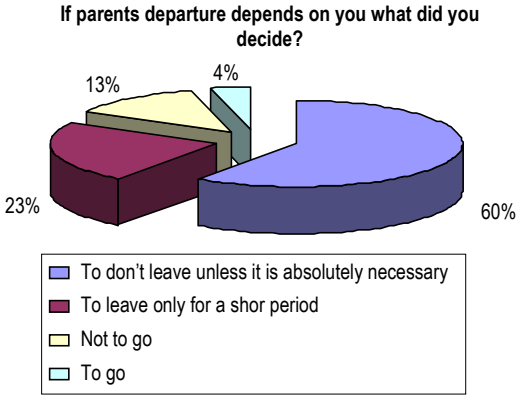


Figure 1. *Children attitude to parents departure*

Pupils who agrees parents departure consider this thing an advantage to parents and to whole family, for the next reasons: "they travel throw many countries", "it's a better life in a foreign county", "they are more peacefull without parents", "have a bigger income". Those who doesn't agree with parents departure brings emottionaly answers: "becose I miss them", "becose I'm worried about them", "it's hard for them and for me, too", "becose we have no one who takes care of us".

Being asked what should they do if they were in parents place, 70% subjects would't leave county, letting theirs children with other persons, 14% said that they should leave, 2% should leave only if is necessary, 14% should leave with children.

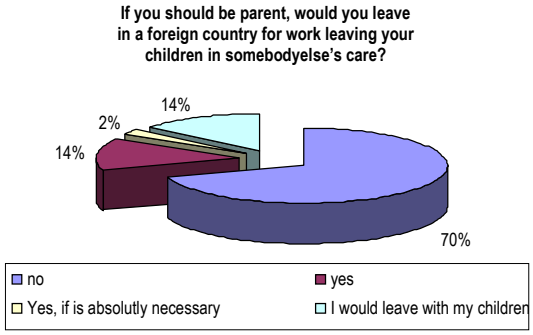


Figure 2. *Parents attitude towards leaving children when ging to work abroad*

Among reasons that would sustain departures by students are: more money, visiting foreign countries, educational reasons, a new career.

58% subjects agreed with parents decision of leaving country and letting children home, becose, if they would leave too, they'll have to interrupt school, 20% of them said that it is more adequate to be next to theirs parents even if that means to interrupt school in native country and start it in a foreign country.

All investigated students sustain that it's acceptable leaving kids in relative's care.

Second dimension shows influence that parents's departure has on children's school performance.

Subject's school behavior, in theirs view, hasn't modified because they present permanently theirs markets to parents, as before (90% from subjects), 10% admit that they present only good marks because is no possibility for directly checking from parents.

Subjects perception on quality school performances during time are't into the country in comparison with the time when parents were home, shows that

students consider that they learn and have good marks as before (60%), learn and have better marks since parents aren't home (30%) learn and have worster results then before (10%).

Subjects which appreciated that their results are worster sayd that: "grandparents don't know how to help me", "I don't study that more", "I feel neglected, nobody helps me".

The ones who have better markets says: "I want to become somebody", "I am appreciating effort that my parents have made and I want to give them a reward".

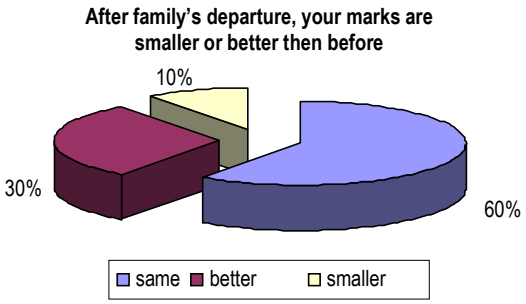


Figure 3. *School evolution of children whose parents leaved abroad*

Further on, is investigated the support that school gives to children in this situation. Communicating to student's family marks by school is appreciated as very important by 85% students, 10% considers that communicating results to their parents is so and so necessary, and the rest appreciates that this has small importance.

Being asked "How is appreciating your master and your schoolmates the fact that your parents are in a foreign country?" subjects says that "they treatesme like before", "many of them are in my situation", "they give me advices", "some of them think is cool being without parents", "they felt sorry for me".

Investigated subjects appreciates school's interest above students-meetings with family; parents that has stayed home, grandparents- informating them about school situation; organizational problems; behavioral problems.

Bigger changes of families that leave country is in subject's personality, which brings emotional answers "I miss them". Student understand this phenomen with it's financial dimension involved and the moral one: parents's obligation to raise and educate their children.

As a conenxion between individual and society, between public space and private space, family is the place where different tensions are tendencyes of society, met.

External changes are inlying by family in adaptation process. Between family adjustment and individual adjustment are symmetry and crossing. Family history and families essential features will mark the way it will react above changes.

3. Migration's aspects in Pitesti Municipality, Arges County

In Pitesti Municipality have been investigated 26.927 subjects, students from 32 educational unities from municipality, 18 elementary schools and 32 high schools between November 10-December,1, 2007. As a procedure, it has been used analyse of school documents.

School documents study was realisates based on records that includes: student's identity, parent left to work in a foreign country, person who takes care about student. The goal of this research is to establish dimensions of phenomen in Pitesti Municipality.

Person/persons that live with students from elementary school in Pitești

Table 1

(N = 11525)

	Students which has a parent left and are in second parent care	Students who have both parents left and nobody's taking care of them	Students who have both parents left and are in somebody else's care	Students who don't have both parents left	TOTAL
	3	-	20	559	582
SCHOOL No. 1	*0,52%*		*3,44%*	*96,05%*	*100,00%*
SCOOL No.2	37	-	11	956	1004
	3,69%		*1,10%*	*95,22%*	*100,00%*
	16	-	15	601	632
SCHOOL No.4	*2,53%*		*2,37%*	*95,09%*	*100,00%*
	9	-	4	546	559
SCHOOL No. 5	*1,61%*		*0,72%*	*97,67%*	*100,00%*
	19	-	18	558	595
SCHOOL No. 6	*3,19%*		*3,03%*	*93,78%*	*1,00%*
	30	-	27	542	599
SCHOOL No. 7	*5,01%*		*4,51%*	*90,48%*	*1,00%*
	6	-	4	227	237
SCHOOL No. 8	*2,53%*		*1,69%*	*95,78%*	*1,00%*
	11	-	5	259	275
SCHOOL No. 9	*4,00%*		*1,82%*	*94,18%*	*100,00%*
	15	-	10	567	592
SCHOOL No. 10	*2,53%*		*1,69%*	*95,78%*	*100,00%*
	29	-	20	1097	1146
SCHOOL No. 11	*2,53%*		*1,75%*	*95,72%*	*100,00%*
	22	-	11	443	476
SCHOOL No.12	*4,62%*		*2,31%*	*93,07%*	*100,00%*
	42	-	15	1126	1183
SCHOOL No.13	*3,55%*		*1,27%*	*95,18%*	*100,00%*
	33	-	22	772	827
SCHOOL No.14	*3,99%*		*2,66%*	*93,35%*	*100,00%*
	35	-	21	511	567
SCHOOL No. 15	*6,17%*		*3,70%*	*90,12%*	*100,00%*
	12	-	10	570	592
SCHOOL No.16	*2,03%*		*1,69%*	*96,28%*	*1,00%*
	14	1	11	379	405
SCHOOL No. 17	*3,46%*	*0,25%*	*2,72%*	*93,58%*	*100,00%*
	28	-	19	852	899
SCHOOL No.19	*3,11%*		*2,11%*	*94,77%*	*100,00%*
	15	-	9	331	355
SCHOOL No.20	*4,23%*		*2,54%*	*93,24%*	*100,00%*
	376	**1**	**252**	**10896**	**11525**
TOTAL	***3,26%***	***0,01%***	***2,19%***	***94,54%***	***100,00%***

At students from elementary school, grades I-VIII, we found that 5.46% (629 students) have parents in a foreign coutry. Most of them, 376 students (3,26%) live with one parent, 252 (2.19%) are in relative's care or family friend's care, and only one student takes care alone by himself.

From a population of 15402, 96.58% (14876 students) don't have parents in a foreign county, 3.42% students (526) have least one parent left in a foreign country, 2.04% (314) students live with relatives, family friends and 0.8% (28) live alone or with minor brothers.

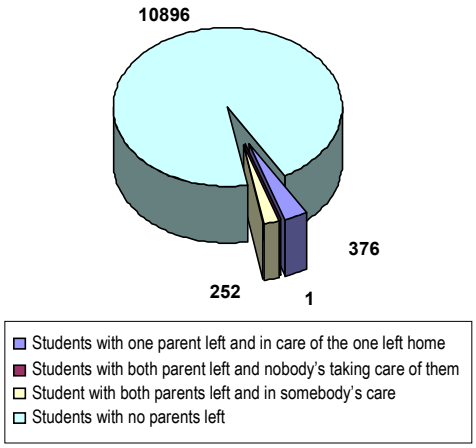


Figure 4. *Pitești – students from primary school*

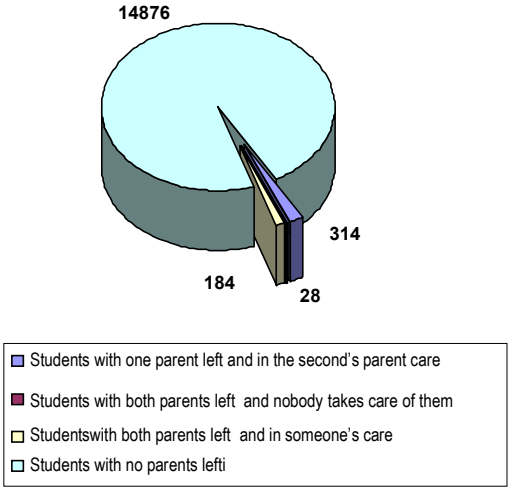


Figure 5. *Pitești – high school students*

Person/persons that live with students from high schools in Pitești

Table 2

(N = 15402)

	Students wich has a parent left and are in second parent care	Students who have both parents left and nobody's taking care of them	Students who have both parents left and are in somebody else's care	Students who don't have both parents left	TOTAL
	24	-	6	1039	1069
DACIA HIGH SCHOOL	*2,25%*		*0,56%*	*97,19%*	*100,00%*
	30	4	27	985	1046
MIHAI VITEAZU HIGH SCHOOL	*2,87%*	*0,38%*	*2,58%*	*94,17%*	*100,00%*
	22	-	22	972	1016
DIMITRIE DIMA HIGH SCHOOL	*2,17%*		*2,17%*	*95,67%*	*100,00%*
	29	-	13	1007	1049
INDUSTRIAL CHEMISTRY HIGH SCHOOL	*2,76%*		*1,24%*	*96,00%*	*100,00%*
	27	-	21	928	976
ION BARBU HIGH SCHOOL	*2,77%*		*2,15%*	*95,08%*	*100,00%*
	32	7	19	992	1050
CAR CONSTRUCTIONS NO. 2 HIGH SCHOOL	*3,05%*	*0,67%*	*1,81%*	*94,48%*	*100,00%*
	10	-	1	1433	1444
ECONOMICAL COLLEGE M. TEIULEANU	*0,69%*		*0,07%*	*99,24%*	*100,00%*
	27	4	6	1254	1291
N. I. C. BRĂTIANU COLLEGE	*2,09%*	*0,31%*	*0,46%*	*97,13%*	*100,00%*
	16	-	6	1003	1025
AL. ODOBESCU COLLEGE	*1,56%*		*0,59%*	*97,85%*	*100,00%*

	Students wich has a parent left and are in second parent care	Students who have both parents left and nobody's taking care of them	Students who have both parents left and are in somebody else's care	Students who don't have both parents left	TOTAL
	10	-	3	557	570
ART HIGH SCHOOL D. LIPATTI	*1,75%*		*0,53%*	*97,72%*	*100,00%*
	13	-	16	896	925
ARMAND CĂLINECU HIGH SCHOOL	*1,41%*		*1,73%*	*96,86%*	*100,00%*
	13	1	13	737	764
CANTACUZINO HIGH SCHOOL	*1,70%*	*0,13%*	*1,70%*	*96,47%*	*100,00%*
	23	7	11	1206	1247
WOOD INDUSTRIALISTION HIGH SCHOOL	*1,84%*	*0,56%*	*0,88%*	*96,71%*	*100,00%*
	38	5	20	1867	1930
ASTRA HIGH SCHOOL	*1,97%*	*0,26%*	*1,04%*	*96,74%*	*100,00%*
	314	**28**	**184**	**14876**	**15402**
TOTAL	***2,04%***	***0,18%***	***1,19%***	***96,58%***	***100,00%***

In Pitesti municipality, from a investigated population of 26.927 subjects, 1155 students-that represents 4.29%- have unleast one parent left in a foreign country for work. From total of students, 0.11% take care alone by themselfes, 1.62% are in relative's care or family friend's care, and 2.56% are in parent's care wich staied home.

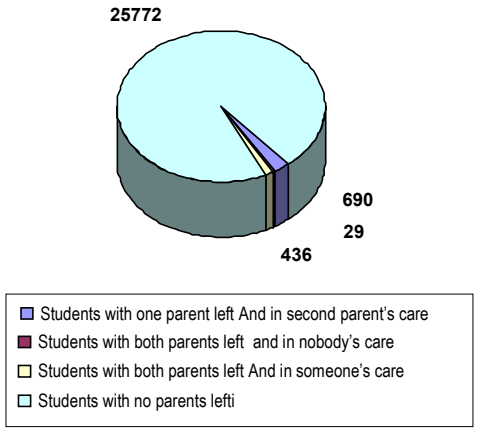


Figure 6. *Situation of the students in Pitești municipality*

Relatated situation demands special care to those students, at school's level, at social care level. In Romania, children that have parents left in a foreign county have been neglected by social care sistem.

New types of trauncy appear, children trauncy and we have to act rapidly because children don't wait, they grow every day!

Some solututions for students who's parents are temporary left in a foreign country are: school counseling, help in learning process, alternatives of spending spare time with other children, call on their home. Family counseling in other countries are very important that has developed in private sector, started to develop and in public sector. Counseling can be orientated on couple problems, children's problems or other aspects. A special form of family counseling is complex supervision service: medical, psychological, social.

References

Constantinescu, Monica (2006). *Efecte ale migrației internaționale asupra dezvo*ltării *sociale. Cazul României*, în *O nouă provocare: dezvoltarea socială*, coordonatori: Cătălin Zamfir, Laura Stoica, Editura Polirom, Iași

Ghebrea, Georgeta (2003). *Regim social-politic și viață privată* în *Familia și viața familială în România*, București

Mihăilescu, I. (1999). *Familia în societățile europene*, Editura Universității din București

Potolea, D. (1989). *De la stiluri la strategii: o abordare empirică a comportamentului didactic*, în *Structuri, strategii, performanțe*, Editura Academiei Române, București

Sandu, D., „Migrația circulatorie ca strategie de viață", în *Sociologie românească*, serie nouă, nr. 2/2000

Sandu, Dumitru (2005). *Dezvoltare comunitară*, Editura Polirom, Iași

Șerban, Monica, Grigoraș, V., „Dogenii din Teleorman în țară și în străinătate. Un studiu asupra migrației circulatorii în Spania", în *Sociologie Românească*, serie nouă, nr. 2/ 2000