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Faculty of Economic Sciences

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New Trends in Modelling and Economic Forecast

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A MODEL TO ESTIMATE THE EFFECT OF GLOBAL CRISIS ON THE CONVERGENCE PROCESS IN EU

LUCIAN-LIVIU ALBU[1]

Abstract: There are evidences that the actual global crisis affected the convergence process in EU. Generally, just new adhered countries were more affected by the actual crisis. Today all forecasts are suffering by uncertainty. There are different opinions regarding how deep and how long the convergence process will be affected. Synthetically, the pessimistic authors are viewing the future economic dynamics as one of so-called L type or U type or W type. Coming from lessons done by standard economic growth theories (Ramsey model, Solow-Swan model, Mankiw, Romer, and Weil model, etc.) and empirical evidences, we are considering the convergence in the level of income per capita as a result of structural changes in economy. In a first part of the study we investigate the differences among countries in EU in terms of the share in total economy of main sectors. Then, based on the spatial (empirical) distribution of such shares in EU we are proposing a model to estimate a typology of the convergence process in the European area. Taking into account the existing differences among sectors in matter of productivity, there are two versions of the model: one considering the share of sectors in total employment and the other one in GDP. Finally, we are using the model to evaluate the negative impact of actual crisis on the convergence process, how deep and how long it will be prolonged, how investment and consumption are affected.

Keywords: convergence, structural changes, spatial distribution, simulation model

JEL Classification: C13, C31, E21, E27, O11, O47, O52

1. INTRODUCTION

Economic theory of development postulates major changes in the structure of national economies along with the historical growth process. At historical scale, in national economies firstly agriculture predominates; then industry is the predominant sector; and finally sector of services becomes the major part of economy. According to a general rule, during the first stage of development, along with a general increase

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of income, the demand for agricultural goods is growing, but slower than income due to a smaller elasticity of income relatively to their demand.

Contrary, in case of manufactured goods there will be a larger elasticity of income relatively to their demand. Thus, the share of secondary sector in economy will increase. However, in the historical process of development, income continuing to increase, coming from one moment people begin to consume more services, taking into account that in their case income elasticity relatively to demand is even larger. Consequently, the tertiary sector will develop faster. This general rule is supposed to guide development at historical scale, but based only on empirical facts.

Such schema may be sometimes false. Thus, may exist underdeveloped countries from the level of income per inhabitant viewpoint, in which tertiary sector is predominant as consequence of an extended activity in tourism, concomitantly existing a non-developed secondary sector. This situation implies major risks. For instance, in case of a deep recession in countries supplying tourists can strongly affect income from tourism in destination country. Further, the overall effect will compromise at a large scale the general development process in this country. In cases where there is not developed either primary sector or secondary sector to be potentially re-improved, loan and increasing debt will be alone solutions.

In actual world expansion of tertiary sector is coincident just with the emergence and fast development of so-called new economy. Thus, the new economy is often viewed as economy of services. Many authors consider as base of spectacular growth of tertiary sector in developed countries during last time certain activities such as: scientific research and technological development; design and experimentation; marketing and trade (including external trade); production, stocking, processing and transmission of information; improvement of human factor, education, health, and increasing of life quality (including quality of environment, leisure, tourism); financial activity, banking, insurance societies, and capital markets, etc.

Just such "services", from which essentially depends the efficiency even in so-called material sphere of production, demonstrate today highest dynamics. They are either integrated together with proper productive activities in the same system or developed as autonomous systems, such as: "banking industry", "tourism industry", "information industry", etc.

2. THEORETICAL MODEL AND EMPIRICAL EVIDENCES

Economic theory usually uses a number of stylised facts of structural changes along with economic growth process. According to it, a satisfactory theory of structural changes should be able to explain the real evolution illustrated by empirical data. Among conclusions three stylised facts are highlighted: the share of primary sector shows continuing decrease converging on long-run to a small constant value; the share of secondary sector increases until a maximum value but further it decreases converging on long-run to a constant value; the share of tertiary sector shows continuing growth converging on long-run to a high value. Consequently, a model of

structural changes should be able to simulate such dynamics. In order to estimate parameters describing medium- and long-run evolution of structure of different national economies usually are used either econometric models or alternatively they should be calibrated to fit reasonably empirical data.

To build a theoretic model, in this case essentially non-linear model, we consider some limit-values to which trajectories of the shares in case of the three sectors are asymptotically converging on long-run, function of the level of GDP per inhabitant. The basic hypotheses, plausible from theoretical viewpoint, should be also in accordance with empirical data. There are three hypotheses that we used for the model, as follows:

$$na = h = ct., \quad \text{for } y \to +\infty \tag{1}$$
$$ni = 0, \quad \text{for } y \to 0 \tag{2}$$
$$ns = d = ct., \quad \text{for } y \to +\infty \tag{3}$$

where na, ni and ns are shares in employment of primary sector (mainly agriculture), secondary sector (mainly industry), and respectively tertiary sector (services).

Coming from these hypotheses dynamics of shares of agriculture and services in total employment can be function of GDP per capita, y, expressed by the following two relations:

$$na(y) = (A*h*y + m*B) / (A*y + m) \tag{4}$$
$$ns(y) = d / (1 + e^{b-c*y}) \tag{5}$$

where A, h, m, B, d, and c are calibrated parameters (they can be also econometrically estimated); e is base of natural logarithms.

Moreover, considering the complementary relation, na+ni+ns=1, one should write also dynamics of the share of industry in total employment:

$$ni(y) = 1 - \{[(A*h*y + m*B) / (A*y + m)] + [d / (1 + e^{b-c*y})]\} \tag{6}$$

Also, taking into account hypothesis (2), we obtain the following implicit relation:

$$B = 1 - [d / (1 + e^{b})] \tag{7}$$

Based on available cross-section statistical data in period 1970-2000, for a number of about 100 countries (including all groups of countries, from poorest to richest), and on hypothesis of some long-run asymptotical trajectories, we calibrated the model. Simulating of the model demonstrated that in case of industry there are a local minimum and a global maximum, corresponding to two specific critical values of income per inhabitant.

Based on the model we can also simulate certain relevant long-run trajectories of structural changes. For instance, using the following set of values for parameters, A=2, h=0.02, m=3, d=0.8, b=1.12, and c=0.21, from the simulating of the model resulted in case of industry a maximum of its share in total employment, ni, equal to around 42% (corresponding to a critical value of GDP per capita y=4000 USD) and a minimum equal to around 14.7% (corresponding to y=28500 USD).

The complete map of simulation is shown in Figure 1 (where y is in thousand USD). Discrepancies among countries can be viewed now not only as difference in

income per inhabitant but also in terms of structural gap. Moreover, the simulating of model demonstrates a general converging of structures on long-run along with economic growth process.

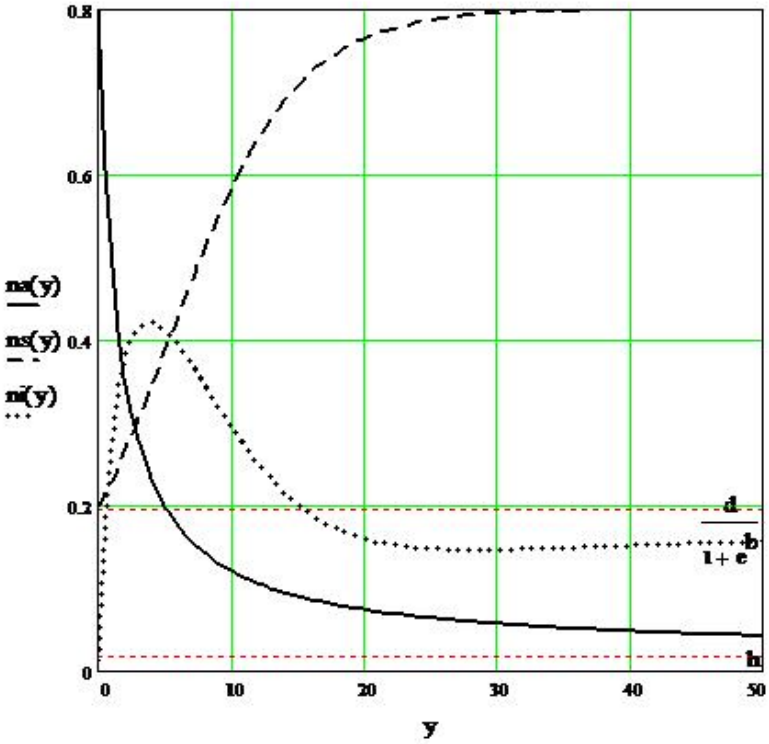


Figure 1.

3. SPATIAL DISTRIBUTION OF SOME MACROECONOMIC VARIABLES IN EUROPE

In context of actual convergence policy in EU-27, it is useful to analyse the spatial distribution of some basic macroeconomic indicators. Moreover, according to recent available data from EUROSTAT for EU countries we used as output of simulation models some significant 3D graphical representations and their attached so-called geodesic maps or contour plots.

Among selected macroeconomic variables, the most significant is GDP per inhabitant. In Figure 2 is shown its spatial distribution in 2007 (before global crisis), as a stylised map of EU, where LO is longitude (on its left side relating to the origin, 0 meridian, we changed West longitude, as it is marked usually on geographical maps, in negative values), LA – latitude, and yPPS – level of GDP per capita in thousand Euro PPS (Purchasing Power Standards). On the stylised map of EU-27 we can see two distinct groups of regions delimited by 30 to 55 contour lines (red colours) and respectively by 20 to 10 contour lines (blue colours) representing highest and respectively lowest GDP per capita levels.

As two general rules, GDP per capita level is increasing from the right side of EU stylised map (eastern EU regions) to the left side (western EU regions) and respectively from the bottom (southern EU regions) to the top (northern EU regions). Moreover, in Figure 3 is shown the spatial distribution of GDP per capita, as differences from the average EU level (EU-27 = 100) in 2009 (in the middle of global crisis). Spatial distributions in EU of other macroeconomic variables considered in the convergence programme are presented in Figure 4 – inflation, at the end of December 2010 (2005=100), and in Figure 5 – unemployment rate, at the end of December 2010.

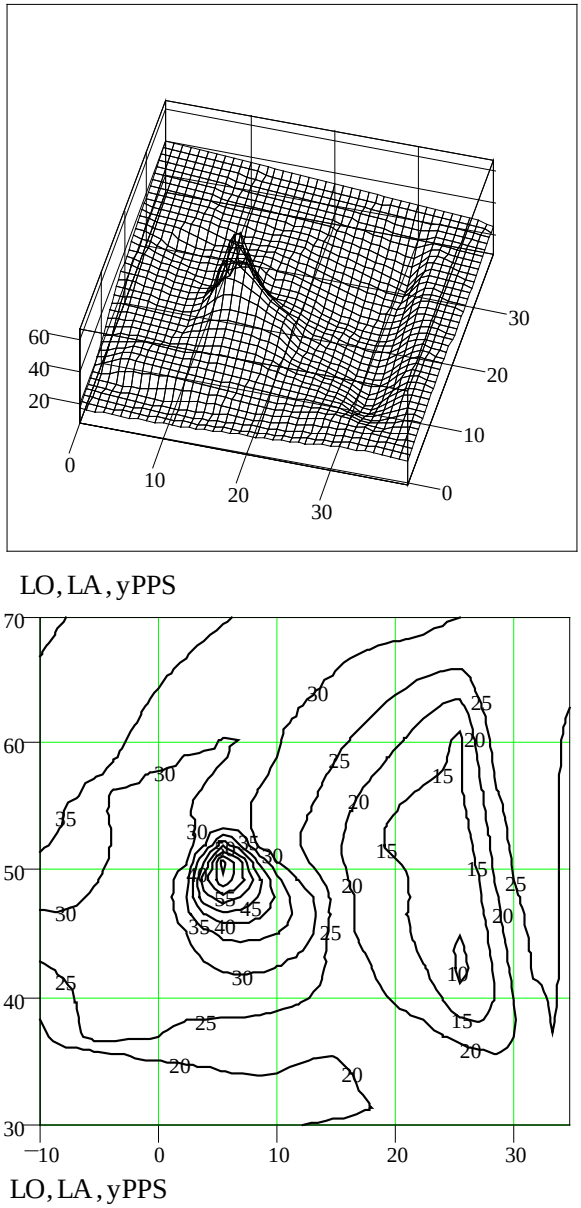
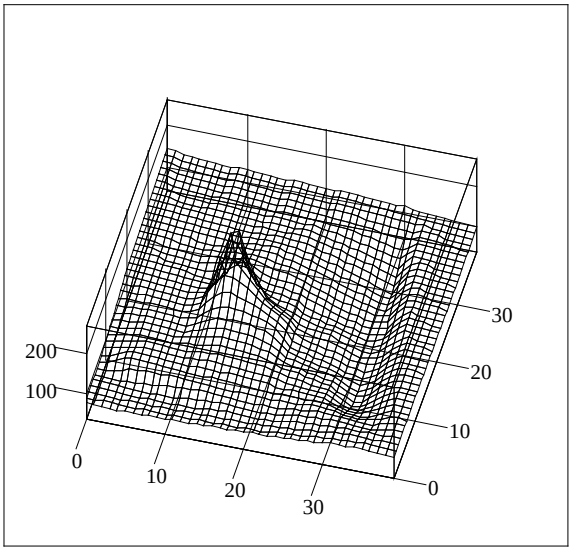
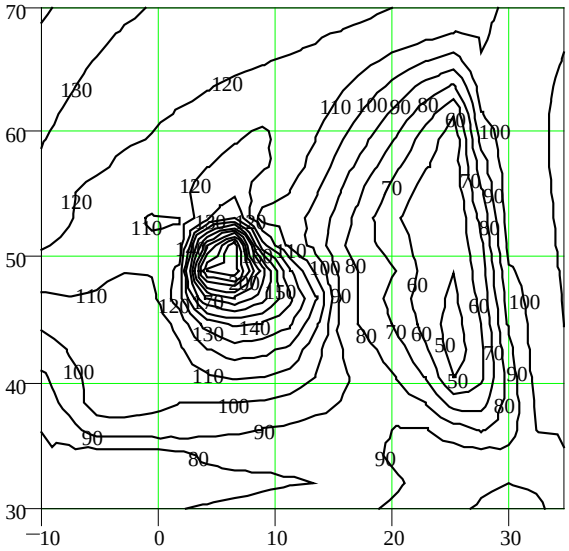


Figure 2.

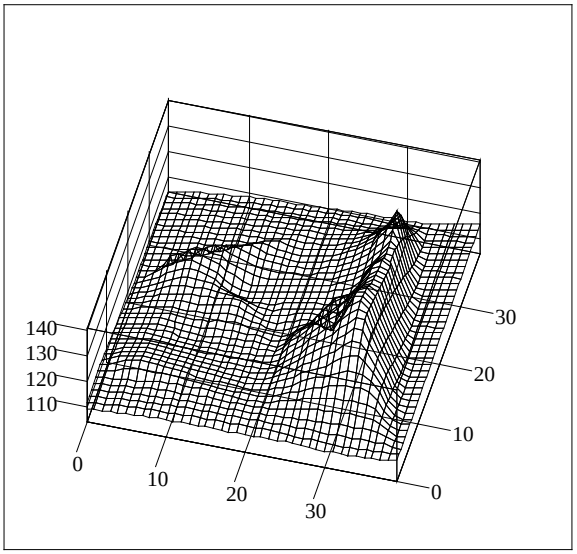


LO, LA, y_UE_100



LO, LA, y_UE_100

Figure 3.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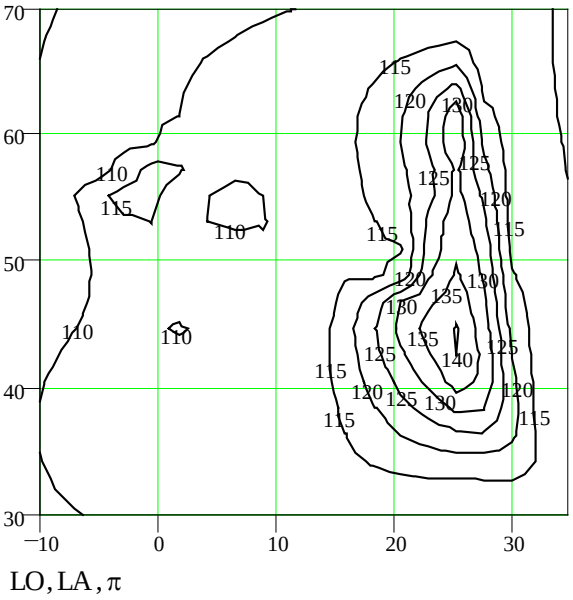
LO, LA, π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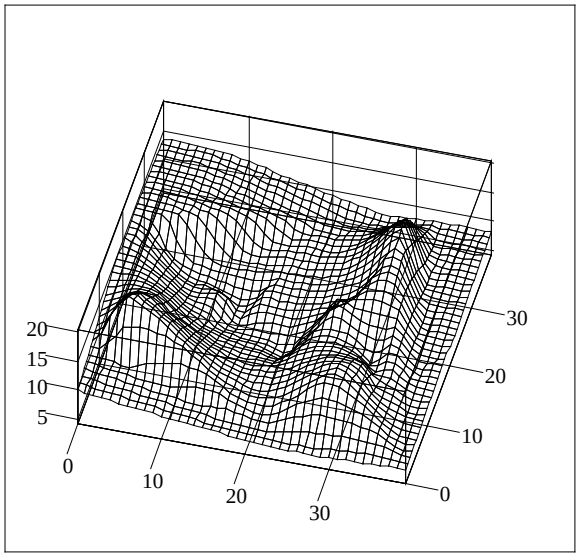
LO, LA, π

Figure 4.



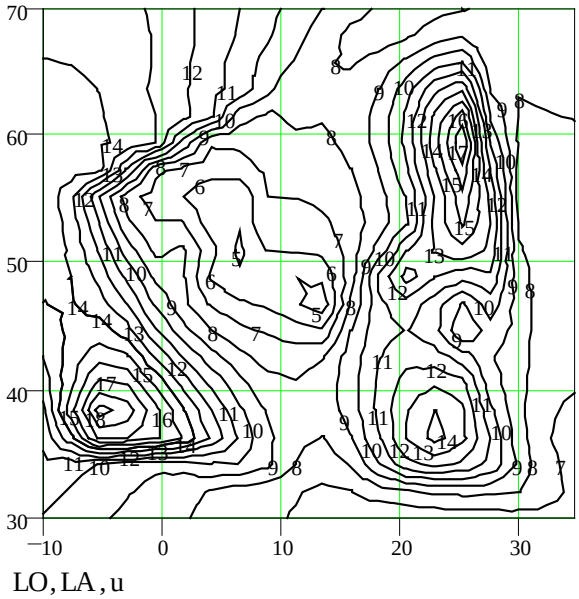


Figure 5.

In order to illustrate how the global crisis affected the convergence in EU, we are presenting comparatively, in Figures 6 and 7, the distributions in EU of the GDP growth rate in the period 2006-2007 (average annual growth rate) and respectively in the period 2008-2009 (average annual growth rate).

We can see a dramatic change in GDP growth rate distribution between the years before the crisis and those in crisis (the year 2008 was excluded because in it some countries were already affected by crises but others were not yet affected).

During last period, the most affected countries by crisis are just those registering lower level of GDP per capita in EU (as a rule, they are the new adhered members located in the Eastern area of Europe). Thus, as the global crisis will delay the recovering process in less developed countries of EU as much the convergence process will be affected.

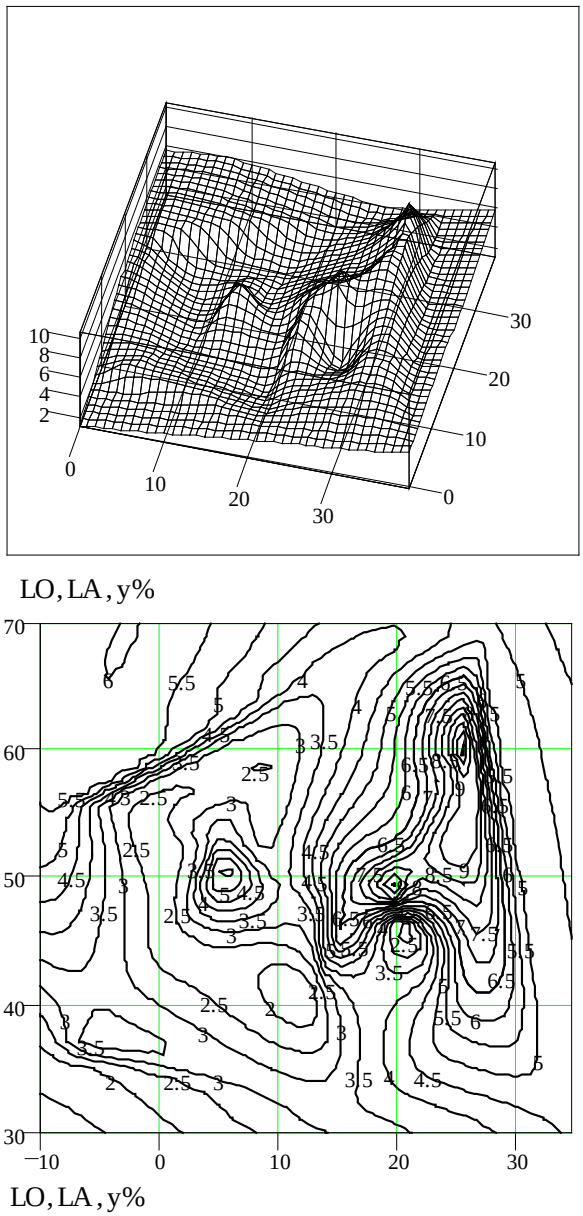


Figure 6.

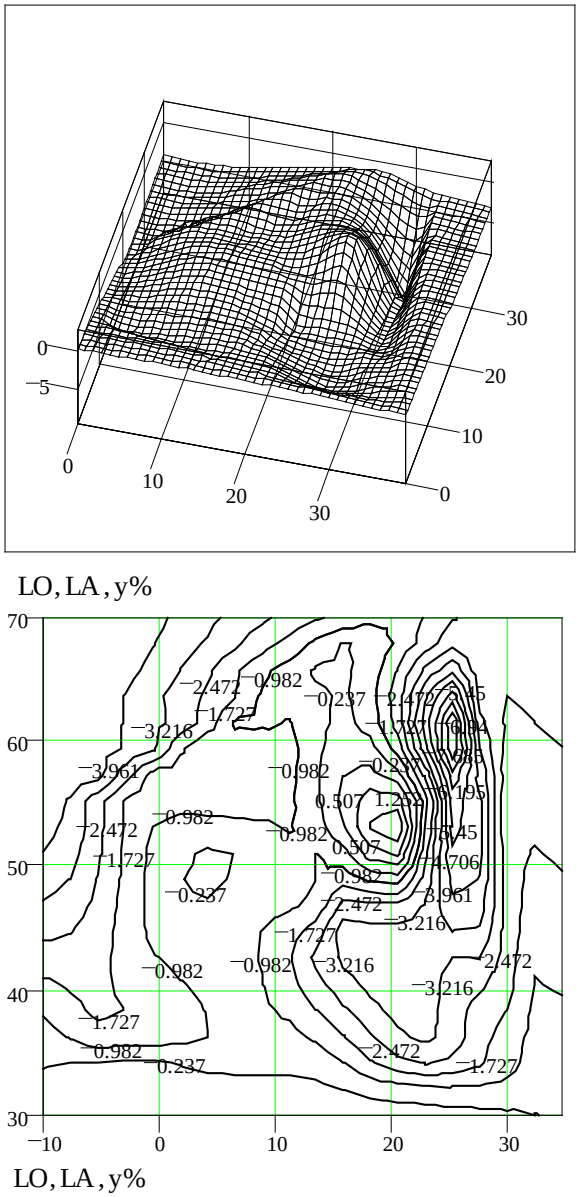


Figure 7.

4. CONTINUING THE CONVERGENCE IN UE-27

Based on the study of structural changes by stages of economic development resulted that the differences among countries can be evaluated by discrepancies in services sector contribution both in total employment and in GDP. Analysing data on the share of services in GDP in an historical short period, 1995-2007, demonstrates a

strong expanding tendency for all EU countries. Regarding this criterion of convergence, Romania is the first country within EU, registering an increase of 16.9 percentage points, from 38.8% to 55.7% (Latvia, placed on the second position, registered in the same period a growth of 16.7 percentage points, from 56.6% to 73.3%). However, Romania continues to be on the last place in EU regarding the share of services in total GDP. Consequently, in case of Romania, the shares of agriculture and respectively of industry in total GDP are among highest in the EU (6.5% and respectively 37.8%, in 2007).

In order to estimate trends in structural convergence in EU function of economic growth we used a model just a little different from the previous theoretical model. Statistical data are referring to 2007 (thus before the crisis). We calibrated econometric model by supposing that exist certain limit-values to which each of the three trajectories are tending along with the income per capita growth. Thus the specification of the model is in line with both long-run growth theory and empirical data supplied by economic history. These hypotheses are synthetically expressed by the following equations used for regression in case of agriculture sector, ya, and respectively services sector, ys:

$$ya\_E\ (y) = [\ (k1*y + k2) / (k3*y + k4)\ ] \quad (8)$$

$$ys\_E\ (y) = [\ k5 / (1 + k6*e^{k7*y})\ ] \quad (9)$$

where y is GDP per capita (we also used GDP per capita in Purchasing Power Standards), k1...k7 are estimated parameters, and e is the base of natural logarithms.

In order to estimate the share of industry sector in GDP, yi, simply we operate substitution of the above two relations in the balance relation, ya+yi+ys=1, obtaining the following equation:

$$yi\ (y) = 1 - \{[(k1*y + k2) / (k3*y + k4)] + [k5 / (1 + k6*e^{k7*y})]\} \quad (10)$$

The results of applying the cross-section model (using GDP in PPS) on EU countries are presented in Figures 8-10 (where the two dashed lines delimit the confidence statistic interval). Moreover, in Figure 11 is shown the resulted general theoretical model at the level of entire EU for 2007. Thus, as minimum for the share of agriculture sector resulted a value close to 0% and as maximum for the share of services sector resulted a value equal to about 87%. These values show that in case of new adhered countries a significant gap relating to the average EU level in matter of structural changes still exists. In case of industrial sector resulted a value of global maximum equal to about 31.1% (corresponding to a critical value of GDP level per capita equal to about 12000 PPS) and respectively a value of long-run minimum equal to about 13.4% (in case of a very large income per capita). More detailed interpretation can be extracted from so-called surface plot or 3D map and contour plot representations of the estimated EU model (see Appendix 1).

According to the resulted cross-section model (estimated on the base of 2007 data) we can evaluate long-run dynamics structural changes for each individual

country. Thus, the actual gap between new adhered countries and average level in EU could be interpreted as delay in time, their actual structure of economy representing a similar situation with that existing in developed western countries in EU 10-20 years ago. Moreover, there are evidences demonstrating that the long-run trends in new members of EU will be similar to those registered in western countries.

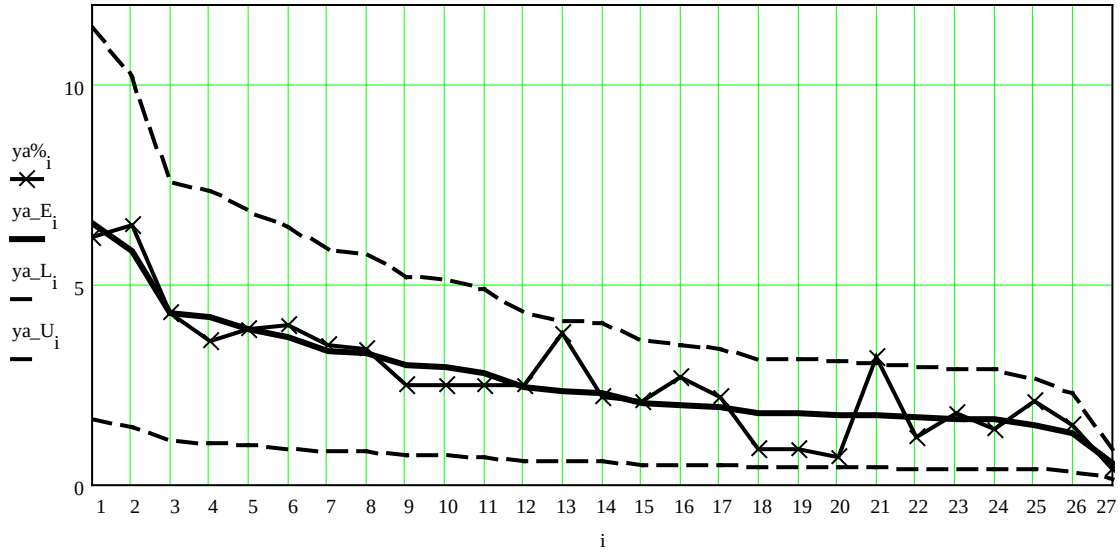


Figure 8.

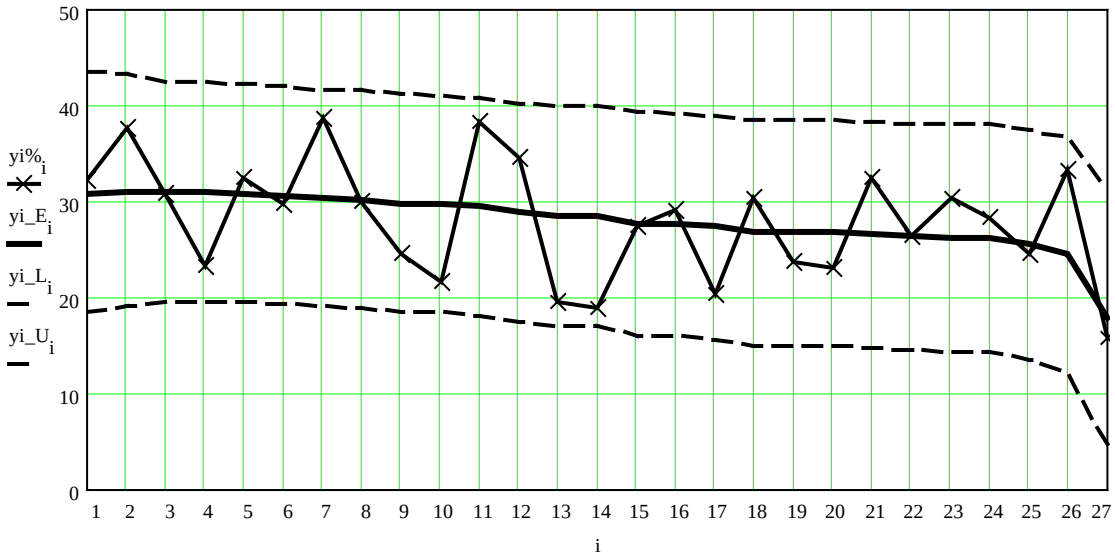


Figure 9.

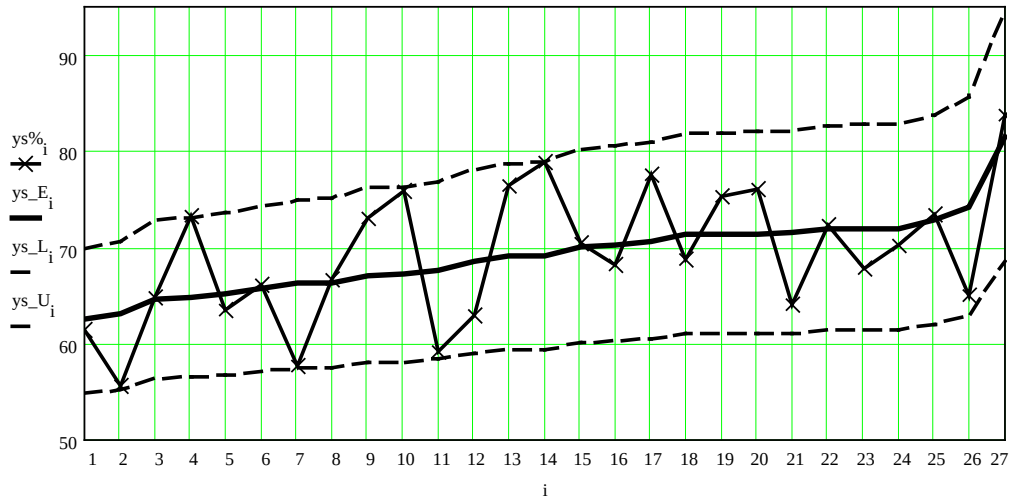


Figure 10.

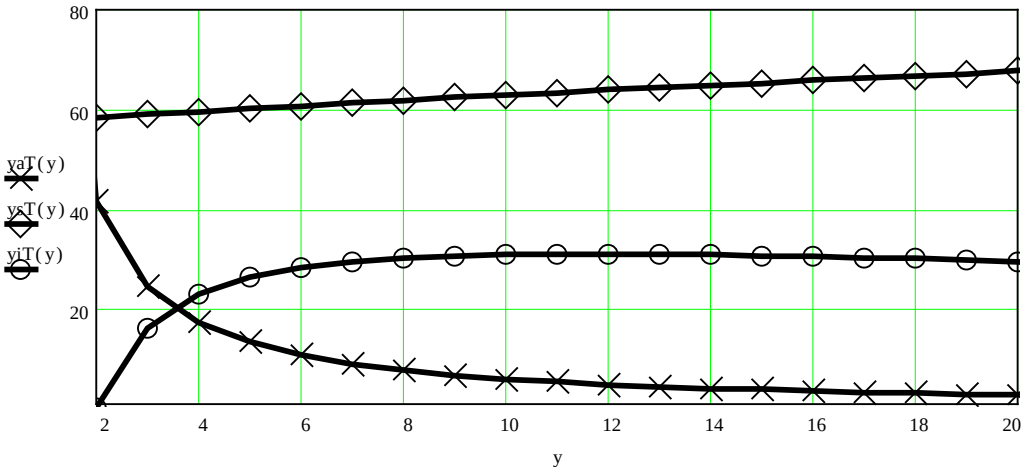


Figure 11.

We also applied the model of structural changes on more digitalised data from EUROSTAT, namely NUTS2 (comprising around 395 regions in EU). The resulted estimations are some different but the conclusions generally are still maintained (see Appendix 2).

Moreover, according to the available data (Nuts 2 database for 2007) we analysed correlations for a number of macroeconomic variables in case of EU-27. The selected variables are as follows:

y - GDP per inhabitant in current prices (Eur);
yPPS - GDP per inhabitant in PPS (Eur);
rAC - Activity rate (active population/total population aged 15 and over, %);
rOC - Rate of occupancy (occupied population/total number of population, %);
rPop70 - Rate of population aged over 70 (%);
u - Unemployment rate (%);

rP0_14 - Rate of population aged 0-14 (%);
rEM - Employment rate (employed population/total population aged 15-64, %);
rP15_64 - Rate of population aged 15-64 (%);
ag% - Share of agriculture (plus hunting, forestry and fishing) in labour force;
in% - Share of industry (plus construction) in labour force;
se% - Share of services in labour force;
rP65_Max - Rate of population aged 65 and over (%);
rIMB - Ageing rate (population aged 65 and over/ population aged 0-14, %).

Using Nuts 2 database, at the EU-27 level, GDP per capita is strongly correlated positively with some variables, as follows:

- Share of services (se%) - $corr(y, se\%) = 0.675$
- Occupancy rate (rOC) - $corr(y, rOC) = 0.588$
- Employment rate (rEM) - $corr(y, rEM) = 0.530$
- Activity rate (rAC) - $corr(y, rAC) = 0.438$
- Rate of population aged 0-14 (rP0_14) - $corr(y, rP0\_14) = 0.222$

and negatively correlated with the following variables:

- Share of agriculture (ag%) - $corr(y, ag\%) = -0.538$
- Share of industry (in%) - $corr(y, in\%) = -0.490$
- Rate of population aged 15-64 (rP15_64) - $corr(y, rP15\_64) = -0.325$
- Unemployment rate (u) - $corr(y, u) = -0.264$

Between GDP and variables as Rate of population aged over 70 (rPop70), Rate of population aged 65 and over (rP65_Max), and Ageing rate (rIMB), there are insignificant correlations (values near 0).

REFERENCES

Albu, L.-L. (2008): "Trends in Structural Changes and Convergence in EU", Romanian Journal of Economic Forecasting, 1, pages 91-101.

Albu, L.-L., Ghizdeanu, I., and Stanica C. (2011): "Spatial Distribution of the Informal Economy. A Theoretical and Empirical Investigation", SCIENZE REGIONALI, FrancoAngeli Editore, vol. 0(1), pages 63-80.

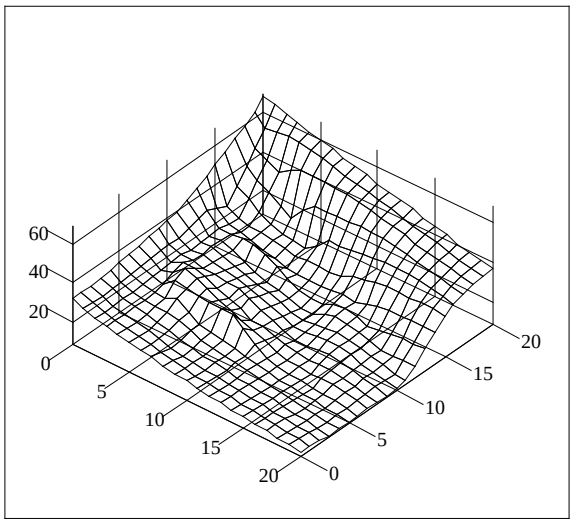
Barro, R. J. and Sala-i-Martin X. (1995): Economic Growth, McGraw-Hill, New York.

Canton, E., Minne, B., Nieuwenhuis, A., Smid, B., and Steeg, M. (2005): "Human Capital, R&D and Competition in Macroeconomic Analysis", ENEPRI, Working Paper, no. 38, August.

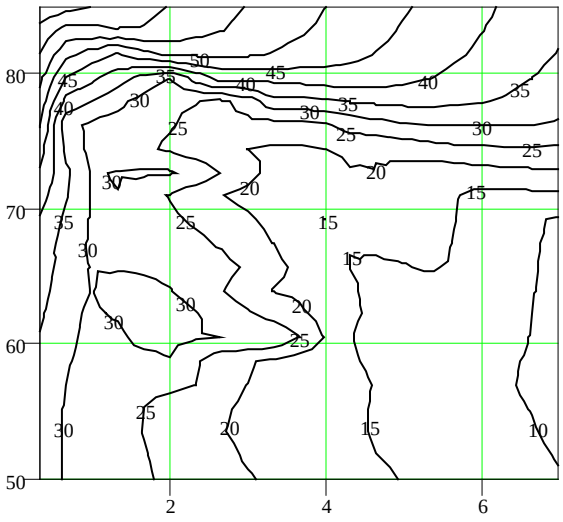
Mankiw, N. G., Romer D. and Weil D. N. (1992): "A Contribution to the Empirics of Economic Growth", Quaterly Journal of Economics, 107, p. 407-437.

Ngai R. şi Pissarides C. (2004): Structural Change in a Multi-Sector Model of Growth, London School of Economics, Centre for Economic Performance, CEPR and IZA.
Rostow W. W. (1962): The Process of Economic Growth, The Morton Library.

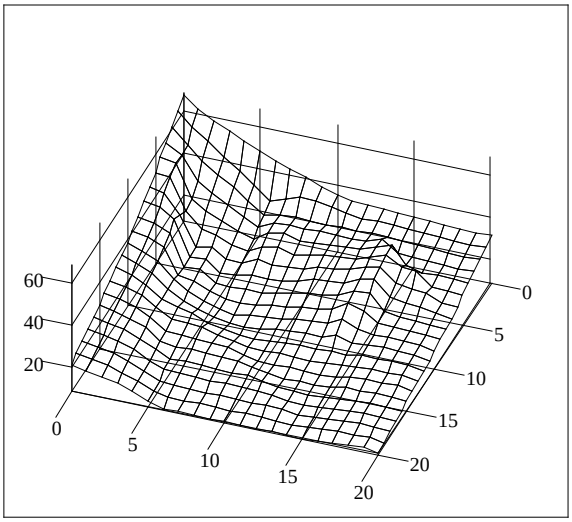
Appendix 1



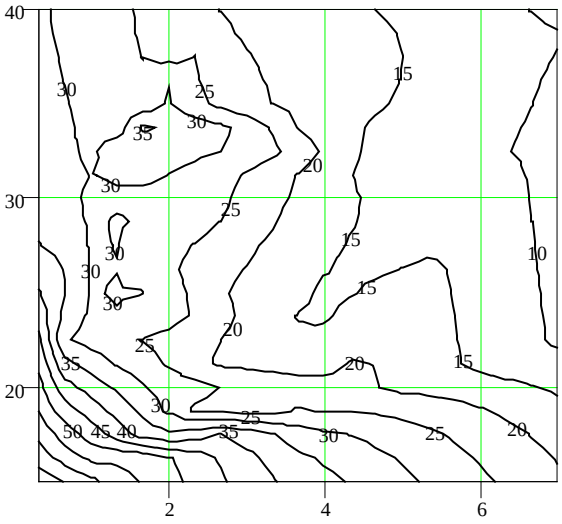
ya%, ys%, yPPS



ya%, ys%, yPPS

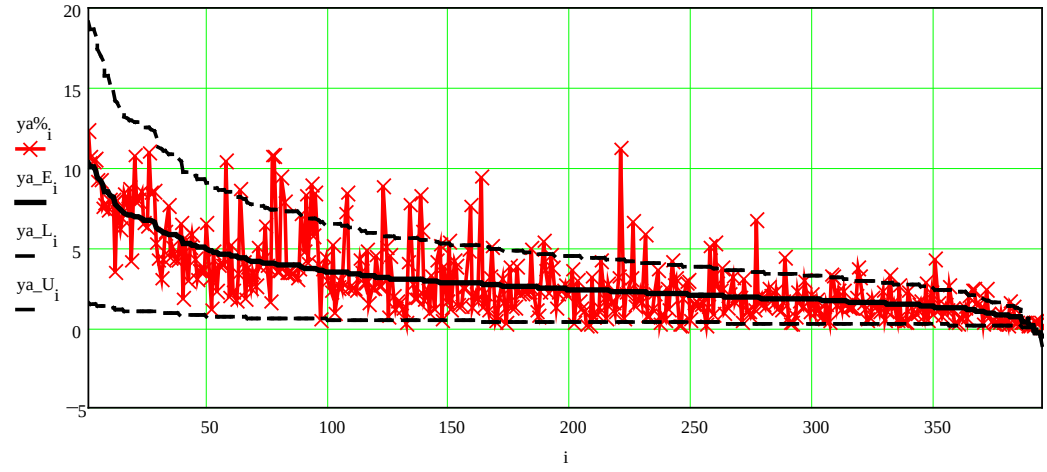


ya%, yi%, yPPS



ya%, yi%, yPPS

Appendix 2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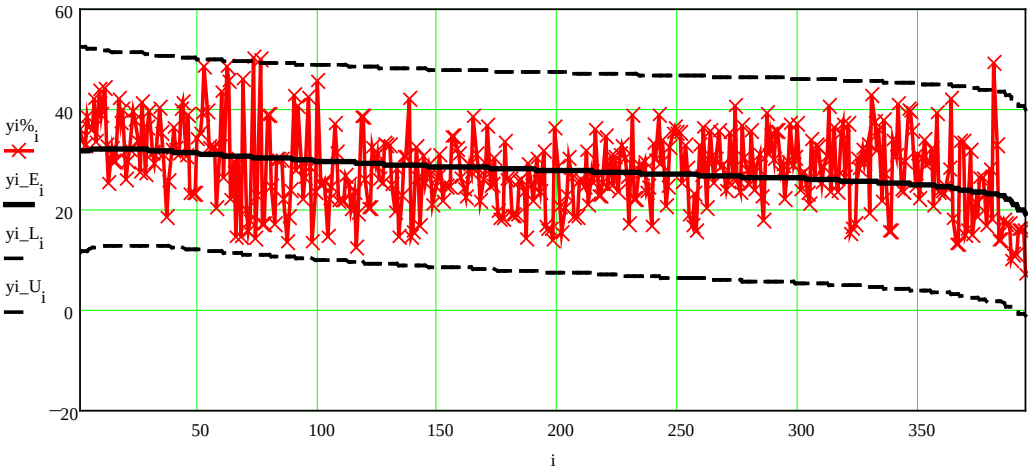
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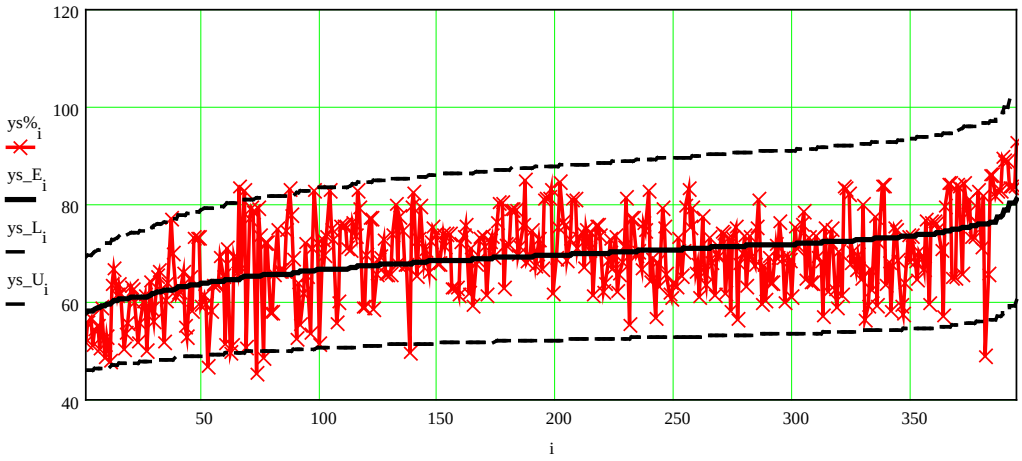
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THE REAL AND FINANCIAL–MONETARY SECTOR FROM NEOCLASICISM TO KEYNESIANISM. SOME CONSIDERATIONS REGARDING THEORETICAL PRINCIPLES

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Abstract: The cyclic evolution of world economy in the 19th and 20th centuries and also at the beginning of the 21st century is mirrored by the economic crises of raw materials, finance and currency and it generates serious dysfunctions between the real and financial sector.These dysfunctions form the basis of certain theories that are still largely tackled as a consequence of the fact that they have to solve the contradictions that these crises generate. The present paper aims to advance general considerations regarding the principles which might balance the functionality of the real sector and the financial and monetary sector by establishing similarities between them.

KEYWORDS: real exchange economy, monetary economy, capital demand and supply curves, economic crises, financial crises, Keynesian clasicism and neoclasicism.

Introduction

According to the neoclasic theory, financial markets are the ultimate markets. Walras considers that the stock exchange is an ideal market because it brings demand and supply in the same place and the transaction dealers may rapidly rebalance the market.
However, according to neoclasic theory, currency and finance are more reliable, but not fundamentally important.

In "Elements of Pure Economics" Walras tackles real exchange economy to facilitate modifications.

Keynesian theory (post-keynesian and the clasically Keynesian theories) deal with financial markets in a double manner. On the one hand, currency and finance (banking system and financial markets) are of crucial importance in production

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monetary economy. On the other hand, the financial system may lead to fragile and unstable economies.

This theory of Keynes is mentioned in his book "Theorie Generale" (chapter 12) and it is embraced by a large number of post-keynesian supporters, especially by Hyman Minshy and others.

According to Keynes, money hoarding creates problems for real economy. Naturally, it is the hoarding of large sums of money which creates problems. Consequently, all managers, enterprises, non-profit associations and states must have liquidities to cope with unpredicted events; these liquidities should come from the investments in the financial sectors which should be able to finance a part of their activities.

The paper aims to examine the principles involved in the relation which exist between the real and financial sectors. In other words, we are going to make reference to neoclasicism (1), general Keynesian principles, as well as post and Keynesian clasicism (2). After we have selected similarities which exist between them (3), we can discuss about two social policy problems (4), which occur when we analyse the interaction of the real and financial sectors.

Literature Review

Neoclasics: exchange economy and the Say law

The neoclasic theory is based upon exchange and the Say law which is one of its fundamental axioms. According to its modern version, this law states that financial resources savings are usually invested. Thus, the financial sector is an extremely efficient market since it directs savings towards the most profitable investments.

The rates of stock exchange shares point out the fact that enterprises have a growth potential and that they can also maintain at their disposal the financial means whereby these growths can be accomplished. Savings also generate investments the individuals' rationality is similar to the rationality of the systems.

It is difficult to integrate currency and finance in the walrasian version of the neoclasic theory, which is not the case of the marshalian version. In consequence, Walras considers that real exchange economy (B-B') is a monetarist economy (B-M-B') or an economy in which the currency has an auxiliary role.

On the contrary, Marshall developed an exchange monetary teory in which M-B'…PM… B'-M', where M = M' [M = currency; B = goods: means of production; B' = final goods; PM = mysterious processes which link factors of production for the final products (Piero Sraffa)] (Bortis 2003a, pag. 87/88).

According to the Marshallian system, production is far from the exchange sphere which is placed among the markets for the factors of production which in their turn determine repartition and the level of usage. For each market, the exchange of a good is evaluated in terms of currency versus currency, e.g., marginal costs = price, or marginal monetary work product = rate of salary. at macroeconomic level, transactions are synthesized as quantitative equations.

Since economies basically tend to attract investments, each security is a real counteraparty.

The savings for which depositors expect to be offered an annuity may imply an accretion of securities (shares, bonds) which are available when they are paid.

These securities correspond to the production capacity and they produce the goods demanded by fund holders. At the same time, the (neoclasic) method of converting capital for former annuities.

Keynesian Clasics: production monetary economy

According to Keynesian theory, both post and clasic theories, the link between investments and savings is broken. Moreover, it is contradictory and it generates negative consequences over economic activities and as regards the use of workforce.

In consequence, in a production monetary economy [M-B…P…B'-M'], social production processes P - represented by Leonteef – Sraffa scheme – are of crucial importance. Production-based prices are established within production and repartition processes, by avoiding different institutions (this is a social complex process); the level of European activity (B' - Q) is determined by demand itself (M'). Savings of financial resources are adjusted, in principle, by the quantitative variations of investments, the national product and the use of workforce.

In a production monetary economy, the currency is by definition closely linked to the produced goods. Bernard-Schmitt used to compare currency with a numerical case which transports the newly produced merchandise (Rossi 2001). This statement is true if the currency circulates in the production and reproduction processes. However, the case will be immediately empty one the currency leaves the productive circuit and enters the financial circuit.

If the currency which is emptied of its content enters the financial sector and is used according to the enterprise policy, this currency will be content-loaded when the new stocks – linked to the investments made – are bought or kept for facilitating the financing of urgent projects which are meant to generate a structural adjustment or a quick turn to higher growth rates.

Securities bought with this money produce an income which increases consumption or contributes, for example, to the functioning of non-profit institutions. On the contrary, the domination of financial speculations may result in groundless fast price increases on the stock exchange which are followed by an unequal income repartition – unfriendly take – overs and restructuring of enterprises for augmenting profit.

Are there similarities between Keynesian neoclasicism and clasicism?

The present dominance of the neoclasic theory does not seem to be inferior to the classical Keynesian economic system which is mainly based on the results of

scientific research pursued by Keynes, Sraffa and Pasinetti (Bortis 1997, 230 a and 203b). This theory is theoretically and historically grounded:

- theoretical grounds: debates regarding the capital theory which do not aim at a general balance and are based upon a cause-effect lack of income balance in non – economic institutions and influenced by the demand and supply curb position (Bortis 1997, cap5, pag. 281 -293; Harcourt 1972);
- historical grounds: the major economic crises of the last quarter of the 19th century, the crises which occurred in the 30's and in 2008-2009: according to the great international organizations two thirds of the mankind live in poverty, and a third of the potentially active population is either underused or unemployed.

Two consequences for social and economic policy

If we refer to the classical Keynesian economic theory, we notice that there are two ideas that are worth mentioning and remembering: one refers to the future macroeconomic policy, while the other one refers to the current social security system.

(a) As to **macroeconomic policy**, a repartition policy and a policy designed for the use of workforce are fundamental for a production monetary economy (Bortis 1997, cap. 4 şi 6). In a monetary economy, macroeconomic policy does not regulate itself at the same time if markets are competitive (Harcourt 1972, Bortis 1997, cap.5). Macroeconomic policy does not tend to use workforce in a balanced way. On the contrary, cumulative processes may reinforce an already existing un balance (Kaldor, Myrdal).

(b) In **a monetary economy**, social securities for seniority and pensions for retirement must rely on the repartition system and not on the principle of capital guarantee. Dissociation between savings and investments leads to a contradiction: a more developed economy regulates the guaranteed capital and investments do not increase; in fact, they decrease. On the other hand, more currency enters the financial circuit and market gaps are filled in (Bernard Schmitt).

Most of the currency mass circulates in the financial sector and it encourages speculations, which leads to an increase in the price of stocks; however, the value of the stock is partially emptied of substance and the rate may amount unrealistic levels in relation to the real value of enterprises which are quoted at the stock exchange. Funds which are reinjected in the circuit of production generate a public deficit for statului and they correspond to the following relation: G - T = S – I.

The state will be indebted because particular investors may place their extra savings in investments which are necessary for maintining the full use of the workforce. We refer to the massive loans on the financial market which the Ministry of Public Finance made due to the serious financial crisis and the increase of the public deficit during the first eight months in 2009 (Euro 5.5 billions).

Conclusions

In a production monetary economy, the financial sector is very important as finance facilitates transactions in an exchange or monetary economy. Real economy – social production and circulation of goods cannot simplify the functioning of an economy without currency and finance (M - B …. P .. B'-M'): the currency is present at the beginning and at the end of production and circulation processes.

All production calculations concerning rentability and consumption involve the currency; furthermore, consumption processes (of long lasting products), production and capital accumulation processes evolve in time, while the currency is the link between past and future (Keynes).

However, the financial sector is fragile and its relation to the real sector is delicate. In consequence, banks may create the (endogenous) currency for financing investments. In this case, savings may surpass the volume of investments (expected by entrepreneurs) and a part of the currency may become a "currency without material content" (Bernard Schmitt).

This currency which is "contentless (empty of content)" may also circulate in the financial circuit by an excessive speculation which produces financial crises (a "good speculation" which balances economy, e.g., is the example offered by negotiators who buy and stock agricultural products if there is an abundant harvest and, thus, they contribute, at the same time, to the stabilization of prices for agricultural products (Kaldor 1939).

REFERENCES

Bortis, H. (1997): Institutions, Behaviour and Economic Theory – A Contribution to Classical – Keynesian Political Economy, Cambridge (Engl.), Ney York and Melbourne (Cambridge University Press);

Bortis, H. (2003 a): Marshall, the Keynesian Revolution and Sraffa's Significance, Journal of Economic Studies, vol.30, no. 1, 2003, pp. 77-97:

Bortis, H. (2003 b): Keynes and the Classics – Notes on the Monetary Theory of Production, in Capitalist Economies, ed. L. – P. Rochon, Sergio Rossi, Cheltenham (UK) and Northampton (US): Edward Elgar: 411-475

Keynes, J.M. (1971-1930): A Treatise on Money, 2 vols, London (Macmillan);

Keynes, J. M. (1973/1936): The General Theory of Employment, Interest and Money. London (Macmillan);

Rossi, S. (2001): Money and Inflation – a New Macroeconomic Analysis, Cheltenham, UK, Northampton, MA, USA (Edwaed Elgar);

Skidelsky, R.(1992): John Maynard Keynes, volume two, The Economist as Saviour 1920 – 1937, London (Macmillan).

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RESHAPING THE INTERNATIONAL TRADE STATISTICS: FACTORS AND IMPLICATIONS

SERGHEI MĂRGULESCU[4]

Abstract: The geographical fragmentation of production has created a new trade reality and has many implications for how we understand trade policy. The growing international flows in intermediate goods reflect the evolution of intra-industry trade, the impact of offshoring and the prominent role of networks of multinational enterprises in world trade. While Europe is still the biggest trader in intermediate goods, Asia has been rapidly closing the gap, and is now a close second. Beside the factors that contributed to the appearance of new types of business and new trade patterns, we should be also aware of some implications of such shifts. We have to mention the need of reshaping of the methodology of foreign trade statistics, the need of re-evaluation of some technical issues of trade policies or the need of re-evaluation of the political speech of some western countries towards certain emerging countries with which they encounter increasing trade deficits.

Keywords: global value chains, intermediate goods, globally integrated businesses, foreign trade statistics.

1. Introduction

The geographical fragmentation of production has created a new trade reality. Often referred to as global value chains or vertical specialization, this fragmentation deepens the interdependency of trade relations and has many implications for how we understand trade policy. "Global manufacturing", is boosting the volume and diversity of products being exchanged. But it is also changing the very nature of international trade. Global manufacturing is characterized by the geographical fragmentation of productive processes and the offshoring of industrial tasks.

"Trade patterns and global value chains in East Asia: From trade in goods to trade in tasks" is the title of a recent book which represent the result of a cooperative effort between the WTO and IDE-JETRO and illustrates how the conjunction of technical, institutional and political changes in East Asia in the past 30 years has led to the emergence of new production and trade networks. We will use some findings of this study to make the picture of the historical evolution of production networks in the region and then to conclude and make some remarks regarding the factors and

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implications of the new types of business on trade patterns, trade statistics and trade policy.

An examination of the historical evolution of production networks in Asia shows us how Asian economies have become interconnected with each other and with the US market.

In 1985, there were only four key players in the region: Indonesia, Japan, Malaysia and Singapore. The basic structure of the production network was that Japan built up supply chains from resource-rich countries like Indonesia and Malaysia. In this initial phase of regional development, Japan drew on a substantial amount of productive resources (natural resources) from neighboring countries to feed to its domestic industries.

By 1990 the number of key players had increased. In addition to the four countries already mentioned, Japan had extended its supply chains for intermediate products to the Republic of Korea, Chinese Taipei and Thailand. While still relying on the productive resources of Indonesia and Malaysia, Japan started to supply products to other East Asian countries, especially to the newly industrialized economies (NIEs). This is the phase when the relocation of Japanese production bases to neighboring countries, triggered by the Plaza Agreement in 1985, was accelerating. It saw the building of strong linkages between core parts' suppliers in Japan and their foreign subsidiaries.

In the 1990s, the Republic of Korea, Chinese Taipei and Thailand also emerged as important links in the production network.

Japan was extending its supply chains, while outsourcing from the United States was also strongly entering the picture.

Then in 1995, the United States came into the picture. It drew on two key supply chains originating in Japan, one via Malaysia and the other via Singapore. These two countries came to bridge the supply chains between East Asia and the United States.

In 2000, on the eve of its accession to the WTO, China began to emerge as the third economic giant. The country entered the arena with strong production linkages to the Republic of Korea and Chinese Taipei. It then gained access to Japanese supply chains through the latter.

The United States also brought a new supply chain from the Philippines, and thus the basic structure of the tri-polar production network in the Asia-US region was completed.

The regional production networks thereafter showed dramatic development.

By 2005, the center of the network had completely shifted to China, pushing the United States and Japan to the periphery. China became the core market for intermediate products, from which final consumption goods were produced for export to the United States and to European countries. Also of note is the nature of the supply chains that China develops with others.

The intermediate goods imported by China come through relatively long and complex supply chains, characterized by a high degree of fragmentation and sophistication. The competitiveness of Chinese exports is not only attributable to its

low production costs, but also to the complex intermediate goods imported from other countries, be they from Asia or the rest of the world.

The evolution of regional production networks, as illustrated above, has created a distinctive structure for the Asian-US production system, understood as the "tri-polar trade through China" model. In this structure:

1. East Asian countries, except China, produce sophisticated parts and components and export them to China,
2. China assembles them into final products,
3. These are further exported to the US market for consumption.

Trade in intermediate goods now dominates world trade in non-fuel merchandise. While Europe is still the biggest trader in intermediate goods, Asia has been rapidly closing the gap, and is now a close second.

While intermediate goods constitute more than 60 per cent of Asia's total imports, Asia tends to export more final goods composed of the imported intermediate ones. This regional characteristic, inherent in the region's role as "Factory Asia", is not equally displayed by each country. Some economies, like China, India and Viet Nam, have distinctly higher shares of intermediate goods in their imports than in their exports, while the opposite is true for the Republic of Korea, Japan and Chinese Taipei. Not only has trade in intermediate goods increased, but these goods are also increasingly complex.

The growing international flows in intermediate goods reflect the evolution of intra-industry trade, the impact of offshoring and the prominent role of networks of multinational enterprises (MNEs) in world trade.

The definition and measurement of trade in "intermediate services" is much more complex and subject to limited data availability. Currently no official trade classification enables precise differentiation between final and intermediate services. One way of assessing internationally-outsourced intermediate services is to consider trade in "other commercial services", which is a very broad aggregate including a number of business services that can be subject to offshoring.

In 2009, world exports of intermediate goods exceeded the cumulated amounts recorded for consumption and capital goods and represented 51 per cent of non-fuel merchandise exports. World exports of intermediate goods nearly doubled between 1995 and 2009, from around US$ 2,774 to US$ 5,373 billion, an annual average growth rate of 4.8 per cent.

A feature of world trade in intermediate goods is that its share of total trade has remained quite stable over the past 15 years. As a matter of fact, world exports in the three categories of goods – capital, consumption and intermediates – evolved at similar speeds between 1995 and 2009, in line with the overall growth of total merchandise trade.

The apparent contradiction with the growth of international supply chains is explained mainly by statistical effects of reporting intra-firm trade and trade in goods sent/received for processing, and the difficulty of distinguishing intermediate from final goods in some categories.

The volume of trade in intermediate goods gives an indication of the level of integration of a region in production sharing. Although the overall value is still very low compared with Western economies, developing economies tend to join global supply chains at a sustained pace since it is a clear opportunity for them to enter international trade through production sharing.

The shares of North American and European exports of intermediate goods in world trade declined notably between 1995 and 2009, whereas Asia's increased by almost 10 percentage points, reaching 35 per cent of world exports of intermediate inputs in 2009.

While North American and European economies tend to further diversify their trade in intermediates towards services, new international production capacity and related trade in manufacturing intermediates are increasingly originating in Asia as a result of industrial fragmentation in this region.

At US$ 2,050 billion, Europe had the highest value of intra-regional imports in 2008. Intraregional trade represented nearly half of its total imports of intermediate goods. Europe was followed by Asia, with US$ 1,479 billion.

Asia has not only developed its own industrial networks, it has also contributed to production chains linked to Western economies. Accordingly, the major interregional flows in intermediate goods involved Asia either as the origin (exporter) or as the destination (importer) of trade flows, essentially with its core partners North America and Europe. For instance, the highest interregional import flows of intermediate goods were observed between Europe and Asia (US$ 384 billion) and between North America and Asia (US$ 330 billion). Asia has been a major supplier of intermediate goods to North America.

In 2009, Asia imported more intermediate goods than it exported, showing its high level of engagement in world production chains. Asia's developing economies were the principal contributors to this outcome as advanced economies like Japan and the Republic of Korea exported more intermediate goods than they imported. China plays the role of assembler within the Asian region, its imports in intermediate goods accounting for more than 33 per cent of Asian imports of intermediates in 2009.

Economies like India and Viet Nam also had markedly higher shares of intermediates in their imports than in their exports. The opposite was the case for Japan and Chinese Taipei.

Chinese Taipei had the highest share of intermediate goods in its exports among the major Asian traders.

China, India and Viet Nam have been the most dynamic importers of intermediate goods within the last 15 years, with average growth rates of between 12 and 16 per cent, far beyond the regional average of 7 per cent.

2. Factors and implications of the new types of business on trade patterns, trade statistics and trade policy.

Regarding the factors that contributed to the appearance of new types of business and new trade patterns, we should point to the following:

The Western factor – the implementation by western companies of new strategies and business models.

We are referring to the "globally integrated businesses" which are stimulated by:

- the competitive advantages offered by the concentration of resources on a specific field of expertize or functions that enhances positioning on the market
- the technical opportunities and economic efficiency enhancement resulting from the relocation of activities, and first of all of manufacturing, through offshoring and international outsourcing.

"The globally integrated companies" reflect the integration in a certain formula of the components of the "product" value chain and the distribution of their fulfillment in at least two countries. Integration also implies, on an ever larger scale, the functional inter-dependence of at least 2 independent companies which realize in conjunction the "product" global value chain, and through this symbiosis generate a "globally integrated business".

Under the category of "globally integrated companies" we have to define two types of companies:

a) "the functions outsourcers", which can be:

- big companies (national companies, multinational companies-MNC, transnational companies-TNC), which undergo a process of vertical disintegration, by retaining the basic function(s) (in which their competencies are maximal) and the distribution of other functions to third parties (outsourcing to functions integrators selected through the arbitrage of their competencies and advantages)
- new companies that design and structure from scratch a "globally integrated business" by assigning functions to "integrated" participants.

b. "the functions integrators", which can be:

- companies that directly perform the contractually undertaken function(s) (design, R&D, manufacturing, assembly, distribution, marketing, post-sales analyses or a combination of these)
- companies that build and use (orchestrate) supplier networks. This kind of integrator becomes in its turn a functions outsourcer, while the network itself becomes a "globally integrated business".

The emergent factor – the governmental policies and private initiatives of some emerging countries. These have facilitated:

- the foreign direct investments
- the set up and growth of a number of national companies meant to become partners to western TNC's within the frame of certain "globally integrated businesses"
- building of national, regional or even international chains or networks

- the extension of functions within the global value chains, ready to be undertaken by emerging companies, from manufacturing to logistics, R&D and other business services.

The conjunction and evolution of the above mentioned factors – which created a new economic reality.

This new reality can be characterized by:

- the re-shaping of international interdependences between companies, countries and regions
- the re-shaping of trade and investments flows
- the reconsideration of the meaning of a country specialization, which is no longer based on the overall balance of comparative advantage of countries in producing a final good, but on the comparative advantage of producing components of final goods (the intra-product specialization) or of tasks/functions that these countries complete at a specific step along the global value chain (the functional specialization).

Regarding the implications of the appearance of new types of business and new trade patterns, we should point to the following:

The reshaping of the methodology of foreign trade statistics in a way that, based on the trade flows of intermediate goods, it could reveal:

- the domestic content embedded in exports and the import content of exports
- the country specialization
- the effects on the foreign balances of payments

The decomposition of exports value into its foreign and domestic content can be done through measuring the value added of exported goods (or in other words, measuring the international trade flows of parts of the entire value added embedded in that specific final good exported). This methodological approach has been recently initiated by WTO and implies the use of the following tools:

- the international trade statistics and
- international input-output (II-O) tables (such as those developed by IDE-JETRO).

As the WTO and IDE-JETRO study points out, the global production chains have blurred the relevance of some conventional trade indicators, like bilateral trade balances, when products are "made in the world" rather than in a single country. The final product and the value added that goes into it come from different places. The speed and depth of such changes have led to the need to revise statistical concepts and methods (national accounts, balance of payments, customs based trade statistics) for measuring trade flows. At the same time, new approaches have been explored and developed to adapt traditional statistics and to better evaluate how economies fit into the new global economy.

Vertical trade is one of the new elements of international exchanges that require the application of innovative metrics.

Attributing the entire commercial value of an exported good to the last link of the chain – the economy exporting the final good – can lead to a statistical bias and to misunderstandings, which may alter trade analysis and have potential implications for trade policy and multilateral trade negotiations.

This does not reflect the geographical fragmentation of the production chain. A more recent methodological development, the "trade in value added" approach, can help circumvent the difficulty of assigning the country of origin faced by traditional trade statistics. This additional measure of international trade flows enables the domestic content embedded in exports to be assigned to each country that participated in the supply chain that led up to production of the final good.

The domestic content of a country's exports is often referred to as the value-added content of exports. In such cases, the value added of an exported good comprises the good's total value minus direct and indirect imported inputs, and includes all the domestic intermediate goods and services used for the production of the good. From a methodological point of view, this is not so different from the notion of sectorial value added derived from the system of national accounts, which corresponds to the final value of the output of an industry, net of the goods and services it purchased from other industries or imported for its production.

The domestic content of any export will include the direct value added from the exporting industrial sector, plus the value added from other domestic sectors indirectly embedded during the production process. In addition, some correction can be done to measure the domestic content of imported inputs (re-imports).

It would require an enormous amount of work to measure directly the different sources of added value for each product traded in the world. An indirect way of estimating vertical trade and trade in value added relies on input-output (I-O) tables or – preferably – their international counterparts, international input-output (II-O) tables. These combine national accounts and bilateral trade data on goods and services into a consistent framework.

II-Os allow the value added contained in exports to be evaluated and decomposed into its foreign and domestic content.

The domestic content of exports corresponds to the accumulation of the value added incorporated in each of the various domestic sectors that contributed to the supply chain. The foreign content of exports, or import content of exports, serves as an estimate of the trade between countries involved in international production chains. It can be measured through the application of the vertical specialization formula, developed by Hummels et al. (2001), based on the use of II-Os. Thus, the impact of the fragmentation of production chains on international trade can be assessed by computing the vertical specialization phenomenon.

Measuring trade in value added uses both trade statistics and international input-output tables, such as those developed by IDE-JETRO, to separate the domestic content of an export from the cost of the imported components.

The re-evaluation of some technical issues of trade policies at the level of countries or customs unions, as:

- the reevaluation of the concept of "country of origin"
- the reevaluation of the importance of certain emerging economies as "countries of origin".

The new methodology developed by WTO-JETRO offers a new perspective for trade analysts, as it dramatically re-evaluates the importance of some economies as "countries of origin". The result is that the absolute value of some bilateral trade imbalances is reduced, notably that of China and the United States, while overall global balances remain untouched.

This can be illustrated with the common example of the US trade deficit vis-à-vis China.

The deficit, as currently measured between the two countries, is clearly overstated, as it does not originate only in China, but also in economic partners belonging to the same production chains. By subtracting the estimated import content from conventional trade values, the value added approach enables bilateral transactions to be adjusted in line with the actual values created in the two countries.

The 2005 US-China trade shortfall would have even been cut by more than half, from US$ 218 to US$ 101 billion, if it had been estimated in value added and adjusted for processing trade (see Figure 9). Similarly, in 2008, the US$ 285 billion bilateral deficit would have been reduced by more than 40 per cent. The difference must be attributed to the value added from other economies, such as Japan, the Republic of Korea, Malaysia, etc., embedded in Chinese exports to the United States.

The re-evaluation of the political speech of some western countries towards certain emerging countries with whom they encounter increasing trade deficits.

In this respect, the negative impact on the foreign balance of payments of the western country should be reevaluated, as the specialists from JETRO suggest, with the foreign value added embedded in the exports of the respective emerging country, or with the value of intermediate goods imported and embedded in the final goods exported.

More than that, in our opinion, the negative impact on the foreign deficit should be re-evaluated also with the value of exports resulted from the participation of companies from emerging countries to the "globally integrated businesses" with western partners who outsourced them functions like manufacturing, logistics or mixes of functions.

In this case, regardless of whether the entire value added comes from a single country or is a sum of value added in several countries, the export originated within a "globally integrated businesses" should be perceived like an even more "positive" component than other bilateral trade flows because it is even stronger linked to the competitiveness and market position of an increasing number of important western companies.

The WTO-JETRO methodology does not separate the trade flows induced by the "globally integrated businesses", so that an emphasis on the "sine qua non" feature of these trade flows cannot be statistically backed-up.

REFERENCES

1. "Trade patterns and global value chains in East Asia: From trade in goods to trade in tasks" - WTO and IDE-JETRO, 2011.
2. Margulescu Serghei, Margulescu Elena, "Trecerea de la globalizarea pietelor la globalizarea productiei si serviciilor in 41ontextual starii de semiglobalizare", in The 33-rd Annual Congress of the American Romanian Academy of Arts and Sciences (ARA) Proceedings, Volume I, Polytechnic International Press, Montreal, Quebec, 2009.
3.Van Agtmael Antoine –"The Emerging Markets Century", Free Press, New York, 2007.
4. Mărgulescu Serghei, Noile strategii ale companiilor transnationale in 41ontextual globalizarii si specializarii functionale, Ed.Cartea Studenteasca, Bucuresti, 2010

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CUDA BASED COMPUTATIONAL METHODS FOR MACROECONOMIC FORECASTS

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Abstract: Parallel computing can offer an enormous advantage regarding the performance for very large applications in almost any field: economics, scientific computing, computer vision, databases, data mining. GPUs are high performance many-core processors that can obtain very high FLOP rates. Since the first idea of using GPU for general purpose computing, things have evolved and now there are several approaches to GPU programming: CUDA from NVIDIA and Stream from AMD. CUDA is now a popular programming model for general purpose computations on GPU for C/C++ programmers. In this paper we present an implementation of some iterative and direct linear systems solvers that use the CUDA programming model. Our CUDA library is used to solve macroeconometric models with forward-looking variables based on Newton method for nonlinear systems of equations. The most difficult step for Newton methods represents the resolution of a large linear system for each iteration. Our library implements LU factorization, Jacobi, Gauss-Seidel and non-stationary iterative methods (GMRES, BiCG, BiCGSTAB) using C-CUDA extension. We compare the performance of our CUDA implementation with classic programs written to be run on CPU. Our performance tests show speedups of approximately 80 times for single precision floating point and 40 times for double precision.

Keywords: parallel algorithms; macroeconometric models; rational expectations models; linear algebra; Krylov techniques;

JEL Classification: C01, C02, C53

1. INTRODUCTION

Advances in the computational power have a large influence on almost all fields of scientific computing. Although, during the last decade, microprocessors'

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performance has significantly increased and new architectures like multi-core processors has appeared, there are still problems that cannot be solved on a single desktop computer (Creel, 2008).

One of the fields that need a special attention is macroeconometric modeling. Macroeconometric models with forward-looking variables are a special class of models which involve very large systems of equations. The matrices resulting from these models could be so large that doesn't fit with the internal memory of a single desktop computer. For such models it is necessary to develop high performance parallel algorithms that can be run in parallel execution environments like parallel computers, clusters of workstations or grid environments.

A special kind of macroeconometric models are the rational expectations models (Fischer, 1992). These models contain variables that forecast the economic system state for the future periods t + 1, t + 2, ... , t + T, where T is the forecast time horizon. Depending on the size of the forecast time horizon, macroeconometric models with rational expectations could give raise to systems with tens or hundreds of thousands of equations.

For example, MULTIMOD model (Isard, P., 2000), (Masson, P, 1990) is a dynamic, annual forecast model designed by the International Monetary Fund that describes the economic behaviour of the whole world decomposed in 8 industrial regions and the rest of the countries. The model contains 466 equations. If we want to solve the model for a 30 years time horizon then we will have to solve a nonlinear system containing 13908 equations which is not a simple task nor for the most powerful workstations.

QPM (Quarterly Projection Model)(Armstrong, J, 1995) (Coletti, D., 1996) is a quarterly model developed by the Bank of Canada to obtain economic forecasts and as a research tool for the analysis of macroeconomic policies and economic equilibrium on long term. The QPM model has 329 nonlinear equations. The resolution of the model for a 30 years time horizon means to solve a system of 39480 equations.

FRB/US (Brayton, F., 1996, 1997) is a quarterly econometric model that describes the U.S. economy and has around 300 equations. An extension of this model is FRB/GLOBAL that describes the world economy using few thousands equations. The resolution of these models for a 20-30 years time horizon implies nonlinear systems with hundreds of thousands of equations.

Let's consider the general form of the nonlinear model with rational expectations:

$$h_i(y_t, y_{t-1}, \dots, y_{t-r}, y_{t+1|t-1}, \dots, y_{t+h|t-1}, z_t) = 0, \quad i = 1,\dots m$$

where $y_{t+j/t-1}$ is the expectation of y_{t+j} conditioned on the information available at the end of the period t-1 and z_t represents the exogenous and random variables. For consistent expectations, the forward expectations $y_{t+j/t-1}$ have to coincide with the next period's forecast when solving the model conditioned on the information available at the end of period t-1. These expectations are therefore linked in time and solving the model for each y_t conditioned on some start period 0 requires each

$y_{t+j|0}$ for j = 1,2, ... T-t and a final condition $y_{T+j|0}$, j = 1, 2 ..., h. Considering these equations for successive time periods a large nonlinear system of equations will result.

One of the first methods used to solve such models was the extended path algorithm proposed by Fair and Taylor (Fair, R.C., and J. B.Taylor 1983). They use Gauss-Seidel iterations to solve the model, period after period, for a given time horizon. The convergence of this method depends on the order of the equations. The endogenous forecast variables are considered as predetermined and then the model is solved period after period for a time horizon.

The solutions thus obtained represent the new values for the forecast variables. The process is repeated until the convergence is obtained. The advantage of this method is it's simplicity in implementation and the low storage requirements but this method has a main disadvantage: if the initial values for the endogenous variables are not "well" chosen, the convergence of the system is very poor or the system is not convergent at all.

An alternative method to solve the model is to build a system of equations written for successive periods t, t + 1, …, t + T¸ and to solve this system of nT nonlinear equations by one of the existing methods for nonlinear systems. Due to the large scale of the system, this method has been avoided in the past. Due to the recent advances in the parallel algorithms field it is now possible to solve such large scale systems with efficiency.

The Newton method applied to solve this model uses the following algorithm:

NEWTON Method
Given an initial solution y(0)
for k = 0,1,2, ... **until** convergence
Evaluate b(k) = - h(y(k),z)
Evaluate J(k) = ∂h(y(k),z)/∂y'
Solve J(k)s(k) = b(k)
y(k+1) = y(k) + s(k)

If the linear system $J(k)s(k) = b(k)$ is very large, the use of direct methods to determine the solution can be very expensive due to high memory requirements and computational cost.

This is a very good reason to develop high performance parallel algorithms as an attractive alternative to the classical serial algorithms. Another alternative to serial direct methods are the iterative methods which determine only an approximation of the solution, but this fact does not influence the convergence of the Newton method. These iterative algorithms can be parallelized too.

We will analyse high performance iterative and direct methods used to solve large linear systems that result by applying the Newton method, then we will describe an implementation of the parallel versions of such algorithms that we've developed using C-CUDA extension.

2. SERIAL ITERATIVE AND DIRECT METHODS FOR SOLVING LINEAR SYSTEMS

Stationary iterative methods such as Jacobi and Gauss-Seidel are well known and there are many textbooks that describe these methods [14]. For very large linear systems, the most appropriate iterative methods are the so-called Krylov techniques [22]. Contrary to stationary iterative methods such as Jacobi or Gauss-Seidel, Krylov techniques use information that changes from iteration to iteration. For a linear system $Ax = b$, Krylov methods compute the i^{th} iterate x(i) as :

$$x(i) = x(i-1) + d(i) \qquad i = 1, 2, \ldots$$

Operations involved to find the i^{th} update d(i) are only inner products, saxpy and matrix-vector products that has the complexity of $\Theta(n^2)$, so that Krylov methods are computational attractive comparing to the direct methods for linear systems.

Perhaps the best known of the Krylov' method is the conjugate gradient method. This method solves symmetric positive definite systems. The idea of the CG method is to update the iterates x(i) in a way to ensure the largest decrease of the objective function $\frac{1}{2}x'Ax - x'b$, while keeping the direction vectors d(i) A-orthogonal. This method can be implemented using only one matrix-vector multiplication per iteration. In exact arithmetic, the CG method gives the solution for at most n iterations. The complete description of the CG method can be found in (Golub, G. H, 1996).

Another Krylov method for general non symmetric systems is the Generalized Minimal Residuals (GMRES) introduced by (Saad, Y. 1996). The pseudo-code for GMRES is:

GMRES
Given an initial solution x(0) compute r = b – Ax(0)
$\rho = \|r\|_2$, v(1) = r/ ρ, β = ρ
for k = 1,2,... **until** convergence
  for j = 1,2, ... k,
    h(j,k) = (Av(k))'v(j)
  end
  $v(k+1) = Av(k) - \sum_{j=1}^{k} h(j,k)v(j)$
  $h(k+1,k) = \|v(k+1)\|_2$
  v(k+1,k) = v(k+1)/h(k+1,k)
endfor

The most difficult part of this algorithm is not to lose the orthogonality of the direction vectors v(j). To achieve this goal the GMRES method uses a Gram-Schmidt orthogonalization process. GMRES requires the storage and computation of an increasing amount of information, vectors v and matrix H. To overcome these

difficulties, the method can be restarted after a chosen number of iterations m. The current intermediate results are used as a new starting point.

Another Krylov method implemented by the authors is the BiConjugate Gradient method (Golub, G. H, 1996). BiCG uses a different approach based upon generating two mutually orthogonal sequences of residual vectors and A-orthogonal sequences of direction vectors. The updates for residuals and for the direction vectors are similar to those of the CG method, but are performed using A and its transpose. The disadvantage of the BiCG method is an erratic behaviour of the norm of the residuals and potential breakdowns. An improved version, called BiConjugate Gradient Stabilized BiCGSTAB, is presented below:

BiCGSTAB
Given an initial solution x(0) compute r = b – Ax(0)
$\rho_0 = 1$, ρ_1 = r(0)'r(0), $\alpha = 1$, $\acute{\omega} = 1$, p = 0, v = 0
for k = 1,2, ... **until** convergence
$\beta = (\rho_k/\ \rho_{k-1})(\alpha/\acute{\omega})$
p = r + β(p- ώv)
v = Ap
$\alpha = \rho_k/$(r(0)'v)
s = r – αv
t = As
ώ = (t's)(t't)
x(k) = x(k-1) + αp + ώs

For the BiCGSTAB method we need to compute 6 saxpy operations, 4 inner products and 2 matrix-vector products per iteration and to store matrix A and 7 vectors of size n. The computational complexity of the method is $\Theta(n^2)$ like the other Krylov methods.

The operation count per iteration cannot be used to directly compare the performance of BiCGSTAB with GMRES because GMRES converges in much less iterations than BiCGSTAB. We have implemented these iterative methods and run experiments to determine the possible advantages of them over the direct methods. The results of our experiments are presented in the next section.

The other alternative to solve a linear system $Ax = b$ is the direct method that consists in two steps:

- First, the matrix A is factorized, $A = LU$ where L is a lower triangular matrix with 1s on the main diagonal and U is an upper triangular matrix; in the case of symmetric positive definite matrices, we have $A = LL^t$.
- Second, we have to solve two linear systems with triangular matrices: $Ly = b$ and $Ux = y$.
- The standard LU factorization algorithm with partial pivoting is (Golub, G. H, 1996):

Right-looking LU factorization
for k =1:n-1 **do**
find ν with k≤ ν≤n such that $|A(\nu,k)| = \|A(k:n,k)\|_\infty$
A(k,k:n)↔A(ν, k:n)
p(k) = ν
if A(k,k) ≠ 0 **then**
A(k+1:n, k) = A(k+1:n,k)/A(k,k)
A(k+1:n,k+1:n) = A(k+1:n,k+1:n) - A(k+1:n, k) A(k, k+1:n)

The computational complexity of this algorithm is $\Theta(2n^3/2)$. After we obtain the matrix factors L and U we have to solve two triangular systems: $Ly = b$ and $Ux = y$. These systems are solved using forward and backward substitution that have a computational complexity of $\Theta(n^2)$, so the most important computational step is the matrix factorization. That's why we have to show a special attention to the algorithms for matrix factorization.

In practice, using actual computers with memory hierarchies, the above algorithm is not efficient because it uses only level 1 and level 2 BLAS operations (Lawson, C. L., et. al. 1979), (Dongarra, J.,1988). As it is well-known, level 3 BLAS operations (Dongarra, J.,1990) have a better efficiency than level 1 or level 2 operations. The standard way to change a level 2 BLAS operations into a level 3 BLAS operation is delayed updating. In the case of the LU factorization algorithm we will replace k rank-1 updates with a single rank-k update.

We present a block algorithm for LU factorization that uses level 3 BLAS operations. The $n \times n$ matrix A is partitioned as in Figure 1. The A_{00} block consists of the first b columns and rows of the matrix A.

A_{00}	A_{01}	=	L_{00}	0	*	U_{00}	U_{01}
A_{10}	A_{11}		L_{10}	L_{11}		0	U_{11}

Figure 1. Block LU factorization

We can derive the following equations starting from A=LU:

$$L_{00}U_{00} = A_{00} \quad (1)$$
$$L_{10}U_{00} = A_{10} \quad (2)$$
$$L_{00}U_{01} = A_{01} \quad (3)$$
$$L_{10}U_{01} + L_{11}U_{11} = A_{11} \quad (4)$$

Equations (1) and (2) perform the LU of the first b columns of the matrix A. Thus we obtain L_{00}, L_{10} and U_{00} and now we can solve the triangular system from equation (3) that gives U_{01}.

The problem of computing L_{11} and U_{11} reduces to compute the factorization of the submatrix $A_{11}' = A_{11} - L_{10}U_{01}$ that can be done using the same algorithm but with A_{11}' instead of A.

The block LU factorization algorithm can now be derived easily: suppose we have divided the matrix A in column blocks with b columns in each block. The complete block LU factorization algorithm is given below.

Block LU factorization
for k_b =1 to n-1 **step** b **do**
$b_f = \min(k_b + b - 1, n)$
{LU factorization of $A(k_b : n, k_b : b_f)$ with BLAS 2}
for $k = k_b$ **to** b_f **do**
find k such that $|A(k,i)| = \|A(i:n,i)\|_\infty$
if $i \neq k$ **then**
swap rows i and k
endif
A(i+1:n, i) = A(i+1:n, i)/A(i,i)
$A(i+1:n, i+1: b_f) = A(i+1:n, i+1: b_f) - A(i+1:n, i)\, A(i, i+1: b_f)$
endfor
{Let $\tilde{L}$ be unit lower triangular matrix $b \times b$ stored in $A(k_b : b_f, k_b : b_f)$}
Solve triangular systems $\tilde{L}\, Z = A(k_b : b_f, b_f + 1 : n)$
Update $A(k_b : b_f, b_f + 1 : n) \leftarrow Z$
{Delayed updating}
$A(b_f + 1 : n, b_f + 1 : n) = A(b_f + 1 : n, b_f + 1 : n) - A(b_f + 1 : n, k_b : b_f)\, A(k_b : b_f, b_f + 1 : n)$
endfor

The process of factorization is shown in Figure 2. The factorization of the current column block is done with the usual BLAS 2 operations and the active part of the matrix A will be updated with b rank-one updates simultaneously which in fact is a matrix-matrix multiplication (level 3 BLAS).

If $n >> b$ almost all floating point operations are done in the matrix-matrix multiplication operation.

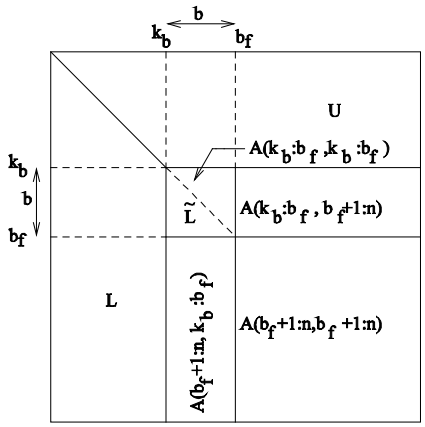

Figure 2. Block LU factorization with BLAS 3 operations

3. PARALLEL IMPLEMENTATION OF THE DIRECT AND ITERATIVE ALGORITHMS

In 2002 Mark Harris (Harris, Mark J., 2003) pointed out a new approach to obtain a high megaflop rate to the applications when he started to use GPUs (graphical processing unit) for non-graphics applications. Nowadays Graphics Processing Units contain high performance many-core processors capable of very high FLOP rates and data throughput being truly general-purpose parallel processors. Since the first idea of Mark Harris many applications were ported to use the GPU for compute intensive parts and they obtain speedups of few orders of magnitude comparing to equivalent implementations written for normal CPUs.

At this moment there are several models for GPU computing: CUDA (Compute Unified Device Architecture) developed by NVIDIA (NVIDIA, 2011), Stream developed by AMD (|AMD, 2008) and a new emerging standard, OpenCL (Khronos OpenCL Working Group, 2009) that tries to unify different GPU general computing API implementations providing a general framework for software development across heterogeneous platforms consisting of both CPUs and GPUs. We used the C CUDA extension to develop a library that implements iterative linear systems solvers.

We've used CUBLAS library in the implementation of the direct and iterative algorithms. Our library implements LU factorization as a direct method, Jacobi, Gauss-Seidel, CG, GMRES and BiCGSTAB iterative methods.

The general flow of the solver implemented in our library is:

- Allocate memory for matrices and vectors in the host memory;
- Initialize matrices and vectors in the host memory;
- Allocate memory for matrices and vectors in the device memory;
- Copy matrices from host memory to device memory;
- Define the device grid layout:

Number of blocks

Threads per block

- Execute the kernel on the device;
- Copy back the results from device memory to host memory;
- Memory clean up.

4. RESULTS

We've tested our direct and iterative solvers for both single precision and double precision floating point numbers. For our tests we used a computer with Intel Core2 Quad Q6600 procesor running at 2.4 Ghz, 4 GB of RAM and a NVIDIA GeForce GTX 280 graphics processing unit (GPU) with 240 cores running at 1296 MHz, 1GB of video memory and 141.7 GB/sec memory bandwith. The operating system used was Windows Vista 64 bit.

We compared the results obtained using the CUDA code with a single threaded C implementation run on CPU.

The CPU implementation of the direct and iterative algorithms used the optimized ATLAS (Whaley, R. C., 2001) library as a BLAS implementation. This gives better performances than a standard reference implementation of the BLAS.

Table 1 shows the speedup obtained by the C-CUDA implementation of the iterative solvers compared with the traditional CPU code for single precision floating point numbers and table 2 shows the speedup for double precision numbers.

From the results presented below one can see that GPU outperforms CPU for numerical computations.

Comparing the results for each method, it can be noticed that BiCGSTAB has better performances than the other methods.

For GMRES, in our experiments we restarted the method after 35 iterations. The tolerance for the solution was fixed at 10-4 for all methods.

For our experiments we have considered linear systems containing between 2000 and 20000 variables.

Table 3 shows the speedup of the CUDA implementation of the direct method for linear systems compared with a single threaded C implementation (the standard block-level implementation that can be found in LAPACK). We considered linear systems with 500 to 3500 equations.

Our performance results show the net advantage of GPU computing compared to the classical CPU code. The results also emphasize the advantage of the iterative solutions compared with the direct solution.

Another advantage of using CUDA programming model is that the code can be easier to read and support. The major drawback of CUDA is that it is only available for NVIDIA devices. A port of our library to OpenCL is intended for the future.

Table 1. Speed up for single precision FP

Matrix dimension	Speedup			
	Jacobi	Gauss-Seidel	GMRES(35)	BiCGSTAB
2000	67.4	69.3	78.3	82.2
4000	56.2	65.5	81.8	84.5
8000	68.3	67.4	80.1	81.9
12000	66.7	68.4	81.4	84.1
16000	71.1	69.2	79.3	86.0
20000	72.8	69.9	81.3	86.9

Table 2. Speed up for double precision FP

Matrix dimension	Speedup			
	Jacobi	Gauss-Seidel	GMRES(35)	BiCGSTAB
2000	35.2	36.1	39.6	41.7
4000	36.1	36.0	41.2	42.3
8000	29.1	35.2	41.6	43.6
12000	33.6	37.8	40.5	43.9
16000	32.3	35.9	42.8	44.0
20000	35.6	37.1	43.2	46.1

Table 3. The speedup of the direct method based on LU factorization

Matrix dimension	C-CUDA
500	8.99
1000	12.45
1500	11.41
2000	16.78
2500	16.23
3000	14.39
3500	15.92

5. CONCLUSIONS

We developed a C-CUDA library that implements the direct method with LU factorization and Jacobi, Gauss-Seidel and non-stationary iterative methods (GMRES, BiCGSTAB). The matrix-vector and matrix-matrix computations were done using CUBLAS routines. We compared the performance of our CUDA implementation with classic programs written to be run on CPU. Our performance tests show speedups of approximately 80 times for single precision floating point numbers and 40 times for

double precision for the iterative methods and about 10-15 for the direct method with double precision FP. These results show the immense potential of the GPGPU. In the future we intend to extend our direct and iterative solver library and to port it to OpenCL.

REFERENCES

1. AMD, ATI Stream Computing - Technical Overview. AMD, Tech. Rep. 2008
2. Anderson, E., Z. Bai, J. Demmel, J., Dongarra, J. Du Croz, A. Greenbaum, S. Hammarling, A. Mckenney, S. Ostrouchov, And D. Sorensen, LAPACK Users's Guide. SIAM, Philadelphia, 1992.
3. Armstrong, J., R. Black, D. Laxton, and D. Rose, "The Bank of Canada's New Quarterly Projection Model QPM. Part 2: A Robust Method for Simulating Forward-Looking Models", Technical Report No. 73, Ottawa: The Bank of Canada, 1995.
4. Black, R., D. Laxton, and R. Tetlow, "The Bank of Canada's New Quarterly Projection Model QPM. Part 1: The Steady-State Model", Technical Report No. 72, Ottawa: The Bank of Canada, November, 1994.
5. Brayton, F., and P. Tinsley, "A guide to FRB/US : A Macroeconomic Model of the United States", Technical Report, Finance and Economics Discussion Series, Federal Reserve Board, 1996.
6. Brayton, F., E. Mauskopf, D. Reifschneider, P. Tinsley, and J. Williams, "The Role of Expectations in the FRB/US Macroeconomic Model", Federal Reserve Bulletin, 1997.
7. Coletti, D., B. Hunt, D. Roseand, and R. Tetlow , "The Bank of Canada's New Quarterly Projection Model QPM. Part 3: The Dynamic Model", Technical Report No. 75, Ottawa: The Bank of Canada, 1996.
8. Creel, M., and W. L. Goffe, "Multi-core CPUs, Clusters, and Grid Computing: a Tutorial", Computational Economics, 32 (4), 353-382, 2008.
9. Dongarra, J., J. Du Croz, S. Hammarling, and I. Duff, "A set of level 3 basic linear Algebra subprograms", ACM Transactions on Mathematical Software, 16 (1), 1-17, 1990.
10. Dongarra, J., J. Du Croz, S. Hammarling, and R. Hanson, "An extended set of FORTRAN basic linear algebra subprograms", ACM Transactions on Mathematical Software, 14, (1), 1-17, 1988.
11. Doornik, J. A., D. F. Hendry, and N. Shephard, "Parallel Computation in Econometrics: A Simplified Approach" Chapter 15 in Handbook of Parallel Computing and Statistics, Chapman & Hall/CRC, 449-476, 2007.
12. Fair, R.C., and J. B.Taylor, "Solution and Maximum Likelihood Estimation of Dynamic Nonlinear Rational Expectations Models", Econometrica, 51(4), 1169-1185, 1983.
13. Fisher, P., Rational Expectations in Macroeconomic Models. Kluwer Academic Publishers, Dordrecht, 1992.

14. Golub, G. H., and C. F. Van Loan, Matrix Computations, Johns Hopkins Series in Mathematical Sciences, The Johns Hopkins University Press, 1996.
15. Harris, Mark J., William V. Baxter III, Thorsten Scheuermann, and Anselmo Lastra, "Simulation of Cloud Dynamics on Graphics Hardware." In Proceedings of the GGRAPH/Eurographics Workshop on Graphics Hardware 2003, pp. 92-101, 2003
16. Isard, P., "The Role of MULTIMOD in IMF's Policy Analysis", Technical Report IMF Policy Discussion Paper, International Monetary Fund, Washington DC, 2000.
17. Khronos OpenCL Working Group, The OpenCL Specification - Version 1.0. The Khronos Group, Tech. Rep. 2009.
18. Lawson, C. L., R. J. Hanson, D. R. Kincaid, and F. T. Krogh, "Basic linear algebra subprograms for Fortran usage", ACM Transactions on Mathematical Software, 5 (3), 308-323, 1979.
19. Levin, J., and R. Tryon, "Evaluating International Economic Policy with the Federal Reserves Global Model", Federal Reserve Bulletin, 1997.
20. Masson, P., S. Symanski, and G. Meredith, "MULTIMOD Mark II: A Revised and Extended Model", Technical Report, Occasional paper 71, International Monetary Fund, Washington DC, 1990.
21. NVIDIA, CUDA C Programming Guide, Version 4.0, 2011.
22. Saad, Y. Iterative Methods for Sparse Linear Systems, PWS Publishing Company, 1996.
23. Whaley, R. C., A. Petitet, and J. Dongarra, "Automated Empirical Optimization of Software and the ATLAS project", Parallel Computing, 27(1-2), 3-35, 2001.

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THE CREDIT POLICY AND ITS IMPACT ON THE ROMANIAN ECONOMY

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Abstract: In this paper we discuss the credit policy and how it affected the macroeconomic dynamics in Romania. We estimate a regression on quarterly data in which economic growth is the dependant variable and foreign direct investments and domestic credit are the explanatory variable. We found significant and strong positive coefficients for the effects of credits and foreign direct investments on economic growth. We also found some degree of inertia in GDP.

Keywords: credit policy, business cycles, linear regression, FDI, inertia.
JEL: E32.

Introduction

It is generally acknowledged in the economics literature that there is inter-dependence between the economic development and the need of financing of this (Demirguc-Kunt, Levine, and Hong-Ghi Min, 1998, King and Levine, 1993). An essential role in the development of the financial sector have both the financing demand as well as the structural impediments of supply to meet the level of demand either due to lack of a viable financial system, either due to political, cultural or legal impediments (Rajan şi Zingales, 2002). The way the financing is implemented varies with various factors among which the access to financing is one of the essential ones.

The access to financing depends, not at last, on the financing policy of national and international financial institutions as well as on the macroeconomic context which might favour either a lax financing or a restrictive financing.

The objective of this paper is to analyse the impact of credit policies on the Romanian economy and to underline the necessary measure to sustain the financing as an instrument for economic recovery.

The paper is structured in three parts: a first part is dedicated to the credit policy, as a component of monetary policy in the period 1989-2009, a second part is dedicated to the analysis of the credit dynamics in Romanian economy, focusing on

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the risks and vulnerabilities of the financing system and in a third part several econometric techniques will be used in order to estimate the impact of credit on the dynamics of Romanian economy. Several conclusions are derived at the end.

1. An Analysis of credit policy in Romania

The credit policy in Romania, as a component of the monetary, has passed from 1989 to the present day through numerous changes.

The first period, from 1989 to 1996, can be seen as dominated by the process of institutional building and by the implementation of specific mechanisms for the functioning of a free market, having as a long run purpose the transition to a market economy. In this period, the credit policy was under the principle of bona fide, being dominated by the administrative feature of the instruments and mechanisms to implement the market economy as well as the benign state of the monetary market under the circumstance of a low competition.

The creditation policy in this period was implemented through the use of direct instruments, like credit ceilings, due to the lack of a significant role of the interest rate in the efficient allocation of resources.

As an essential feature of the credit policy, we could mention the preference financing, which was imposed on political reasons, and it favoured certain sectors viewed as having a strategic importance (thermic energy, coal extraction, natural gases, oil, siderurgy and the transportation of merchandise by rail) to which we could add the agriculture. All these benefited from preferential lines of financing with lower interest rates, which led to the illusion of a cheap financing, which delayed the process of reform of Romanian economy.

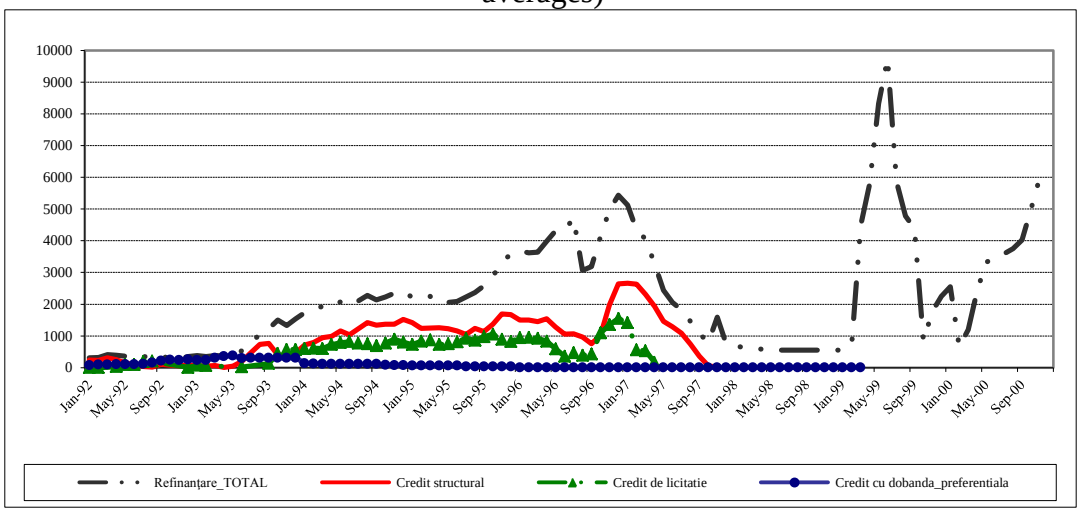
The adoption of the statute for refinancing (approved by the Administration Council in 1991 and implemented from 1st of January 1992), modified the instruments of financing by central banks, introducing three new mechanisms of financing: the credit line, the auction credit (which anticipated the open-market operations) and the fixed-term credit, to which a series of facilities of refinancing under special conditions were added.

As essential features of the credit policy in this period we can metion: the lowering of the importance of auction credit, as the main instrument for financing as well as the transformation of structural credit from "re-discount" credit to directed credit. Moreover, the swap agreements were used as an "opaque" tool to provide liquidity, while the inflation rate has replaced the official tax of "discount" for the case of directed credits. This last measure has led to the segmentation of interest rates and of the monetary market.

The credit system in this period was marked by rigidities which were due to the abundance of special credits and of the lack of instruments of absorbing the liquidity excess like: operations with "government securities" (these were transacted only on the primary market), "deposit T-bills" at NBR, deposits "remunerate" by

NBR, "reverse repo agreements", and in general of instruments that were used to control the liquidity on the monetary market.

The evolution of refinancing, of auction credit and of special credit, as well as of credit of preferential interest rates between 1991-2000 in Romania (billions lei; daily averages)



Source: Data from Annual Reports between 1990-1995 and 1996-2000

The second period in the credit policy, the one between 1997 and 2000, was characterized by both restructuring and adjusting measures of the banking sector, as well as preparing Romania to enter in the European structures. These things implied the change and the adaptation of the rules to the new realities on both national and international plan, with a major impact for credit policy.

These changes in the credit policy meant, first of all, changing the founding principles. Thus, the bona fide principle was replaced with the principle of credit warrantee, according to the EU practices, which opened the way for the open market operations, as the main instrument for controlling liquidity on the labor market.

Second of all, the credit policy in this period was influenced by the introduction of concurrential instruments, the decrease in the number of structural credit as well as the acceleration of the process of implement the market mechanisms for credit market. In this sense, in 1997, the mechanism of mandatory reserves was modified and it came into force the secondary market for state titles.

Third, the credit policy was influenced by the negative effects of credit policy from the previous period which continued to manifest. Two other banks suffered from the high volume of accumulated nonperforming loans (Bancorex and Banca Agricola). In order to avoid the systemic risk, the government and NBR choose the measure of converting these nonperforming loans into state tatles with maturity at 5 years, with a total value of 7875 billions ROL for Bancorex, to which a special financing from NBR of 2974 RO. The funding for Banca Agricola was of 420 billions ROL.

Fourth, the role of NBR as a financer of the state budget deficit was accentuated at the beginning of the new period, as the debt to NBR increased from 274.8 billions ROL at the end of 1996 to 3271.3 billions ROL at the end of 1997 due to the buying on the secondary market of an important number of treasury bills, which is actually incompatible with the rules in EU member states, indicating a strong fiscal character of monetary policy.

Fifth, the mechanism of mandatory reserves became much more active starting with 1998, especially after the adoption in August of the new statute which tried to follow the adaptation of this mechanism to the new statute of NBR. In this context, the base for computing the mandatory reserves was extended and a fluctuation band for the bank reserves was included by establishing a minimum and a maximum level for the reserves.

Sixth, the refinancing, as a credit instrument, lost from its importance in 1998, so that toward the end of 1998, NBR had in portfolio an average volume of credits of 555.6 billions RON which represented 2.9% from the level of the monetary base.

Seventh, there was a movement to the perfectioning of the legislative and institutional framework according to the new international and nationa context. A particular attention was paid to the norms and measure to increase the prudential overseeing.

The period between 2001 and 2011 was distinguished from the point of view of credit policy through the functioning of instruments specific to the free market in the actions of the central banks to control the growth of credit, and, through it, of the aggregate demand in order to reduce inflation and to maintain the price stability. Starting with 2001, the credit channel, as a monetary policy transmission channel, started to function at the same with with the interest rate channel.

Their efficiency manifested not only on the segment central bank – banks but also on the segment banks – clients. In this period, the instruments of design and implementation of the credit policy diversified, with the accent changing from direct instruments (the mechanism of reserve rate and of interest rate) to open market indirect instruments.

2. The impact of credit policies on the financial flows within the Romanian banking system

In order to underline the impact of the credit policy on financial flows from the Romanian banking sector and from the overall economy, we followed the approach by Hanousek, Kocenda, Ondko (2007), based on the methodology due to Schmidt, Hackethal şi Tyrell (1999) which used the concept of economy as a set of sectors which exchange financial assets, distinguishing a matrix of demand of financial resources and of supply of financial resources. Within this matrix, each cell on a row indicates the demand of financial resources and each cell on a column indicates the sources.

Following the approach by Hanousek, Kocenda, Ondko (2007), as we are interested by the interactions between the banking sector, especially the companies,

the households, the government as well as the central bank, we tried to reveal a global image of the attracting of financial resources in Romanian economy during the transition period and the way these changes in the credit policy of central banks and commercial banks affected the financial flows.

We used annual data from annual reports of NBR in order to make easier the computations. We also took into consideration the fact that the data series are affected by a break at the level of year 2007, when the standards of European System of Central Banks was adopted at a national level. The most important changes are tied to the definitions of monetary aggregates as well as to the economic sectors that are linked to the making of this report.

In order to underline the development and the changes in the financial flows, several new proportions were introduced which indicate the importance of each financial channel relative to the share of assets (liability) within each sector in total assets (liabilities) which are directed towards other sectors as well as the dynamic of this evolution.

Generally speaking, an intermediation rate or a share of financial flows between sector i and sector j at moment (denoted by $SFA_{i,j}$) can be defined as a proportion of financial flows between sector i and sector j (denoted by $FA_{i,j}$) in total financial flows between sector i and the rest of the economy, according to the formula below (where k is the number of sectors considered in the analysis):

$$SFA_{i,j}(t) = \frac{FA_{i,j}(t)}{\sum_k FA_{i,k}(t)}. \qquad (1)$$

Following the general definition from equation (1), we build the share of financial flows from sector j towards banking sector at moment t (denoted by $SB_j(t)$):

$$SB_j(t) = \frac{FS_jB(t)}{\sum_k FS_kB(t)}, \qquad (2)$$

where $FS_jB(t)$ is the dimension of flows from sector j toward the banking sector, in which case the banks are the debtors and the sectors are the creditors. The resulting data is presented in Table 1.

Similarly, we define the share of financial flows from the banking sector toward sector j at moment t, denoted by $BS_j(t)$:

$$BSj(t) = \frac{FBS_j(t)}{\sum_k FBS_k(t)}, \qquad (3)$$

where $FBS_j(t)$ is the dimension of flows from the banking sector toward sector j, in which case the banks are the creditors and the sectors are the debtors. The data resulted from this formula are gathered in Table 2.

These proportions represent the share of each sector in the economy relative to the commercial banking system and show the contribution of each sector to the development of the banking sector as well as the contribution of the banking system to the development of the investments and the ensurance of the necessary funds for

each sector. This indicator reflects better the contribution of the banking system to the development of the economy, when compared with the indicator regarding the share of financial assets sector in total financial assets in the economy, which is usually used in the literature in order to demonstrate the importance of the banking sector within the overall economy.

However, there also some shortcomings of this indicator which originate from the impossibility of eliminating double entries of the financing demand within the financial sector.

The sectors taken into consideration in this study were: the sector of economic agents, which was broken on agents with capital that is mostly state owned and agents with capital that is mostly private owned; the sector of households; the public sector; the sector of nonbanking financial companies; the sector central bank and the sector rest of th world (including the relations with the external world).

In order to determine the evolution in the credits and debits and to capture the way the flows from a certain sector have changes along the period between 1994 and 2009, indices of credits from sector j towards commercial banks in year t, denoted by $IC_j(t)$, were constructed by deflating with the consumer price index, CPI, in order to eliminate the influence of inflation:

$$IC_j(t) = \frac{C_j(t)}{C_j(1994)} * \frac{CPI(1994)}{CPI(t)} \qquad (4)$$

where C_j is the flow of credits from sector j toward the commercial banks sector (the deposits of sector at banks). The synthetic data is presented in table 1.

Similarly, an index of debit of sector j towar the commercial banks sector was constructed:

$$ID_j(t) = \frac{D_j(t)}{D_j(1994)} * \frac{CPI(1994)}{CPI(t)} \qquad (5)$$

where D_j is the flow of debits from sector j toward the commercial banking sector (credits taken by sectors from the banks). The synthetic data is presented in Table 2.

In order to facilitate the comparison with the dynamics of the GDP, GDP deflators with the basis in 1990 were used, in which case in the formulas above, the CPI was replaced with the GDP deflator.

Within this analysis, annual data was used for debits and credits. The data were taken from the monthly bulletins and annual Reports of NBR for the period between 1990 and 2009, while for CPI the data were taken from the monthly price bulletins from the National Institute of Statistics. The GDP deflator has been determined by the author on the basis of statistical data of the National Institute for Statistics as published in the Statistical Yearbooks between 1990 and 2008[10].

[10] From the point of view of methodology, after 1st January 2007, the national statistical system has been adapted to the EU Central Banks system standards, which led to important changes in both content and form of the reported data. That is whhy there is no compatibility between the reports from

The analysis of the data from Tables 1 and 2 reveal for the credit policy in Romania between 1990 and 2009 several aspects which are discussed below.

The internal savings by the economic agents and by the population had an important role in ensuring the necessary resources for the banking system. The share of these resources in the total attracted resources was about 50% in the period 1990 to 2009 (excepting the years 1990 and 1992, when the share was about 40% and the years 2005-2007) when it decreased to 30%, according to domestic methodology, but it remained around 50% according to the EU methodology).

The attraction of external funds for the financing of the economy has been around 20-30%, reaching a minimum in 1990 at 11% and a maximum of 45% in 2005 (according to the methodology in use in 2006, but following the EU methodology, the maximum was reached in 2008 at a share of over 37%). The attraction of foreign funds was bigger in 1998, when Romania was confronted with a financial crisis, which led to an ample process of restructuring and cleaning of the banking system. After 2000, an accelerated tendency of increased external financing was registered (a growth by 4.6 times in 2006 relative to 1994), so that the share of the external sources of financing has increased by 16% in the period 2000 to 2008.

The public sector has known after 1996 an accelerated process in the reduction of the deposits to the banks due to the reduction of the budgetary revenues under the circumstances of a lower GDP, on one hand, and, on the other hand, due to the reduction of expenditures after 1997 as a restructuring process took place, implying compensatory payments for the civil servants that were fired and the cover by public debt of the debts resulted from the reforming of the banking sector.

The dynamics of the deposits of banks at NBR were influenced by the leglistative changes regarding the mechanism of mandatory reserves (which was changes in 1994 and modified again in 1997), which contributed to a leap in the share of the deposits of banks at NBR in the total resources attracted by banks in 1994 and 1998 when this mechanism became much more active as an instrument to control the liquidity. The rate of mandatory reserves increased strongly reaching about 30% for deposits in RON and 20% for deposits in foreign currencies with fluctuations from one period to another, according to the needs of monetary policy. What was different with respect to other countries from CEE area (like Czech Republic) where the central bank was the biggest creditor of the banking system in the context of large inflows due to privatizations, in Romania only between 1999 and 2001, and between 2005 and 2006, did the central bank had a share of over 10% in the credits of the banking system.

The high inflation in Romania (which maintained itself at levels of two figures until 2004) has influenced in a strong manner the dynamics of the resources of the banking system which has passed through big fluctuations relative to the year 1994

1990 to 2006, when national definitions were used for monetary agreggates, as well as for economic sectors, and the reports from 2007 to 2009.

taken as a basis for the period between 1990 and 2006, and relative to the year 2005, taken as a base for the period between 2007 and 2008. In these conditions, we can say that there was no tendency of continuing growth of the capacity of the banking system to ensure the resources necessary for the development of Romanian economy, like it happened in Czech Republic, Hungary, Poland or Slovak Republic (Hanousek, Kocenda, Ondko, 2007).

The sector of non-banking financial companies has a weak contribution to the overall credits given by the Romanian banking system. This differs from the situation of other countries like Czech Republic, Hungary, Poland or Slovak Republic where this sector is on the second place relative to the credits given to the banking sectors (Hanousek, Kocenda, Ondko, 2007).

Table 1
The share of the flow of credits from sectors to the baking sector (Sectors are the creditors, while the banks are the debtors)

Credits (deposits of sectors at the banks)		Banking sector										
		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Population	share	31,1	17,4	17,0	16,3	24,6	25,7	27,0	35,2	28,9	30,5	32,9
	growth	527,2	216,2	121,2	67,0	100,0	142,9	181,6	171,1	107,5	117,0	115,0
Economic agents	share	12,3	31,7	25,1	32,8	24,1	22,1	23,6	24,7	20,3	19,4	20,6
	growth	212,2	402,8	182,1	137,8	100	125,4	161,8	122,7	77,1	76,1	73,5
Public Sector **	share	9,0	13,7	21,0	19,2	13,1	12,8	9,2	2,8	3,1	5,6	3,1
	growth	287,0	320,2	280,5	148,6	100	133,8	115,5	25,9	21,3	40,1	20,0
Rest of the World***	share	10,7	22,7	23,0	19,3	18,6	25,4	25,9	26,6	32,7	24,1	21,3
	growth	240,3	374,3	216,6	104,9	100,0	186,4	230,0	171,2	160,9	122,2	98,2
NBR****	share	28,0	10,0	5,0	2,9	6,2	3,0	4,8	1,3	7,3	12,4	12,6
	growth	1881,7	492,3	141,4	46,9	100	66,0	126,9	24,2	107,7	188,5	174,8
Financial non-banking companies	share	8,9	4,5	8,9	9,6	13,2	11,0	9,6	9,4	7,7	8,0	9,5
	growth	280,4	103,9	117,9	73,6	100,0	114,0	120,1	85,5	53,8	57,5	61,5
Total	share	100	100	100	100	100	100	100	100	100	100	100
	growth	417,8	306,7	175,4	101,5	100,0	137,0	165,6	119,9	91,7	94,6	86,0

		Banking sector								
Credits (deposits of sectors at the banks)		2001	2002	2003	2004	2005	2006	2007	2008	2009*
Population	share	30,8	34,1	30,8	26,8	22,0	20,5	28,5	28,2	22,2
	growth	109,9	140,9	157,1	170,2	156,1	186,6	176	201,1	...
Economic agents	share	22,5	21,6	23,3	20,2	11,7	14,0	23,2	20,3	12,8
	growth	82,1	91,0	121,3	130,9	84,6	130,4	138	138,8	...
Public Sector **	share	3,9	4,4	4,5	4,0	3,5	6,3	2,1	4,0	6,53
	growth	25,9	34,4	42,9	47,8	46,8	106,9	148,2	320,9	...
Rest of the World***	share	22, 7	23,0	25,1	35,5	45,1	38,4	33,4	37,1	29,0
	growth	107,0	125,9	169,2	298,1	422,1	461,8	180	230,5	...
NBR****	share	10,9	7,6	6,5	4,3	10,9	14,5	9,9	7,3	4,6
	growth	154,5	124,2	130,6	108,8	305,5	520,8	221,2	187,6	...
Financial non-banking companies	share	9,2	9,3	9,7	9,3	6,8	6,3	2,9	3,1	24,9
	growth	61,4	71,9	92,5	109,7	89,4	106,6	123,2	149,6	...
Total	share	100	100	100	100	100	100	100	100	100
	growth	88,0	101,9	125,5	156,6	174,6	224,1	167,2	192,6	...

Source: Authors' computations using statistical data from monthly bulletins of NBR, National Institute of Statistics.
Notes:

* For 2009, the data refers to the first seven months (Ianuary-July 2009); for the period 2007-2008, because of methodological changeses the dynamics was computed with 2005 as fixed base, the last year for which the series were computed;
**Includes SDR holdings with IMF, foreign bank deposits, deposits with BIS, FED and others, US treasuries, other convertible foreign assets, quota subscriptions at foreign banks, other quota subscriptions at IMF, which until 2002 were included in domestic assets at NBR;
*** Includes deposits of banks at NBR; in the new reporting includes current accounts of financial institutions at NBR.

Table 2
The share of debt flows toward the banking sector of other sectors (the sectors are the debtors and the banks the creditors)

Debits		Banking sector										
		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Population	share	2,3	2,8	1,3	1,4	1,0	1,3	1,6	2,0	2,5	1,8	2,2
	growth	564,8	729,2	213,5	129,9	100,0	155,2	198,1	155,0	183,5	122,0	121,5
Economic agents	share	82,7	57,3	38,8	45,1	42,2	43,4	52,1	42,9	38,6	38,0	37,4
	growth	501,0	362,0	152,1	102,2	100,0	131,1	154,3	79,9	68,5	62,2	51,1
Public Sector **	share	3,0	18,7	24,9	15,2	16,1	24,3	20,1	18,2	16,9	25,0	23,9
	growth	47,7	311,3	256,3	90,7	100,0	192,9	156,3	88,9	78,7	107,3	85,8
Rest of the World***	share	8,7	8,5	15,0	17,6	15,9	17,0	19,4	23,7	32,1	26,0	23,3
	growth	140,1	141,8	155,4	105,3	100,0	136,3	152,2	116,6	150,4	112,4	84,1
NBR****	share	3,4	12,7	20,0	20,5	24,0	13,3	6,1	12,8	9,0	8,2	12,1
	growth	36,5	141,4	138,1	81,6	100,0	70,9	31,9	41,8	28,0	23,6	29,2
Financial non-banking companies	share	0,0	0,0	0,1	0,2	0,9	0,6	0,6	0,5	1,0	1,0	1,2
	growth	0,0	0,0	20,4	27,3	100,0	96,0	93,4	43,9	83,3	78,6	77,7
Total	share	100	100	100	100	100	100	100	100	100	100	100
	growth	255,8	266,6	165,5	95,5	100,0	127,4	124,9	78,5	74,8	69,0	57,6

Debits		Banking sector								
		2001	2002	2003	2004	2005	2006	2007	2008	2009*
Population	share	3,0	5,4	13,5	13,1	11,8	24,1	17,8	18,5	25,7
	growth	169,5	361,9	1126,9	1097,9	1676,3	2792,9	299,5	385,5	...
Economic agents	share	39,1	38,8	37,7	32,0	25,3	37,9	18,2	17,6	24,5
	growth	54,7	64,0	77,0	65,8	87,6	107,3	187,9	226,0	...
Public Sector **	share	14,9	11,8	5,2	3,6	2,2	2,8	2,4	3,2	11,6
	growth	54,6	51,3	28,0	19,2	20,1	20,9	259,9	433,4	,,,
Rest of the World***	share	32,5	35,7	36,3	45,4	29,9	17,3	60,3	59,4	33,2
	growth	120,4	155,4	196,2	246,5	273,9	129,8	628,8	769,4	...
NBR****	share	9,3	6,2	3,9	1,8	27,3	12,7	0,3	0,5	4,1
	growth	22,9	17,8	14,0	6,6	166,5	63,3	3,4	6,6	...
Financial non-banking companies	share	1,3	2,1	3,5	4,2	3,5	5,2	0,9	0,8	0,9
	growth	86,3	172,7	353,0	422,8	604,2	723,8	90,5	96,4	...
Total	share	100	100	100	100	100	100	100	100	100
	growth	59,0	69,5	86,2	86,6	146,1	119,4	278,1	345,6	...

Source: Authors' computations using statistical data from monthly bulletins of NBR, National Institute of Statistics.
Note:
* For the year 2009, the data refer to the first seven months (January to July 2009); for the period 2007-2008, due to methodological changes, the dynamics was computed with a fixed based 2005, the last year for which the series were recalculated.

** Includes the governmental credits given by NBR and other banks, including settlements with the state budget, includes tresures bills, other state bonds and not includes the credits gives by the population to the government sectors, from 2005 includes olso the public negociated securities;
*** Includes credits from foreign banks, deposits of foreign banks, and deposits of foreigners, "agreements and bilateral payments agreements", medium and long run deposits, deposits BIS deposits at NBR. Includes SDR holdings with IMF, foreign bank deposits, deposits with BIS, FED and others, US treasuries, other convertible foreign assets, quota subscriptions at foreign banks, other quota subscriptions at IMF, which until 2002 were included in domestic assets at NBR; after 2006, includes foreign assets less cash and other currency and monetary gold
**** Includes interbanking assets and other assests; from 2007 it also includes credits, foreign securities, stocks and other assets.

As for the credits to the economic from the banking sector, we notice that the economic agents and the public system are the main beneficiaries of the financing until 2000. After 2000, the rest of the world sector and after 2003 the population too, tends to attract most of the banking sector resources.

This might be due to, first, the trade deficit increased and it was financed with resources from the international financial markets, and second due to relaxation in the conditions for giving credits to the population which also stimulated the degree of indebtness until levels that put into question their ability to return them (see Table 2).

When comparing the dynamics from the two table, we can also remark a major disequilibrium between the dynamics of the resources attracted from economic sectors (growth by 2.2 times in 2006 relative to 1994 and by 1.9 times in 2008 relative to 2005) and the level of credits given, with increases for the latter by 1.2 times in 2006 relative to 1994 and 3.4 times in 2008 relative to 2005.

We could say that after 2005, the dynamic of the debt of the sectors toward the banking sector was much accelerated than the dynamic of the attracted resources which suggested the beginning of an explosion of credits in Romanian economy with major consequences with respect to their repayment. We can also state there there is a reverse in the dynamic of the relationship between savings (resources attracted by the banking sectors from the other sectors) and indebtness.

Commenting on this relationship between indebtness and savings and the current financial crisis, Hume and Sentance (2009) argued that the "process of saturation of the global savings", can be regarded as being responsible for the trigerring the initial phase of the financial crisis, but other factos are also they tied to the way monetary policy was driven as well as the perception of a reduced macroeconomic risk, those two latters being more important in the final steps the preceded the trigerring of the crisis, around middle 2000's.

3. The impact of credit policy on Romanian Economy

The credit policy in Romanian followed the "stop and go" trajectory of Romanian monetary policy and it served as one of the triggering factors of both the financial crisis in 1998 and the credit expansion after 2004.

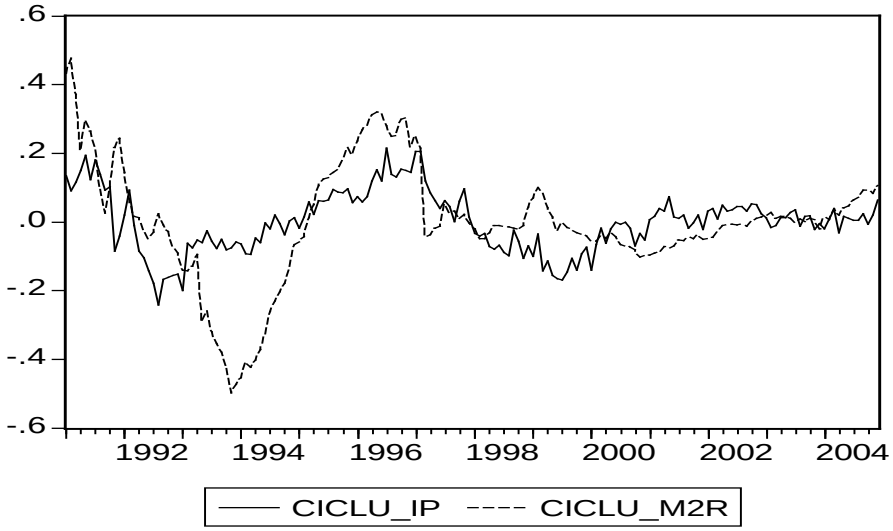
These changes led to a modification of the behavior of the economic agents towards the banking sector, which generated weaknesses within it through the increase in the general level of endebtness, within the context of a reduced capacity to reimburse the debts.

A large literature in the field is dedicated to the analysis of the financing of the economy and how this is related to the economic cycles. Following the approaches in the literature, we obtained for Romanian economy similar results with regard to the cyclical behavior of both nominal M2 as well as real M2, see figure 2.

The nominal M2 appears as pro-cyclical and has a lag of two months relative to the overall economic activity. The real M2 has a stronger pro-cyclical behavior, as the contemporaneous correlation coefficient is of 0.56) and it is contemporaneous with the production. We have thus the image of a pro-cyclical money supply, with a weaker or stronger pattern, depending on whether it is nominal or real.

Figure 2

The cycles of real money supply



Source: our computations.

Until the emergence of the real business cycles school, the theses according to which money determine production was almost unanimously accepted. This acceptance was based on very detailed studies on business cycles, like Friedman and Schwartz (1963), as well as econometric approaches like the one by Barro (1977).

However, since the real business cycles emphasized the productivity (or technological shocks), this led to a departure from the Keynesian paradigm even if only temporary. Later, the real business cycles tried to explain the pro-cyclical

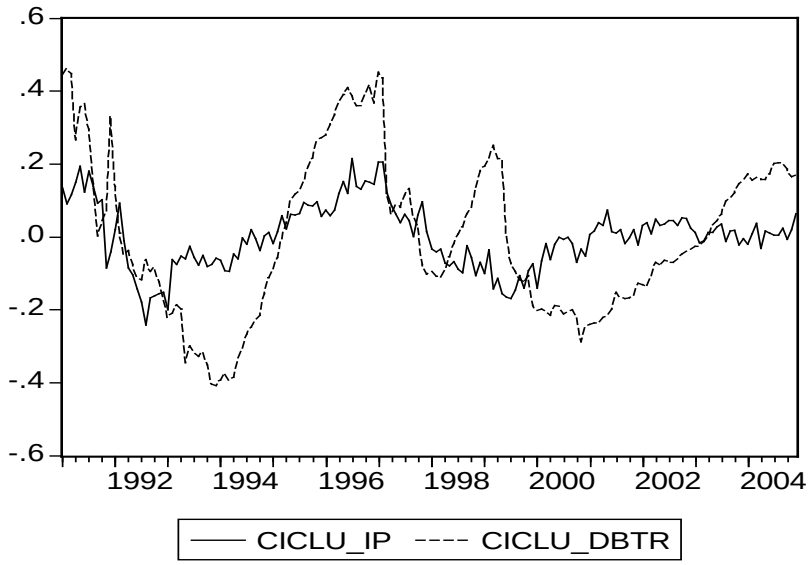
behavior of monetary by considering endogenous money, like in King and Plosser (1984).

The behavior of money is further underlined by the cyclical properties of real nongovernmental credit, which is both strongly pro-cyclical and synchronous with the production cycles, see Figure 3.

In literature it is considered as a normal feature of emerging economies the fact that the credit is pro-cyclical, due to the low development of financial markets, see Agenor, McDermott and Prasad (2000).

Figure 3

The cycles of real nongovernmental debt



Source: our computations.

In order to underlinre the relationship between the financing process both internal (through internal credit) and external (through foreign direct investments) and economic growth in Romania, we used a simple regression, which we ran on quarterly data from 2001 Q1 to 2009 Q1. The data were all logged.

The specification of the equation is given in expression (1), while the results are presented in equation (2). In round brackets we given the values for t statistics, while in the straight brackets the level of erros. The value for R^2 is high enough, while DW indicates that the errors are not correlated. The statistical tests for coefficients and errors indicate a meaningful estimated model (they are available on request).

Loggdp= c(1)*logisd(-4) +c(2)*logw +c(3)*log_d_ex(-2)+c(4)*logcredit(-1)+c(5)*(r_sa(-1)/r_sa(-2))+c(6)*ar(1)

or:

LOGGDP = 0.00427868282276*LOGISD(-4) + 0.195379985305*LOGW + 0.480276036818*LOG_D_EX(-2)
(2.863808) (2.600767) (2.964768)
[0.0084] [0.0154] [0.0066]
+0.0164839388*LOGCREDIT(-1) + 0.00930401385*R_SA(-1)/R_SA(-2) + [AR(1)=-0.63562875]
(1.825063) (5.709792) (-4.032515)
[0.0800] [0.0000] [0.0005]

$R^2 = 0.710618$
DW = 2.0231

The notations used in the equation have the following significance:

- loggdp=log(gdp_sa/gdp_sa(-1)) is the logarithm of the GDP growth;
- logisd =log(isd_sold_sa/isd_sold(-1)) is the logarithm of the growth in the net foreign investments;
- logw=log((gdp_sa/l_ec_sa)/ ((gdp_sa(-1)/l_ec_sa(-1))) is the logarithm of the growth in labor productivity computed as a share between GDP and the number of employees in the economy;
- logcredit=log(l_d_sa/l_d_sa(-1)) is the logarithm of the internal credit growth (denoted_d_sa)
- logD_ex is the logarithm in the growth of foreign demand, proxied through the GDP of the 25 EU member stats (all states, less Romania and Bulgaria), taking into account that the share of trade with EU in total trade is of over 70%.
- Δr-sa =r-sa/r_sa(-1) is the growth of interest rate on the money market at 3 months.
- All series were seasonally adjusted using Census X12 from Eview.

We notice the positive link between the economic growth in Romania and the increase in foreign direct investments (a positive coefficient of 0.04) as well as the much higher influence of internal credit on economic growth (a positive coefficient of 0.0164), with the positive sign as the theory predicts. This might serve as an explanation of why the recent international financial and economic crisis that has hit the Romanian economy has done it in such a strong manner, as the contraction from 2009 proved it.

The transmission channels were both that the reduced external demand, with a strong influence on GDP (a coefficient of 0.48) and through the credit that stimulated the internal demand. We can also mention that the influence of foreign direct investments and internal credit manifests not only directly (see the positive values of the coefficients), but also indirectly through the increase in labor productivity.

This is due to the fact that some of the direct investments or credits are directed toward increased economic performances, which are expressed through higher labor productivity (which itself has a significant influence (a positive coefficient of 0.2). The presence of the autoregressive process AR indicates that the GDP has some inertia.

Conclusion

We discussed in this paper the main features of credit policy in Romania. In this sense we reviewed the main developments during the transition period as well as the last significant developments.

We analyzed the cyclical behavior of main monetary variables, M2 and nongovernmental credit, in both real and nominal terms, and we found a pro-cyclical behavior. Running a regression on quarterly data between 2000 and 2009, between GDP growth as dependant variables, and credit variables (either internal or external) as explanatory ones, we found significant effects of both foreign direct investments and credits on production.

REFERENCES

Abel, Istvan, Siklos Pierre. (2004). "Secrets to the Successful Hungarian Bank Privatization: the benefits of Foreign Ownership through Strategic Pertnership." Economic Systems 28 (2004): 111-123.

Agenor, Pierre-Richard, John McDermott, and Eswar Prasad. "Macroeconomic Fluctuations in Developing Countries: Some Stylized Facts." The World Bank Economic Review 14 (2000): 251-285.

Barro R. J. "Unanticipated Money Growth and Unemployment in the United States." American Economic Review 67 (1977): 101-115.

Barisitz, Stephan. "Banking in Central and Eastern Europe since the Turn of the Millennium – An Overview of Structural Modernization in Ten Countries." Focus on European Economic Integration 2 (2005): 58–82.

Bonin, John P., Iftekhar Hasan, Paul Wachtel. "Privatization Matters: Bank Efficiency in Transition Countries." Journal of Banking and Finance 29 (2005a): 2155–2178.

Bonin, John P., Iftekhar Hasan, Paul Wachtel. "Bank Performance, Efficiency and Ownership in Transition Countries." Journal of Banking and Finance 29 (2005b): 31–53.

Demirgüç-Kunt, Asli, Ross Levine, and Hong-Ghi Min. "Opening to Foreign Banks: Issues of Stability, Efficiency, and Growth." in The Implications of Globalization of World Financial Markets, edited by Seongtae Lee, .Seoul: Bank of Korea, 1998.

Friedman, Milton and Anna Schwartz. A Monetary History of the United States, 1867-1960. Princeton: Princeton University Press, 1963.

Kocenda, Evzen, Jan Hanousek, Peter Ondko. "The Banking Sector in the New EU Membre Countries: A Sectoral Financial Flows Analysis." Czech Journal of Economics and Finance 57 (2007): 200-223

Hume, Michael, Andrew Sentance. "The global credit boom: challenges for macroeconomic policy." Journal of International Money and Finance 28 (2009): 1426-1461.

Miani S, Sagan K. (2006). "The Role of Foreign Banks in Poland." Transition Studies Review, 13(2), pp.255–269.

King, Robert G., and Charles Plosser. (1984). "Money, Credit, and Prices in a Real Business Cycle." American Economic Review 74 (1984): 363-380

King, Robert G., and Ross Levine. "Finance and Growth: Schumpeter Might Right." Quarterly Journal of Economics 108 (1993): 717-737.

Nollen, Stanley, Zdenek Kudrna, Roman Pazderník. "The Troubled Transition of Czech Banks to Competitive Markets." Post-Communist Economies 17 (2003): 361–380.

Rajan, Raghuram and Zingales Luigi. "Financial Systems, industrial structure and growth." Oxford Review of Economic Policy 17 (2001): 467-482

Schmidt, Reinhard, Hackethal Andreas, Tyrell Marcel. "Disintermediation and the Role of Banks in Europe: An International Comparison." Journal of Financial Intermediation 8 (1999): 36–67.

Fries, Steven, Neven Damien J., Seabright Paul and Taci Anita. "Market Entry, Privatization and Bank Performance in Transition." Economics of Transition 14 (2006): 579-610.

Weill, Laurent. "Banking efficiency in transition economies." The Economics of Transition 11 (2003): 569–592

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DYNAMIC EFFECTS OF MIGRANT REMITTANCES ON GROWTH: AN ECONOMETRIC MODEL WITH AN APPLICATION TO SOUTHEAST EUROPEAN COUNTRIES

MARIANA BĂLAN[11]

Abstract: This paper presents a dynamic econometric model to study the impact of remittances on consumption, investment, output and imports.
Multiplier effects of exogenous shocks of remittances are estimated in the short and long term, with data from six Southeast European countries.
The analysis reveals a uniform country performance of instability and uncertainty, with great temporal and inter-country fluctuations of remittance effects.
Are highlighted the different inter-country priorities of remittances spending and an asymmetric impact on economic growth of remittances changes.

Keywords: Remittances, Migration, Economic Growth, Econometric Model, Southeast European Countries

JEL Classification: C33, C52, F22, O11, O15

Introduction

Migrant remittances are a significant and vital financial source for labor exporting countries, therefore the issue of their effects is of utmost importance. In many of the labor exporting countries, migrant remittances represent a very high proportion of their foreign exchange proceeds and an indispensable source for covering the balance of payments deficits.
There are more than 215 million international migrants in the world. Recorded remittances received by developing countries, estimated to be US$325 billion in 2010, and constitute more than 10 percent of gross domestic product (GDP) in many developing countries.

Cross-country analysis and evidence from household surveys suggest that migration and remittances reduce poverty in the origin communities. Remittances lead to increased investments in health, education, and small businesses. At the same time, the loss of skills associated with migration can hamper development and delivery of

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basic services in sending countries. The diaspora of developing countries can be a source of capital, trade, investment, knowledge, and technology transfers.

So, recipients of these transfers typically spend the money on necessities such as food, housing, health care and educational expenses (Amuedo-Dorantes et al. 2007; Edwards and Ureta, 2003; Gitter and Braham, 2007; Valero-Gil, 2008). Moreover, remittances have helped receiving countries deal with financial distress and have been an important source of support during humanitarian crises (Savage and Harvey, 2007). Contrary to foreign direct investment, remittances have a direct impact on household incomes and, since there is no need of direct government intervention, remittances are less likely than foreign aid to end up in the hands of corrupt government officials (Kapur, 2004). In addition, remittances also represent a lucrative business for many banks and money transfer agencies.

However, remittance-related development programs are relatively new. In both the private sector and the development community, few organizations have made a concerted effort to use remittances to enhance their positive impacts on recipients.
Since the beginning of the 1990's, emigration represents a significant phenomenon in

Southeast Europe

According to the "Migration and Remittances Factbook 2011", remittances are rapidly increasing in world from $101.3 billion in 1995 to $440.1 billion in 2010. The proportion of remittances to developing countries is also increasing, from 54.6% in 1995 ($55.2 billion) to 74% in 2010 ($325.5 billion).

Three East European countries are among the world's main recipients of remittances as percentage of gross domestic product (GDP), namely Moldova (23%), Serbia (13%) and Albania (11%).

Even if the question of the impact of remittances on recipient countries growth is still open, remittances represent an important source of external financing. They exceed international aid flows and, for some countries, the volume of foreign direct investments (Ratha, 2005).

This paper will try to respond empirically to some of these questions and estimate the relative effects of remittances and the time distribution of these effects for different sectors of the economy or macroeconomic variables that have a bearing on development and growth. The tool of our analysis is a macro-econometric model, which will be applied to a number of Southeast European Countries.

1. Remittances and Development: Some Preliminary Observations

Flows of workers´ remittances to developing countries have grown steadily during the last 30 years. They have gone up from 55 billion dollars in 1995, to 192 billion in 2005 and about 325 billion in 2010. Remittances are only second to FDI as a capital flow towards developing countries, and substantially exceed both private debt flows and development aid (Figure 1).

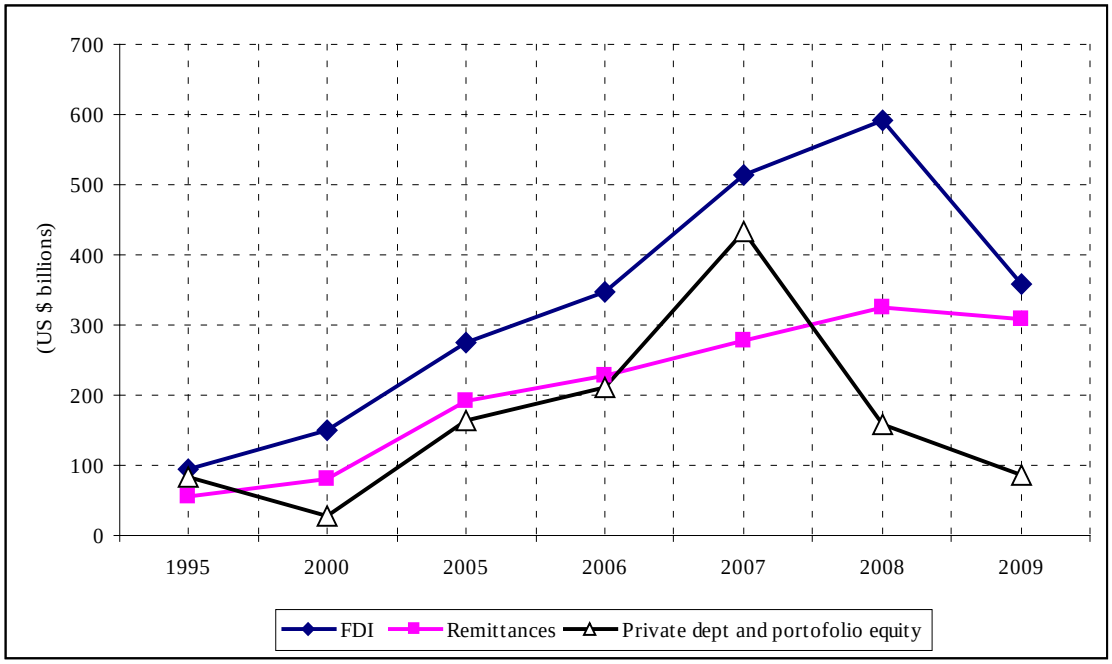
The substantial rise in officially recorded remittances over the last decade has in part been fuelled by increasingly intense migration and in part by an increasing use of formal channels of transmission for remittances. However, a precise estimation of total remittance flows is difficult for various reasons:

The lack of comparable migration figures across countries with different nationalization laws;

The different understanding of the specific components of remittance flows by different countries, and even by international organizations;

The still large share of remittances sent through informal channels, and thus going unrecorded, which may be even larger than formal remittances.

Figure 1 Resource Flows to Developing Countries



Data Sources: World Development Indicators database and World Bank Migration and Remittances Unit.

Migration has mixed effects on the economic conditions in the receiving country. Research on remittances and their impact in home country households and regions is abundant (Massey et al. 1998, or Taylor 1999). The most visible effects are summarized in the following points:

- Remittances augment the income and welfare of those relatives left behind in the home country, alleviating the poverty of the recipient (Adams and Page, 2003). Other authors argue that remittances may reduce recipients motivation to work, creating permanent financial dependency, and slowing down economic growth (Chami et al. 2003);

- Empirical evidence indicates that remittances tend to rise in times of economic downturns (Chami et al., and Ratha 2003);
- Remittances can also accelerate financial development in recipient countries, as remittance recipients are persuaded to turn their remittances into deposits with financial institutions, and more credit and savings products are developed to attend their demands for financing education, housing, investments, etc. Financial development, in turn, has positive effects on growth and development, both directly and indirectly by encouraging a more effective utilization of remittances;
- Large foreign exchange inflows, especially in small economies, can lead to exchange rate appreciation and lower export competitiveness;
- Low-skilled migration might represent a valuable safety valve for insufficient employment at home;
- A well-educated diaspora can improve access to capital, technology, information, foreign exchange and business contacts for firms in the country of origin. Both the return of expatriates and the maintenance of close contacts with high-skilled emigrants play an important role in the transfer of knowledge to origin countries, and the development of commercial networks and foreign investment opportunities;
- Remittances represent a source of savings and capital for investment in education, health and entrepreneurship, all of which have an effect in a shorter or longer term on productivity and employment, and ultimately on growth (Woodruff and Zenteno (2004) and Masey and Parrado (1998) find a positive impact of remittances on entrepreneurship in Mexico, Yang (2004) on education and entrepreneurship in the Philippines, Brown (1994) for business investment in Tonga and Western Samoa).

Even though investment in housing, health care and education are not perceived as productive investments, they can have an indirect effect on local production and employment opportunities through: consumption of local inputs and labor, improved household welfare and increased human capital, which positively affect the productivity of the workforce and have long term effects on growth. (Taylor (1999); Stahl and Arnold (1986); Durand, Parrado and Massey (1996)). The largest impact on growth and development, though, occurs when remittances fund productive investment.

3. Brief presentation of the model

The model used for quantifying the impact of remittances on economic growth comprising four major features, that is, i) be demand oriented; ii) be aggregate enough to have room for a number of different countries, offering comparable estimates and setting aside detailed individual or sectoral characteristics; iii) satisfy a certain

minimum of accepted econometric standards; and, iv) make good theoretical sense, compatible with the kind of economies to which it will be applied.

The model adopted consists of three behavioral equations, namely, a consumption function, an investment function and an imports function, and a national income identity.

With this model can be determined the short-run effects of an exogenous shock of remittances on these four endogenous variables and the effect of the remittances on economic growth.

For the countries in the sample considered, for the consumption function, was considered the relation:

$$C_t = a_0 + a_1 Y_t + a_2 C_{t-1} \quad (1)$$

where C is private consumption,
Y is GDP and remittances,
t is the time considered.

For investment, was considered that they are a positive function of income (Y) and a negative function of a lagged capital stock (K_{t-1}), allowing some time for investment to adjust to that stock:

$$I_t = b_0 + b_1 Y_t + b_2 K_{t-1} \quad (2)$$

For the import equation, was considerate the relation:

$$M_t = c_0 + c_1 Y_t + c_2 Y_{t-1} + c_3 M_{t-1} \quad (3)$$

and

$$Y_t = C_t + I_t + G_t + X_t - M_t + R_t \quad (4)$$

The dynamic characteristic of the model emerges from the introduction of lagged endogenous variables into the equations (1-3).

The reduced form expression of the structural equations (1) - (4) is:

$$\Gamma_{jt} = \alpha_0 + \alpha_1 C_{t-1} + \alpha_2 Y_{t-1} + \alpha_4 K_{t-1} + \alpha_5 G_t + \alpha_6 X_t + \alpha_7 R_t \quad (5)$$

where Γ can be any of the endogenous variables C, I, M, Y

$\alpha_j \left(j = \overline{1,7}\right)$ are the partial derivatives of the endogenous variable Γ_j, with respect to any predetermined variable V, i.e. $\alpha_j = \dfrac{\partial \Gamma_{jt}}{\partial V_{jt}}$ and the estimates of these parameters may be obtained, most frequently, directly by OLS from equation (5) (or by TSLS method).

If considered as variables in equation (5) are discrete, then the partial derivatives of this equation is equivalent to $\Delta\Gamma = \alpha \Delta V$, which tells that α is a multiplier, called "impact multiplier", that represents the magnitudes of direct and indirect effects of a unit change in any predetermined variable V on any endogenous variable Γ of the system, in the first year of the change in V.

4. Estimated Macroeconomic Effects of Remittances

The model is estimated and is applied individually to 6 countries: Albania, Bulgaria, Republic of Moldova, Romania, Ukraine, Bosnia and Herzegovina, and Hungary. In the top 10 emigration countries[12] are some countries of Southeast Europe: Ukraine, Romania, Bosnia and Herzegovina and Albania.

For Albania, in 2010, the stock of emigrants (1438.3 thousand persons) represents 45.4% of population, and the destination countries are: Greece, Italy, the former Yugoslav Republic of Macedonia, the United States, Germany, Canada, Turkey, the United Kingdom, France, Australia.

Bulgaria have migrants in Turkey, Spain, Germany, Greece, Italy, Moldova, the United Kingdom, the United States, Romania, Canada, and in 2010, the stock of emigrants: was 1200.6 thousands, which represents 16% of their population

Republic of Moldova, with a population of 3.6 million persons (in 2009), have 770.3 thousands migrants in 2010 (the stock of emigrants as percentage of population is 21.5%), and the most important destination countries are: the Russian Federation, Ukraine, Italy, Romania, the United States, Israel, Spain, Germany, Kazakhstan, and Greece.

According with Development Prospects Group, World Bank; UNPD 2009, Romania, it ranked the position 18 in Top Emigration Countries, with 2.8 millions emigrants, which would represent 13.1% of the Romanian population. For Romanian, the preferred countries for emigration are: Italy, Spain, Hungary, Israel, the United States, Germany, Canada, Austria, France and the United Kingdom.

Ukraine, the fifth country in Top Emigration Countries (stock of emigrants was 6563.1 thousands in 2010), ranks the position 21 in the world in terms of remittances received (5.3 US$ billions).

In Bosnia - Herzegovina the stock of emigrants as percentage of population was, in 2010 38.9% (1461.0 thousands migrants), so, occupying the 12th place in the first 29 countries with high percentage of emigrants in the population. 13% of GDP represent the remittances received by this country.

In Hungary, the number of emigrants in 2010 was 462.7 thousands (4.6% as percentage of population). Characteristic for this country is leaving a large number of physicians: (3,694 or 10.9% of physicians trained in the country[13].

In most of the labor exporting countries considered, the volume of remittances increased after 2004 (until 2008) and significant increases registered in Romania and Ukraine (Table 1). After 2004 (until 2008), there were significant increases in remittances, the highest recorded in Romania and Ukraine. Triggering the economic and financial crisis determined the reduction of remittances in all countries analysed, since 2009, the most pronounced registered in Romania (47%)

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[12] Migration and Remittances, Factbook 2011
[13] *Source: Bhargava, Docquier, and Moullan 2010*

Table no.1 *Remittances as a proportion (%) of GDP in selected Southeast European Countries*

Country		Albania	Bosnia and Herzegovina.	Bulgaria	Hungary	Republic of Moldova	Romania	Ukraine
Remittances / GDP (%)	2003	15.47	20.9	8.31	0.35	24.58	0.21	0.66
	2004	15.88	20.74	6.81	1.67	27.14	0.17	0.63
	2005	15.81	18.76	5.58	1.75	30.79	4.77	0.69
	2006	15.1	17.47	5.17	1.81	34.68	5.48	0.77
	2007	13.72	17.73	4.02	1.65	34.04	5.01	3.17
	2008	11.51	14.78	3.62	1.61	31.33	4.59	3.2
	2009	10.89	12.71	3.21	1.76	22.27	3.02	4.32
	2010	10.8	13.24	3.36	1.95	22.65	2.79	3.88
Volume of remittances (in millions of current USD)	2007	1468	2700	1694	2280	1498	8542	4530
	2008	1495	2735	1874	2520	1897	9381	5769
	2009	1317	2167	1558	2277	1211	4928	5073
	2010	1285	2228	1602	2514	1316	4517	5289

Data source: The Economic Statistics Database, http://www.economywatch.com

The data used are annual figures of the period 2003-2010. All figures are obtained from The World Bank (Migration and Remittances Factbook 2011) and the Economic Statistics Database. The estimates of the model are presented in Table 2.

Table no.2 *Structural Regression Coefficients (TSLS estimates)*

		Albania	Bosnia and Herzegovina	Bulgaria	Hungary	Republic of Moldova	Romania	Ukraine
Consumption	a_0	-104.5 (-0.852)	223.4 (1.929)	325.1 (2.013)	-1323.5 (-1.295)	-378.5 (-0.325)	7562 (2.987)	4358.4 (2.0110
	a_1	0.301 (2.963)	0.265 (2.359)	0.225 (2.1560	0.352 (1.956)	0.398 (5.14))	0.542 (7.826)	0.411 (3.215)
	a_2	0.456 (3.758)	0.584 (3.251)	0.385 (2.864)	0.621 (2.651)	0.523 (4.96)	0.096 (1.251)	0.185 (1.963)
	R^2	0.926	0.915	0.875	0.921	0.941	0.952	0.892
	DW	2.061	1.693	1.951	1.935	1.915	1.634	1.725
Investment	b_0	1863.2 (2.564)	-105.3 (-0.986)	3524.8 (2.789)	25631.2 (2.965)	705.4 (0.019)	-1850.3 (-1.152)	-2513.2 (-1.198)
	b_1	0.152 (1.206)	0.325 (3.981)	0.287 (2.961)	0.365 (2.631)	0.35 (4.381)	0.348 (2.951)	0.258 (2.015)

		Albania	Bosnia and Herzegovina	Bulgaria	Hungary	Republic of Moldova	Romania	Ukraine
	b_2	-0.182 (-2.53)	-0.038 (-1.624)	-0.012 (-2.012)	-0.021 (-1.23)	-0.039 (-1.05)	-0.048 (-1.375)	-0.041 (-1.206)
	R^2	0.824	0.734	0.725	0.756	0.814	0.791	0.698
	DW	1.722	1.562	1.795	1.571	1.32	1.325	1.425
Imports	c_0	564.2 (1.201)	201.3 (1.282)	635.2 (1.945)	1235.9 (1.075)	1027.2 (1.105)	155.6 (0.425)	278.3 (1.181)
	c_1	0.301 (2.052)	0.415 (1.624)	0.382 (1.723)	0.325 (2.001)	0.256 (1.56)	0.081 (0.489)	0.176 (0.985)
	c_2	0.725 (3.520)	0.812 (3.412)	0.769 (4.052)	0.865 (7.016)	0.431 (2.581)	0.759 (2.125)	0.743 (2.541)
	c_3	-0.123 (-1.506)	-0.298 (-1.625)	-0.284 (-1.732)	-0.211 (-1.629)	0.071 (0.841)	0.056 (0.365)	-0.062 (0.42)
	R^2	0.879	0.891	0.846	0.924	0.942	0.881	0.795
	DW	1.923	2.398	2.014	1.987	1.562	1.752	1.832

Source: Estimates of the author

The size of remittances and their annual changes determine the magnitudes of overall effects on growth of macroeconomic variables considerate.

Estimating these effects can be achieved by two methods: i) calculate the effects of current and past remittances on current year's value of the variables concerned,

ii) calculate the overall impact of a current change of remittances on current and future variables, over a number of years.

If you consider the last method, then, quantify the impact of remittances on the variables considered, can be achieved using the relationship:

$$\Delta\Gamma_t = \sum_{k=0}^{n} \frac{\partial \Gamma_t}{\partial R_{t-k}} \cdot \Delta R_{t-k} \quad \text{, by adding,} \quad \Rightarrow$$

$$\sum_{t=1}^{n} \Delta\Gamma_t = (\Delta R_t) \sum_{k=0}^{n} \frac{\partial \Gamma_t}{\partial R_{t-k}} \quad (6)$$

where $\frac{\partial \Gamma_t}{\partial R_{t-k}} = \alpha_k$ is the multiplier of year k,

∂R_{t-k} is the actual change of remittances between year (t-k) and {(t-k)-1},

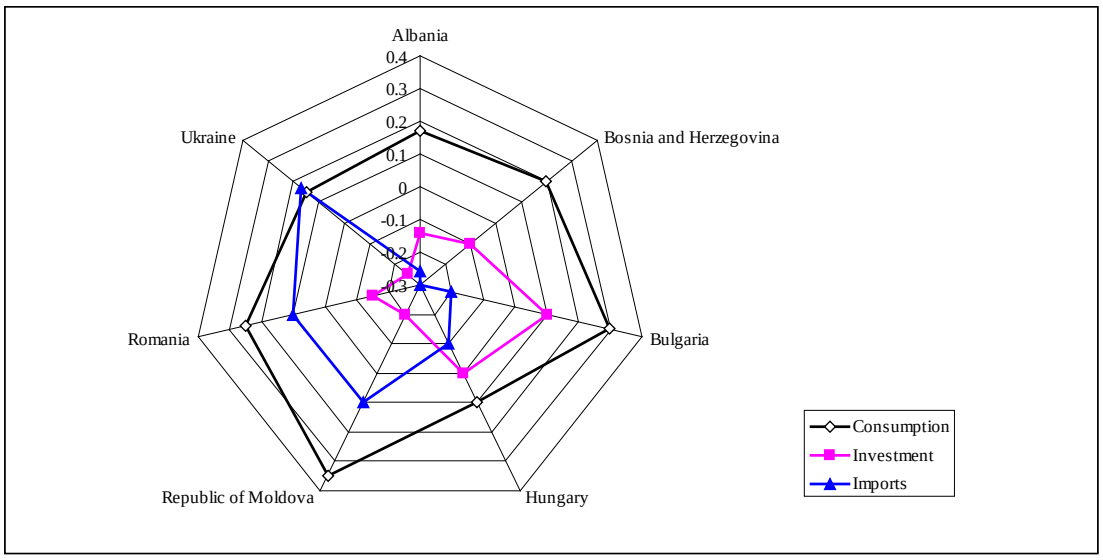
Γ_t is any of the endogenous variables: C, I, M and Y,

$k = \overline{1,n}$ represent the number of years over which the effects of remittances are distributed,

Δ is the difference over two consecutive years.

Based on the presented relations, were estimated the effects induced by changes in current and previous years' changes of remittances on current year's indicators considered in the period 2008-2010 (Figure 2).

Figure 2 *Effects of Current and Past Years' Changes of Remittances on Current year's*
Consumption, Investment, Imports



Source: Estimates of the author

All induced growth rates, positive or negative, are below 1 per cent, demonstrating very weak effects. These results were expected given that all countries have crossed economic and financial crisis.

Conclusions

The estimated model offers the opportunity of assessing the particularities of the countries involved. Using the lags in the model allows determining the time distribution of the effects of remittances on the endogenous macroeconomic variables. Estimates made using the model allowed the determination of the correlation between remittances and growth rates of consumption, investment and import in southeastern Europe countries considered. Thus, it was emphasized a strong correlation between the growth rate of remittances with the rate of consumption, and lower with the import. In considered countries, remittances have insignificant influence on investment. During 2008-2010, remittance changes played an almost insignificant factor in moderating the recession.

REFERENCES

Bichaka Fayissa, The Impact of Remittances on Economic Growth and Development in Africa, 2008. Accessed March 2010. www.mtsu.edu.

Ferdous Alam and al., "Impacts on International Migration and Remittances Growth", American Journal of Environmental Sciences 7 (1): 20-25, 2011 ISSN 1553-345X.

Hein de Haas, "Remittances, Migration and Social Development". Programme Area: Social Policy and Development. Paper No.: 34. Code: PP-SPD-34. Project Title: Social Policy and Migration in Developing Countries. No. of Pages: 44. www.unrisd.org; (2007). Accessed April 2010.

Hein de Haas, "The impact of international migration on social and economic development in Moroccan sending regions: a review of the empirical literature", Working papers-International Institute of Migration-University of Oxford. Paper 3. 2007. www.imi.ox.ac.uk. Accessed February 2010.

Iranzo Susana and Peri Giovanni, "Migration and trade: theory with an application to the Eastern-Western European integration", Journal of International Economics, 79 (1) (2009): 1-19, www.ideas.repec.org. Accessed September 2009.

Kevin Savage and Paul Harvey, Remittances during Crises: Implications for Humanitarian Response. London: ODI, ISBN-10: 0850038464, 2007.

Krishnan Sharma, "The Impact of Remittances on Economic Insecurity: DESA Working Paper No. 78ST/ESA/2009/DWP/78, www.un.org. Accessed November 2009.

Milligan Milligan, "International Remittances and Eastern Europe", United States Agency for International Development, 15 august 2008.egateg.usaid.gov. Accessed September 2008.

Richard H Adams, The Effects of International Remittances on Poverty, Inequality and Development in Rural Egypt. International Food Policy Research Institute, Research Report 96, 1991.

*** Romanian Statistical Yearbook 2000-2010; National Institute of Statistics of Romania.

*** Romanian Statistical Yearbook 2000-2010; National Institute of Statistics of Romania.

*** Migration and Remittances Factbook 2011. 2nd Edition, The World Bank, Washington D.C., ISBN-10: 0821382187, 2011.

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PERFORMANCES OF THE POLICY OF INDUSTRIAL COMPETITIVENESS IN ROMANIA, IN THE EUROPEAN CONTEXT

DALINA ANDREI[14]

Abstract[15]: This communication aims briefly describing Romanian industry and corresponding Government policy about in this vicinity of these two decades. Or, this is a real mixture between old and obsolete aspects and new imperatives of restructuring. The last's basing concepts were really unknown around just two decades earlier. There was (and probably still is) to talk about long inertia and reticence about settling an industrial policy, but either foreign investors' support was rather missing in such respect. Besides, there is an economic crisis all over unexpected to currently face. Romanian Government looks hardworking, but not always successfully performing face to such a complex of facts. It might rather be just one part of the issue.

Keywords: industry, industrial restructuring; competitiveness policy, research-development-innovation (R&D&I), small and medium size (SMS) firms, environment policy, business environment; economic crisis.

JEL Classification: L50,L60, M00, R00

INTRODUCTION: An overview on the Romanian industry update

Recall that in the year 1989 end (see the Romanian revolution) the Romanian industry was basically energy intensive and unsustainable in resource matter. Then, restructuring was coming, but it stayed unsubstantial both in general terms and as depending on foreign investors' option for a similar general situation for the Romanian industry. Also currently, Romania has a mainly manufacture-based industry, see: its high labour costs industries -- like the ones of textiles, ready-made

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[15] This paper belongs to either the current research theme of the Institute of Economic Forecasting of the Romanian Academy of Sciences on the year 2011 – "Role of innovative clusters in transferring knowledge" -- , as publishing results, or to an extra research project called " Innovative clusters' strengthening and comparative developemnt of industries – as tools of sustained industrial policy for the globailizing era".

clothes, wires, fibers and lather; heavy equipment industries -- like the ones of wires and fibers again, plus of milling and cement; energy-intensive industries -- like rather all of the above. The comprehensive result of all these would be for an overall note of half skilled labour and still reduced level of research-development-innovation (R&D&I) factor for this industry[16].

Another significant aspect to be considered is that the whole Romanian industry bases on small and medium size (SMS) firms as for 99% -- whether only the number of firms is here considered as criterion. And this aspect was decissive for absolutely and relatively consolidating this zone for either its employment and activity turnover related to individual firms, as the average level.

PAPER CONTENT

I. Current developments

Despite these aspects, a real structural changing is to be considerd. It stays less obvious sometimes due to the higher pace of similar processes within the whole EU area[17]. As one of the dynamic factors of this industry, top technologies were imposed together with a new industrial sector like radio-tv industry, but also already dominant industries get here involved as well, see automotives, wires and cables industries etc. In a similar way, high knowledge and education dominant industries, like communciations and software were built. And such structural changings tend at least to narrow the old-tradition Romania's international specializing[18]. Besides these above, there is to be noticed that the last years economic crisis rather helped these structural changes in process. Plus, it is about a "top-crisis" stage about April 2011, that so is supposed to have already been overpassed[19].

See also two more relevant results related to all last years evolving, including the same current economic crisis. Firstly, the crisis stroke about (-) 13% of the manufacture industry, and secondly the corresponding competitiveness was concomitantly suffering from the +80% increasing exchange rate of the RoN currency throughout the last decade, as compared to the corresponding phenomenon on its EU27 average for only +21%. Actually for Romania, the unit labour cost was so becoming +326% higher and the competitiveness evaluating number at 58 percentage points under the European average.

Then, the crisis brought credit restrictions for all firms as nearly equally, given the basic structure of SMS firms' domination. Later on, when crisis seemed to be over a similar banking mentality of keeping these firms from accessing credit resources was persisting – actually, State sector's needs and the ones of other related zones were

[16] The Bucharest Summit: Analysing Romania's future economic potential
[17] European Competitiveness Report 2011
[18] The Bucharest Summit: Analysing Romania's future economic potential
[19] European Commission: Industrial competitiveness as the solution for economic recovery. Press communiqué. Brussels, 14 October, 2011

prioring in context. Besides, the same State was originating the delaying in VAT restitution to the private business sector. Finally, this is the latest that suffered from a significant number of bankruptcies during at least 2009 and 2010. However, some progress was concomitantly performed on the arrears' liquidation[20].

II. The research-development and innovation (R&D&I) factor

Innovation, as in particular for Romania, reaches a rather contradictory picture. The industry's demand for knowledge stays low and associates to a weak innovation culture of the domestic area and there is to talk about rather low specific R&D ratios in the costs of firms of all sizes. The domestic business environment benefits from anty-risk type services at equally low levels. Plus, it is found rather ignoring newly available alternative financing sources, so yet dependent on traditional government resources. These aspects play for a specific innovation factor that stays under the European average, at the same. But, however, its "catching-up" dynamic also stays to be considered, and not ignored[21].

The research-development (R&D) factor, in its turn, keeps some aspects under focus. It especially regards the small and medium size (SMS) enterprizes sector, meaning technologic tranfers and corresponding cost reduction that these firms benefit from in context[22].

Another specific of R&D relates to labour employed in. The last here cannot account for its low skilled part in any way, but high technical domains related diplomas also face problems; the same for diplomas of sciences, and mathematics that stay far from a knowledge really turned into competitive advantage of firms. Or, there is a basically institutional cause to talk about in the education system. The last still suffers at least from repeated and stressful reorganizations and losses in teaching personnel. That is why the government drawed and succeeded to enact the new Law of National Education in the 2010 year end in order to reform this system.

As for policy elaborating and managing about the whole research-development-innovation (R&D&I) area, in the first place they prove dominated by direct type tools, whereas the alternative indirect tools (e.g. specific tax reductions) yet prove unsubstantial and low efficiency. But, let us just enumerate some more of these latter, as new:

/ the R&D&I plan for the 2007-2013 interval, as for the firms' use;

/ budget allowances for investments in innovation that can go up to 120% of private amounts invested, as in detail;

/ fast depreciation of R&D use equipments;

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[20] Commision Staff Working Document – European Economic Forecast Spring 2011 European Competitiveness Report 2011

[21] The Bucharest Summit: Analysing Romania's future economic potential

[22] Communication from the Commission Industrial Policy –Reforming Competitiveness

/ the law of "Public-Private Partnership" that was enacted in late 2010 is actually as comprehensive as regarding all kinds of investments, including the ones in R&D.

And besides these above, the economic crisis year 2009 was equally bringing in reductions of public spending all over, here including in R&D&I. It was -25%, as compared to the previous 2008 and -50%, as compared to the previously planned level of. A situation that lead to the "Memorandum of Understaing (MoU)" of June 2009, basing on the agreement with the IMF's provisions[23].

III. The environmental aspect and its specific policy

Environmental performances stay also low for Romania. The country keeps the third place in Europe for the energy intensiveness of its industry and industrial offas per capita as high as double for the European average number, plus its ecological goods' exports also stay much under the European average level[24].

The environment policy of Romania is mainly funded by the operational programme (OP) called "Environment" that disposes of EUR 5.6 billion, of which the European contribution to be developed within the 2007-2013 interval is as high as EUR 4.5 billion. Besides this OP, another important one is called "Economic Competitiveness" and specifically serves industrial development for objectives as efficiency, cost reduction and resouce renewal by alternative ones[25].

As for institutional aspects, several norms and directives are there to be mentioned, all included in the "road file" of the "Ecological Technologies Applied Plan(ETAP)" for the 2010-2013 interval. This multy-annual programme inclueds, among other provisions, some specific goods and services to be aquired up to 2011 end. Plus, in April 2010 an inter-ministry working group for a strategy of turning the automotive technology into the electric base was formed. Unfortunately, the last two initiatives still expect their concretness of facts[26].

The "Increase of Economic Competitiveness" OP also regards the ecological part of the competitiveness process, i.e. carbon-dyoxide emissions, and so, given the scarce home resources in such a concern, EU Structural Funds are especailly here expected as for decissive contribution.

IV. A policy favouring competitiveness and the business environment

From the environment itself back to the business environment, the last equally suffers from managerial and administrative incapacities of the central and also local authorities, from complicated and contradictory rules, from the high amounts of

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[23] European Commission: Industrial competitiveness as the solution for economic recovery. Press communiqué. Brussels, 14 October, 2011
[24] The Bucharest Summit: Analysing Romania's future economic potential
[25] European Competitiveness Report 2011
[26] European Commission: Industrial competitiveness as the solution for economic recovery. Press communiqué. Brussels, 14 October, 2011

permissions all over required and from a number as high as 113 of taxes and other obligations to be paid. Romania so stays on the last places for operationality performance due to such causes[27].

Some of actions here taken for competitiveness, business environment and others were taken over by the "Memorandum of Understanding (MoU)", attached to the Agreement with the IMF. These were:

- Law for public authorities organizing, enacted in 2009 and including in the one of its parts consequences on business environment;
- Law of public employees' retribution, that was enacted in 2009-2010 and targeting the reduction of public spending;
- additional EU-IMF Agreement of 2011 regarding some structural reforms for the energy's and transports' markets. Here, some provisions on reinforcing corporative governance of State owned companies, arrears' reduction and a list of measures ending by private management for some of State owned companies might be significant;
- strategies drawn for privatizing some companies in the domains of energy (4 companies) and extraction (1 company);
- restruction of the public administration, that is conveyed to the World Bank for one of its programme in the region;
- some new procedures and amendments to other two types of activity – these are land accounting and bankruptcy of firms[28].

Two newly founded Agencies were founded to make the government's actions more dynamic. These are National Council for Competitiveness and Department of "Business Environment", working as subordinated to the Ministry of Economy, Trade and Business Environment (METBE).

Up to the moment of this report, this last department has already drawn the "Plan for Improving the Business Environment", that comprises a set of measures to help the private investors. Let us note that some measures remain in the conceptual area, whereas others are already detailed and described in their concreteness, here including for consulting services providing for innovation and for supporting the young investors' activity.

Moreover, a "Strategy for easing legal and administrative condition of business environment" was adopted in Romania in 2008, as operational for the 2008-2013 interval. There is to be here considered at least a reduction of the number of fiscal duties for firms, and this was concretely for reduction the number of 491 fiscal duties – at the end of 2009 – to 237 – see the present.

Another important measure taken consists in the unification of financial Statements for social contributions up to the early 2011. Thirdly, a double law (code)

[27] The Bucharest Summit: Analysing Romania's future economic potential
[28] Communication from the Commission Industrial Policy –Reforming Competitiveness

project was drawn, see the (a) Administrative Code and (b) Code for the Administrative Procedure.

Government equally chosen to act in favour of improving Internet-based services' quality during the 2009-2015 interval through the so called "Broadband" strategy for communications throughout Romania. Unfortunatley, weak progress has been performed so far on this programme since 2009, when it was started, here including an eRomania portail in way to be shaped.

Besides, in March 2011 the ‚Ghiseul.ro' site was achieved in the framework of the programme called "the unique guishée" for facilitating taxes' and the other duties' payment by firms – it is true that this is also a programme in way in the sense that only part of local public administrations are already able to access this electronic facility.

Investing in infrastructure remains either as a point of high political ambitions, or as a continuous dissapointment for achievements that are still low level.

The amounts of permissions for investors were more highly reduced in this domain, as compared to others – the impact was though not enough ressented, especially for small and medium size firms.

Then, more contacts between entrepreneurs and local public authorities are expected to clearify the administrative burden problems on firms' side. The investment amounts' level in infrastructure is crucially significant for all domestic industries' competitiveness and for a criterium of foreign investments' attraction into the country area.

More actions taken in favour of business environment and economic recovery were coming directly from the financing zone. Some of them were announced since 2009, but their implementing being so delayed afterwards effects were running out – e.g. some tax exemptings on reinvested profit.

On the other hand, in 2009 a Guaranteeing Fund for credits to small and medium size firms was funded (capitalized) and founded. Then, the above mentioned "Increase of Economic Comepetitiveness" OP came to support new investments, these firms' entering international markets and international consulting standards offered. The "Regional Operational Programme" here came with its support for regional business infrastructure building. Ultimately, "Administrative Capacity Development" OP helps drawing a consistent programme for the business environment's improving at least through the "Act regarding Small Business" drawing[29].

Public purchasings were also considered as a chapter of activities for supporting business envirounment the way that their specific law had to be also

[29] "Promoting transnational clusters to boost competitiveness and foreign direct investments ", a communication reported together with Dr. Carmen Beatrice Pauna and Nona Chilian of the IEF for being presented to the ‚Warsaw Regional Forum' named "Functional regions – towards a new paradigm of territorial and cohesion policies", 19-22 October, 2011. Host Institution: ‚Institute of Geography' of the Polish Academy of Sciences. This communication is currently in way to being published by this host Institution.

corrected and adapted to at least two lines of purposes: procedure flexibilizing and easing the access to European Funds. More than 55% of the total amount of public purchasings, meaning about EUR 4 billion were re-directed to small and medium size firms. Unfortunately, similar initiatives regarding innovation and environment issues proven not so simply to approach[30]. It proven not so simple approaching the need for fiscal consolidation – the results' space of effects reduced, plus these were really costly. Government here continuously insists for increasing access to European funds and liquidating arrears of small firms.

CONCLUSIONS

The communist past of a country like Romania keeps on obsessive, here including for the story of industry. There was once in the late 19th century when authors argued that Romania was "condemned" to base on agriculture and "feed" neighbour countries by and later on the communist regime expressed its hard retort by a "socialist" industrialization in an equally autarchical concept.

The result was the Romania's industrial and economic structure of late 1989. Then, in this third phase industry has got rather a topic of profound doubts and controversial issues, as a research, as business, but also as a political issue, and not only in Romania or in post-communist countries, i.e. does future belong to industry (like it was thought some time in the past) ?

And, even if yes, there is not only domestic resources or government to play for, but the international factor becomes much stronger, technologies are much different than before and the environmental aspect won't miss any business strategy of this century on. Or, this is still called industry, but means a mainly different issue.

REFERENCES:

Communication from the Commission Industrial Policy –Reforming Competitiveness

Commision Staff Working Document – European Economic Forecast Spring 2011 European Competitiveness Report 2011

European Commission: Industrial competitiveness as the solution for economic recovery. Press communiqué. Brussels, 14 October, 2011

The Bucharest Summit: Analysing Romania's future economic potential

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"Promoting transnational clusters to boost competitiveness and foreign direct investments ", a communication reported together with Dr. Carmen Beatrice Pauna and Nona Chilian of the IEF for being presented to the ‚Warsaw Regional Forum' named "Functional regions – towards a new paradigm of territorial and cohesion policies", 19-22 October, 2011. Host Institution: ‚Institute of Geography' of the Polish Academy of Sciences. This communication is currently in way to being published by this host Institution.

[30] The Bucharest Summit: Analysing Romania's future economic potential

Institute for Economic Forecasting, Romanian Academy
"Nicolae Titulescu" University from Bucharest, Romania
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"New Trends in Modelling and Economic Forecast"
9-10 December 2011

COMPETITIVENESS OF THE ROMANIAN ECONOMY FROM EUROPEAN PERSPECTIVE

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MARIOARA IORDAN[32]
MIHAELA-NONA CHILIAN[33]

ABSTRACT[34]: The sustainable growth of economic competitiveness as a whole and of industry, in particular, is of paramount importance for Romania. A look at the literature reveals that although there is no consensus in defining and measuring competitiveness, many studies focus on competitiveness i) in a broader sense, envisaging the overall economic development, and ii) in a limited sense, concerning only the foreign trade relationships and the correlation between the domestic currency exchange rate, foreign prices and domestic inflation rates (or costs in sectors that produce tradable commodities). In such line of argument, the paper presents a picture of the Romanian economy competitiveness in the European context, focused on the analysis of real effective exchange rate, the evolution of Romania's foreign trade with the European Union and the comparative advantages/disadvantages on the European markets.

KEYWORDS: competitiveness, real effective exchange rate, deflators, foreign trade, comparative advantage
JEL CLASSIFICATION: F11, F14, F16, F31

INTRODUCTION

The new European architecture, to which Romania is participating, opens up unexpected prospects to social-economic and cultural exchanges, stimulates efforts to modernize and streamline the national structures in a competitive framework,

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[34] The paper presents some preliminary results of research performed for the project: Consolidarea competitivităţii clusterelor inovative şi evaluarea comparativă a competitivităţii sectoarelor industriale – instrumente de politică industrială durabilă, adaptate erei globalizării, Contract No. 06/04.10.2011, Phase I/2011: Analiza comparativă a strategiilor, politicilor şi instrumentelor de dezvoltare industrială, cu accent pe rolul jucat de structurile de tip cluster/pol de competitivitate în România şi în Uniunea Europeană şi identificarea instrumentelor şi măsurilor specifice de sprijinire a parteneriatelor inovative, Contracting Authority: Ministerul Economiei, Comerţului şi Mediului de Afaceri, Contractor: Institutul de Prognoză Economică, November 2011.

according to the international requirements. The single market with 500 million consumers, 220 million workers and 20 million entrepreneurs is the basis of construction of a Europe whose growth is based on more competitive firms acting in an economy that is becoming increasingly global.

Competitiveness and globalization, as basic concepts in economic theory, have an increasingly important place in economic debates and studies. In terms of competitiveness, many papers show that competitiveness creation level is the microeconomic one, because firms are interacting in their efforts to entry, maintain on and develop in the markets.

However, firms operating in an economic environment where the role of national and international economic frameworks in creating comparative and competitive advantages, especially in the context of globalization of economies, cannot be neglected. Globalization may lead to even greater convergence of economic performance of economies and nations, including competitiveness.

Due to globalization, Europe already has acquired a number of advantages, such as lower prices for consumers and businesses, a substantial increase in the volume of international trade, higher levels of productivity and real wages, spread of technological progress to a larger scale and greater variety of products.

To continue to receive benefits of globalization, it must ensure full implementation of the Europe 2020 Strategy proposed by the European Commission, which will enable the Union to emerge stronger from the current economic crisis, to direct the economy towards:

a) smart growth, knowledge- and innovation-based;
b) sustainable economic growth, by promoting a greener and more competitive economy, based on more efficient use of resources and
c) inclusive growth, by promoting high employment economy, able to generate social and territorial cohesion.

For Romania, the sustainable growth of economic competitiveness as a whole and of industry in particular, is of paramount importance. A look at the literature reveals that although there is no consensus in defining and measuring competitiveness, different studies focus on competitiveness in a broad sense covering various aspects of performance and economic efficiency: from the price of products, costs and quality to the capacity of firms to adapt to consumer preferences and new technologies, from macroeconomic and institutional performance to flexibility of market factors, etc.

Academician Emilian Dobrescu (2005) believes that "although not always specified (rather not specified at all), the term (competitiveness) circulates in two somewhat different meanings:

i) a broader sense envisages the overall economic development and is difficult to define, and
ii) a limited sense concerns only foreign trade relationships and refers to the correlation between the domestic currency exchange rate, foreign prices and domestic inflation rates (or costs in sectors that produce tradable

commodities). The correlation between the domestic currency exchange rate, the foreign prices and domestic inflation rates can be expressed through the aggregate indicator of the real effective exchange rate.

As discussed above, the paper presents a picture of the Romanian economy competitiveness in the European context, focused on the analysis of real effective exchange rate, the evolution of Romania's foreign trade with the European Union and the comparative advantages/disadvantages on the European markets.

1. EXCHANGE RATE AS INDICATOR OF ROMANIAN ECONOMY COMPETITIVENESS

To analyze the competitiveness of Romanian economy in relation to major global competitors, the bilateral and multilateral nominal effective exchange rate, the real exchange rate (RER) and the real effective exchange rate (REER) deflated by consumer price index and by industrial products price index (considered a good proxy for tradable goods - see Menzie D. Chinn, 2002) and the unit cost of labor in industry were used as indicators[35].

Eurostat data for Romania were used in order to analyze the effective exchange rate (real and nominal), annual and quarterly data computed for 36 trading partners over the interval 2000-2011.

For the calculation of bilateral nominal effective exchange rate monthly data during 1991-2011 from the NBR bulletins were used.

Nominal exchange rate movements against the U.S. and European currencies during the analyzed interval are shown in Figure 1, a continuous trend of depreciation of currency indicating an increase in competitiveness and a currency appreciation a decreased competitiveness of the Romanian economy.

Bilateral nominal exchange rate developments suggest an almost constant trend of depreciation of domestic currency, with different intensities from one year to another (much more pronounced before 2000), both against the U.S. dollar and against the euro, as a result of both slippages of economic policies ("stop and go" monetary policy, high fiscal and current account deficits) and of different exchange rate regimes.

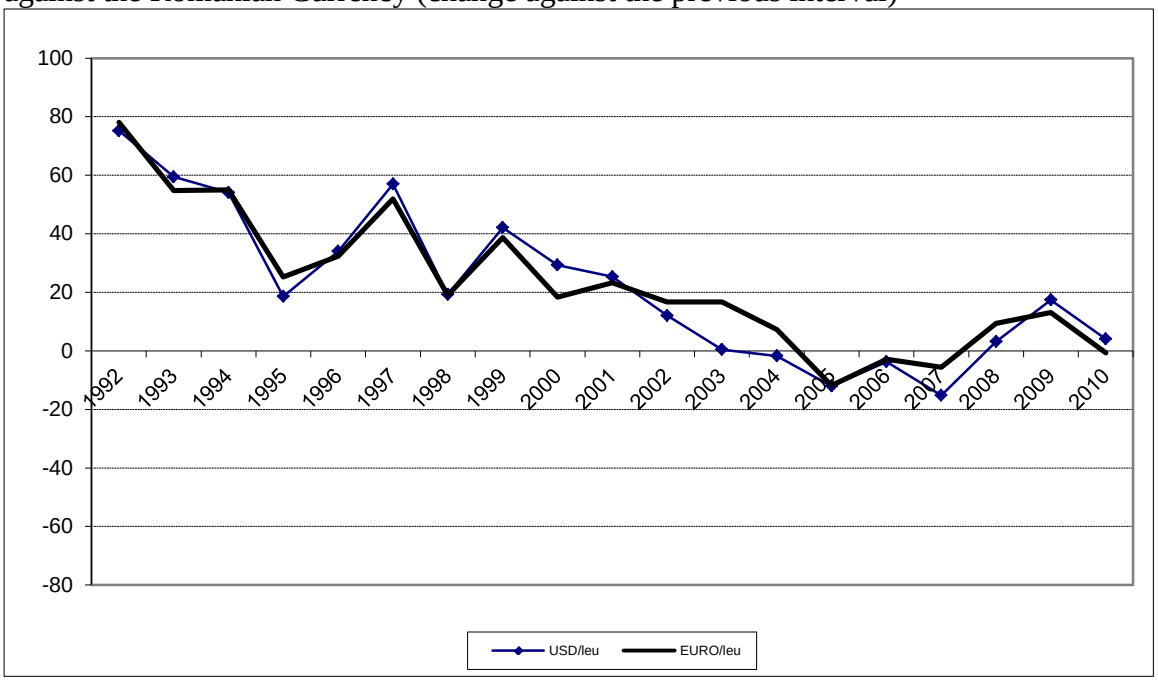
After 2000, an alternation of periods of appreciation/depreciation was visible. The decrease in bilateral nominal exchange rate indicates an increase in competitiveness of the Romanian economy, both before 2000 and afterwards.

The upward trend in the period 2005-2007, when the leu strengthened against the euro and the U.S. dollar, shows that due to the depreciation of both currencies against the leu, the Romanian economy has recorded a loss of export competitiveness and cheaper imports (which for products in U.S. dollars continued also in 2007), as

[35] For methodological presentation and discussions, see E. Pelinescu (ccordinator), *Cursul de schimb şi competitivitatea în perspective aderării la Uniunea Europeană*, Editura Expert, Bucureşti, 2006.

noted in Figure 1, which had a negative impact on the balance of payments, which has deteriorated sharply in this period.

Figure 1. Nominal Appreciation (+)/Depreciation(-) of US Dollar and EU Currency against the Romanian Currency (change against the previous interval)



Source: Authors' computations on the basis of data from the NBR Monthly Bulletins over the interval 1991-2010.
Note: For the interval 1991-1999 the exchange rate was Ecu /leu.

The 2008 crisis reversed the trend of American and European currencies movement against the leu, which led to a resumption of upward trend of the Romanian economy competitiveness.

Nominal effective exchange rate movements (NEER, calculated based on the 36 trading partners) showed similar trends; the data reveal that whether over the years 2000-2005 the Romanian economy recorded growing competitiveness, the trend reversed after 2005, following deterioration in competitiveness against 36 major trading partners until 2009, when the tendency of increasing competitiveness was resumed.

In literature (Rajan, 2004), it is considered that the nominal exchange rate depreciation is actually a consequence of large-scale use of imports in manufacturing and that repeated use of nominal depreciation policy as a tool to raise national competitiveness leads to loss of efficiency because costs and prices will increase as a result of anticipation or simultaneously with currency depreciation.

The statement is confirmed also in the case of Romania, whose manufacturing is based largely on imports of raw materials and equipment (including for outsourcing

processing) and has faced both domestic currency depreciation and high inflation rates that have led to loss of long-term effectiveness of this industry.

On the other hand, by increasing the nominal appreciation of domestic currency against other world currencies as a result of capital inflows amid high rates of recovery of capital (high interest rates) and market information asymmetry, in Romania both exchange rate stability and price competitiveness were affected as well.

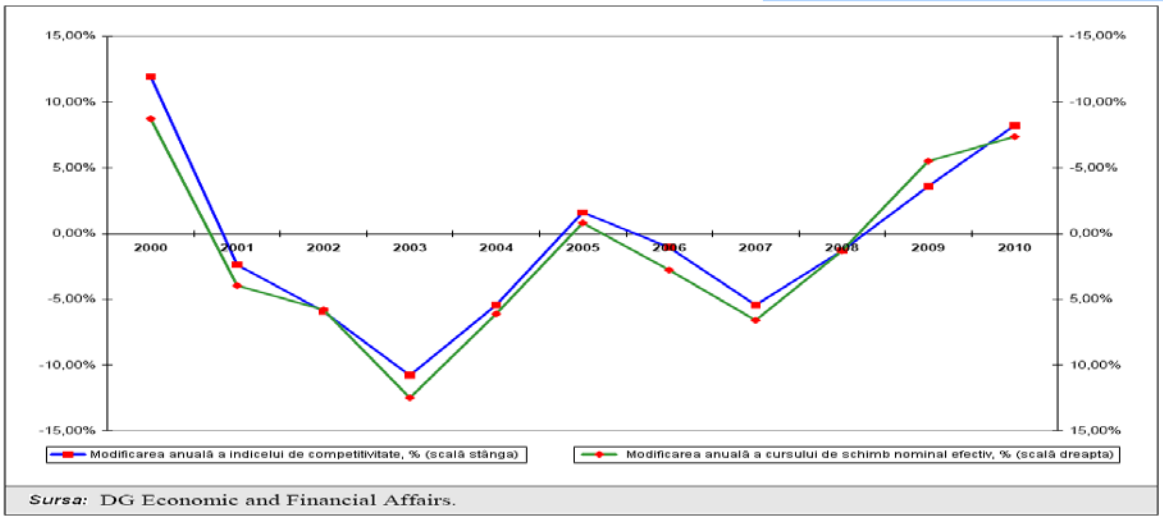
When comparing the evolution of the NEER in Romania with the one registered the EU27 countries one may notice that the nominal effective exchange rate trajectory closely follows that of competitiveness cost index, which highlights the potential of the NEER as an indicator of competitiveness, as shown in Figure 2.

The nominal effective exchange rate deflated using the consumer price index – CPI deflator, the GDP deflator - DGDP and industrial products price index - PPI indicates a trend of loss of competitiveness in the period 1994-2005.

The explanation of these developments is the influence exerted by other important factors of competitiveness, namely labor costs and inflation, expressed by the GDP deflator or the commodity price index (CPI).

Expanding the analysis after 2000 based on annual REER data from Eurostat and calculated for the 36[36] main trading partners of Romania and for the EU 27, it was found that REER trajectories were almost similar but slightly shifted due to different evolution of deflator used (unit labor cost or CPI), as noted in Figure 3. Increasing the number of trading partners from 19 to 36 did not significantly alter the REER trends.

Figure 2. Competitiveness Index Based on Unit Labor Cost

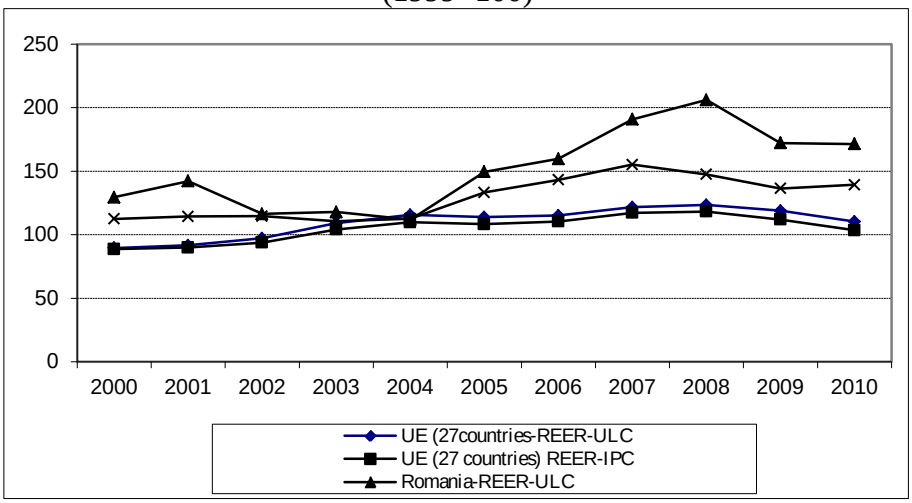


Source: European Commission Enterprise and Industry, Commission Staff Working

[36] The 36 trading partners considered were: the EU27 countries, Australia, Canada, the USA, Japan, Norway, New Zealand, Mexico, Switzerland and Turkey, the weighting was doubled for exports to reveal not only the domestic, but the foreign competitiveness as well.

Document, Member States Competitiveness Performance and Policies 2011, SEC(2011), 1187, p. 13.

Figure 3. Real Effective Exchange Rate as against 36 Main Trading Partners of Romania
(1999=100)



Source: Eurostat Data.

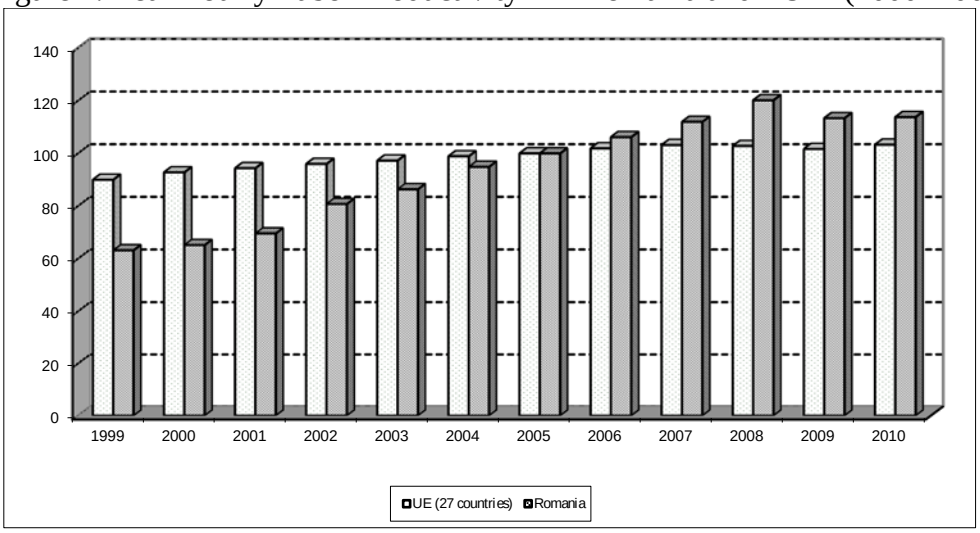
Following the trend registered in the EU27 countries, Romania has experienced a strong appreciation of real effective exchange rate in the last decade (80%, as compared to only 21% in the EU27), indicating a loss of competitiveness at both costs (REER-ULC) and prices (REER-CPI). In Romania, the 326% increase in the labor unit costs in 2010 as compared to 2000 and high inflation have played an important role in this evolution. A document published by the European Commission shows that in 2000-2007 the cost competitiveness in the 27 EU countries has been eroded by more than 25% due to the movement of the euro against the currencies of the 36 trading partners considered, which was reflected also in the Romanian economy.

It is worth mentioning that although the hourly productivity of Romanian workers increased gradually in recent years, it is still 58% below the level of the EU 27 countries, which is reflected by the movement of the real effective exchange rate of Romania as compared to EU27 (Figure 4).

Appreciation of national currency against the currencies of trading partners is both the result of the Balassa-Samuelson effect revealed for almost all the transition countries that joined the EU and, especially of the capital inflows due to either the acceleration of the privatization process or to the income and net transfers. Net capital investment in Romania increased from Euro 1.3 billion in 2000 to Euro 5.2 billion in 2005. Net income and transfers increased from Euro 633 million in late 2000 to Euro

1349 million in late 2005, which led to the nominal appreciation of domestic currency against the euro and U.S. dollar, and even in real terms since 2005.

Figure 4. Real Hourly Labor Productivity[37] in Romania and EU27 (2000=100)



Source: Eurostat Data.

After a peak in 2005, the capital inflows have followed a downward trend to 3444 million Euros in 2010 and to 1.169 billion Euros in the first nine months of 2011. The net income and transfers fell to 339 million Euros in 2010 from 2250 million Euros in 2009 and to 417 million Euros in first nine months of 2011, on the background of deteriorating balance of net income (which from positive turned negative), so that these flows have not supported that the Romanian currency any longer, and it depreciated against the currencies of the trading partners.

One should notice the much larger gap between REER deflated by ULC and REER deflated by the CPI in the case of Romania, which highlights the major impact of income policy applied in 2007-2008 on this indicator, the trend being to reduce this gap after 2009 due to changes in the wage policy, especially in the public sector. In this context, it is necessary to emphasize the importance of labor costs to ensure competitiveness in the short, medium and long term in terms of competitive advantage and not of comparative advantage in the Ricardian sense.

According to Porter (1990), the cost of labor is an important factor of demand conditions that shapes the competitive advantage of nations. Other authors (Dunning, 1993, Caves, 1996, Buckley and Casson, 1998) highlight the importance of national labor cost and labor market flexibility in the location or relocation decisions of multinational companies, with impact on competitiveness. To ensure long-term competitiveness, the wage policy should correlate with the evolution of labor

[37] The real hourly labor productivity is computed as real GDP (deflated by the GDP deflator, with 2000=100 as fixed base) per unit of used labor, determied as the total number of hours worked.

productivity in respect of the Golden Rule: the productivity growth should surpass that of wages.

Another aspect worthy to note is that the labor cost gap caused a massive migration of labor from Romania to the EU countries, where the incomes are greater, allowing Romanian immigrants even to send billions of euro back home, which has contributed and contributes to the balance of payments equilibrium.

Moreover, these capital inflows associated with the direct capital investments help *reduce the pressure on the exchange rate*. This impact is easily revealed in the case of labor incomes, if we follow the exchange rate fluctuations during the periods with massive inflows of money from the Romanians working abroad, when they return to spend vacations or holidays.

The REER evolution shows that the resources of long-term growth of competitiveness should be sought where it does appear, namely in the manufacturing companies and not the in the macroeconomic policies of real exchange rate depreciation. FDIs orientation towards business restructuring to increase productivity, improve the production structure by increasing the share of high-value added products will ensure long-term competitiveness of the Romanian industry in the European market. To reverse the competitiveness trend of Romania and EU27 countries the rehabilitation of research-development capacity and implementation of new products in the manufacturing industry are necessary.

2. DYNAMICS OF ROMANIAN EXPORTS IN THE EUROPEAN UNION

During 2000-2010, the total exports of Romania in the European Union[38] registered a continuous growth, with the exception of 2009 (when the effects of the economic crisis started in 2008 were felt the strongest in the foreign trade of Romania to the EU, due to the high dependence on European trade partners). The trend of increasing Romanian exports to EU has accentuated after 2003, the total exports of Romania to the EU markets was 2.3 times higher in 2010 than in 2000. The largest increases have been recorded by the product groups 1 - Beverages and tobacco (after 2006), 4 - Animal and vegetable oils, fats and waxes (also after 2006), 7 - Machinery and equipment, including for transport (after 2003) and 5 - Chemicals and related (after 2005).

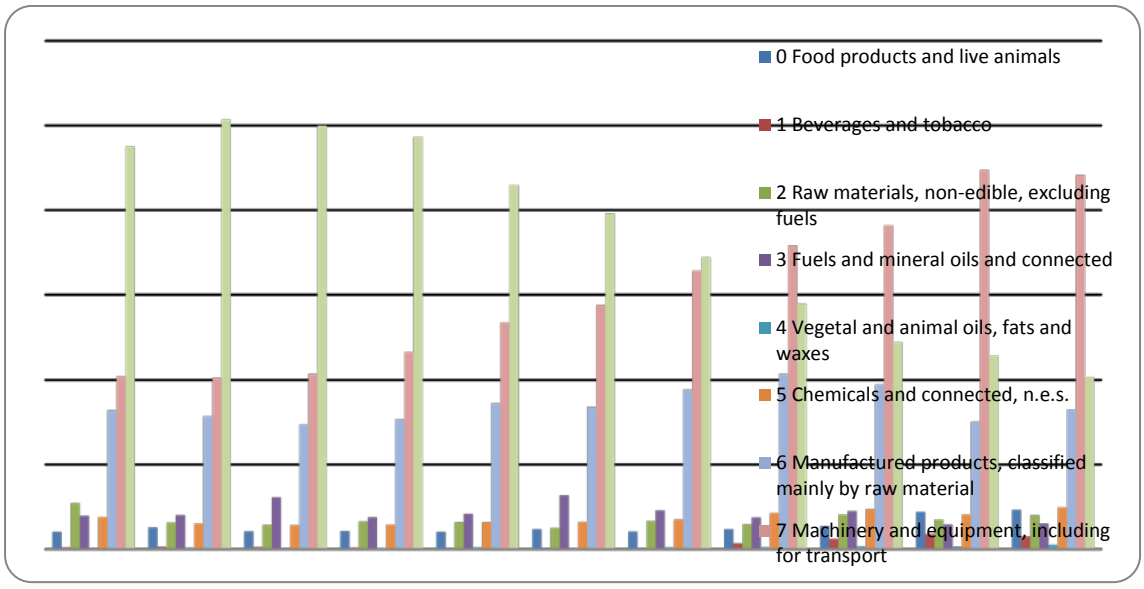
Also, the subgroups of products increases that far exceed the average level of the groups were recorded for subgroups[39]: 09 – Miscellaneous food products, 04 - Cereals and cereal products, 12 - Tobacco and tobacco products, 22 – Oilseeds and fruits, 26 - Textile fibers and wastes, 42 – Vegetable oils and fats, 54 - Medicinal and pharmaceutical products, 59 – Chemicals and chemical products, 62 – Rubber

[38] The intra-EU27 exports and imports of the EU member states were considered, by SITC product groups and subgroups.
[39] Detailed results by subgroups of products were not included due to space restrictions; they may be provided upon request.

products, 78 – Road transport vehicles and 87 - Professional, scientific and measuring and control instruments and apparatus. The only subgroup of products with decreasing (by approx. 10%) exports from 2010 to 2000 was 84 - Clothing and clothing accessories.

Such developments have led to important changes in the structure of exports of Romania in the EU (Figure 5); we can say that 2003 was a turning point in the evolution of Romanian exports on the intra/EU markets - from this year there is an obvious increasing trend of the share of group 7 - Machinery and equipment, including for transport (with a small rebound in 2010) and another of obvious decrease in the share of group 8 - Miscellaneous manufactured articles. Also, during the post-accession period there were significant increases in the shares of agricultural and food products. The general trends are partly found in the product subgroups dynamics.

Figure 5. Romanian Exports in the EU – Share of Main Groups of Products in Total, %



Thus, the share of subgroup 84 - Clothing and clothing accessories decreased from 31.1% of total exports in 2001 to just 8.1% in 2010, of the subgroup of 85 - Footwear from 11.2% in 2001 to 4% in 2010, while the share of subgroup 78 - Vehicles for road transport has increased from only 1.6% of total exports in 2000 to 13.5% in 2010, and of the subgroup 77 – Electric machinery and equipment from 5.1% in 2000 to 13.9% in 2008 (maximum) and 13.5% in 2010. Significant increases were also recorded by groups 62 - Rubber products (from 0.6% in 2000 to 3.7% in 2010), 74 - General industrial machinery and equipment (from 1.7% in 2000 to 5.2% in 2008 and almost 5% in 2010), 76 - Telecommunication equipment and appliances (from 1.1% in 2007 - after a marked decrease since 2000 – to almost 7% in 2010), 54 - Medicinal and pharmaceutical products (from 0.1% in 2003-2005 to 1.6% in 2010),

22 - Oilseeds (from 0.2% in 2002 to 1.6% in 2010), 12 - Tobacco and tobacco products (from less than 0.1% in 2004-2006 to 1.6% in 2009 and 1.3% in 2010) and 04 - Cereals and cereal products (from below 0.2% in 2000 to approx. 1.8% in 2009 and 2010).

At the same time, significant reductions in shares in total exports recorded subgroups 24 - Wood and cork (from 2.2% in 2000 to approx. 0.5% in 2010), 33 - Crude oil, petroleum products and related materials (from 5.3% in 2005 to 2.5% in 2010), 66 - Non-metallic mineral products (from 1.5% in 2001 to below 0.5% in 2010), 67 - Iron and steel (from 5.3% in 2008 - after a period of growth – to just 2.3% in 2009 and 3.1% in 2010), 68 - Non-ferrous metals (from 4.3% in 2000 to 1.5% in 2009 and 1.8% in 2010) and 82 - Furniture and supplies for furniture (from 5.1% in 2004 to 3.8% in 2010).

3. DYNAMICS OF ROMANIAN IMPORTS FROM THE EUROPEAN UNION

During 2000-2010, the total imports of Romania from the European Union showed annual increases greater than the exports by 2008, followed by a significant decline in 2009 (a decrease by 28.6%), as a result of crisis-induced adjustments in the Romanian economy, by reducing both domestic and foreign demand. Throughout the period 2000-2010, import growth was even more significant than that of exports by 2008, both overall (by almost 3.3 times) and for the main product groups.

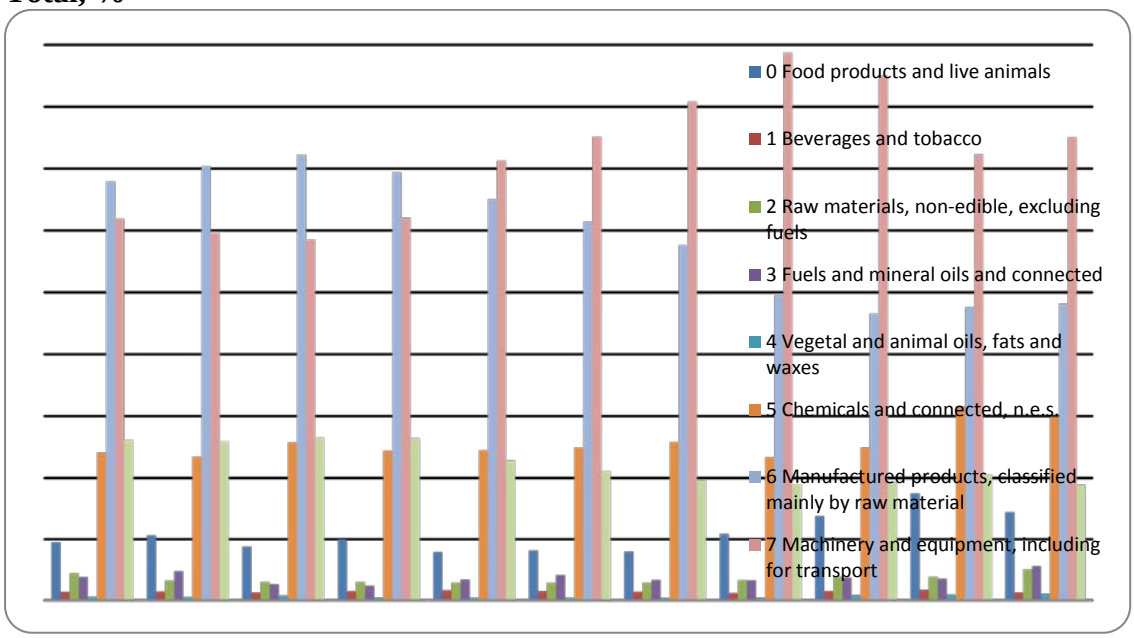
The largest increases were recorded by groups 0 - Food and live animals, 4 - Vegetable and animal oils, fats and waxes and 7 - Machinery and equipment, including for transport, a similar bias in import growth at both ends of the spectrum of technological development being noticeable. By subgroups of products, imports increases much higher than the group average were recorded for subgroups 02 - Dairy products and eggs, 11 – Beverages, 22 - Oilseeds, 25 - Pulp and waste paper, 29 - Raw vegetable and animal materials, 42 - Fixed animal oils and fats, 56 - Fertilizers, 62 – Rubber products, 78 - Vehicles for road transport, 79 - Other transport equipment and 83 - Travel goods, while most notable tendencies of reduced imports were recorded for groups 21 - Raw hides and skins, 28 - Metal ores and scrap metal and 65 - Yarns, fabrics and textile products.

Similar to exports, in the imports structure by main groups of products important changes have occurred, identifying in this case a possible inflection point in 2002 (Figure 6). The most important changes relate to the sharp decrease in imports of Group 6 - Manufactured products, mainly classified by raw material (except in 2008 and 2009) and the sharp increase in the imports of group 7 - Machinery and equipment, including for transport (but oscillating after 2007). Another significant upward trend in imports is identified with Group 5 - Chemicals and related, while a relatively significant downward trend for the group 8 - Manufactured products.

By product subgroups, the most important increases and decreases in the Romanian imports from the EU in 2000-2010 were lower than in the case of exports, indicating the presence of more stable structures, the most worthy to note being the sharp decline in the share of imports of subgroup 65 - Yarns, fabrics and textile

products (from 17.8% in 2000 to 5.1% in 2008 and 5.2% in 2010) and the boom in imports share of group 78 - Road transport vehicles (from less than 4% of total imports in 2000 to almost 15% in 2007).

Figure 6. Romanian Imports from the EU – Share of Main Product Groups in Total, %



4. COMPARATIVE AND COMPETITIVE ADVANTAGES/DISADVANTAGES IN THE ROMANIAN FOREIGN TRADE WITH THE EUROPEAN UNION

Identification of comparative and competitive advantages/disadvantages (in the sense of economic theory) in the Romanian trade in goods with the EU is important in several respects:

- it is a measure of assessing the external competitiveness of the Romanian economy in the specific context of the European single market and EU Member States' economies,
- provides information on specialization of Romanian sectors/industries to adapt their production to the requirements of the European single market, characterized by a high degree of competition and sophistication of consumer demand,
- indicates possible problems of adaptation/adaptability of sectoral structures of the Romanian economy to changes in the general economic environmental conditions and to specific demand shifts,
- provides a picture of the integration of Romanian companies (native or not) in the European production structures and value chains and of the

degree of integration of the Romanian economy as a whole with other economies in the European Union.

Data used to assess the revealed comparative/competitive advantages/ disadvantages in Romania's trade with the EU refers to the Romanian exports and imports to/from intra-EU market[40] and use the SITC classification with average degree of disaggregation (level 2 digits). Both indices of export comparative advantage and overall comparative advantage indices were determined (multiplicative index of comparative advantage, comparative advantage additive index, Balassa general index and Neven index[41], as well as the ratio of exports to imports) for the product groups with the largest shares in the Romanian exports/imports to/from the EU in 2000-2010 and higher degree of industrial processing (5 - Chemicals and related, 6 - Manufactured products, mainly classified by raw materials, 7 - Machinery and equipment, including for transport, 8 - Manufactured products)[42]. The main issues highlighted were:

- In terms of chemical and petrochemical industry and related product groups, with very few (but important) exceptions, the comparative and competitive disadvantages prevailed, and their tendency was to maintain. Thus, for group 5 - Chemicals and related, significant comparative and competitive advantage, but accompanied by a deterioration of the relationship between intra-Community exports and imports of Romania (the trade balance, in fact) were noted between 2000-2010 only in the case of subgroup 56 – Fertilizers, and very weak comparative and competitive advantages in certain years for subgroups 52 - Organic chemicals and 51 - Inorganic chemicals. With the exception of chemical fertilizers and organic chemicals, the shares of chemical product groups in the Romanian exports were very small, however. Besides, chemicals represent a category of goods for which the trade balance deficit has been growing, a situation worsened in 2008 and 2009. Also, there was a significant export comparative advantage and competitive advantage to the end of the period in the case of subgroup 62 – Rubber products. Increases in the share of Romanian exports in the intra-EU exports were recorded also for subgroups 57 - Plastics in primary forms (excluding the years 2009 and 2010) and 58 - Plastics in non-primary forms, but comparative and competitive disadvantages Romania of these products on the intra-EU market are still significant. It is also worth noticing a preserving comparative and competitive disadvantage of subgroup 64 - Paper,

[40] Data from Eurostat.
[41] For details of computing methodology, see M.N. Chilian, *Competitivitatea economiei româneşti şi integrarea în Uniunea Europeană*, Editura Universitară, Bucureşti, 2011.
[42] Detailed resukts are available upon request.

cardboard and goods made from pulp, paper and cardboard, but export volumes remain modest.

- In the case of product groups 'traditionally' exported by Romania to the European markets, based on natural resources and low labor cost, important comparative and competitive advantages were still present, but their tendency was of net diminution, signaling a reduction in specialization in such products. In the case of group 8 - Manufactured products, some of the largest export comparative advantages and competitive advantages were recorded all over the analyzed period, but with significant downward trends in recent years for subgroups dominated by outward processing: 84 - Clothing and clothing accessories, knitted or crocheted, 85 - Footwear and 83 – Travel goods. Trade balance was in surplus throughout the period analyzed, although with downward trend amid the trend of reduction in exports and the cap relative to the volume of imports. Subgroup 65 - Yarns, fabrics and textile products, which include mostly inputs for the above-mentioned groups, showed significant comparative disadvantage, although with downward trend, due to maintaining a trade balance in deficit. Finally, in the case of Group 82 - Furniture and supplies for furniture - a more significant export comparative advantage and a constant competitive advantage were recorded (in decline, however, in recent years), accompanied by a trade balance surplus.
- In terms of the product groups with higher energy intensity, the comparative advantages recorded by the metallurgical products (except for subgroup 69 - Metal products, which consistently showed comparative disadvantages) were "transformed" in 2009 and 2010 into significant comparative disadvantages, due to high decline in the demand for Romanian products on the European markets. In the case of subgroup 66 - Non-metallic mineral products, an increase in the comparative and competitive disadvantages was registered, along with an increasing trade deficit.
- Finally, the most important changes are reported for groups of products with higher technological level: significant increase in the share of Romanian exports in the European ones, significant diminution of comparative and competitive disadvantages and gaining of comparative and even competitive advantages, the trade and production specialization model evolving clearly in favor of such products. Thus, group 7 - Machinery and equipment, including for transport, recorded the most significant changes in the structure of international trade flows of Romania with the EU, but also important developments in terms of comparative and competitive advantages (translation from the comparative and competitive disadvantages to advantages in the years 2009 and 2010, due to significant reduction in the trade deficit). Subgroups 76 - Telecommunications equipment and 77 - Electrical machinery and apparatus passed from

comparative and competitive disadvantages to significant export comparative advantage and increasing competitive advantage to the end of the period, while the trade balance shifted from deficit to surplus, but situation is reversed for subgroup 71 - Machinery and equipment for power generation, where the comparative advantages of the early 2000s have been eroded and turned into disadvantages and the trade balance deteriorated. Regarding transport equipment subgroups, the most remarkable development was that of subgroup 78 - Vehicles for road transport - which in 2009 and 2010 shifted from comparative disadvantage to advantage and to a trade balance surplus (however, also due to drastic reduction in imports of motor vehicles form the intra-EU market induced by the economic crisis). Finally, subgroups 87 - Professional, scientific and measuring and control instruments and apparatus and 88 - Photographic apparatus and equipment, optical products, continue to have comparative disadvantages, albeit weakening, accompanied by trade balance deficits.

CONCLUSIONS

The external competitiveness of the Romanian economy has experienced alternative periods of gain and loss. The gains obtained by the nominal depreciation of domestic currency to support competitiveness were only temporary, on long term being required measures to enhance productivity, to better correlate wage earnings with productivity throughout the economy and to change production in according with the domestic and external demand developments.

The trend of appreciation of real effective exchange rate, characteristic not only to Romania but to all the countries that have gone through the transition period, can be considered a normal one, which finally provides the intensification of economic agents' efforts to increase productivity in order to survive and grow in an open market economy, subject to competitive pressures. A number of specific factors can explain this trend, of which we may retain as having a broader spectrum the Balassa Samuelson effect, econometrically demonstrated in a number of countries in transition, the capital inflows generated by privatization and restructuring, and the inflows of incomes of domestic citizens working abroad (more visible in Romania and Bulgaria).

Amplitude of the real effective exchange rate movements is closely related to the exchange rate regime in the country considered; the fluctuations are much lower for fixed exchange rates in a tough monetary policy regime (currency board). Often, these movements are related to the fact that the nominal exchange rate depreciation was used as a means of improving short-term current account deficits (and not only for Romania). As an EU member, Romania has to face new challenges related to competitiveness and exchange rate policies, involving macroeconomic policies, mainly wage policy, by restoring the wage-productivity correlations destroyed during the period of transition.

The economic crisis of 2008 has significantly affected the Romanian exports on the intra-EU market, especially in 2009, when the strongest effects of crisis were felt (embodied primarily in import demand and order reduction) among the trade partners of Romania in the EU. Despite the overall decline, there were groups/subgroups of products that have achieved good export performance, however, placed rather at the ends of technological development spectrum: agricultural and food products and machinery and equipment.

With very small (but important) exceptions, all groups/subgroups of products registered significant increases in the level of exports during 2000-2010, especially since 2003, which, in retrospect, may be seen as an inflection point in the evolution of Romanian total exports to the EU. The same year may be considered as a point of inflection for the structural evolution of Romanian exports to the intra-Community market, the main change being the important advance registered by products with an advanced level of technological development, such as machinery and equipment, and the decline in exports of labor intensive, outward processing products. Also, in the post-accession period, the advance of Romanian agricultural and food exports to the intra-EU market was noticeable. Nevertheless, such a point (or time) of inflection it is possible to appear also in the period after 2009, which may induce further changes in the evolution and structure of Romania's EU exports by adapting them to the general economic developments and to the European trading partners demand, although lower in magnitude as compared to the pre-accession period, but with sudden fluctuations from one year to another.

Romania's EU imports increased more than the exports in the period 2000-2010, but also two inflection points can be noticed in their evolution, the first in 2002, when the accelerated imports growth began (one year later reflected in accelerated exports growth) and another in 2009, when there was a sharp decline induced by the crisis. The most important adjustments induced by the 2008 crisis to imports were registered both in subgroups of primary products for consumption (due to reduced household income and, hence, domestic demand) and products for investment, whether in fixed capital formation, technological upgrading and related real estate. The largest increases in imports during the period analyzed occurred in the case of subgroups of raw materials or products with low degree of processing, as well as in that of subgroups of products in connection with the automobile industry. At the same time, the most important trends to reduce Romania's EU imports were recorded for subgroups of products that are inputs to production subject to outsourcing arrangements.

Similar to exports, significant changes in the structure of imports were registered, in favor of groups and subgroups of products with a higher technological level and at the expense of products with high intermediate or energy intensive, but the magnitude and number of changes are smaller than for exports, suggesting a relatively stable structure. Also, the presence of inflection points for imports in the years 2002 and 2008-2009 it is worth mentioning, suggesting the start of a new period of restructuring, this time caused by the economic crisis (still ongoing).

Analysis of Romania's foreign trade with the EU highlighted, especially in the pre-accession period, a "specialization" especially in providing products and services with low added value and high consumption of labor and energy, but higher-tech products recorded significant increase in share in recent years. In terms of capital-intensive products, most Romanian products with significant shares on the EU market and comparative advantage also recorded significant shares in the country's total exports. However, some products or groups of such products which had important shares in Romanian exports did not also register comparative advantages, or only some very small ones. Paradoxically or not, the economic crisis led to an improvement in recent years in the relative competitive position of Romania, but especially on account of adjustments induced by reduction in imports caused by the economic crisis.

Analysis of Romania's international specialization pattern in terms of comparative advantage shows the location of our country's economy still in the phase of advantages based on factors of production, the current international specialization of Romania being still confined mainly in the sectors of labor-intensive goods and standardized industrial products in the maturity stage of their life cycle. From this point of view, Romania is competitive in industries that require low processing technology, cheap and widely accessible. Also, it should be noted that the EU is the main commercial partner of Romania, representing a market for much of Romania's exports of industrial products, and the negative side of this situation was fully felt in 2009, when the European partners import demand reduction led to an important rebound of Romanian exports to the intra-EU market. The feature of the Romanian exports to the EU is their high concentration in a not very large number of groups and subgroups of products, such as textiles and clothing, footwear, furniture, articles of iron and steel and, in recent years, machinery and production equipment, household equipment, telecommunications equipment and vehicles. As regards imports, they consist mainly of machinery and equipment, chemicals, transport means and materials, imports of raw material processed in the system for future export contracts, raw products, agricultural products and foodstuffs.

Finally, the structural changes in the evolution of Romanian exports and imports to/from the European markets, in the percentages of groups/subgroups of products and in the dynamics of comparative advantages/disadvantages received new impetus as a result of the economic crisis triggered in 2008, whose effects are far to be mitigated, especially when the prospect of a new recession is looming again over Europe.

REFERENCES

Bordo M.D., (2003) "Exchange Rate Regime Choice in Historical Perspective", IMF, Working Paper, 03/160, International Monetary Fund, Washington DC.

Balassa B., (1964), "The Purchasing Power Parity doctrine: A Reappraisal", in Journal of Political Economy, Vol.72, No.6, pp.584-596.

Bubula A. şi Robe I.O. (2002), " The Evolution of Exchange Rate Regimes Since 1990; Evidence from De Facto Policies, in IMF Working Paper, No.02/155, International Monetary Fund, Washington DC.

Buldorini L., Makrydakis S., Thimann C., (2002), "The Effective Exchange Rates of the EURO", in Occasional Paper Series No.2, European Central Bank.

Broeck M.D., Sløk T., (2001), " Interpreting Real Exchange Rate Movements in Transition Countries", BOFIT, in Discussion Paper, No.7, Bank of Finland.

Boltho, A. (1996). The assessment: international competitiveness. Oxford Review of Economic Policy, 12(3), 1-16.

Buldorini L, S. Makrydakis şi C. Thimann, (2002) "The Efective Exchange Rates of the Euro", European Central Bank, Occasional Paper Series, , Frankfurt am Main, Germany.

Carrera, J. şi Vuletin G. (2002). "The Effects of Exchange Rate Regimes on Real Exchange Rate Volatility. A Dynamic Panel Data Approach". Mimeo,University de la Plata and University of Maryland, August.

Chinn M.D., (2002), " The Measurement of Real Effective Exchange Rates: A Survey and Applications to East Asia", University of California, Santa Cruz and National Bureau of Economic Research.

Chilian, M.N. (2011). Competitivitatea economiei româneşti şi integrarea în Uniunea Europeană, Editura Universitară, Bucureşti.

Chobanov D. şi Sorsa P., (2004), " Competitiveness in Bulgaria: An Assesment of the Real Effective Exchange Rate", in IMF Working Paper, No.37, International Monetary Fund, Washington DC.

Coudert V., Couharde C., (2002), "Exchange Rate Regimes and Sustainable Parities for CEECs in the Run-up to EMU Membership", in CEPII, No2/15 December.

Dunning, J.H. (1993) Multinational Enterprise and the Global Economy. Workingham, England and Reading Mass:Addison Wesley.

Dobrescu Emilian (2005), "Restructurarea şi competitivitatea din perspectivă economică (unele repere conceptuale)", mimo.

Ganeshan. Wignaraj a(2001), "Competitiveness in a Rapidly Globalizing Economy: Lessons of Experience", Action Programme on Productivity Improvment, Competitiveness and Quality Job inDeveloping Countries-Working Paper PMD2, www.ilo.org/dyn/empent/docs /F111PUB78_01 /PUB78_01.htm.

Halpern L., Wyplosz C., (1997) "Equilibrium Real Exchange Rates in Transition Economies", in IMF Staff Papers No. 4, International Monetary Fund, Washington DC

Lall S, 2001, Comparing National Competitive Performance. An Economic Analiysis of World Economic Forum's Competitiveness Index, Working Paper nr.61, Queen Elisabeth House, Oxford.

Lamdany R., Mates N., Wagner N., Braumann B., Dorsey T., (1998), "IMF Country Report no.98/60, Slovak Republic: Recent Economic Development", International Monetary Fund, Washington DC.

Marca M.L. (2004), "Real Exchange Rate, Competitiveness and Policy Implications: A Formal Analysis of Alternative Macro Models" in CEPA 5/24/04.

Menzie D. Chinn,(2002),"The Measurement of Real Effective Exchange Rates: A Survey and Applications to East Asia", National Bureau of Economic Research.

Mills C.A., Nallari R., (1992), "Analytical Approaches to Stabilisation and Adjustment Programs", Economic Development Institute of The World Bank, An EDI Seminar Paper, No. 44.

Mussa M. (1986). "Nominal Exchange Rate Regimes and the Behavior of Real Exchange Rates, Evidence and Implications." Carnegie-Rochester Conference Series on Public Policy, Vol. 25, pp. 117-213.

Nilsson K., (1999), " Alternative Measures of the Swedish Real Effective Exchange Rate", Working Paper No.68, National Institute of Econbomic Research, Stockholm, Sweden.

Pelinescu, E. coord. 2006. Cursul de schimb şi competitivitatea în perspective aderării la Uniunea Europeană, Editura Expert, Bucureşti.

Pelinescu, E. (2006), "Cursul de schimb ca indicator de competitivitate", în volumul Cursul de schimb şi competitivitatea în România în perspectiva intergării în Uniunea Europeană, coordonator E. Pelinescu, Bucureşti, Editura Expert.

E. Pelinescu, P. Caraiani (2006). Estimating the Real Effective Exchange Rate (REER) by using the Unit Labor Cost (ULC) in Romania, Figure 2, în Journal of Economic Forecasting No. 4/2006.

Pisano, G.P şi W. Shih (2009). Restoring American Competitiveness, in Harvard Business Review, July-August.

Porter, M. E (1990). The Competitive Advantage of Nations. London: Macmillan.

M. Poenaru, V. Vasile, (2006), " Analiza evoluţiei sectoriale a costului forţei de muncă în România" în volumul: Cursul de schimb şi competitivitatea în România în perspectiva intergării în Uniunea Europeană, coordonator E. Pelinescu, Editura Expert, Bucureşti.

Rajan R.S (2004), Policy Brief. Competitiveness in the Global Economy with Reference to Singapore, Institute of Policy Studies, PB1, April.

Šmídková K., Barrell R., Holland D., (2002) "Estimates of Fundamental Real Exchange Rate for the Five EU Pre-Accession Countries", in Working Paper, No.3, Czech National Bank.

Spatafora N., Stavrev E., (2003), "The equilibrium Real Exchange Rate in Commodity Exporting Country: The Case of Russia", IMF Working Paper, No.93/2003, International Monetary Fund, Washington DC.

Turner Ph. şi J. Van't Dack's, (1993) "Measuring International Price and Cost Competitiveness", BIS Economic Paper, No.39, BIS, Basel.

Turner A. G. and Golub S.S. (1997), Towards a System of Multilateral Unit Labor Cost-Based Competitiveness Indicators for Advanced, Developing, and Transition Countries, IMF Working Paper, http://www.imf.org/external/pubs/ft/wp97151.pdf.

Veltov I. (2002), "Analysis of the Real Exchange Rate and Competitiveness in Lithuania", National Bank of Lithuania.

Voinea L., Albu L.L. et al., Reindustrializarea României. Politici şi strategii, Asociaţia pentru studii şi prognoze economico- sociale.

Williamson J., (1993), "The Exchange Rate Management", in The Economic Journal, Vol.103, Issue 416, pp. 188-197.

Williamson J., (2001), "From Breton-Woods to Bipolarity: The Evolution of Thought on Exchange Rate Regimes, 1971-2001", Paper prepared for presentation to the 30th Anniversary Conference of the Monetary Authority of Singapore, July, 20, 2001, Institute for International Economics, Washington.

Wren-Lewis S. and Driver R., (1988), "Real Exchange Rate for the Year 2000", Institute for International Economics, Washington.

Programul Naţional de Reformă 2011-2013, Guvernul României, Bucureşti, Aprilie 2011, în http:// ec.europa.eu/europe2020/pdf/npr_romania_ro.pdf

EC 2005, Price and Cost Competitiveness, http://europa.eu.int/comm/ economy_finance/ publications/price-cost-competitiveness/2005

European Comission, Europe 2020, in http://ec.europa.eu/europe2020/tools/ monitoring /annual_growth_survey_2011/index_en.htm

European Commission Entreprise and Industry, Commission Staff Working Document, Member States Competitiveness Performance and Policies 2011, SEC (2011), 1187

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CLUSTERS – INSTRUMENTS FOR PROMOTING ECONOMIC COMPETITIVENESS

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Abstract: In recent years, territorial (spatial) development concepts in relation to industrial development are often raised as an issue that needs to be considered by those who have this authority. The increased power of regions, given by Lisbon Agenda, highlighted the existing links between development and territory, bringing to the attention of policy makers, the necessity and utility to promote measures that support all industrial agglomeration, competitively poles, and clusters in general.

KEYWORDS: excellence clusters, innovative clusters, cluster policy, cross-border networks

Introduction

The concept of cluster has gained in the last few years a large popularity, all policy makers, business men and science men are referring nowadays to this. The interest is so intense that even the number of definitions is extremely large, and the economic impact itself, both from a competitively and innovation point of view, is very well observed. Its gaining popularity is reflected in the growth of new policies and initiatives which are designed to help clusters.

In Japan and South Korea most companies are grouped together in large industrial conglomerate, connected strongly both from an economic point of view, but also in structure of stakeholders and geographical proximity. This agglomeration is focused either on one large corporation (South Korea), or one large investment bank (Japan). In both cases the central entity is the one who makes all the decisions concerning the whole formation, keeping a very close connection, also, with local

[43] The paper presents some preliminary results of research performed for the project: Consolidarea competitivităţii clusterelor inovative şi evaluarea comparativă a competitivităţii sectoarelor industriale – instrumente de politică industrială durabilă, adaptate erei globalizării, Contract No. 06/04.10.2011, Phase I/2011: Analiza comparativă a strategiilor, politicilor şi instrumentelor de dezvoltare industrială, cu accent pe rolul jucat de structurile de tip cluster/pol de competitivitate în România şi în Uniunea Europeană şi identificarea instrumentelor şi măsurilor specifice de sprijinire a parteneriatelor inovative, Contracting Authority: Ministerul Economiei, Comerţului şi Mediului de Afaceri, Contractor: Institutul de Prognoză Economică, November 2011

authorities in order to channel public funds towards the central entity. Basically, this fact is leading to the formation of industrial clusters with geographical focus, formed around a very strong and competitive entity capable to act both locally and globally. Another important aspect is the ability to innovate effectively, driving the whole value chain around this.

Nevertheless, clusters are not specific to Asia; one can find this concept also in other continents and regions (Hollywood, Silicon Valley, Medicon Valley, Stuttgart, etc.), but opposite to the Asian ones, in general, clusters do not meet such fierce on global markets (with some exceptions – auto industry, wine industry).

Taking into consideration the economic context in which the concept of cluster was born, this type of industrial organization was largely influenced by the success story of the Asian ones. Hence, the model of industrial development based on regional (geographical) clusters comes into play as a reaction to the growing competition within global markets, but also for regaining the advantage of American and European industries that was lost in front of the Asian ones.

Starting with 2003, the European Commission has begun an intensive process of study, trying to find a way to adapt and integrate this type of initiatives; this would be a part from a larger plan to support the whole European industry through excellence clusters which are driven by innovation.

Within the Community, a new concept of industrial policy was adopted. This was all about integrated vision (European Commission, 2005); that means taking a horizontal approach to all support themes along with detailed analysis of all sectorial challenges, but also integrating directory lines within the economic strategy towards macro and micro economic priorities, and of course labor market.

Within this new paradigm, the E.U.'s industrial policy is focused on unique, free market, guaranteed by institutional framework, which will favor development and creation of new partnerships, along with transparent, consistent and predictable regulations; moreover, the capital market is supposed to be more accessible, and, last but not least, the local business environment should be in permanent connection with the local labor market.

Also, territorial (spatial) development concepts in relation to industrial development are often raised as an issue that needs to be considered by those who have this authority. The increased power of regions, given by Lisbon Agenda, highlighted the existing links between development and territory, bringing to the attention of policy makers, the necessity and utility to promote measures that support all industrial agglomeration, competitively poles, clusters, and in fact all economic concentrations within the space limit.

Based on the decision of the Council 702/2006, creation of clusters should be around excellence: "bringing together all SMEs within the high-technology sector around research and technology institutes, or through developing of regional concentration around large enterprises"

Cluster policies will generate economic growth, productivity, competitiveness, innovation and new jobs. Europe 2020 strategy stipulates the importance of clusters for business, especially for SMEs.

Clusters policies should not be seen only as tools to promote research, development and innovation, but also as an integral part of industrial policy that aims to prepare Europe for global competition.

The key messages should be the following:

- Cluster policy is an important political instrument for regions and nations within their strategies for innovation and business development;
- Internationalization of cluster programs or management entities, is a very important element for regions and nations, which can be improved by sharing best practices and with continuous support from the European Commission;
- Cluster management excellence is essential;
- Emergence of new cluster programs: E.U. - U.S.A., E.U. - Japan (presented by Ayako Kawamura, Center for Industrial Cooperation E.U.-Japan), E.U. – Australia, E.U. - India. All these with one single purpose - contributing to the animation of meta-clusters and cluster communication, with futures objectives in mind (to be launched in early 2012);
- Cluster policy lobbying, by creating a group with specific responsibilities within the European institutions in order to attract investors from within and outside the E.U. towards the innovative clusters.

Cluster initiatives offer 'policymakers the possibility of addressing business demand collectively and ensuring a cost-efficient way to address a critical mass of recipients with a substantial policy impact through public-private partnership'[44].

In the US as well as in Europe, cluster initiatives are usually initiated by local and regional stakeholders that know best their own competitive advantage in the region and have privileged contacts with the regional business community and academia[45].

In addition, clusters can provide a fertile combination of entrepreneurial dynamism and contribute to the building of a knowledge-based economy, in line with the Europe 2020 strategy[46].

Inside the industrial Europe, we are facing, for more than a decade, an increasingly competition on global level, occurring from industrial concentration based in East Asia.

Under these conditions, some national governments (Sweden, Germany) were forced to experiment with new economic development strategies and policies, including the

[44] Landabaso, Mikel, Rosenfeld, Stuart. 2009: "Public policies for industrial districts and clusters" in Becattini Giacomo, Bellandi Marco, De Propris Lisa (eds) 2009, A Handbook of Industrial Districts, Edward Elger, Nottingham: 744

[45] Sallet Jonathan, Paisley Ed, Mastermann Justin, 2009: "The Geography of Innovation. The Federal Government and the Growth of Regional Innovation Clusters", Science Progress: 6 and OECD, 2009: "Regions Matter – Economic Recovery, Innovation and Sustainable Growth", Paris:12

[46] European Commission SEC (2008) 2637

encouragement of emerging clusters. There is still no consensus on how policy is defined when cluster come into play, but it can be divided into three large categories:

- Development policies focused explicitly on mobilizing and strengthening of a particular type of cluster or clusters;
- Policies that use clusters as tools for distributing financial benefits allocated to a small group of agents (e.g. allocation of grants for research and innovation only towards those companies belonging to regional clusters, where there is a high probability for the occurrence of positive externalities);
- Policies that encourage cooperation between SMEs inside a certain region, with the purpose to form new clusters within that specific area.

The year 2010 marks a new milestone for European integration, through the communication of the European Commission – Europe 2020: "A European strategy for smart, sustainable and ecological growth favorable towards inclusion" (EU Commission 2010b). An example for competitiveness and industrial policy is the package of conclusions of the Competitiveness Council on "Industrial policy: the need for industrial policy (Competitiveness Council 2010c). Another good example is the special emphasis which is placed for "a modern industrial policy framework to support entrepreneurship and help guide the industry to be able to cope with these challenges; to promote the competitiveness between primary European industries – processing and services - , in order to help them to benefit from the opportunities of globalization and green economy" (EU Commission 2010c, p. 15).

In short, Europe 2020 Strategy envisages the following:

- Developing an economy based on knowledge and innovation;
- Promoting an economy more efficient when it comes to use of resources, more environment friendly and competitive;
- Sustaining a high employment economy that provides social and territorial cohesion.

The importance of clusters for synergetic growth has been stressed by the Community Strategic Guidelines on Cohesion (CSGs) for the period 2007-2013, explicitly encouraging Member States and regions to promote strong clusters, as a means of cooperation among businesses and between businesses and public research / tertiary education institutions – a knowledge triangle in their economic reform strategies.

The analysis carried out so far allow us to see clusters as drivers of competitiveness and innovation and thereby towards economic growth and job creation. Data provided by the EU makes it clear that clusters are significantly related to prosperity, and all businesses can benefit from clustering.

The European Cluster Observatory has identified so far, more than 2,000 statistically clusters. Therefore, Europe does not lack on number of clusters, but apparently lacks when it comes to "world-class cluster" that means cluster on international level, thus of global importance

We must make a clear distinction between clusters as a real phenomenon and "cluster initiatives" – clusters that are formed as a result of an initiative – in which new clusters are build or developed or by improving the performance of the existing ones. Some of these cluster initiatives can be successful, others not. Measuring the impact of support programs for clusters through performance indicators remains a challenge. For this purpose it is required reliable and neutral information on clusters, cluster policies and cluster initiatives.

The European Commission makes an important contribution in this regard, by improving the European Cluster Observatory and by facilitating transnational cooperation between clusters, through the use of its Transnational Cluster Policy within the European Cluster Alliance.

Insufficient innovation, in recent years, has been considered by the European Commission[47] as the main cause for poor performance in terms of economic growth. Thus parts of Europe need more innovation and growth to meet global changes. Regional networks and clusters are considered as true "drivers" (engine) for development, many of them contributing to strengthening local economies, creating jobs and attracting new investors. For these reasons alone, they launched several initiatives to create new clusters. Some countries have included cluster policies in their national development plans, and others have followed regional patterns.

Clusters are important mainly because they allow companies to be more productive and more innovative, compared to them working separately from each other. Second, clusters are important because they reduce barriers related to the ability to enter and develop new business in other locations. As a result, clusters and company networks have been placed frequently in the center of debates, within the national support initiatives and academic research.

Some countries are in a better position because of their tendency to engage more intensely in networking. The Innobaromether (2006) shows that networking is most popular in Nordic countries, as: Finland, Sweden, Denmark and Norway, where most companies that make up clusters, actively participate in at least two business networks (business network), and approximately 90% of them are part in at least one business network. By contrast, many companies within existing clusters in Czech Republic, Italy, Hungary, Slovakia, Belgium, Portugal and Slovenia, are between 39% and 51% active through participation inside business networks.

Continuous success for clusters depends on their ability to change and adapt. High degree of specialization, for these clusters, carries greater risk being much more vulnerable to market shocks, especially if the region's portfolio is too concentrated, making it difficult to adapt to market changes in time.

Availability and international cooperation is the only barrier against these risks. However, a higher agglomeration of economic activates can lead to disadvantages in terms of increased labor costs, real estate costs and traffic congestion, which in time may exceed the benefits of having clusters. In the end,

[47] Aho Report http://ec.europa/invest-in- research/action/2006_ahogroup_en.htm

potential benefits of clusters can lead to increasing gaps for those regions that plan to create clusters from scratch, by making promises of growing areas, without taking into account the strengths of the region, and the lack of critical mass in the global context already defined.

For these reasons, clusters are not stable and cluster policies are not always successful. Also, for the same reason many case studies were developed in order to better understand the "success factors" of clusters.

In 2007, Brenner&Muehlig published a study in which they analyzed 159 local industrial clusters, taking into consideration 135 different local conditions and processes that can lead to cluster formation.

The study highlights three types of success factors for the emergence of clusters, namely "mandatory prerequisites for cluster development", "triggering events" and certain actions that trigger the process of making good use for the potential of development for a cluster namely "self-growth process". The results of this study, suggest that the most important "prerequisites" for the emergence of clusters is qualified workforce (105 out of 159 cases), and of course strong connections between actors.

When we speak of mandatory prerequisites for cluster development, networking was regarded as one of the most "important" factors for clusters (with a total of 78 cases), while those clusters that find this less important were in total of 37 cases. The presence of universities and public research centers was mentioned between important premises (in 70 cases). After taking into consideration all these factors, they considered as prerequisites: tradition and history (in 66 cases), industrial structure (in 61 cases) and local policies (in 56 cases)[48].

As for triggering events, the most important three events mentioned are: creating a business leader (in 62 cases), specific policy measure (in 53 cases), and finally historical events such as wars (in 52 cases); these events are a mix of opportunities and public policies.

Among the self-growth processes they observed: human capital accumulation (in 116 cases), cooperation between companies (in 87 cases), and the option of co-location along with other companies (in 83 cases).

An interesting result of these studies is that policy measures are considered to be of utmost importance and that their importance has even increased over time.

Trends in development of economic clusters – creation of transnational clusters

Policies related to clusters are often seen as tools for improving national and regional competitiveness, which in turn explains why only a small number of cluster programs have an international dimension.

[48] 2007, Brenner & Muehlig

This perception of national and regional approach began to change. Taking into account the effects of globalization, that strengthens competition between different locations, and also the presence of a new horizon between companies across different value chains, transnational cooperation starts to appear in a different light. There is a growing recognition that a certain country cannot remain competitive without a particular specialization.

At the lowest level, peer learning is the only reason for closer cooperation between those responsible for cluster policies and programs. To learn from others, to adopt successful practices, to avoid mistakes and to be aware of new challenges and new political trends in the field, will help companies to advance more quickly, and to adjust their emergence policies towards cluster needs and challenges.

However, a precondition for this type of cluster policies based on cooperation must be that all participants should have the same interests. Without incentives there is no interest to share experience with those who have to climb before reaching the same maturity, or with those who started their cluster policies many years ago.

A second motivation is the interest in developing tools and practical solutions to relevant issues related to policies and programs for clusters, such as: better methodology for cluster mapping, better identification of emerging new markets, better performance measurement and evaluation of a cluster, or even the evaluation of the evolution of a cluster, study on the efficiency of cluster initiative inside a specific territory. Development of such tools can make it easier for policy makers who would have the advantage of experience within certain areas.

The role of transnational cooperation on program and policy level to strengthen clusters

Different countries may have a common interest in working to build strong clusters or to increase the cooperation between them, using the same specialized research facilities and the same test facilities in order to facilitate cross-border transfer of knowledge.

This requires developing of long term joint strategy in order to facilitate the development of strong global clusters. This ambitious cooperation may be limited to cross-border cooperation between regions with a strong common cultural identity, such as the Baltic Sea region and Central Europe. For these reasons one can conclude that although transnational clusters would be a great benefit, it is unlikely to occur spontaneously. Most often such cooperation remains limited to the same region, although common problems could be better addressed through broad cooperation.

Therefore, the instruments of the European Community, that facilitate transnational cluster cooperation, could provide greater benefits. In this respect, it would be necessary to address and develop, on a strategic dimension, transnational cluster cooperation.

European initiatives to support clusters should be as largely complementary to national and regional efforts, to better exploit synergies and to better support country specific priorities. On the other hand, regions and Member States should make full use of the advantages of community's financial instruments to strengthen cluster and open them to transnational cooperation.

Provision by European Cluster Observatory of neutral and comparable information about clusters and cluster policies within the Member States, is a major contribution to promoting mutual learning of policies at E.U. level, in order to promote a policy approach based on real facts, concerning cluster support.

Moreover, providing policy learning platforms that allow regions and Member States to learn from each other, in order to be able to formulate support cluster policies, is an example of how the European Community supports transnational cooperation in the field of clusters. This type of support includes: Regional Innovation Strategies (RIS) schemes, which since 1994 have helped many regions lagging behind the EU, to develop innovation strategies, Innovative Action Program (IAP) (2000-2006) co-financed by European Development Fund, as well as the initiative Regions for Economic Change. This initiative was launched under Cohesion Policy, aiming to balance the experience of regions, both developed and less developed.

The new objective of the Cohesion Policy for 2007-2013 is the "European Territorial Cooperation", which aims to support integrated territorial development, interregional cooperation and exchange of best practices – all based on innovation. 2 billion of euros were allocated for innovation within EU 27, but also for intercluster activities where more than one region could benefit from this.

Facilitating interregional cooperation is a part of the cohesion policy that launched the new initiative "Regions for Economic Change", which is one step forward in the effort to improve these policies for growth and job creation. Topics related to clusters included in this initiative include: faster linking of innovation results to market, improving research and innovation capacity, improving knowledge and innovation for growth, improving the capacity of regions for research and innovation and improved environmental monitoring.

A first generation of pilot projects and networking activities were launched under PAXIS initiative which aims to identify examples of "best practices" and to develop tools for cluster initiatives. As a result, there were a large number of successful practices that have been transferred to other regions in key areas, through development of start-ups, financing innovation, technology transfer, incubation and entrepreneurship. PAXIS manual for decision makers and practitioners of innovative policy, describes in detail these practices, providing a useful guide for creating and managing of clusters.

Most pilot projects that facilitate mainly networking between cluster initiatives, do not always get up to the political level. They have reached their limits, and now there is an increasing need to design and implement better regional and national clusters. After all, there are lots of "best practices" from which one can learn. The challenge that remains is to consolidate information and deliver it in a friendly way. This does not prevent such information to become outdated and difficult to

replicate. A fundamental challenge is the regional policy within the clusters, which is motivated by different interests and aspirations. Clearly a good example cannot remain good whatever the place or time frame is. This raises the question of who can best learn and from whom, which require a different configuration of learning policies related to clusters.

In this respect, the existing guidelines and materials, concerning creation of regional national cluster policies should be further discussed and tested by government experts, from all levels, and maintained over time. European network Innovating Regions can play an important role to disseminate information on these documents, as well as publications of the European Commission: "Innovative Strategies and Action: Results after 15 years of experience", which contains a summary of the experience of innovative actions from the Cohesion Policy program, as well as guidelines on how innovation and experimentation should be continues in the current program period 2007-2013 (European Commission Working Document).

Facilitating interregional cooperation is also part of the Cohesion Policy; for this purpose the initiative "Regions for Economic Change" was launched as a step forward in efforts to improve the contribution of this policy to growth and job creation. This initiative focuses on the need for innovation which is consistent with the objectives for modernization set out in the Lisbon Agenda. Topics related to clusters included in this initiative refer to: "to bring results of innovation even faster on the market", "improving research and innovation capacity", "improving knowledge and innovation for growth", "improving the capacity of regions for research and innovation" and "improving environmental monitoring".

This initiative was made possible through the experience of 2000-2006, under the INTERREG III C initiative, through the support of interregional cooperation and the URBACT network for exchange of good practice between Europe's cities. These two programs have created numerous networks that linked local and regional actors across Europe. This type of know-how provides a valuable asset, and it can be a starting point for regional policy to bring economic development in Europe - in the form of "relationship capital" (i.e. consisting of relational capital).

One of the most recent projects, which are still in place (2009-2012), focused on promoting transnational networks, is called **Adriatic Danubian Clustering**[49] (ADC).

The general objective of the project is to overcome the current stage, characterized by lack of information between countries of South-East Europe on the potential of entrepreneurial cooperation (trade facilitation, high specialization, access to innovation, join initiative on global markets).

The ADC project is working within the framework of a partnership which involves 13 organizations coordinated by Italian Veneto Region, well known for its knowledge within cluster area.

The representative countries inside the project are:

[49] www.adcproject.eu

- 5 E.U. countries, namely Italy, Hungary, Slovenia, Bulgaria, Romania, as well as
- 4 non E.U. countries, namely Serbia, Montenegro, Bosnia-Herzegovina and Croatia.

Project description: Project "Adriatic Danubian Clustering"(ADC) - "Clusterization within the Adriatic – Danube area", also known as "ADC Project" falls between the guidelines of many other projects which reflect the European Union's policy to support economic development based on clusters.

This project is financed from European funds and via the **Transnational Cooperation** Program for South-East Europe (SEE) 2007-2013. Romania is participating to this project represented by Institute of Economic Forecasting, as project partner 8.

The project is coordinated by the Italian Region of Veneto, well-known for its experience in the field of entrepreneurial activities. The other partner countries in the project are: Bulgaria, Italy (with four regions: Veneto, Friuli Venice Giulia, Emilia Romagna and Molise), Slovenia, Hungary, Croatia, Serbia, Montenegro and Bosnia-Herzegovina.

The ADC Project (www.adcproject.eu) intends to identify in the Adriatic-Danubian area companies and/or clusters that are already formed or are about to be formed – with activities in the different sectors of common interest for all the partners in the project, in order to support the process of development through the opportunities offered by transnational cooperation, in general, and through cooperation between all countries involved in this project, in particular:

The following sectors were found to be common among all the partners involved in the ADC project:

- The Sector of "Agro-Food": processing, preservation and packaging of food products and related technologies;
- The Sector of "Building and modernization of living dwellings": this sector includes a multitude of activities meant to create healthy and comfortable living spaces, namely: ecological building materials ("green houses") and building technologies, technologies for renewable energy sources, electronic household appliances, furniture etc.;
- The Sector of "Logistics": storage, packaging, related transport and technologies, ITC applications in the mentioned fields;
- The Sector of "Mechatronics": manufacturing of engines, generators, electric transformers, control systems for industrial processes, mechanical instruments, pumps, compressors, air processing systems and other thermo-mechanical devices, bio-medical technologies, technologies for processing and packaging of textiles, leather, wood; industrial robots and antennae manufacturing etc., added to which are mechanical parts produced by smaller suppliers, specialized, however, in the mentioned fields.

The goal of ADC project is to support the companies in the four economic sectors of strategic importance for the countries involved in the ADC project, preferably integrated in national clusters, to cooperate among themselves for the formation and/or development of competitive and effective transnational clusters.

The main expected results of this project are the creation of new, efficient and sustainable facilities to support creation of cluster networks, to integrate companies and local production systems, building a regional economic identity for the Adriatic-Danube region, as well as developing this region as a productive integrated system, with high competitiveness and with strong capacity to attract foreign investors.

Within this project a joined data base will be created, for nine countries, which will be structured on the above mentioned sectors. All companies involved in this project will be inserted in this data base, with the possibility to cooperate and promote their own products on the European market, in general, and in the south-eastern market, in particular.

The advantages of integrating companies in transnational clusters via the ADC project are mainly the following:

- Priority to European funding, on the occasion of calls for proposals of projects, meant to promote and develop transnational clusters;
- Enlisting the companies in a common data base of the nine partner countries, structured on the four sectors mentioned above, creating in this way a virtual platform which will be active even after the project is completed and which will facilitate the initiation and consolidation of cooperation among the respective companies;
- Mutually knowing about opportunities for cooperation between enterprises/firms/companies in the nine partner countries in the project.
- Acquiring an important and direct experience on the markets of South-East Europe by direct contact with the economic and entrepreneurial realities in this area;
- Facilitation of an exchange of knowledge on the production processes, for an easier and effective collaboration, as well as for a more active presence in the South-East European countries.;
- Promotion of new trade relations among the companies that cooperate in producing a finished product, as well as among the local production systems involved;
- Knowledge of potential competitive companies in the transnational context, in terms of access to new markets;
- Informing all institutional actors involved, on measures that can have a positive impact in terms of economic recovery, with particular emphasis on improving the management of those territorial units which focus on providing, entrepreneurs and clusters, facilities to stimulate innovation.

ADC's efforts to integrate companies within clusters or network of clusters have been materialized by signing in the year 2011, of 3 agreements that establish transnational clusters in each of the four sectors: food, housing construction and

modernization, mechatronics, logistics (to be signed in 2012) (according to http://www.ipe.ro/adc/index.html).

These examples show that there is interest in transnational cooperation between clusters, on economy policy level. But, as confirmed by feedback from the participants, this kind of cooperation could not take place without the financial support of the Commission. Only with the help of European funding, more advanced government's body are ready to share their experience with countries that have recently initiated policies and programs to create clusters, which have a special interest to learn, especially in the effective implementation of regional development strategies area.

In many areas, progress has been registered especially when it comes to closer cooperation between policies and programs on clusters from different Member States countries and regions, by signing the Memoranda of Understanding and through launching pilot projects. Moreover, different public administrations are now working closely together to improve the methodology of mapping clusters to assess their impact. This would not have been possible without the initiative launched so far by the European Community.

According to experts, further progress must be made regarding the removal of legal restrictions in place, in order to achieve closer cooperation between different Members States regions when it comes to cluster policy. This would require the development and practical application of new legal instruments for cross-border cooperation, such as the "European Grouping of Cross-Border Cooperation" (See Regulation 1085/2006 of the European Parliament of 5 July 2006, published in the Official Journal of the European Union).

Measures dealing with cluster policies

Romanian academia and companies

1. Establishing closer links between academia and private companies through common events, such as:
   - Trade/Job fairs within the premises of the universities
   - Demonstrative activities based on specialization of companies (those with technical profile) within extracurricular classes
   - Visits organized at the company's headquarters
   - Social campaigns promoted by companies involving students (as secondary objective: improving Social Corporate Responsibility)
   - Annual competitions with awards, held by companies (as secondary objective: targeted publicity)
   - Media, design or marketing project, even new products development (as secondary objective: websites of companies could be designed / improved by students with special abilities, both parties benefiting from the experience) (examples of marketing campaigns: Open day for Students; One week training within the companies, Women day, etc.)

- Extended periods of practice, during the summer (paid or not, full-time/ part-time)
- Setting up special departments within the universities' premises that could be funded by companies with well-defined goals (e.g. web-design department to launch joint projects to improve the web pages for companies that financially support this department) (e.g. Inside the marketing department where students could brainstorm about new marketing campaigns, and even promote them, etc.)
- Adapting universities' curricula on two main directions (reducing the difference from the current system through increasing the share of special education at the expense of the basic one; even more, such specialized studies should have a stronger practical component – for example, a period of two months with practice in the summer with or without pay)
- Basic Studies – to cover most of the information necessary to enrich the basic knowledge in the field
- Focused Studies – to include only the information that needs to be extensive, depending on the specialty
- Setting up Union of Students (to represent their interests before the company, but with the objective to encourage cooperation between companies and students by initiating active dialogue with companies, and even to negotiate salaries)

2. Contracts between universities and companies to both use equipment / laboratories in order to improve practical skills of students (ex. Companies can temporarily move equipment in university laboratories, or 2 hours / week visits in companies' laboratories under the supervision of a teacher and / or a company employee)
3. Research orientation within technical universities can be drawn by companies (with or without sponsorship from companies)
4. Joint application (companies&universities) for national and European projects, based on the interests of companies, as well as universities competencies
5. Improving the image of an industry / company / product by actively involving students in street campaigns and / or among friends (fliers distribution or by learning predefined texts to be communicated among them)
6. Establish a working office that will create, maintain and update 2 databases:
   - Contact information for all universities within a city / county with all the faculties, specialties, equipment and laboratories
   - Relevant companies in related sectors with the profile of universities within the same city / county;
   - Using these two databases, and through direct contact with the companies, this office would be aware on all available jobs from all companies, along with required research results…. acting as a liaison between companies and universities (funding this office can come from companies, or private universities' funds, or from state budget)

7. Creating social networking for students, by involving companies; each week / month certain issues could be discussed among students based on online debate (Optimal solutions for specific issues can be rewarded by the company)
8. Establishment of councils based on the specialization of the faculties (e.g. Electronics and engineering faculty council, Faculty of Economics council) formed by: dean's office and General Secretariat, along with a designated person within each interested company. The purpose of this council would be to address all of the above issues (from 1 to10), and even by creating a lobby group that promotes the needs of companies along the Ministry of Education.

Government and Romanian companies

Establishment within each ministry of a department to support cluster activities in the same field. Among the activities that could be run by this department:

- early information on national and international projects (ex. Writing a newsletter on the most important data and relevant information on projects that companies might apply – only in the area of ministry's expertise); That would mean one newsletter to each area / sector / ministry
- Market development by initiating campaigns led by companies, but with logistic support from the government (providing a space, equipment)
- Initiation and mediation of international partnerships between Romanian companies and rest of the world (more active missions, not only at ministerial level but also for specialized departments <<those that have support activities for clusters>>)
- Promoting feedback from the European Commission for the private sector in Romania (this could be addressed within the same newsletter mentioned at 2a; companies should be better informed on all directions outlined by the E.C.)
- Most important: active support for project applications, consulting (free) on application process and support for project management (once won)
- Mediation of consortia on Romanian territory
- Drawing up papers (by specialized departments) to be promoted on government level, containing the situation of all companies (e.g. Implementation of programs to stimulate innovation and technology research; current situation for a specific sector along with current issues, pointing out where there is need to adapt certain laws)
- Activity centered on search for technology; Departments should have a flexible database with companies within a certain industry, with all their equipment, their needs, but also with their areas of interest in research. These ddepartments could thus be involved in actively solving technology needs of companies (by finding the necessary technology with the country, or even through international companies – this type information can be found by working with local representatives of European Enterprise Network)

- Departments may undertake studies to assess projects / ideas that would be received from interested companies; those ideas considered important can be promoted as strategic directions in the field

The division of cluster policies in several key areas, thus leaving a small number of clusters (see the German model in North Rhine Westphalia Region – where there are only 16 clusters in the land, each focused on one specific sector: automotive, biotechnology, chemistry, culture and creative industries, energy industry, energy research, environmental technology, food, health, ICT, logistics, mechanical engineering, media, medical technology, nano-materials, plastic. An observation period could be considered (3 to 5 years) for existing or emerging clusters, within the time frame; based on their results, after that period, only those who are performing may merge, thus forming one national cluster. This policy can be set up at national level or at most on macro regional level (4 macro regions with 16 clusters, in Romania).

Promotion (from state budget) of inter-cluster competition, by giving certain prizes for those products that will receive special attention in competitions. The winning products will receive a title called "product of the year", then during the year (until the next competition) can be actively promoted, both by companies and state (through media campaigns) by highlighting the special status of that specific product. In time, this could become a brand itself.

Promoting the concept of regional brand, which is much more sustainable than industrial brand. Firstly, it can cover a wider range of products, and secondly a region is much easier to recognize / remembered than a specific product. Once the brands are defined they can also be promoted in campaigns carried out by the Ministry of Tourism.

The government can help the development of areas that are not performing by initiating special programs called "strategic", pushing all complementary companies to intensify activity in that specific area (e.g. Currently the span of one battery is very low compared to market demand; by promoting campaigns and even projects like "Energy Efficiency" in any field that uses batteries, certain companies might be stimulated to intensify their research on batteries; this could be beneficial in terms of creating new jobs or by increasing investments in related fields).

REFERENCES

Dr. Carmen Pauna, Drd. Gabriela Bilevsky, Drd. Tiberiu Diaconescu, selected ideas from the study (in manuscript): "Comparative analysis of strategies, policies and instruments for industrial development, with emphasis on the role of cluster structures / pole of competitiveness, in Romania and the European Union, by identifying specific instruments and measures to support innovative partnerships", November 2011, within the sectorial Project: "Strengthening the competitiveness of innovative clusters and benchmarking the competitiveness of industrial sectors - sustainable industrial policy instruments, adapted to the globalization era" contractor Ministry of Economy, Trade and Business

Environment; Contractor as coordinator: Institute of Economic Forecasting (in partnership with GEA Strategy&Consulting, INNO Consult, INMA, INCDTP, ICMET Craiova);

Landabaso Mikel, Rosenfeld, Stuart: "Public policies for industrial districts and clusters", 2009

Becattini Giacomo, Bellandi Marco, De Propris Lisa: "A Handbook of Industrial Districts", Edward Elger, Nottingham: 744, 2009

Sallet Jonathan, Paisley Ed, Mastermann Justin: "The Geography of Innovation. The Federal Government and the Growth of Regional Innovation Clusters", 2009

Science Progress (6), OECD: "Regions Matter – Economic Recovery, Innovation and Sustainable Growth", Paris, 12/2009

*** Innovative Strategies and Actions: "Results of 15 years of experience", European Commission Working Document.

*** European Commission SEC (2008) 2637;

*** Aho Report http://ec.europa/invest-in- research/action/2006_ahogroup_en.htm

*** European Cluster Observatory

*** www.adcproject.eu

*** http://www.ipe.ro/adc/index.html

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MODELLING OF VOTING BEHAVIOUR IN ROMANIA

NICOLAE MARIUS JULA[50]

Abstract: Romania has experienced a new electoral model, a model in which a gap between general elections and the Presidential election was introduced. Also in 2008 the election law was changed. The current design provides a uninominal voting system with a correction of the total number of seats by the total number of votes obtained by each party on the national level. In these circumstances, given the uninominal component of the vote for parliament, we analyze the significance of the signal given by the municipal elections, held in mid-year, over the results recorded in the general election (with 6 months lag). We also consider the relationship between regional distribution of votes in general elections and, respectively, Presidential elections (with one year lag). We use for this purpose regional data from elections in June 2008, from general elections in November that year, and the Presidential elections in November 2009. In building the econometric model used for electoral forecast we exploit both political variables and data concerning the state and dynamics of the economy, at the national and regional level.

KEYWORDS: electoral process, regional election, electoral models, economic voting, political business cycles.

JEL: C21, D22, O18.

1. Electoral process in Romania - institutions, rules, outcomes.

1. Local Elections - June 2008

Romania's EU membership imposed a harmonization of Romanian legislation with the common acquis, meaning supplementing the local elections law (67/2004) with a set of rules governing a non-discriminatory manner regarding Romanian citizens, the conditions on which EU citizens must meet to exercise their right to elect and be elected to local government authorities in Romania, in accordance with Council Directive 94/80/EC of 19 December 1994[51].

[50] Nicolae Titulescu University from Bucharest
[51] Council Directive 94/80/EC of 19 December 1994 to establish procedures for exercising the right to vote and to stand in local elections by Union citizens residing in a Member State without citizenship, amended.

In Romania, Law no. 67/2004, republished[52], regulating elections for local public administration authorities - local councils, county councils and mayors. By law, local councils, county councils, mayors and chairmen of county councils[53] are elected by means of a universal, equal, direct, secret, and freely expressed ballot. Local councils and county councils shall be elected in constituencies, based on electoral lists, according to the principle of proportional representation. The mayors of communes, towns, municipalities, Bucharest Municipality districts, and the general mayor of the Bucharest Municipality shall be elected in constituencies, by means of uninominal voting. For election of the local councils and mayors, each commune, town, municipality and administrative-territorial sub-division of the municipality represents a constituency. For election of the county councils, president of county council and the General Council of the Bucharest Municipality, each county, respectively Bucharest Municipality, represent a constituency.

Elections for councillors, mayors and chairmen of county councils are valid, regardless of the number of voters who participated in the vote (Art. 95). In order to distribute the councillor's seats, the constituency election bureau shall establish the election threshold of the constituency, representing 5% of the total number of validly expressed votes in that constituency. In the case of political alliances[54] or electoral alliances[55], 2% shall be added to the 5 % threshold for the second member of the alliance. For alliances of at least 3 members, the election threshold is 8%.

For County Council chairman, candidate in the first round who obtained the highest number of votes is declared the winner. Voting the Chairmen of County Councils by direct vote was a strong premise for changing the structure of power within the parties[56].

For the mayor's position, the candidate having obtained the majority (50%+1) of the validly expressed votes shall be pronounced mayor. If none of the candidates

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[52] Republished in the Official Journal, Part I, no. 333 of May 17, 2007, pursuant to Art. II of Government Emergency Ordinance no. 8 / 2005 amending and supplementing Law no. 67/2004 for the election of local authorities, published in the Official Journal, Part I, no. 175 of March 1, 2005, approved by Law no. 131/2005, published in the Official Journal, Part I, nr. 420 from 18 May 2005 (a new counting system for the texts). Law no. 67/2004 published in the Official Journal, Part I, no. 271 from 29 March 2004.

[53] Until the local elections from 1st June 2008, according to art. 1 align. (5) from Law no. 67/2004, the presidents and the vice-presidents of the local councils, as well as the vice-mayors, were indirectly elected by the county councils, respectively local councils. In March 2008 (OUG no. 32 from 19th March 2008), the Government decided to change the procedure for electing the presidents of the county councils, by modifying and supplementing the Law 67/2004 for electing the local public administrative authorities, republished in Official Journal of Romania, Part. I, no. 333 from 17th May 2007.

[54] Political alliances are associations between political parties, based on an association protocol registered to Tribunal of Bucharest, according to the Law of Political Parties.

[55] Electoral alliances are associations between political parties and / or political alliances and / or organizations of citizens belonging to national minorities, in order to participate in elections, registered in the electoral responsible authority.

[56] "Ovidiu Şincai" Institute, *Report on Parliamentary Elections of November 30th*, 2008, February 1st, 2009, Bucharest, p. 5.

has obtained the majority of the validly expressed votes, a second ballot shall be organized. A second ballot shall also be organized in the event of a tie between several candidates to the mayor's position. Only the candidates ranking first and second and the candidates in a tie, respectively, shall participate in the second ballot. The second ballot shall take place two weeks after the first ballot and the person who obtains the most number of votes becomes the major.

A year before the normal expiration of the seat there are no longer hold elections for local councils, county councils, mayors, the General Council of Bucharest or the capital's Mayor.

Vice-presidents of the councils and deputy mayors are elected indirectly by secret ballot by the county councils or local councils, respectively.

In Romania, local elections took place on June, the 1st, 2008. Where appropriate, the second round was organized on June, the 15th, and in some cases a repetition or a third round was organized. Percentage of the voters' participation in elections to appoint representatives of the county councils on June 1st was 50.67% and to appoint representatives to local councils and mayors was 48.81%. For Bucharest, the rate of voters' participation in elections for the designation of the General Council and the Mayor of Bucharest on June, the 1st was 31.36%, while on second round on June, the 15th was 31.49%.

On local elections from June 2008, the Permanent Electoral Authority considered that, although elections were generally organized and took place within normal limits, respecting existing legal framework, however, "in the context of the changes in electoral laws by introducing uninominal voting system also for electing presidents of county councils, it seems that the reduction of the number of voting citizens leads to an increase of the importance in local elections, leading to increased virulence in some cases in election campaigns and electoral confrontations, the emergence of the trading phenomena of votes or the financial corruption of some categories of voters."[57]. However, irregularities and shortcomings, including legislative ones, did not influence the outcome of the vote.[58]

Electoral results – Local elections, June 2008

	Electoral Competitors	Number of seats			% of total valid recorded votes	
		Presidents of local counties	County councilors	Mayors	County councilors	Local councilors
1.	Social Democrat Party (afterwards PSD)	17	436	661	28.22%	26.67%

[57] Permanent electoral authority, *Report on the organization and deployment for election of Local Public Administration Authorities from June 2008*, p. 121-122, http://www.roaep.ro/
[58] *idem*, p. 128.

	Electoral Competitors	Number of seats			% of total valid recorded votes	
		Presidents of local counties	County councilors	Mayors	County councilors	Local councilors
2.	Democrat Liberal Party (afterwards PDL)	14	434	473	28.38%	27.70%
3.	National Liberal Party (afterwards PNL)	5	289	355	18.64%	18.08%
4.	Democratic Union of Hungarians in Romania (afterwards UDMR)	4	89	148	5.43%	4.75%
5.	Conservative Party (afterwards PC)	–	16	10	3.31%	3.71%
6.	Greater Romania Party (afterwards PRM)	–	12	3	3.65%	3.70%
7.	New Generation Party – Christian Democratic	–	5	2	2.79%	3.53%
8.	Independent Candidate	–	1	15	0.41%	3.38%
9.	Others	1*)	56**)	41**)	9.17%**)	8.48%**)
	Total***)	41	1338	1708	100%	100%

*) Democratic Forum of Germans of Romania
**) Over 40 other electoral competitors
***) The total does not include the Mayor of the Capital or the General Council of Bucharest.
Source: Central Electoral Bureau for election of Local Public Administration Authorities– 2008, http://www.beclocale2008.ro/rezultate.html

2. Parliamentary elections - November 2008

Romanian Parliament is bicameral and comprises the Chamber of Deputies and Senate. The parliamentary elections in Romania shall be conducted by observing the universal, equal, direct, secret, and freely expressed nature of the vote. Romanian citizens who have attained the age of 18 years, residing at home or abroad are entitled to vote (and to be elected) regardless of race, sex, nationality, ethnic origin, language, religion, political opinion, wealth or social origin. Exceptions are mentally defective

or alienated people, laid under an interdiction, or the persons convicted to the loss of the electoral rights, by final judgment. Citizen participation in elections is based on their free will.

November 2008 elections were the first parliamentary elections in Romania separated from Presidential elections. If for the election during 1990-2004 the Presidential candidates seemed to work as an election locomotive for the party, this time political parties acknowledged the personalization of political life and launched their own candidates for prime minister, although this feature is not directly eligible. In addition, since the 2008 elections, deputies and senators were elected in uninominal colleges by uninominal voting according to proportional representation.[59] Organizations of citizens belonging to national minorities, legally constituted, which did not obtained at least one seat of deputy or senator are entitled to one deputy seat, if they obtained, on entire country level, a number of votes equal to at least 10% of the average number of valid cast votes on country level to elect a deputy.

The most important change to the electoral law for the election of 2008 (Law no. 35/2008) is the replacement of the party lists voting with uninominal voting system. Thus, each electoral competition (political party, political or electoral alliance, minority party, independent candidate) has the possibility to register a single candidate in a college.

In November 2008, competitors ran for 452 electoral seats in the Romanian Parliament: 315 seats for the Chamber of Deputies (7717 candidates: 7689 from the 30 political parties and 28 independents) and 137 for Senate (895 candidates: 892 candidates from 30 political parties and three independents).

Distribution of seats was made using a multi-stage system. The first step is to collect the data at a national level and to identify political parties which exceeded the electoral threshold (number of votes obtained more than 5% of the cast votes, both the Senate and the Chamber of Deputies[60], or have obtained 6 deputy seats and three seats in the Senate by an absolute majority, defined as 50% +1 of the votes). Next move is to allocate the seats on electoral competitors (parties, alliances, formations of minorities, independents), in two stages. First, the electoral bureau of constituency shall set the electoral coefficient determined by as the integer part resulted from dividing the number of validly cast votes by the total number of Deputies and Senators.

For each electoral competitor they shall divide the total number of validly cast votes by this coefficient. The integer result obtained shall constitute the number of seats allocated by the electoral bureau of constituency to the electoral competitor in the first stage. Each independent candidate shall be granted a seat by the electoral

[59] Rule of representation for the Chamber of Deputies was a deputy to 70,000 inhabitants and for the Senate, one Senator to 160,000 inhabitants.

[60] in the case of the political alliances and electoral alliances, to the threshold of 5% they shall add, for the second member of the alliance, 3% of the validly cast votes in all the constituencies and, for each member of the alliance, beginning with the third one, one percentage of the validly cast votes in all the constituencies, without exceeding 10% of these votes.

bureau of constituency if they have obtained the majority of the validly cast votes in the Uninominal College in which they stood for election.

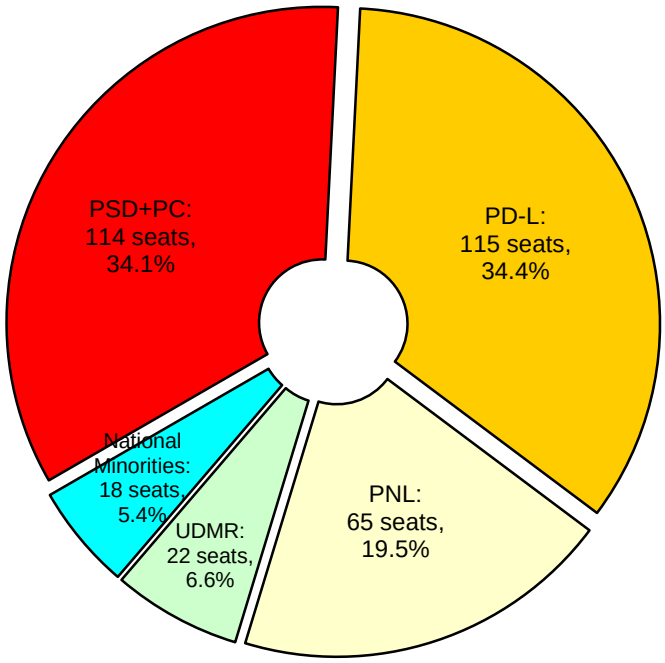
The votes remained, that is the unused ones or those inferior to the electoral coefficient, obtained by the electoral competitors, as well as the seats that could not be allocated by the electoral bureau of constituency shall be communicated to the Central Electoral Bureau, in order to be allocated by centralization in the second stage, at national level, using the Hondt method.

This election mechanism, in which nominations are held in constituencies and the distribution of seats is done by proportional rule has no precedent in Europe and led to the situation that 25% of senator or deputy seats may not be granted to the first ranked competitor in constituencies[61].

Parliamentary elections in Romania (Chamber of Deputies and Senate) were held on November, the 30th, 2008, with a participation rate of 39.20%.

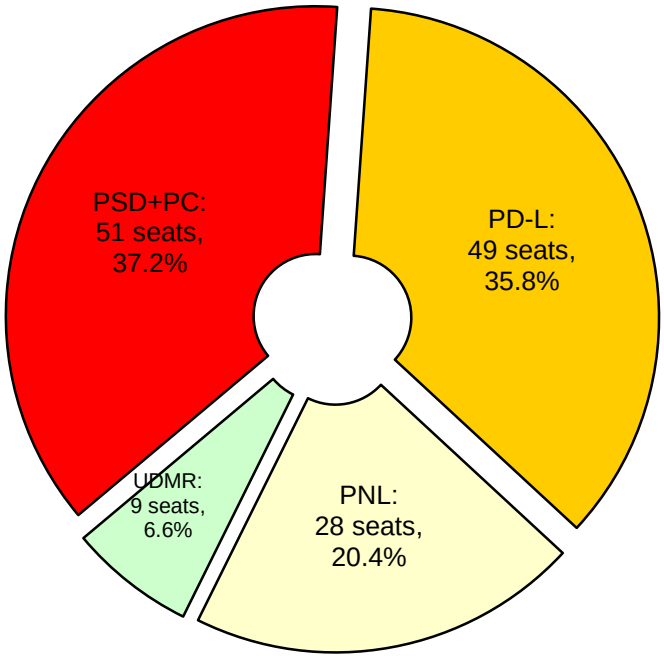
Following the aggregation of valid votes for the Chamber of Deputies, a total of 334 seats were awarded. 316 from these seats were allocated to political parties, organizations of citizens belonging to national minorities, political alliances, electoral alliances, independent candidates. 18 seats were allocated to members of national organizations that have obtained at least 10% of the national established electoral coefficient. The November, the 30th elections led to a diminution of the number of parliamentary parties on the Romanian scene: PSD + PC, PD-L, PNL, UDMR.

[61] The procedure is described in Articles 47 and 48 of the Voting System Law (Law for the election of the Chamber of Deputies and the Senate and for amending and supplementing Law no. 67/2004 for the election of local authorities, the local government Act no. 215/2001 and Law no. 393/2004 on the status of local elected officials, law no. 35/2008), published in the Official Journal, Part I no. 196 of 03.13.2008. The two articles count 22 paragraphs. Simplified description is taken from the *Report on November 30th, 2008 parliamentary elections* Ovidiu Sincai Institute, February 1st, 2009, Bucharest, p.11-12.



Chamber of Deputies – total number and percentage of the obtained seats by the political entities – elections from 30th November 2008

For Senate, a total number of 137 seats were distributed.



Senate – total number and percentage of the obtained seats by the political entities – elections from 30th November 2008

The electoral system adopted for parliamentary elections in November 2008 was relatively complicated and led to some problems in the distribution of seats. Thus, although the use of Voting System was the goal for changing the electoral system, results showed that only 21% of senators and of 26% deputies entered the Parliament by direct vote (comprising over 50% of the cast votes), while the remaining candidates have benefited from a redistribution system. Redistribution led to situations of inequity by making it possible for a candidate who obtained 49.6% of votes in its favour not to enter the Parliament[62], while another candidate with only 34 votes to obtain a seat[63]. Also, situations when candidates from a constituency were ranked third in peoples' options, to enter into the Parliament as a result of redistribution of votes on national level, and the situation that candidates situated on the top positions received any seat. However, nationally, the chosen system allowed a proportional representation of political choices of voters.

Presidential election - November 2009

Elections for President of Romania from 22nd November – 6th December 2009 were conducted in accordance with Law no. 370/2004, as amended and supplemented, supplemented by Government Emergency Ordinance no. 95/2009. [64]

According to the new electoral law that marks the difference between the term of President's seat (5 years) and duration of the seat of Parliament (four years) for the first time in Romanian politics, election of the President of Romania was not held simultaneously with elections for the Chamber of Deputies and the Senate. Instead, its first round of electing the President of Romania overlapped with the time of the national referendum held on the initiative of the President in office, on the shift from a bicameral Parliament in an unicameral Parliament and reducing the number of Parliament's members to the maximum of 300. The first round of Presidential elections was set on November 22nd, 2009, and the second round was scheduled two weeks later (December 6th, 2009).

In due time, a total of 29 applications were made, of which the Central Electoral Bureau admitted 12 (3 - of the independent candidates and 9 from political parties) [65]. The percentage of voters was 54.37%, over 15 percentage points higher than in parliamentary elections (39.20%).

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[62] PSD candidate Lucian Bălu ţ, ranked first in the constituency of Constanta with 49.6% of the vote, did not obtain a mandate, while UDMR candidate, Joseph Koto, obtained a mandate with only 34 votes (2% of votes in his constituency)!

[63] Permanent electoral authority, *Report on the organization and deployment for election of Chamber of Deputies and Senate from November 30th,2008*, p. 121-122, http://www.roaep.ro/

[64] Government Emergency Ordinance no. 95/2009 amending and supplementing Law no. 370/2004 for the election of the President of Romania, published in Official Journal no. 608 of September 3, 2009.

[65] Applications rejected did not meet certain criteria imposed by the electoral law: in most cases, were not accompanied by a list of at least 200,000 supporters.

Results for Presidential elections – 1st round, 22nd , November 2009

		Valid cast votes	
No. crt.	Name and surname of the candidate	Number	% of total number
1	Traian BĂSESCU (PD-L)	3153640	32.44%
2	Mircea-Dan GEOANĂ (PSD)	3027838	31.15%
3	Crin ANTONESCU (PNL)	1945831	20.02%
4	Corneliu VADIM-TUDOR (PRM)	540380	5.56%
5	Hunor KELEMEN (UDMR)	373764	3.83%
6	Sorin OPRESCU (independent)	309764	3.18%
7	George BECALI (PNGcd)	186390	1.19%

Source: Central Electoral Bureau for election of the President of Romania from 2009, first round results, November, 22nd, 2009, http://www.bec2009p.ro/rezultate.html

The other five candidates have obtained each a percentage less than 1% of votes, which means less than the required minimum number of supporters that was presented to support the application (200,000 supporters).

In the second round, held on December 6th, 2009, the first two runners competed and the turnout has been higher, 58.02%. Traian Băsescu, the President in office, won by a close shave the Presidential elections, with a difference of less than one percentage point from the PSD candidate (50.33% vs. 49.66%, nearly 70,000 additional votes, from a total of 10,500,000 valid votes).

As Election Observation Mission OSCE / ODIHR[66] assessed: "The elections for President of Romania in 2009 took place in an atmosphere characterized by respect for fundamental political freedoms and were conducted generally in accordance with OSCE commitments and international standards for democratic elections and with national legislation.

Although authorities have taken steps to correct some deficiencies observed in the first round and to investigate irregularities, further efforts are needed to address remaining weaknesses in order to improve election process and to enhance public confidence"[67].

2. Political determination of voting

Given that for the parliamentary elections from November 2008, deputies and senators were elected in single-member constituencies, through single-member district elections, according to proportional representation and, for local elections,

[66] OSCE/ODIHR means Organization for Security and Co-operation in Europe / Office for Democratic Institutions and Human Rights

[67] Romania, Presidential Elections, November 22nd and December 6th, 2009 – Final Report of Election Observation Mission OSCE / ODIHR, cited by the Permanent Electoral Authority, the *White Paper for Election of President of Romania 2009*, p. 103, http://www.roaep.ro/

presidents of county councils are elected through uninominal voting and county councillors by direct vote on the lists, we analyzed the impact of local representation on the vote in parliamentary elections. Political impact model is:

$$cd_{ij} = a_{0,ij} + a_{1,ij} \cdot cj_{ij} + a_{2,ij} \cdot prescj_{ij} + e_{ij}, \quad (1)$$

where

cd_{ij} – represents the share of votes won by the competitor i in county j, to the total number of valid votes in that county, in the elections to the Chamber of Deputies, in November 2008;

cj_{ij} – represents the share of votes won by the competitor i in county j, to the total number of valid votes in that county, in the elections to the Local Councils, June 2008;

$prescj_{ij}$ – dummy variable, $prescj_{ij} = 1$, when party i won the presidency of County Council j, local elections in June 2008 and $prescj_{ij} = 0$, otherwise;

$a_{0,ij}$… – parameters of the model;

e_{ij} – error of regression equation, random variable.

The model was estimated only for parties that exceed the electoral threshold and, consequently, have parliamentary representation: the Social Democratic Party + Conservative Party (PSD + PC), Democratic - Liberal Party (PD-L), National Liberal Party (PNL) and Democratic Union of Hungarians in Romania (UDMR).

The results confirm a panel model, with specific effects for constant terms and common effects for explanatory variables. Accepted model is the following:

$$cd_{ij} = a_{0,i} + a_1 \cdot cj_{ij} + a_2 \cdot prescj_{ij} + e_{ij}, \quad (1')$$

where

$a_{0,i}$ – represents the constant in the regression equation associated to the party i (specific effect);

a_1, a_2 – constant parameters of the model.

The obtained results are presented in the table below:

Dependent Variable: CD?
Method: Pooled EGLS (Period SUR)
Included observations: 4
Cross-sections included: 42
Total pool (balanced) observations: 168
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$a_{0,PSD}$	7.131789	0.839826	8.491985	0.0000
$a_{0,PDL}$	6.635535	0.945950	7.014680	0.0000
$a_{0,PNL}$	2.300443	0.808208	2.846350	0.0050
$a_{0,UDMR}$	1.652317	0.405851	4.071237	0.0001
CJ?	0.708750	0.021673	32.70130	0.0000
PRESCJ?	4.613843	0.991318	4.654250	0.0000

Weighted Statistics			
R-squared	0.955322	Mean dependent var	10.31194
Adjusted R-squared	0.953943	S.D. dependent var	5.212104
S.E. of regression	1.008735	Sum squared resid	164.8426
F-statistic	692.7880	Durbin-Watson stat	2.007981
Prob(F-statistic)	0.000000		
Unweighted Statistics			
R-squared	0.924140	Mean dependent var	22.53792
Sum squared resid	2944.400	Durbin-Watson stat	2.724072

A similar model is valid also for the Senate:

$$sen_{ij} = b_{0,ij} + b_{1,ij} \cdot cj_{ij} + b_{2,ij} \cdot prescj_{ij} + e_{ij}, \quad (2)$$

where

sen_{ij} – represents the share of votes won by the competitor i in county j, to the total number of valid votes in that county, in the elections to the Senate, in November 2008;

cj_{ij} – represents the share of votes won by the competitor i in county j, to the total number of valid votes in that county, in the elections to the Local Councils, June 2008;

$prescj_{ij}$ – dummy variable, $prescj_{ij} = 1$, when party i won the presidency of County Council j, local elections in June 2008 and $prescj_{ij} = 0$, otherwise;

$b_{0,ij}$… – parameters of the model;

e_{ij} – error of regression equation, random variable.

The same, the tests validate a model with specific effects for constant terms (b_0) and common effects for explanatory variables, so that we use the following model:

$$sen_{ij} = b_{0,i} + b_1 \cdot cj_{ij} + b_2 \cdot prescj_{ij} + e_{ij}, \quad (2')$$

where

$b_{0,i}$ – represents the constant in the regression equation associated to the party i (specific effect);

b_1, b_2 – constant parameters of the model.

The obtained results are presented in the table below:

Dependent Variable: SEN?
Method: Pooled EGLS (Period SUR)
Total pool (balanced) observations: 168
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$b_{0,PSD}$	7.368119	0.828612	8.892118	0.0000
$b_{0,PDL}$	7.230648	0.949825	7.612610	0.0000
$b_{0,PNL}$	1.964547	0.813176	2.415893	0.0168
$b_{0,UDMR}$	1.748847	0.400904	4.362257	0.0000
CJ?	0.727403	0.021240	34.24688	0.0000
PRESCJ?	5.000008	0.982771	5.087664	0.0000

Weighted Statistics			
R-squared	0.958652	Mean dependent var	11.20433
Adjusted R-squared	0.957376	S.D. dependent var	5.891028
S.E. of regression	1.012407	Sum squared resid	166.0448
F-statistic	751.1945	Durbin-Watson stat	2.009669
Prob(F-statistic)	0.000000		
Unweighted Statistics			
R-squared	0.929167	Mean dependent var	23.22869
Sum squared resid	2975.737	Durbin-Watson stat	2.682022

As a synthesis, the results are:

	Chamber of Deputies				Senate			
	PSD	PD-L	PNL	UDMR	PSD	PD-L	PNL	UDMR
Constant	7.1318 (8.49)	6.6355 (7.01)	2.3004 (2.85)	1.6523 (4.07)	7.3681 (8.89)	7.2306 (7.61)	1.9645 (2.42)	1.7488 (4.36)
CJ	0.7088 (32.7)				0.7274 (34.25)			
PRESCJ	4.6138 (4.65)				5.0000 (5.09)			
R^2	0.9553				0.9586			
R^2 adjusted	0.9539				0.9574			

(in brackets, under the estimators, there are standard deviation values; the estimators have a confidence level over 95%)

The results confirm the hypothesis of a political determination of the vote. On average, about 70% of political votes in local elections have been preserved up to parliamentary elections by the electoral competitors and the presence as the head of County Council of a representative of the party fired up the party's election outcomes with 4.6 - 5 percentage points.

For Presidential Elections from November 2009 – first round, we have built a similar model:

$$pr_{ij} = c_{0,ij} + c_{1,ij} \cdot cj_{ij} + c_{2,ij} \cdot prescj_{ij} + e_{ij}, \qquad (3)$$

where

pr_{ij} – represents the share of votes won by the competitor i for Presidency in county j, to the total number of valid votes in that county, in the Presidential Elections in November 2009;

cj_{ij} – represents the share of votes won in county j, by the party from which the candidate i is, to the total number of valid votes in that county, in the elections for the Local Councils, June 2008;

$prescj_{ij}$ – dummy variable, $prescj_{ij}$ = 1, if the party of the candidate i won the Presidency of Local County j, in the local elections from June 2008 and $prescj_{ij}$ = 0, otherwise;
$b_{0,ij}$… – parameters of the model;
e_{ij} – error of regression equation, random variable.

The tests validate a panel model, with specific effects for constant terms (c_0) and common effects for explanatory variables, so the model is the following:

$$pr_{ij} = c_{0,i} + c_1 \cdot cj_{ij} + c_2 \cdot prescj_{ij} + e_{ij}, \qquad (3')$$

where
$c_{0,i}$ – represents the constant in the regression equation associated to the party i (specific effect);
c_1, c_2 – constant parameters of the model.

We considered only the first three candidates, so the previous description, i = 1, for Mircea Geoana (PSD + PC), i = 2 for Traian Băsescu (PD-L) and i = 3 for Crin Antonescu (PNL). The results are:

Dependent Variable: PR?
Method: Pooled EGLS (Period SUR)
Sample: 1 3
Included observations: 3
Cross-sections included: 42
Total pool (balanced) observations: 126
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CJ?	0.445549	0.033772	13.19286	0.0000
PRESCJ?	2.303273	1.146651	2.008695	0.0468
$C_{Geoană}$	15.71962	1.258790	12.48788	0.0000
$C_{Băsescu}$	16.53802	1.189346	13.90514	0.0000
$C_{Antonescu}$	8.683501	0.855954	10.14482	0.0000
	Weighted Statistics			
R-squared	0.826710	Mean dependent var		9.584683
Adjusted R-squared	0.820982	S.D. dependent var		3.394960
S.E. of regression	1.016358	Sum squared resid		124.9909
F-statistic	144.3133	Durbin-Watson stat		2.067084
Prob(F-statistic)	0.000000			
	Unweighted Statistics			
R-squared	0.747613	Mean dependent var		27.33733
Sum squared resid	2711.178	Durbin-Watson stat		2.686440

As shown in the previous equation, a good part of the results in Presidential elections for the first three candidates can be explained by the conservation of

electoral behaviour between local and Presidential elections under the influence of local representatives of those parties.

We also tested a model of political analysis that pursues each candidate's position to the trend recorded for the party that supported him. The model is the following:

$$pr_{ij} = (c_0 + c_1 \cdot cd_{ij}) + c_{2,i} + e_{ij}, \quad (4)$$

where

pr_{ij} – represents the share of votes won by the competitor i for Presidency in county j, to the total number of valid votes in that county, in the Presidential Elections in November 2009;

cd_{ij} – represents the share of votes won in county j, by the party from which the candidate i is, to the total number of valid votes in that county, in the elections for Chamber of Deputies, in November 2008;

c … – parameters of the model;

e_{ij} – error of regression equation, random variable.

The first part of the model estimates the overall national trend for each party i. The positive $c_{2,i}$ coefficient means that the obtained votes of the candidate from party i are above the regular votes of that party and, obviously, $c_{2,i} < 0$ means that in the Presidential Elections from 2009, the candidate i scored under the political performances of his party.

We considered this time, the top five candidates (together have 93% of the total valid votes in round I of the Presidential election, November 2009). The results are:

Dependent Variable: PR?
Method: Pooled EGLS (Period SUR)
Sample: 1 5
Included observations: 5
Cross-sections included: 42
Total pool (balanced) observations: 210
Linear estimation after one-step weighting matrix

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.119204	0.328170	15.59922	0.0000
CD?	0.730803	0.017064	42.82715	0.0000
Fixed Effects				
C_2 – Geoană (PSD+PC)	2.587327			
C_2 – Băsescu (PD-L)	3.855761			
C_2 – Antonescu (PNL)	0.095458			
C_2 – Kelemen (UDMR)	-5.020011			
C_2 – Vadim-Tudor (PRM)	-1.518535			

Weighted Statistics			
R-squared	0.967887	Mean dependent var	25.91606
Adjusted R-squared	0.967100	S.D. dependent var	18.70538
S.E. of regression	1.014598	Sum squared resid	209.9996
F-statistic	1229.723	Durbin-Watson stat	1.986549
Prob (F-statistic)	0.000000		
Unweighted Statistics			
R-squared	0.925412	Mean dependent var	19.06313
Sum squared resid	3054.200	Durbin-Watson stat	2.424733

PD-L's candidate (Băsescu) and PSD+PC's (Geoană) scored higher than the general trend of the party, Liberal candidate (Antonescu) obtained a score according to the general tendency of his party. Well below the score of the party which supported him stood the UDMR's candidate.

3. Economic determination of the voting

Economic voting is "a special case of the rational-choice perspective on electoral behaviour"[68] where the main focus is on the relationship between the voters and the state of the macroeconomy. In specific literature there are multiple references to the economic analyses of electoral behaviour: Owen and Tucker (2010), Lewis-Beck and Stegmaier (2000, 2008), Anderson (2007) and so on[69]. As Anderson stated (2007, p. 273), by the end of the twentieth century the flow of scholarly papers on the topic had "changed from a trickle to a torrent of over 300 articles and books on economics and elections" (Lewis-Beck and Stegmaier 2000, p. 183) and covered virtually every democracy for which data on economics and elections were available.

In its most straightforward form, the predominant model of economic voting employed in studies of established democracies expects that voters will tend to punish the incumbent in bad economic times and reward the incumbent when the economy is doing well. In this framework, elections function much like referenda on economic conditions during the incumbent party's term in office.

In Paldam analysis[70], a Vote function (hereafter V-function) is defined as a function explaining (the change in) the vote for the government by (changes in) economic conditions and other variables. A Popularity function (hereafter P-function) explains (the change in) the popularity of the government – as measured by pools – by (change in) the economic conditions and other variables.

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[68] Han Dorussen and Harvey D. Palmer, "The Context of Economic Voting," in *Economic Voting*, ed. Han Dorussen and Michaell Taylor (London, Routledge, 2002), quoted in Sari Rannanpää, 2008, *Economic Voting in Estonia*, Central European University, Department of Political Science, http://web.ceu.hu/polsci/teaching/seminarpapers/Sari.pdf

[69] For more on economic voting, see, for example, the 19 articles in special issue of *Electoral Studies*: Economics and Elections (Volume 19, Number 2/3, June/September 2000).

[70] Paldam, Martin. 1991, "How Robust is the Vote Function? A Study of Seventeen Nations over Four Decades". In: Helmuth Norpoth, Michael S. Lewis-Beck, and Jean Dominique Lafay (eds.), *Economics and Politics*, Ann Arbor: The University of Michigan Press, 9- 32.

For Romania, we have studied the impact inducted by the state and dinamics of some economic variables on the change of voting intensions. The data are analysed in regional structures. We used a Paldam type model. In its most simple linear version the function are:

$$\Delta P_t = \{a_1\Delta u_t + a_2\Delta p_t + ...\} + [c_1 D^1{}_t + c_2 D_t{}^2 + \ldots] + e_t \qquad (5)$$

Here Δ is used to indicate the first difference, P is either the vote or the popularity, for the political parties, in percent. The as and cs are coefficients to be estimated, and the e is the disturbance term. The braces contain the economic variables: the e-part of the model. Two of the variables are u and p, where u is the rate of unemployment and p the rate of price rises. The next set of variables, the ds, are the political variables forming the p-part of the model – it is found in the square brackets[71].

Concretely, we have analysed a model like:

$$P_{ij} = \{a_0 + a_1 \cdot cj_{ij} + a_2 \cdot prescj_{ij}\} + [a_{3,i}(rs_{nov2008} - rs_{mai2008})_j] + e_{ij}, \qquad (5')$$

where

P_{ij} – represents the share of votes won by the competitor i in county j, to the total number of valid votes in that county, in the Parliamentary Elections from November 2008;

cj_{ij} – represents the share of votes won by the competitor i in county j, to the total number of valid votes in that county, in the elections for the Local Councils, June 2008;

$prescj_{ij}$ – dummy variable, $prescj_{ij}$ = 1, when party i won the Presidency of Local County j, Local Elections 2008 and $prescj_{ij}$ = 0, otherwise;

rs_j – unemployment rate in county j; nov2008 = 30 November 2008, mai2008 = 31 May 2008;

a … – parameters of the model;

e_{ij} – error of regression equation, random variable.

The used data are in regional structures and refer to the first 3 parliamentary parties (PSD+PC, PD-L şi PNL). The obtained results are:

	Chamber of Deputies			Senate		
	PSD	PD-L	PNL	PSD	PD-L	PNL
Constant	6.8377 (6.94)			6.5888 (6.684)		
CJ?	0.6400 (16.684)			0.6735 (17.553)		
PRESCJ?	5.3823 (4.539)			6.1834 (5.155)		
$RS_{nov2008}$-$RS_{mai2008}$	2.1514 (1.944)	2.4978 (2.085)	-3.0629 (-2.517)	1.8465 (1.679)	2.5053 (2.009)	-3.6142 (-2.856)
R^2	0.8397			0.8548		
R^2 adjusted	0.8330			0.8487		

[71] *idem*, p. 14.

(in brackets, under the estimators, there are standard deviation values; the estimators have a confidence level over 90%)

The results suggest an interpretation consistent with the theory of economic voting: in the period June to November 2008, Liberal Party was the party of government. Increase of unemployment in regional structures resulted in a penalty for PNL and an increase in intentions to vote for opposition parties (PSD and PDL). Estimators are econometrically significant.

For Presidential election, we have built a model where periods are shown separately: May 2008 - November 2008 (PNL in office) and November 2008 - November 2009 (PD-L in office)

$$\begin{aligned} pr_{ij} &= \{a_0 + a_1 \cdot cj_{ij} + a_2 \cdot prescj_{ij}\} + \\ &+ [a_{3,i}(rs_{nov2008} - rs_{mai2008})_j + \\ &+ a_{3,i}(rs_{nov2009} - rs_{nov2008})_j] + e_{ij}, \end{aligned} \quad (6)$$

where

pr_{ij} – represents the share of votes won by the competitor i for Presidency in county j, to the total number of valid votes in that county, in the Presidential Elections in November 2009

We anticipate, in line with the economic voting theory, that a_3 is negative for candidates who represent the ruling parties and positive for the ones representing opposition parties.

The results for Presidential elections in November 2009 are not econometrically significant. Nor is any other econometric model, in which the results from parliamentary elections in November 2008 are regarded as political variables and as economic variables are used the change in unemployment between the two time election, or three months before the election. Lack of regional statistics for other economic variables discussed in the specific literature in the context of vote-popularity functions (e.g. inflation) has not allowed the construction of some models with more variables. Subject to this methodological observation, the conclusion of the tested econometric models is that for Presidential elections in Romania, organized in November 2009, the economic voting has no significant influence on election results of the main candidates, as resulted in regional structures.

Conclusions

Romanian electoral system has undergone significant changes in 2008. The main elements of the new introduced electoral law are:

Presidents of county councils are elected by universal, equal, direct, secret and freely expressed vote. Until the local elections from June 1, 2008, presidents of county councils were indirectly elected by the county councils. Under the new law, a candidate who, in the first round, obtaining the highest number of votes is declared the winner. The election of Chairmen of County Councils by direct vote was a strong premise for changing the structure of power within the parties;

November 2008 elections were the first parliamentary elections in Romania separated from Presidential elections. If for the election during 1990-2004 the Presidential

candidates worked as a locomotive for the parties, this time political parties acknowledged the personalization of political life and launched their own candidate for prime minister, although this feature is not directly eligible.
Since the 2008 elections, deputies and senators were elected in single-member constituency, through single-member constituency elections, according to proportional representation. The most important change to the electoral law for parliamentary elections in 2008 refers to the replacement procedure of voting on party lists with the uninominal voting system. Each electoral competitor (political party, political alliance or electoral party of minorities, independent candidate) has the possibility to register a single candidate in a constituency.

The econometric models built for the Parliamentary elections from November 2008 confirm the hypothesis of a political determination of the vote. On average, about 70% of political votes in local elections have been preserved up to parliamentary elections by the electoral competitors and the presence as the head of County Council of a representative of the party fired up the party's election results with 4.6 - 5 percentage points.

For the Presidential elections from November 2009, econometrically, a good part of the results of Presidential elections for the first three candidates can be explained by the conservation of electoral behaviour between local and Presidential elections under the influence of local representatives of those parties.

Also there are econometric elements for supporting the fact that PD-L's candidate (Băsescu) and PSD+PC's (Geoană) scored higher than the general trend of the party (on national level), and that the Liberal candidate (Antonescu) obtained a score according to the general tendency of his party. Well below the score of the party which supported him stood the UDMR's candidate.

Regarding the economic voting for the Parliamentary elections from November 2008, the increase of unemployment in regional structures resulted in a penalty for PNL (as the party in office) and an increase in intentions to vote for opposition parties (PSD and PDL). But for the Presidential elections from November 2009 (round I), the hypothesis of an economic component in voting behaviour's creation could not be based on the analyses of regional variables.

REFERENCES

Anderson C.J., 2007. "The end of economic voting? Contingency dilemmas and the limits of democratic accountability". Annual Review of Political Science 10, 271–296.

Dorussen H., Palmer H.D., 2002, "The Context of Economic Voting", in Economic Voting, ed. Han Dorussen and Michaell Taylor (London, Routledge)

Duch R.M., 2006, "Voting in Context: How Political and Economic Institutions Condition the Economic Vote". Paper presented at the annual meeting of the American Political Science Association, Marriott, Loews Philadelphia, and the Pennsylvania Convention Centre, Philadelphia, PA, Aug 31, http://www.allacademic.com/meta/ p150897_index.html.

Duch R.M., Stevenson R., 2005, Assessing the Magnitude of the Economic Vote over Time and Across Nations, http://www.raymondduch.com/economicvoting/articles/ecpr03special%20editionjan72005.pdf

Hibbs D. (Jr.), 2006, "Voting and the Macroeconomy", in The Oxford Handbook of Political Economy, ed. Weingast B.R., Wittman D.A. (Oxford, Oxford University Press)

Institutul "Ovidiu Şincai", Raport asupra alegerilor parlamentare din 30 noiembrie 2008, 1 februarie 2009, Bucureşti.

Jula D., 2008, Economic Impact of Political Cycles – The Relevance of European experiences for Romania, Working Papers of Institute for Economic Forecasting, http://www.ipe.ro/RePEc/WorkingPapers/wpiecf081101.pdf

Jula D., Jula N.-M., 2009, "Regional Economic Voting in Romania", in Journal for Economic Forecasting, vol. 6, issue 1: 5-15

Lewis-Beck M.S., 2006, Economics and Elections: the Major Western Democracies, The University of Michigan Press

Lewis-Beck M.S., Nadeau R., Elias A., 2008, "Economics, Party, and the Vote: Causality Issues and Panel Data" American Journal of Political Science 52.1 (2008): 84-95.

Lewis-Beck M.S., Paldam M, 2000, "Economic Voting: An Introduction" Electoral Studies 19.2-3 (2000): 113-121.

Lewis-Beck M.S., Stegmaier M., 2000, "Economic Determinants of Electoral Outcomes", Annual Review of Political Science, June, Vol. 3: 183-219.

Lewis-Beck M.S., Stegmaier M., 2008, "Economic Voting in Transitional Democracies" Journal of Elections, Public Opinion and Parties 18.3: 303-323.

Owen A, Tucker J.A., 2010, "Past is still present: Micro-level comparisons of conventional vs. transitional economic voting in three Polish elections", Electoral Studies, An International Journal on Voting and Electoral Systems and Strategy, 29: 25–39

Paldam M., 1991, "How Robust is the Vote Function? A Study of Seventeen Nations over Four Decades". In: Helmuth N., Lewis-Beck M.S., Lafay J.D. (eds.), Economics and Politics, Ann Arbor: The University of Michigan Press, 9-32.

Permanent Electoral Authority, Raport asupra organizării şi desfăşurării alegerilor autorităţilor administraţiei publice locale din iunie 2008, http://www.roaep.ro/

Permanent Electoral Authority, Raport asupra organizării şi desfăşurării alegerilor pentru Camera Deputaţilor şi Senat din 30 noiembrie 2008, http://www.roaep.ro/

Permanent Electoral Authority, Cartea albă a alegerilor pentru Preşedintele României din anul 2009, http://www.roaep.ro/

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APPLICATION OF MONETARY MODELS FOR ESTIMATING UNDERGROUND ECONOMY IN ROMANIA

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Abstract: Article addresses the issue of sizing the underground economy by recognized methods in the literature based on empirical data provided by official statistics in Romania. The monetary method to assess non-accounted economy dynamics studies to date has defined two types of measurements in terms of velocity of money. The first is the accountability one, used in banking statistics, calculated by reporting GDP to the money supply from the M2 point of view, and the second was called operational, considered to be the real one, meaning the equivalence between the volume of transactions and the GDP (including commercial credit) which comes for the monetary unit. The relationship between the two methods was achieved by means of a β coefficient, which measures the monetary distortion induced by arrears and the disturbing form of "dollarization" of the economy. Also to be noted that there are not yet adequate information and a suitable algorithm to reasonably approximate the output size of unreported taxable income, of household production for own consumption and of illegal economic activities. Therefore, we must resort to partial estimates, and their use must be considered with care all the conceptual and statistical assumptions on which they rely.

KEYWORDS: underground economy, monetary rate method, simple cash demand method, method of transaction

JEL CLASSIFICATION: D63, H26, E26.

A number of recent studies revealed that there is a close link between the prevalence of cash payments and size of underground economy in a country.

In Romania, the low level of intermediation of payments, but also small number of electronic payments per capita are elements that suggest the prevalence of intermediate cash trade, which can be a sign of expansion transactions unreported, unrecorded and untaxed, respectively dynamism underground sector (hidden).

Based on the assumptions that unreported income produced by a monetary unit traded in the underground sector reported income equals income produced by a

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monetary unit traded in the formal sector, that cash is the only medium of exchange in transactions not reported and that the rate of monetary deposits, respectively at sight, is subject to changes only because of unreported income growth based on simple monetary rate method proposed by Cagan (1958) and Gutmann (1977), we estimated the underground economy in Romania.

Deposit rate in the formal sector was assumed to be constant in size over time, maintaining the base year level. We took that approach in initiating base year 1940, the proposed year by the initiator of the method. We found that the association is relevant because at that time, prior to the introduction of taxes on income, the development of unrecorded transactions and therefore do not make sense at the time the underground economy, unreported, there

Therefore, in calculations we used a rate of deposits / cash demand qual

$$k_o = \left(\frac{C_o}{D_o}\right)_{1940} = \left(\frac{C}{D}\right)_{1940} = 0{,}217\ ^{74}.$$

The results reported in monetary aggregate M1, are summarized in Table 1

Estimating the underground economy in Romania based on simple monetary rate method

Table1.

- milion lei comparabile price, 1990 = 100 -

Year	GDP	Cash in circulation	At sight liquid assets	Estimated non-registered income	The balance between non-registered income and the GDP (%)
1990	85.79	9.2	15.7	26.011	30.32
1991	74.7	0.176	0.52	7.45536	9.98
1992	68.136225	13.9275	20.9081667	25.1453	36.90
1993	69.143793	11.8491	13.3514063	38.0932	55.09
1994	71.843021	7.59021	8.04906806	42.8574	59.65
1995	76.946896	5.42549	4.79492287	57.8213	75.14
1996	79.968545	5.74087	6.17599667	46.8211	58.55
1997	75.106309	6.75267	6.99562213	46.179	61.48
1998	71.48081	3.422	3.14289788	51.2057	71.64
1999	70.645061	3.32137	2.35107847	69.4088	98.25

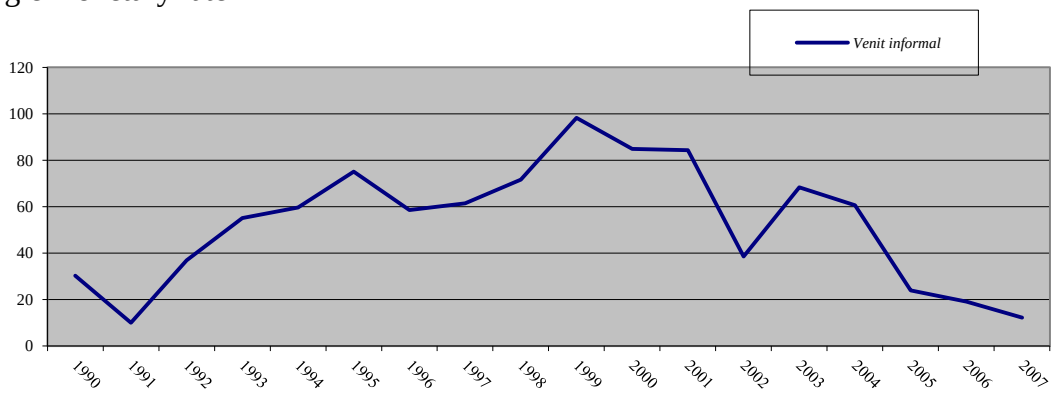
[74] Is the rate used by Gutmann (1977), resulting from estimates made by him for the period 1937 to 1941 in the United States of America. Value was taken by Richard Porter & Amanda Bayer - Monetary Perspective on Underground Economic Activity in the United States, in The Underground Economies. Tax Evasion and Information Distortion, Edgar L. Feige edited by, Cambridge University Press, 1989, pag. 132.

Year	GDP	Cash in circulation	At sight liquid assets	Estimated non-registered income	The balance between non-registered income and the GDP (%)
2000	72.160487	3.33219	2.66515646	61.267	84.90
2001	76.8268	3.19898	2.5739217	64.7594	84.29
2002	81.504138	2.9974	4.3632749	31.4739	38.62
2003	85.744136	3.10748	2.96298006	58.6025	68.35
2004	93.031153	3.24217	3.39805895	56.3481	60.57
2005	96.887076	4.28154	8.41401182	23.2352	23.98
2006	104.47313	5.07104	11.2601079	20.0322	19.17
2007	110.96719	6.49769	17.7195022	13.6495	12.30

Source: National Statistics Institute and own calculations.

For the period under review the average income unregistered (underground economy) accounted for 52.72% of official GDP.

Figure 1 - Evolution of unregistered income in Romania, according to the method single monetary rate



There is a very sinuous evolution in time of informal income, but this does not seem relevant. Therefore, I think the model is not suitable to be applied to the Romanian economy, being one of the main reasons and using market exchange transactions, mainly after 1990.

Because the results are significant, we proceeded to use a modified version simple monetary rate. We accepted the hypothesis that cash transactions is predominantly informal in nature and velocity of money is the same in both sectors, official and underground. However, we calculated the monetary velocity by dividing income officially registered in M2. We also considered as the currency in circulation as statistically reported as cash outside banks, savings and population are not stored as bank deposits. The category includes both deposits were term deposits in lei and demand and foreign currency deposits of residents.

We also found that for Romania in the context of statistical information available, it is impossible to be determined a base year in which income was not unregistered products, such as informal. However, the results following the application of this method are significantly influenced the choice of base year. Therefore, we considered 1990 as baseline year, but I attributed this level of shadow economy represents 5% of official GDP. Based on this assumption we calculated a rate of deposits in the formal sector (ko) I used it in calculations for other years and we expressed all data used in comparable prices in the year 1990.

The results are collated in Table 2. Summary data are presented in Figure 2.

Estimating the underground economy in Romania based on a modified version of the simple monetary rate method

- million comparable prices, 1990 = 100 -

Table 2.

Year	GDP	Currency in circulation	Deposits	Revenue estimated unregistered	Share of unregistered income in GDP (%)
1990	85.79	34.1	17.2	4.29999	5.01
1991	74.7	43.8	59.5	29.038	38.87
1992	68.136225	27.7872	35.106743	25.1581	36.92
1993	69.143793	19.1461	31.367898	29.9398	43.30
1994	71.843021	17.0055	19.734535	24.7509	34.45
1995	76.946896	12.8365	13.537757	24.1662	31.41
1996	79.968545	15.1344	17.217284	27.0628	33.84
1997	75.106309	21.5542	24.063002	24.9753	33.25
1998	71.48081	12.6167	14.857281	24.9412	34.89
1999	70.645061	10.8233	14.819805	27.6061	39.08
2000	72.160487	9.09886	14.856348	31.1931	43.23
2001	76.8268	8.91775	15.365611	34.0781	44.36
2002	81.504138	8.84344	15.733493	36.6778	45.00
2003	85.744136	8.44499	16.2496	39.8651	46.49
2004	93.031153	9.15615	18.842147	44.359	47.68
2005	96.887076	4.28154	28.145495	57.585	59.44
2006	104.47313	5.07104	31.945043	61.8503	59.20
2007	110.96719	6.49769	38.3654	65.2799	58.83

Source: National Statistics Institute and own calculations

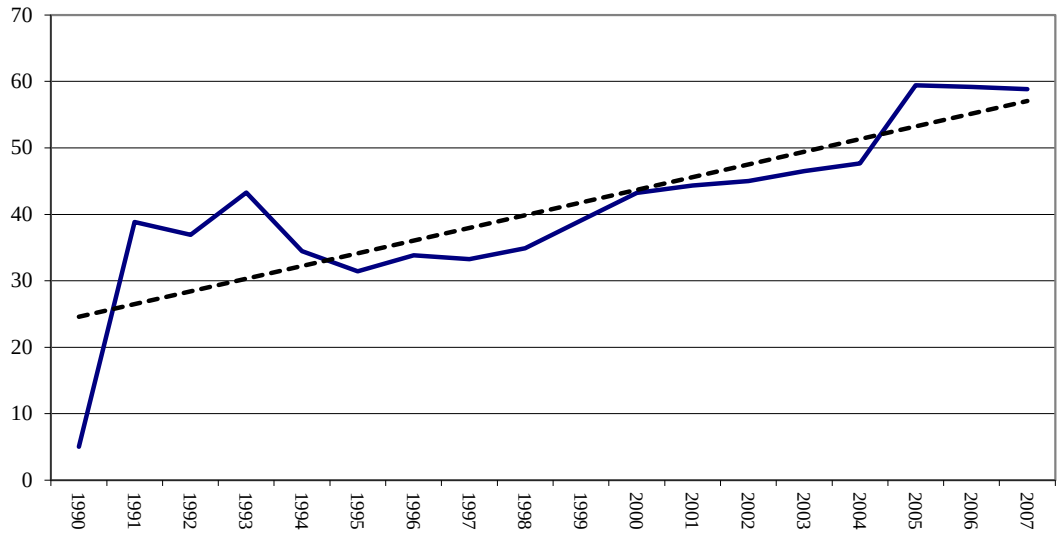
As can be seen in Figure 2, the development trend informal income to GDP is raising official. However, it should be kept in mind that the deposit rate in the formal sector, i.e. the ratio of cash in circulation and bank deposits, may undergo changes

due to an accumulation of reasons. Underground economy is not the only reason and far most important. I think more important is the development of means of payment in the form of checks, cards and transfers, electronic payments and the emergence of new types of savings. Therefore, this method is most effective in estimating the underground economy in Romania.

An alternative method of simple monetary rate, cash demand method (Tanzi, 1983) is used also to estimate the size of informal activities. Unlike the original model, it includes the effects exerted by tax on cash in circulation. Also, the regression equation proposed variable proportion among wages and salary gains in national income, the average interest rate on savings deposits, and income per capita.

Any excess of cash, which cannot be explained by conventional factors outlined above, is attributed to increasing taxation and other factors that determine the orientation of individuals towards the ground.

Figure 2 - Share of unregistered income in GDP, according to the modified version of the simple monetary rate method



The model includes the assumption that it is possible to increase the share of demand for cash in M2 even if real per capita income and lower interest rates for deposits. Also, the share of wages in national income positively affects the above report and reflect changes in the methods of payment used by the population, but directly proportional to the tax. Where there is an increase in taxation, monetary benefits arising from involvement in the economy grow, generating an upward trend in demand for informal transactions necessary cash[75].

[75] Porter Richard & Bayer Amanda – Monetary Perspective on Underground Economic Activity in the United States, in The Underground Economies. Tax Evasion and Information Distortion, edited by Edgar L. Feige, Cambridge University Press, 1989, pag. 133

Cash and cash demand associated with the underground economy is calculated as the difference between size, determined following the application of model based on historical data to forecast the dependent variables and size in the context of lack of taxation. Since the velocity of money is supposed to be the same in the official economy, and in the underground, underground GDP will be the balance obtained by multiplying the underground currency monetary velocity. Based on these considerations, we applied the model using annual data available specific to our country for the period 1998 - 2007.

For the estimation of cash in circulation in the general context of taxation, at an appropriate rate of tax burden, the regression equation was used

$$\ln C/M2 = -138870 + 6{,}3470 \ln(1+t) - 0{,}1331 \ln(S/VN) - 0{,}3929 \ln(R) + 1{,}2909 \ln(VN/P) + u, \quad (1.)$$

$R^2 = 0{,}889$; DW = 1,06.

And in the context of zero taxes

$$\ln C/M2 = -9.7972 + 0{,}0268 \ln(S/VN) + 0{,}5747 \ln(R) + 0{,}9679 \ln(VN/P) + u, \quad (2.)$$

$R^2 = 0{,}882$; DW = 1,04.

where:

t - rate of tax burden;

S / VN - the share of wages in national income;

R - the average annual interest rates on deposits;

VN / P - national income per capita.

Sizes of these indicators were expressed in comparable prices in the year 1998 (1998 = 100).

Table 3 summarizes the main data used in calculations on the estimated size of hidden activities (underground) in Romania in the period, cash on demand method described above.

Estimating the underground economy in Romania using cash demand model **(Tanzi, 1983)**

Table 3.

- million comparable prices, 1998 = 100 –

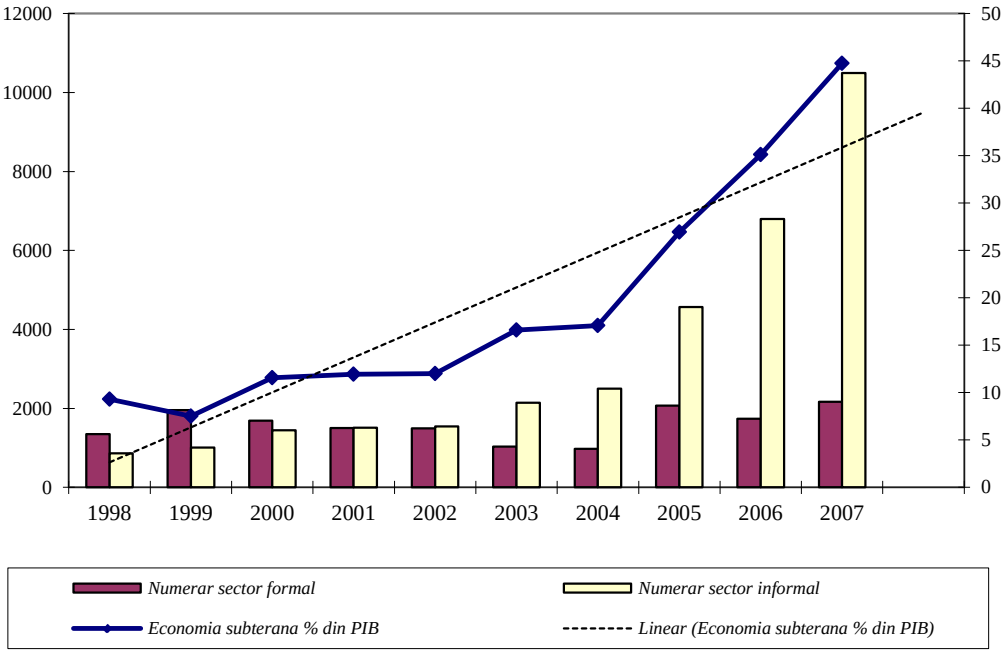
Year	Cash Demand in the underground	Official GDP	M2	Speed movement money	GDP hidden (underground)	Undergound economy (% from official GDP)
1998	862.013741	24074.10	9253	2.6	2242.75	9.32
1999	1006.34088	36949.95	13412.3	2.8	2772.39	7.50
2000	1448.74382	37742.57	18506	3.0	4364.06	11.56
2001	1515.73199	40183.23	27051.2	3.2	4795.41	11.93
2002	1542.68525	42629.64	37371.3	3.3	5115.98	12.00
2003	2144.19555	44847.32	46074.1	3.5	7445.03	16.60

Year	Cash Demand in the underground	Official GDP	M2	Speed movement money	GDP hidden (underground)	Undergound economy (% from official GDP)
2004	2499.76245	48658.69	64461.7	3.3	8306.06	17.07
2005	4571.35623	50675.48	86230.3	3.0	13658.50	26.95
2006	6801.09403	54643.27	110442.3	2.8	19195.21	35.13
2007	10498.7415	58039.90	148043.6	2.5	25968.23	44.74

Source: National Statistics Institute and own calculations

Not allow us to compare data with those obtained by applying other methods, the conclusion can be drawn is that Romania economy is part of a trend of upward evolution, the average period being analyzed 19.28%.
However, we cannot be convinced that the velocity of money is the same in both sectors, but no increase in deposits is that a consequence of the underground sector development. Moreover, informal transactions do not think that mediation is made compulsory cash

Figure 3 - Demand for cash and evolution of the underground economy in Romania



An alternative method based on so-called monetary transactions method (Feige, 1979, 1980), who estimated informal activity to a change in monetary transactions to GDP ratio, focusing on cash flow managed through monetary aggregates. The method assumes that the total value of transactions in an economy is

directly proportional to the total economic activity (the sum of official and underground activities). Economic income is the sum total of official income (a view that is represented by GDP) and income or unregistered underground.

Although we think the major changes occurring in the relationship between the volume of transactions (or payments) in an economy and total economic income can be explained without reference to factors associated with the underground economy, we performed a simulation of the evolution of the underground economy based on this method.

Adopting specific method that is the sum of three components transactions - transactions associated with the production of final output, real or financial transactions and securities transactions generated by the direct financial transfers (or direct payments) - Net transactions to determine the size of Romania have defined following financial categories:

A - Cash in circulation outside the banking sector;
B - bank deposits (demand and time deposits, savings of the population etc.).
C - Amount of cash in transit upon request;
D - Amounts in transit at the request of bank deposits;
E - The total amounts of trading shares and negotiable securities;
F - oriented capital flows outside the country, expressed through the balance of foreign trade;
G - government payments expressed through budget transfers from the state budget and public sector personnel costs (staff salaries budget);
H - The amount of insurance contributions and taxes on wages or personal income;
I - Net volume of transactions.

Net transaction amount (I) resulting from adding categories A, B and G and reducing the value obtained with the corresponding amounts categories C, D, E, F and H. In Table 4 are presented data were the basis for determining the level of net transactions in Romania during 1990-2007, expressed in comparable prices to 1990 levels

The estimated level of net transactions in Romania between 1990 – 2007

Table 4

- million comparable prices, 1990 = 100 -

	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
1990	9.2000	42.0000	0.0000	0.2800	1.8500	-10.0000	12.5000	15.0000	56.5700
1991	17.6000	85.5000	1.0000	23.5100	4.6400	-12.2300	14.9000	17.2200	83.8600
1992	13.9275	48.9529	0.0068	5.2491	4.8933	-20.5862	16.7740	15.5100	74.5815
1993	11.8491	38.6716	0.0147	1.7768	3.5638	-14.8131	13.0351	14.9655	58.0481
1994	7.5902	29.1426	0.0662	0.6662	1.7968	-5.6795	10.2475	11.1114	39.0192
1995	5.4255	20.9443	0.0594	0.4275	0.9551	-7.1563	6.9172	6.6133	32.3879
1996	5.7409	26.5909	0.0509	0.6048	1.0798	-11.4307	8.3060	7.0988	43.2341
1997	6.7527	38.8648	0.0049	0.0756	1.1487	-15.4554	12.8017	10.2359	62.4095
1998	3.4220	24.0520	0.0559	0.0415	1.5220	-9.4927	7.1024	4.5126	37.9370
1999	3.3214	22.3217	0.0251	0.0444	1.8308	-6.1838	5.0885	1.9802	33.0349

	A	B	C	D	E	F	G	H	I
2000	3.3322	20.6232	0.0243	0.0639	1.6983	-7.8781	4.1924	3.4198	30.8194
2001	3.1990	21.0845	0.0486	0.0790	2.3336	-10.9454	3.6454	3.8644	32.5487
2002	2.9974	21.5795	0.0007	0.0433	2.1385	-8.6868	3.1981	3.1121	31.1672
2003	3.1075	21.5871	0.0016	0.0589	2.0265	-11.3680	3.4325	2.9592	34.4491
2004	3.2422	24.7561	0.0029	0.0221	2.1827	-12.8838	3.7549	3.1442	39.2851
2005	4.2815	28.1837	0.0009	0.0381	2.8278	-14.0203	3.1149	2.5828	44.1510
2006	5.0710	32.3703	0.0003	0.0994	3.1808	-17.6346	3.4352	0.8495	54.3810
2007	6.4977	44.3066	0.0003	0.0152	4.2660	-22.0431	4.0092	0.9653	71.6099

Source: National Statistics Institute and own calculations

According to theory, income is determined based underground proportionality between the volume of net transactions and total income generated in the economy. Series of transactions with net income calculation follows a route similar underground applied to currency demand method. It's about choosing a period / year is assumed that there was no activity hidden / underground. In the simulation we realized we considered 1990 underground activities characterized as null. The choice does not have a scientific reason, but is purely coincidental.
The volume of "ideal" official transactions in each year of the analysis is obtained by multiplying the ratio of volume of transactions and total income of the year considered to be free from hidden income (year 1990, the ratio is 0.659401) officially registered with the income each year. The difference between the "ideal" of transactions and actual transactions is the ground (Table 5).

Unregistered income generated by underground transactions in Romania during 1990 – 2007

Table 5

- million comparable prices, 1990 = 100

	Neat transactions	Transactions in "ideal" conditions	Official income (GDP)	Underground income	Total estimated income	Under ground income (% of GDP)
	(1)	(2)	(3)	(4=2-1)	(5=3+4)	
1990	56.57	56.57	85.79	0	85.79	0.00
1991	83.86	127.17	74.70	43.31	118.01	57.99
1992	74.58	113.10	68.13	38.52	106.65	56.54
1993	58.04	88.03	69.14	29.93	99.12	43.36
1994	39.01	59.17	71.84	20.15	91.99	28.05
1995	32.38	49.11	76.94	16.72	93.67	21.74
1996	43.23	65.56	79.96	22.33	102.30	27.93
1997	62.40	94.64	75.10	32.23	107.34	42.92
1998	37.93	57.53	71.48	19.56	91.07	27.41

	Neat transactions	Transactions in "ideal" conditions	Official income (GDP)	Underground income	Total estimated income	Under ground income (% of GDP)
	(1)	(2)	(3)	(4=2-1)	(5=3+4)	
1999	33.03	50.09	70.64	17.06	87.70	24.15
2000	30.81	46.73	72.16	15.91	88.08	22.06
2001	32.54	49.36	76.82	16.81	93.64	21.88
2002	31.16	47.26	81.50	16.09	97.60	19.75
2003	34.44	52.24	85.74	17.79	103.54	20.75
2004	39.28	59.57	93.03	20.29	113.32	21.81
2005	44.15	66.95	96.88	22.80	119.69	23.54
2006	54.38	82.47	104.47	28.08	132.56	26.89
2007	71.61	108.59	110.96	36.98	147.95	33.33

Source: National Statistics Institute and own calculations

According to estimates, the average underground income as a percentage of GDP is 28.9% official. Obviously, the figures may differ depending on the year considered to be devoid of such transactions underground. Also, an econometric evaluation of the method is very difficult transactions because not yet have a solid theory on the total volume of transactions in an economy.

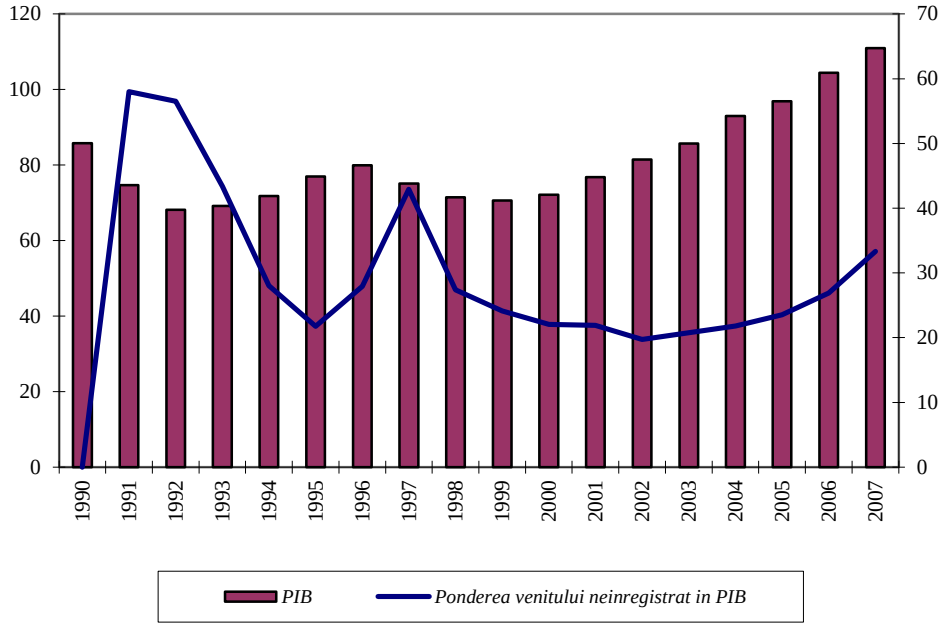
However, compared to other methods of monetary origin, the method has several advantages transactions, at least theoretically. It is, first, that does not involve any assumption on monetary velocity in the formal sector or in the underground. Also, do not use the assumption that cash is the medium of exchange used exclusively in informal transactions and bank deposits are placed in similar cash.

On the other hand, the method requires the establishment of year there is no unrecorded revenue and similar other method, its choice is crucial in terms of relevance of the results of estimates.

In practice, the biggest problem in implementing the transaction method is the limitation of available data. To estimate the required data series based on existing statistical data we proceeded to their adjustment and the inclusion of several approximations in the calculations. We also eliminated a number of additional transactions.

In conclusion, estimation of underground economy in Romania based on their methods of monetary statistics, although in different numbers and weights, suggests a relatively upward trend of underground activities in Romania.

Figure 4 - Total estimated revenue and unrecorded revenue share in GDP (1990-2007)



Estimates made on the basis of simple monetary rate method and the method depend on the overwhelming demand for cash by the ratio of cash outside the banking system to GDP, and the share of cash and bank deposits in the monetary aggregate M1 or M2. Cash and bank deposits are used in the same proportion in the underground. Also, the ratio of unregistered income and GDP is influenced by the official estimates of income. Transactions method, although avoid this, do not provide reliable estimates for Romania not only for the situation our country is unique (not taken into account so-called dollarization), but also because a number of methodological difficulties involved in separating financial transactions pure from other transactions. It also notes that increased transactions that increase their development is mainly due to bank deposits, not cash.

Figure 4 shows an estimate of the evolution of unregistered income share in GDP for the period 1990 to 2007. This development must however be seen as an attempt to commensurate unregistered income, because it is based on solid theory of total transactions in the economy, and the simulation results we have achieved a simple predictions are.

Conclusions

Application methods for estimating monetary economy in Romania shows the low level of intermediation of payments, but also a small number of electronic payments per capita, elements that facilitate the trade intermediated by cash, which can be a sign of unreported, unregistered and untaxed transactions expansion, and of the underground sector dynamism respectively (hidden).

Based on the assumptions that unreported income produced by a monetary unit traded in the underground sector reported income is equal with the income produced by a monetary unit traded in the formal sector, that cash is the only medium of exchange in transactions not reported and that the rate of monetary deposits, respectively at sight, is subject to changes only because of unreported income growth based on simple monetary rate method we obtained an estimate of the average level of income unregistered (underground economy) in Romania from 1990 to 2007 amounting to the average of 52,72% of official GDP.

The evolution of income sinuous underground NII not thought relevant to characterize real progress, the model is not suitable to be applied to the Romanian economy, being one of the main reasons and using market exchange transactions, mainly after 1990. Because we considered the results as having real significance, we used a modified version of the above model, by adapting to the realities of our country. We thought that, for Romania in the context of statistical information available, it is impossible to be determined a base year in which income was not unregistered products, such as informal. However, the results following the application of this method are significantly influenced the choice of base year

REFERENCES

Albu L.- L. (2003): Estimating the Size of Underground Economy in Romania, Research Project "Tax Evasion, Underground Economy and Fiscal Policies in Candidate Countries" (GRC III - 100);

Albu, L.-L. (2001): Estimating the size of underground economy in: Proceedings of the Romanian Academy, Series C: Humanities and Social Sciences, Vol. 1, No. 2-3, Bucharest

Albu L.- L., E. Pelinescu, C. Scutaru (2003): Modele şi prognoze pe termen scurt - Aplicaţii pentru România, Ed. Expert, Bucureşti

Bowles Roger A. (1999): Tax Policy, Tax Evasion and Corruption in Economies in Transition, in Underground Economies in Transition. Unrecorded Activity, Tax Evasion, Corruption and Organized Crime, Edited by Edgar L. Feige and Katarina Ott, Ashgate Publishing Ltd., 1999

Dobrescu Emilian (1998): Essai d'estimer l'économie non comptabilisée - sur l'exemple de Roumanie - Pour le VII-ičme colloque de Comptabilité Nationale Session No.3 - Paris, Janvier 1998

Lemieux T., B. Fortin, P. Fréchette (1994): The Effect of Taxes on Labour Supply in the Underground Economy, The American Economic Review, March, 84(1)

Tanzi Vito (1982): The Underground Economy in the United States and Abroad, Lexington, Lexington Books;

Tanzi Vito (1998): Corruption around the world: Causes, consequences, scope and cures, IMF Working Paper, 63;

Tanzi Vito (1999): Uses and Abuses of Estimates of the Underground Economy, The Economic Journal, 109 (June