

MACROMODEL SIMULATIONS FOR THE ROMANIAN ECONOMY

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Abstract

The paper revises the previous author's estimates of the medium-term evolution of the Romanian economy. It is organized in three chapters.

The first examines the most important crisis and post-crisis problems of Romania. The analysis is developed preponderantly from a structural point of view.

The second chapter presents three simulated scenarios for the period 2010-2014. One of them (named the Base Scenario BSc) is conceived with macroeconomic parameters close to those envisaged by Government, in correlation with the IMF stand-by Agreement. The other two (the Worsened Scenarios W1Sc and W2Sc) admit less favorable domestic and external business environment.

In the final chapter, the results of simulations are compared to each other and also to the officially accepted forecasting documents. Some former similar predictions (anticipating more optimistic indicators) are discussed from the modeling perspective.

Keywords: macromodel, input-output analysis, simulation, scenario, crisis

JEL Classification: C53, C67, E17

1. Some Structural Problems

There are some structural characteristics of the Romanian economy, which have to be taken into account when building the policy mix targeted to surpass the recession and the consequent effects of crisis.

These features can be quantified on the basis of input-output analysis. Some authors also recommend the sectors' impact on the entire economy as a discriminating criterion in accordance of bailout funds (Luo, 2009).

In the case of Romania, tables for 34 sectors, obtained by aggregation of extended tables for 105 sectors, have been used (both classifications are described in Appendix 1. The data refer to year 2006.

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Based on the Leontieff matrix, the simulations highlight four distinct segments of the global output:

- the sectors where the contraction of the private domestic demand could be significantly compensated by public expenditures;
- the sectors - also depending on private domestic demand - to which the possible impact of budgetary policies is limited;
- the sectors mainly oriented to exports;
- the sectors without highly difficult problems on the demand-side, but which encounter serious supply-side restrictions.

Jointly, these cover 73.7% of the total gross value added. The difference, that is 26.3%, is due to the branches that prevalingly deliver raw materials and intermediate products. Therefore, we are going to pay attention to the above-mentioned four segments.

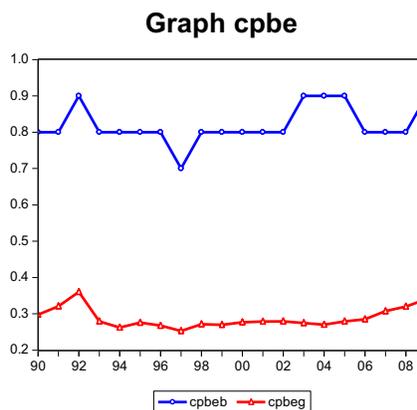
1. The first group includes especially the sectors linked with productive and residential investments (construction, real estate transactions, glass, building materials, metals, equipment and transport means). The share of this group in the total gross value added represents 23%. Their dynamics can exert an important stimulating influence on the whole economy: a variation of 5% in the final demand for this group would generate a modification in the total gross value added (obviously, of the same algebraic sign) of approximately 3.5%. The effects of the recession could be tackled by at least partially compensating the decline in private demand through the extension of public investment programs.

However, the amplitude of such a policy depends on two main conditions.

1.1. The first refers to the available financial resources.

a) The problem of current public expenditures becomes stringent. They are too high for the economic potential of the country and the present accessible fiscal revenues. The shares of the current general consolidated budget expenditures (for salaries of the budgetary sector, transfers, subsidies, purchasing of goods and services) in the total public expenditures (cpbeb), and in the gross domestic product (cpbeg), respectively, registered the following evolution:

Figure 1



Therefore, the largest part of public resources is allocated for current expenditures (cpbeb), to the disadvantage of the capital investments. Highly alarming is, of course, the increasing share (during the last years) of these expenditures in the gross domestic product (cpbeg). It is obvious that such a structure of the public budget cannot be sustained without affecting the economic development of the country. The reduction in these current consolidated budget expenditures and the allocation of more public resources to investments, especially to infrastructure, is imperiously necessary.

b) Taking the necessary measures to increase the absorption of European Union structural funds is also vital.

c) As expected, the economic crisis had a negative impact on the inflow of foreign capital. The revival of this inflow depends not only on the revival of the European and world economies, but also on the domestic institutional stability. The rating agencies as well as foreign political and business circles frequently underline these risks.

1.2. The second is related to the limited actual capacity of the Romanian economy to accomplish large investment programs (regulatory system, design and construction potential, etc.).

a) In the transition period - due to institutional transformations and casual interests - complicated central and local regulations that negatively influence the investment process were developed. According to some microeconomic analyses, even for simple projects - with guaranteed financing and available location - the legally imposed permits and approvals take more than two thirds of the investment cycle. Obviously, the situation is much more difficult for complex objectives or when the authorities do not fairly cooperate. Without a major simplification of these bureaucratic procedures (impregnated sometimes with corruption), the recovery of the investment potential of the Romanian economy remains doubtful.

b) On the other hand, most of the "actors" involved in the construction sector are able to undertake only small-scale works. Thus, before the crisis, on this market there were 47 thousand active micro-enterprises, with a total of about 500 thousand employees. Even the dominating companies (2255) – which covered 80% of the turnover - had low productive potential (the average number of employees being 117). Therefore, the construction sector (including adjacent designing and management services) were not well tailored for big scale objectives even during the previous economic boom. The recession made it more fragile. We have to take into account that only the great investment works (as highways, intra-city roads, communication and energy infrastructure, etc.) could give an important impetus to the entire economy. The existing potential in this area must be realistically evaluated and the adequate set of measures targeting to compensate the present deficit has to be taken. Without such consistent policies, the long-run economic recovery and the reduction in the development gap between Romania and the European Union are not achievable.

2. The sectors in the second category are affected by the crisis effects on the disposable income of households and firms. We refer especially to the production of goods and services characterized by high demand elasticity (chemical industry, hotels and restaurants, travel agencies, some of the services, publishing houses, etc.).

We also have to mention the activities related to the imports for consumption. Compared to the GDP, the deficit of the commercial trade balance was around 13-15%, a level which is not sustainable. The external finance, which is now accessible, generated in 2009 a drastic adjustment of this disequilibrium via a significant decrease in imports. Consequently, a number of productive activities were affected (transport, stores of goods, commercial and financial services) as well as the indirect taxes associated with imports.

In these sectors we cannot rely on the compensative effect of public expenditures. The share of these sectors represents 28%. A change in the final demand for this group of 5% causes a modification in the total gross value added of the economy by approximately 2.1%.

3. Certainly, the world economic crisis has a substantial impact on the sectors oriented to exports (textile industry, manufacturing of leather and related products, manufacturing of furniture, wood products and related products). Though these branches have a share of only 7.3% in the total gross value added, their propagation effects are considerable. A change in the final demand for this group of 5% induces a modification of the total value added of the economy by 1.88%.

The international competitiveness of the Romanian exports ought to be sustained - by commercial, fiscal and monetary policies - in all necessary directions:

- Reduction in production costs simultaneously with the improvement of the quality of products, which are decisive.
- It is also important, at the governmental level, to participate actively in the international efforts against protectionist tendencies. The exporting firms must be stimulated and assisted to penetrate new markets, especially in more dynamic economic areas.
- Maintaining the exchange rate at a reasonable level is also important.

4. The fourth group of sectors includes agriculture and downstream industries. It ensures 15.5% of the total gross value added. In this case, the problem is not the demand. The share of these products in consumption is important and not volatile. It is possible to substitute partially the imports that excessively dominate the domestic market. The main restrictions are on the supply side: technical precariousness, ageing labour force, non-optimal scale of farms. Unfortunately, to a great extent, the present Romanian agriculture is a subsistence one (Otiman, 2009).

The consolidation and stimulation of this segment of economy can be a real reserve of economic growth. An increase of 5% in the final production of these sectors would generate a corresponding modification of 2.37% of the total gross value added.

II. Three Illustrative Scenarios for the years 2010-2014

1. The present predictive estimations are based on the 2005 version of the Romanian macroeconomic model (Dobrescu, 2006a, 2006b, 2007), amended with some methodological corrections in the statistical indicators. It has been used for building the possible scenarios for 2010-2014. The indicators for 2009 have been updated

and, as a result, some of them differ somewhat from the estimations published in RJEF (2010, No.1). The demographic parameters are concordant with official forecasts.

2. A large number of simulations have been processed, based on some common qualitative premises:

- The world economy, including international trade, recovers from recession.
- The Romanian economy is also involved in this process. However, the consequences of crisis are reabsorbed step by step, continuing to exercise a non-negligible influence, especially during the first part of this period (the gross fixed capital formation, total factor productivity, the unemployment are concerned).
- The budget policy is dominated by the imperative to compress the public deficit to sustainable levels (compatible with the standards requested by the integration into the Eurozone).
- The re-monetization of the economy continues, along with a gradual decrease in the interest rate. The National Bank is able to manage the evolution of the exchange rate of RON in order to maintain its fluctuations between reasonable limits.
- During the entire period, Romania will benefit from the structural funds delivered by the European Union.

3. We have selected three simulations that seem to be representative for the current state of the Romanian economy. These will be hereinafter detailed:

- The first is named the Base Scenario (BSc). Generally, it is conceived in accordance with the macroeconomic policies envisaged in the Stand-by Agreement with the International Monetary Fund and, also, in the Government Programme (2009-2012) and other similar documents. Normally, under these hypotheses, some of its indicators are close to those included in the official projections. Consequently, such a forecast can be admitted as a revised desirable scenario. The term "revised" is necessary in order to delimitate it from the former desirable scenario for 2008-2013 (Dobrescu, 2008).
- The following two simulations – Worsened Scenarios WSc1 and WSc2 - assume less favorable conditions, under which the Romanian economy will function during the next years. These variants are distinguished by some differences regarding the monetary and budget policies.

Obviously, all these predictions – like other analogous forecasting exercises - must be cautiously taken into consideration, due to the high uncertainty degree of the domestic and external conjuncture.

A. The Base Scenario (BSc)

A1. Computational Assumptions

1. The pressure on nominal revenues – either in the private sector or in the budgetary one – remains significant. Nevertheless, the market forces and the public authorities are able to maintain it within economically bearable limits. Thus, the index of expected

disposable income – which is an important exogenous variable of the macromodel – ranges between 1.06 and 1.085. In other words, it is presumed that the inflationary expectations do not register noticeable breaks.

2. We have already mentioned (Dobrescu, 2008) that after the elaboration of the 2005 version of the macromodel, some factors interfered and negatively influenced the global return of the Romanian economy. This impact was accentuated by recession. Therefore, the equation for the index of total factor productivity (ITFP) is slightly corrected downwards as compared with the previous estimations.

A similar solution is adopted for the relationship defining the unemployment rate. In the case of gross fixed capital formation, such a “penalization” affects only the first two years of the period.

3. In accordance with a largely accepted presumption, the base scenario assumes that the international financial crisis will pass into a moderate global recovery. The parameters concerning world trade index in real terms and world trade deflator are projected as slowly ascending series. The short-term interest rate in the advanced economies is kept at a constant level.

4. It is also expected that the capital inflows will increase; either the foreign direct and portfolio investments or the net transfers from abroad. The present simulations bargain on a rising degree of absorption of the European structural and cohesion funds.

5. The general consolidated budget is conceived under stability of taxation. Thus, either the ratio (to gross domestic product) of the direct taxes and other budget revenues, or the ratio (to gross value added) of the value added tax, excise duties and other similar indirect taxes are maintained unchanged.

Instead, the ratio (to general consolidated budget expenditures) of the government transfers is decreasing, but in a moderate (therefore tolerable) manner. This allows for a compression of the public deficit, which reached unsustainable levels during 2008-2009.

6. The annual index of broad money (IM2) is projected to exceed slightly the similar index of expected disposable income (IYd), which facilitates a reduction in interest rates.

7. The rate of tangible fixed assets depreciation is maintained - during the entire period - at a constant level (0.075).

A2. Results of Simulations

1. The leading indicators resulted from simulations on the Base Scenario are given in Table 1.

Table 1

Macromodel Estimations for the Base Scenario BSc

Indicators	Symbol	2009	2010	2011	2012	2013	2014
GDP, current prices, bill. RON	GDPB	491.27	523.215	564.651	615.553	671.243	726.336
GDP index, current prices	IGDPB	1.0031	1.0650	1.0792	1.0901	1.0905	1.0821

Macromodel Simulations for the Romanian Economy

Indicators	Symbol	2009	2010	2011	2012	2013	2014
GDP index, constant prices	IGDPcB	0.93	1.0037	1.0235	1.0388	1.0433	1.0458
Household consumption index, constant prices	ICHcB	0.908	0.9792	0.9983	1.0363	1.0574	1.0699
Gross fixed capital formation index, constant prices	IGFCFcB	0.747	1.0000	1.0147	1.0632	1.0689	1.0689
Public consumption index, constant prices	ICGrB	0.97	0.9286	1.0057	1.0213	1.0245	1.0275
Export of goods and services, bill. EUR	XGSEB	36.116	35.6297	36.8344	39.6161	43.7306	48.7223
Import of goods and services, bill. EUR	MGSEB	43.17	44.4337	44.8747	48.1805	52.0312	57.2202
The deficit of the trade balance (% of GDP)	rNXB	-0.0731	-0.0707	-0.0616	-0.0610	-0.0552	-0.0519
Labor force, mill. pers.	LFB	9.95	9.9662	9.936	9.8334	9.7719	9.7592
Employment, mill. pers.	EB	9.274	9.0907	9.0654	9.0831	9.1159	9.2222
Unemployment rate	ruB	0.0844	0.0878	0.0876	0.0763	0.0671	0.0550
GDP deflator	PGDPB	1.0786	1.0611	1.0544	1.0495	1.0452	1.0347
Consumption price index	CPIB	1.056	1.0538	1.0468	1.0406	1.0368	1.0250
Exchange rate, RON/EUR	EREB	4.2373	4.19908	4.3288	4.3872	4.4658	4.4373
The general consolidated budget deficit (% of GDP)	cbbB	-0.0747	-0.0670	-0.0489	-0.0401	-0.0317	-0.0286
Broad money velocity, GDP/M2	vB	2.7932	2.6425	2.5096	2.4139	2.3146	2.2349

2. The main features of the Base Scenario could be synthesized as follows:

- The real economy surpasses the recession phase, but gradually and slowly. Only at the end of the period, the rate of the gross domestic product at constant prices slightly exceeds 4 percent.
- Economic growth is sustained either by the domestic absorption (especially investments) or by the modest recovery of exports. On the supply-side, the principal factors are the capital accumulation and the improvement of the total factor productivity.
- Unemployment rate remains relatively high during 2010-2011, after which tends to decrease along with the recovery of production.
- The deficit of trade balance does not exceed, during the entire period, unbearable limits.
- After the inflation recrudescence during 2009, the price indices descend, reaching normal levels at the end of the period. Owing to the NBR policy and improvement of Romanian economy's performances, the real exchange rate appreciates in a proportion which can be considered as acceptable from the international competitiveness point of view.
- Public budget deficits decrease, tending finally to reach the European Union standards.

B. The Worsened Scenario W1Sc

B1. Computational Assumptions

Generally, the Worsened Scenario W1Sc maintains the hypotheses of the Base one. However, it assumes that the domestic situation (institutional reforms, fiscal system, etc.) does not allow for a significant improvement of the business environment.

1. Consequently, the capital inflows are more limited. This concerns the foreign direct and portfolio investments, current account net transfers, structural European funds, which are exogenously defined.
2. The relationship for total factor productivity is also penalized by slightly increased negative correction coefficients.
3. It is, nevertheless, admitted that the NBR policy remains able to maintain the exchange rate of RON in a narrow band of fluctuation.

B2. Results of Simulations

1. The most important indicators of simulations for the first Worsened Scenario (W1Sc) are detailed in Table 2.

Table 2

Macromodel Estimations for the Worsened Scenario W1Sc

Indicators	Symbol	2009	2010	2011	2012	2013	2014
GDP, current prices, bill. RON	GDPW1	491.274	520.429	560.46	608.747	669.597	727.18
GDP index, current prices	IGDPW1	1.0031	1.0593	1.0769	1.0861	1.1000	1.0860
GDP index, constant prices	IGDPCW1	0.9300	0.9768	0.9991	1.0218	1.0332	1.0350
Household consumption index, constant prices	ICHcW1	0.9080	0.9557	0.9644	1.0075	1.0235	1.0393
Gross fixed capital formation index, constant prices	IGFCFcW1	0.7470	0.9772	0.9934	1.0509	1.0490	1.0565
Public consumption index, constant prices	ICGrW1	0.9700	0.9035	0.9814	1.0039	1.0135	1.0153
Export of goods and services, bill. EUR	XGSEW1	36.1160	35.1424	35.4411	37.4258	40.2408	44.1458
Import of goods and services, bill. EUR	MGSEW1	43.1700	42.3229	41.8452	44.2751	47.8702	51.3494
The deficit of the trade balance (% of GDP)	rNXW1	-0.0731	-0.0602	-0.0517	-0.0516	-0.0524	-0.0458
Labor force, mill. pers.	LFW1	9.9500	9.9662	9.9360	9.8278	9.7591	9.7382
Employment, mill. pers.	EW1	9.2740	9.0809	9.0476	9.0569	9.0812	9.1784
Unemployment rate	ruW1	0.0844	0.0888	0.0894	0.0784	0.0695	0.0575
GDP deflator	PGDPW1	1.0786	1.0845	1.0779	1.0630	1.0646	1.0493
Consumption price index	CPIW1	1.0560	1.0772	1.0704	1.0547	1.0572	1.0411
Exchange rate, RON/EUR	EREW1	4.2373	4.3619	4.5246	4.5866	4.5996	4.6229
The general consolidated budget deficit (% of GDP)	cbbW1	-0.0747	-0.0703	-0.0576	-0.0569	-0.0462	-0.0401
Broad money velocity, GDP/M2	vW1	2.7932	2.6284	2.4910	2.3872	2.3090	2.2375

2. What are the striking changes (comparatively to the Base Scenario)?

- The economic growth slackens, reaching only at the end of the period very modest (for a developing country) positive rates. Normally, this has repercussions on the dynamics of the private and public consumption.
- Such an evolution, doubled by keeping the expected available income at the previous levels (from the Base Scenario), induces higher rates of inflation. The real appreciation of the exchange rate is more restrained.
- The exports remain constantly below the levels of the Base Scenario. The stagnation and slow increase (at the end of period) in real output, in combination with more limited obtainable external financial resources, generates a slow dynamics of imports. As a result, the deficit of trade balance is low enough.
- The general consolidated budget deficit decreases, remaining, nevertheless, above the Base Scenario.

C. The Worsened Scenario W2Sc

C1. Computational Assumptions

Practically, this scenario is derived from the previous one. It tries to compress the inflation by more restrictive income, monetary, and budget expenditure policies.

1. First of all, a slower increase in expected disposable income index is taken into account.
2. The exogenous coefficients regarding government transfers and other public expenditures are also somewhat reduced in comparison with the Scenarios BSc and W1Sc.
3. Finally, the broad money supply is projected at lower levels.

C2. Results of Simulations

1. The second Worsened Scenario (W2Sc) is numerically defined by the indicators presented in Table 3.

Table 3

Macromodel Estimations for the Worsened Scenario W2Sc

Indicators	Symbol	2009	2010	2011	2012	2013	2014
GDP, current prices, bill. RON	GDPW2	491.274	518.689	554.89	600.997	657.877	707.94
GDP index, current prices	IGDPW2	1.0031	1.0558	1.0698	1.0831	1.0946	1.0761
GDP index, constant prices	IGDPCW2	0.93	0.9740	0.9962	1.0166	1.0146	1.0016
Household consumption index, constant prices	ICHcW2	0.908	0.9481	0.9603	0.9975	0.9995	0.9987
Gross fixed capital formation index, constant prices	IGFCFcW2	0.747	0.9672	0.9936	1.0399	1.0303	1.0372
Public consumption index, constant prices,	ICGrW2	0.97	0.9020	0.9785	0.9997	1.0222	0.9543

Indicators	Symbol	2009	2010	2011	2012	2013	2014
Export of goods and services, bill. EUR	XGSEW2	36.116	34.9617	35.1588	36.8195	38.9633	41.4481
Import of goods and services, bill. EUR	MGSEW2	43.17	41.756	41.3366	43.4714	46.5872	48.862
The deficit of the trade balance (% of GDP)	rNXW2	-0.0731	-0.0573	-0.0501	-0.0503	-0.0528	-0.0480
Labor force, mill. pers.	LFW2	9.95	9.96618	9.936	9.82756	9.75881	9.7371
Employment, mill. pers.	EW2	9.274	9.0805	9.0473	9.0552	9.0733	9.1589
Unemployment rate	ruW2	0.0844	0.0889	0.0894	0.0786	0.0702	0.0594
GDP deflator	PGDPW2	1.0786	1.0840	1.0738	1.0654	1.0789	1.0744
Consumption price index	CPIW2	1.056	1.0755	1.0666	1.0561	1.0713	1.0687
Exchange rate, RON/EUR	EREW2	4.2373	4.3716	4.4991	4.5435	4.5545	4.5814
The general consolidated budget deficit (% of GDP)	cbbW2	-0.0747	-0.0669	-0.0560	-0.0538	-0.0431	-0.0398
Broad money velocity, GDP/M2	vW2	2.7932	2.6599	2.5222	2.4530	2.3923	2.2474

2. The extended economic stagnation seems to be the most important characteristic of the Worsened Scenario W2Sc. Even the intended goal – disinflation – is not achieved.

III. Comparative Comments

Three plans will be followed in this section:

- The results of the above computed scenarios will be compared for a set of essential macroeconomic parameters.
- They will be also confronted with the officially accepted forecasting documents.
- Some prior similar estimations (from 2008, for instance) will be discussed from a modeling point of view.

1. The inter-scenarios comparison is focused on six major indicators, namely:

- GDP index, constant prices;
- Household consumption index, constant prices;
- Gross fixed capital formation index, constant prices;
- The deficit of the trade balance (% of GDP);
- Consumption price index; and
- The general consolidated budget deficit (% of GDP).

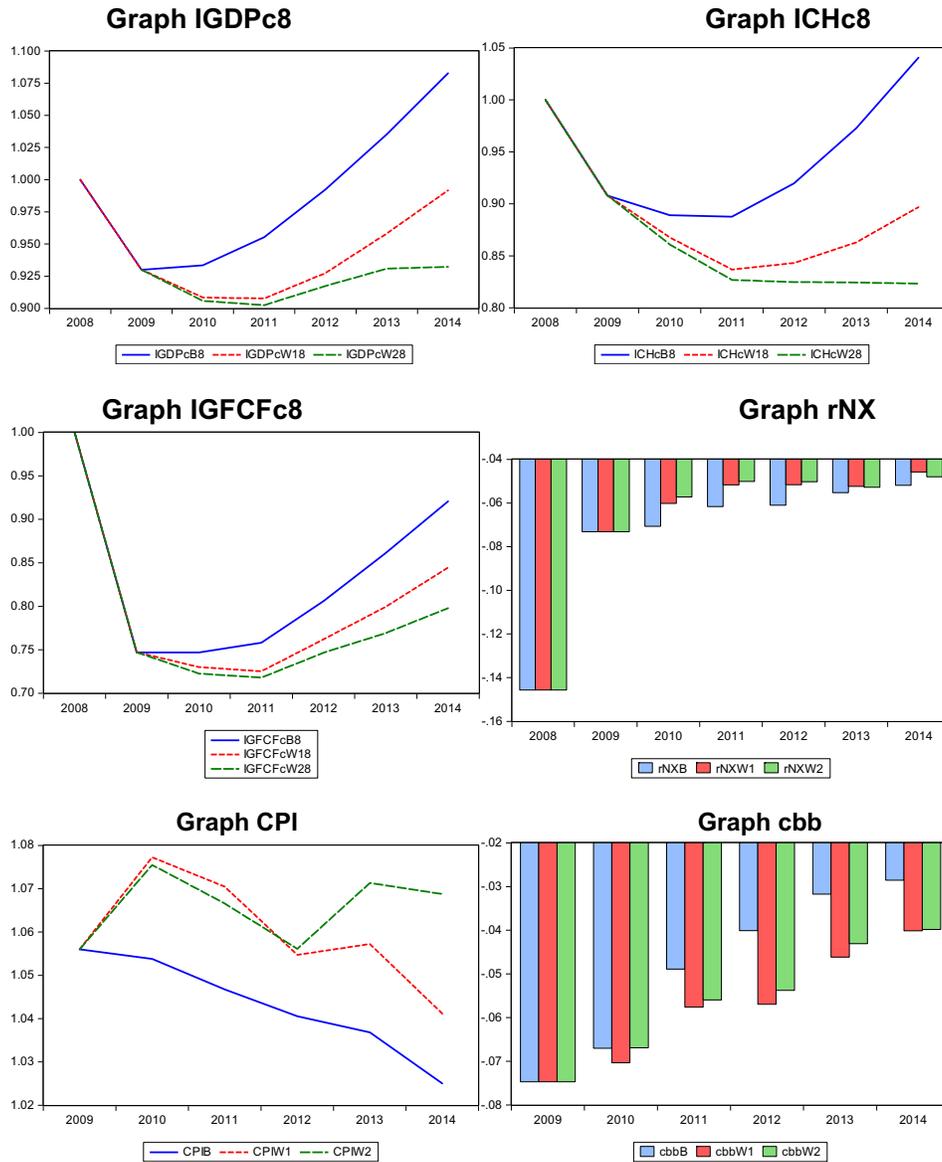
1.1. In order to identify easier the position of each scenario in relation to ante-crisis levels, the first three variables are characterized by indices related to the year 2008 (=1), adding to corresponding symbols the suffix 8. Data are presented graphically (Figure 2.).

1.2. Some short comments about each of the presented indicators are given below.

- The Graph IGDPc8 shows that the ante-crisis global output (gross domestic product at constant prices) will be reached during 2012 in the Base Scenario BSc and only at the end of period in the Worsened Scenario WSc1; the last of them

(Worsened Scenario WSc2) maintains during the entire period this parameter below 2008 (approximately 90-93% of this level).

Figure 2



- Only the Base Scenario BSc would allow returning to ante-crisis real household consumption (2013-2014), while in the other two scenarios this oscillates between 82-90% (GraphIChc8).
- The gross capital formation at constant prices (GraphIGFCFc8) does not exceed the 2008 level in all computed scenarios. As in the previous cases, the Base Scenario BSc is situated in the best position, while the Worsened Scenario W2Sc on the last one.
- Concerning the net exports (GraphrNX), the order of scenarios is somewhat converse due to the differences among them concerning economic growth, domestic absorption, and exchange rate. It is worth to outline that all the estimated variants maintain the foreign trade deficit between acceptable limits. Such a result goes along with the expectable more difficult access to the future external financial resources.
- The inflation (GraphCPI) remains significant in both worsened scenarios (W1Sc and W2Sc). The Base Scenario BSc comes off to reduce it especially in the final years.
- During the next period, the general consolidated budget deficit (Graphcbb) seems to continue to be high enough. The European Union standards in this field are reached only in the Base Scenario BSc at the end of the interval.

2. There are many forecasting works regarding the present Romanian economy. For this section, we shall retain several from those which have been officially accepted (in parenthesis it is specified the suffix which is attached to the corresponding indicators):

- National Commission for Prognosis: "Autumn Forecast – 2009, Projection of Main Macroeconomic Indicators for the Period 2009-2014", November 2009 (O1);
- Government of Romania: "Convergence Programme 2009-2012", February 2010 (O2); and
- National Commission for Prognosis: "Forecast for Elaboration of the Fiscal-Budgetary Strategy", Project 2010 (O3), which refers to years 2010-2013.

Appendix 2 presents the estimations of these documents for the same (as in macromodel scenarios) set of indicators.

2.1. Consequently, here we shall only represent, again graphically (Figure 3), the data concerning the real economic growth and inflation. The first official forecast (O1) will be compared with the macromodel scenarios.

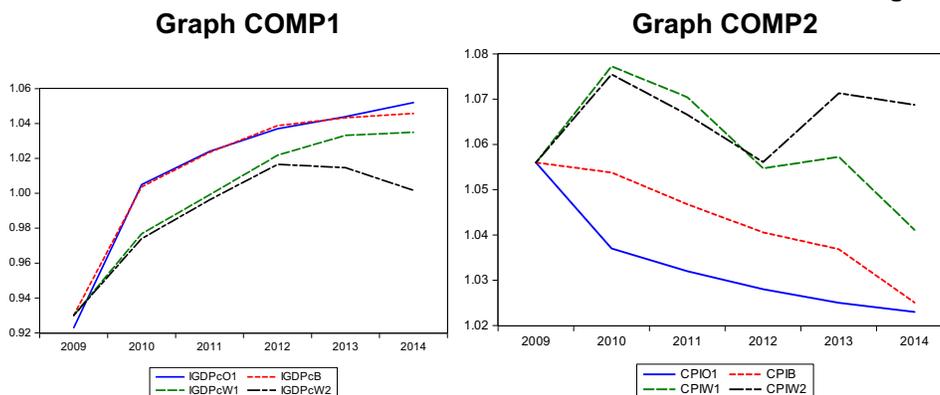
2.2. In what concerns the real output (Graph COMP1), only the Base Scenario BSc - as we expected - provides predictions close to the officially agreed forecast. In the case of inflation (Graph COMP2) all the macromodel simulations generate higher levels, together with a raised nominal exchange rate (see Appendix 2).

3. The projection elaborated by the author in the summer of 2008 and published in RJEJF (Dobrescu, 2008) underlined the fact that it did not incorporate the major negative shocks, which could interfere due to the evolution of the world's economy. Unfortunately, these shocks have occurred and our current estimates did naturally take them into consideration. In these respect, a short technical comment would be useful, not only conceptually but also from a pragmatic perspective.

In the last decades - and especially nowadays - the firms, governments, monetary authorities, mass media, and the public in general are interested in economic

predictions. This is natural, taking into account that practically all our decisions depend on our own image of the future market conditions.

Figure 3



The success of micro- and macroeconomic modeling comes exactly from this dependence. We must recognize that the achievements obtained in this field were generously rewarded by the scientific community and society. Symmetrically, the failures of this activity were vigorously sanctioned. Such criticism has extended during the later years as a reaction to the fact that the recent crisis was not correctly forecasted.

The examination of the complexity of the recent crisis would exceed the framework of the present paper. Many other studies were already consecrated to this question (for instance: Almunia *et al.*, 2009; Claessens *et al.*, 2010; Eichengreen, 2009; Reinhart, 2008; Reinhart and Rogoff, 2009; UN Conference, 2009). That is why we shall limit to several questions, involving the modeling techniques. In our opinion, however, the incriminated blames addressed to the modeling techniques only partially are justified.

What is the problem? Despite many contrary assertions, there are solid arguments in favor of the statement that the world economy, and its driving force (USA), entered, after the oil shocks in the beginning of the seventies, a descendent phase of very long Kondratieff oscillations. Of course, the real business cycles continued, but - sometimes transparently and sometimes not - they have been grafted on this secular trend. The explanation seems to come from the fact - almost evident - that the economic pattern based on an over-dimensioned public and private consumption, on an excessive use of primary resources and an alarming pollution of the natural environment has exhausted its capacities to fuel growth. Many positive technical reactions were developed, but these proved to be not enough. From this point of view, it would be unfair to blame the quantitative analysis. It is well known that many models, grouped around bio-economics and durable development, have stressed the historical deadlock towards which the modern civilization makes for.

How was it possible that the necessary corrections were put off for such a long time? This was largely possible because of an artificial stimulation of demand, accompanied and made easier by the sophistication of the means of payment. Based on some

sources (Quintos, 2008), the ratio of the world's financial assets to the world's GDP has grown from around 1 in 1980 to almost two in 1993 and over 3.1 at the end of 2005. At this point, we have at least two problems, which involve also the qualitative analysis.

3.1. The potential GDP models were developed preponderantly in relation to the internal equilibrium, especially inflation. But CPI and other price indexes from USA and the main developed countries were not signaling anything alarming. The FED was practicing for a long period low monetary policy interest rates. In reality, the internal disequilibrium was made unclear by the external one. The USA was ensuring 65% of its oil consumption from imports. Directly and indirectly, other important external resources were involved: labor force through immigration and cheap imports of labor-intensive products. Step by step, however, it became more and more difficult to cover the domestic demand excess through external factors. If the potential GDP models would have incorporated to a higher degree the implications of external disequilibria, maybe the recent recession would have been more correctly anticipated.

In the case of Romania, there were opinions that - during the pre-crisis period - the potential GDP gap was negative, based on descending rates of price indices. In reality, the disinflation was based on a growing external imbalance (Dobrescu, 2004), and not on sound increasing economic performances.

3.2. There is also a comment regarding the monetary phenomenon. It became more and more evident that the spectacular explosion of the financial derivatives on international and domestic markets represented a parallel monetary creation, outside of the controlled (by central banks) circuit. By themselves, these financial derivatives are not to be blamed. Their predecessors have made the evolution from M0 to M1 possible, and afterwards to M2 and so forth. It is essential for this process not to be distorted and, also, not to be out of the control of the central monetary institutions. The macroeconomic models have not yet incorporated this phenomenon.

3.3. What lessons have to be learned from the prediction techniques?

- We cannot give up modeling. It is useful to recall the remark of a famous econometrician George Box that "all models are wrong; the practical question is how wrong do they have to be not to be useful" (Box and Draper, 1987).

Why do we use modeling? In principle, because we need to interpret very complex phenomena. The connections between the economic indicators are much too diverse and subtle to be entirely mentally detected. The model helps us to make a rational synthesis, to build scenarios based on multiple sets of hypotheses, to associate Bayesian probabilities to these trajectories. No doubt, the reality will not model itself on the modeling blueprints, but the labor put into the constructing of these blueprints and the outputs of these blueprints, such as the approximation of risks, the analysis of future developments, is an excellent prelude to the decisional process. At the same time, the prediction techniques themselves improve.

- For some decades now, the economic modeling is preoccupied with the incorporation of human behavior and uncertainty. There is a more intense use of expectation and bounded rationality. A number of fields of science have important

contribution - fuzzy sets, mathematics of chaos and complexity, experimental psychology. Even if the progress is visible and even if it will continue, we have to admit that human decisions - due to the characteristics of the human nature as conscious and voluntary beings - will always have a component of uncertainty. These facts do not invalidate predictive modeling, but disqualifies possible evolutions outside of its cognitive legitimated framework.

- As a final comment, we point out a recent and interesting approach - consensual modeling. It refers to constructing a number of models which differ from the perspective of their structure and specification, but everyone offers the possibility of forecasting the same indicators. The final forecast would be a combination of the outputs of these rival models. Such an approach seems to be fruitful.

Bucharest, April 2010

Appendix 1

I-O Tables of Romania: Sectoral classification (Code RNIS)

I-O Classification for 34 sectors	I-O Classification for 105 branches
1.Agriculture, forestry, fishery	1.Vegetal culture, 2.Animal breeding, 3.Auxiliary services (for agriculture), 4.Forestry and hunting, 5.Forest exploitation, 6.Fish and fishing
2.Coal, coke	7.Extraction and preparation of coal (including bituminous sands and shales), 35.Cocsification
3.Crude oil, petroleum products	8.Extraction of oil (including related services), 36.Processing of oil, 37.Processing of nuclear fuels
4.Gas	9.Extraction of natural gas (including services annex to it), 10. Extraction of radioactive ores
5.Ores, ferrous and nonferrous	11.Extraction and preparation of ferrous metals, 12.Extraction and preparation of non-ferrous metals
6.Ores for building	13.Extraction of ores for construction materials, 14.Extraction of sand and clay
7.Other ores	15.Extraction and preparation of ores for the chemical industry, 16.Extraction and preparation of salt, 17.Extraction and preparation of other non-metal ores
8.Food, beverages, tobacco	18.Production, processing and preserving of meat, 19.Processing and preserving of fish and of fish products, 20.Processing and preserving of fruits and vegetables, 21.Manufacturing of vegetal and animal oils and fats, 22.Manufacturing of dairy products, 23. Manufacturing of mill products, starch and starch products, 24.Manufacturing of animal feed, 25.Manufacturing of other foodstuffs, 26.Tobacco industry, 27.Manufacturing of beverages
9.Textiles and clothing	28.Textiles and textile products, 29.Textile apparel industry
10.Leaner and footwear	30.Fur and leather apparel, 31.Leaner and shoe wear industry
11.Wood, furniture and other industrial products	32.Wood processing industry (excl. furniture), 77.Manufacture of furniture, 78.Other industrial activities
12.Pulp and paper	Pulp, paper and cardboard industry, and articles thereof
13.Publishing, printing	Printing, polygraphy and recording on support
14.Chemical and synthetic fibers	38.Manufacturing of basic chemicals, 39.Manufacturing of pesticides and other agri-chemical products, 40.Manufacturing of dyes and varnishes, 43.Manufacturing of other chemical products, 44.Manufacturing of synthetic or artificial yarns and fibers

I-O Classification for 34 sectors	I-O Classification for 105 branches
15.Medicines, detergents, cosmetics	41.Manufacturing of pharmaceuticals and drugs, 42.Manufacturing of soaps, detergents, maintenance, cosmetics and perfume products
16.Rubber and plastics	45.Production of rubber articles, 46.Production of plastic articles
17.Glass	47.Manufacturing of glass and glass articles
18.Building materials	48.Manufacturing of refracting and non-refracting ceramic articles (exclusive of articles for constructions), 49.Manufacturing of ceramic plates and slabs, 50.Manufacturing of bricks, tiles and other construction materials, 51.Manufacturing of cement, lime, plaster, 52.Manufacturing of elements from concrete, cement and plaster, 53.Cutting, forming and finishing of stone, 54.Manufacturing of other products from non-metallic minerals
19.Iron and steel	55.Metallurgy and production of ferrous alloys, 56.Manufacturing of pipes, 57.Other metallurgical products, 58.Production of precious metals and other non-ferrous metals, 59.Foundry
20.Mechanical engineering	60.Metallic constructions and metal products industry, 61.Manufacturing of equipment for producing and using mechanical power (excepting planes, vehicles and motor-bikes engines), 62.Manufacturing of general use machinery, 63.Manufacturing of agricultural and forest machinery, 64.Manufacturing of machine-tools, 65.Manufacturing of other specific use machinery, 66.Manufacturing of armament, ammunition
21.Machinery and appliances	Manufacturing of household machinery and apparatus
22.Electrical and electronic products	68.Industry of office and IT equipment, 69.Industry of electric machinery and apparatus, 70.Industry of radio, TV sets and communication equipment, 71.Industry of medical precision tools, optical and watch apparatus and tools
23.Vehicles	72.Road transport means, 73.Naval constructions and repairs, 74.Production and repairs of rail transport means and rolling stock, 75.Aircraft constructions and repairs, 76.Production of motorcycles and bikes and other transport means (including for handicapped persons)
24.Electricity, heat, water, gas	79.Production and distribution of electric power, 80.Production and distribution of gases (excl. extraction of methane gas), 81.Production and distribution of thermal power and hot water,

I-O Classification for 34 sectors	I-O Classification for 105 branches
	82.Catching, purification and distribution of water
25.Construction	83.Constructions
26.Trade	84.Wholesale and retail trade
27.Hotels, restaurants, travel agencies	85.Hotels, 86.Restaurants, 93.Activities of tourism and tourist assistance agencies
28.Transport	87.Rail transports, 88.Other terrestrial transports, 89.Transport through pipelines, 90.Water transports (sea, river and coastline), 91.Air transports, 92.Annex and auxiliary activities to transport
29.Communications	94.Postal and courier activities, 95.Telecommunications
30.Banking and financial services and insurance	96.Financial, banking and insurance activities
31.Real estate	97.Real asset transactions
32.Business services	98.IT and related activities, 99.Research and development, 100.Activities of architecture, engineering and other technical services, 101.Other services to companies
33.Public Administration	102.Public administration and defense, compulsory social assistance
34.Community, social, personal services	103.Education, 104.Health and social assistance, 105.Other activities of collective, social and personal services

RNIS: Romanian National Institute of Statistics.

Official forecast estimates

	Symbols	2009	2010	2011	2012	2013	2014
GDP, current prices, bill. RON	GDPO1	497.32	525.11	563.13	610.27	663.67	724.59
	GDPO2	495.26	527.94	567.01	614.64		
	GDPO3	491.27	524.13	563.64	611	664.28	
GDP index, current prices	IGDPO1	0.98761	1.05626	1.07315	1.08470	1.08785	1.09198
	IGDPO2	0.982	1.066	1.074	1.084		
	IGDPO3	0.95501	1.06669	1.07630	1.08470	1.08785	
GDP index, constant prices	IGDPcO1	0.923	1.005	1.024	1.037	1.044	1.052
	IGDPcO2	0.93	1.013	1.024	1.037		
	IGDPcO3	0.929	1.013	1.027	1.037	1.044	
Household consumption index, constant prices	ICHcO1	0.885	1.018	1.021	1.035	1.04	1.048
	ICHcO2	0.894	1.038	1.028	1.038		
	ICHcO3	0.908	1.016	1.02	1.034	1.041	
Gross fixed capital formation index, constant prices	IGFCFcO1	0.86	1.02	1.053	1.067	1.078	1.082
	IGFCFcOO2	0.8	0.99	1.05	1.067		
	IGFCFcO3	0.747	1.017	1.055	1.067	1.08	
Public consumption index, constant prices,	ICGrO1	0.96	0.96	0.98	1.02	1.015	1.02
	ICGrO2	0.973	0.965	0.987	1.019		
	ICGrO3	1.012	0.96	0.98	1.02	1.015	
Export of goods and services, bill. EUR	XGSEO1	33.2	34.01	35.52	37.71	40.37	43.9
	XGSEO2*	36.161	37.355	38.251	39.552		
	XGSEO3	36.116	39.06	41.95	44.79	47.96	
Import of goods and services, bill. EUR	MGSEO1	40.22	41.49	43.69	46.96	50.95	55.82
	MGSEO2*	44.392	45.99	47.507	50.12		
	MGSEO3	43.17	45.2	48.3	51.83	56.26	
The deficit of the trade balance (% of GDP)	rNXO1	-0.06	-0.061	-0.061	-0.063	-0.065	-0.067
	rNXO3	-0.0608	-0.049	-0.046	-0.047	-0.051	
Labor force, mill. pers.	LFO1	9.93	9.955	9.995	10.035	10.09	10.155
	LFO2*	9.959	9.969	10.039	10.089		
	LFO3	9.952	10.02	9.95	9.99	10.04	

	Symbols	2009	2010	2011	2012	2013	2014
Employment, mill. pers.	EO1	9.092	9.185	9.25	9.33	9.42	9.52
	EO2	9.088	9.179	9.243	9.326		
	EO3	9.274	9.22	9.28	9.36	9.45	
Unemployment rate	ruO1	0.08439	0.07735	0.07454	0.07025	0.06640	0.06253
	ruO2	0.08746	0.07925	0.07929	0.07563		
	ruO3	0.06813	0.07984	0.06734	0.06306	0.05876	
GDP deflator	PGDPO1	1.07	1.051	1.048	1.046	1.042	1.038
	PGDPO2	1.056	1.053	1.048	1.046		
	PGDPO3	1.028	1.053	1.048	1.046	1.042	
Consumption price index	CPIO1	1.056	1.037	1.032	1.028	1.025	1.023
	CPIO2	1.0559	1.037	1.032	1.028		
	CPIO3	1.0559	1.041	1.032	1.028	1.025	
Exchange rate, RON/EUR	EREO1	4.25	4.25	4.2	4.15	4.1	4.05
	EREO3	4.2373	4.15	4.1	4.07	4.05	
The general consolidated budget deficit (% of GDP)	cbbO2	-0.08	-0.064	-0.045	-0.03		

*Author's estimations based on derived indicators.

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