

1 A DESIRABLE SCENARIO FOR THE ROMANIAN ECONOMY DURING 2008-2013¹

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Abstract

The paper presents a possible medium-run evolution of the Romanian economy. It is organised in two chapters. The first chapter discusses the conceptual framework of the macromodel used for simulations, insisting on the behavioural (stochastic) relationships and the sectoral decomposition of the global output (based on input-output techniques). The specification is concordant (as much as possible) with the standard theorems. It takes also into account the specific features of the Romanian economy. The following blocks are examined: a) labour market, b) production function, c) domestic absorption, d) foreign trade, e) prices and exchange rate, f) interest rate, g) branch structure, and h) main interactions of the macromodel.

The second chapter describes a medium-run scenario (2008-2013) for the Romanian economy, in comparison with the official forecasts (published by national authorities). This scenario is built according to several qualitative premises, as follows: a) the inflationary expectations are gradually diminishing, and the money supply accommodates such a tendency; b) the National Bank of Romania is continuing a prudent policy with respect to the non-governmental credit, which leads to a limited expansion of the domestic demand; c) the foreign capital inflows are relatively stable; d) the public budget coefficients are aligned to the parameters of the last Government economic programmes. The real convergence problem is also analysed.

Keywords: macromodel, econometric relationship, scenario

JEL Classification: C5, E2-E6, H6

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The present paper uses the 2005 version of the Romanian macroeconomic model (Dobrescu 2006, 2007), which has been amended in order to take into consideration the most recent evolutions of the internal and external business environment. It is organised in two chapters. The first discusses the conceptual framework of the macromodel used for simulations, insisting on the main behavioural relationships and the sectoral decomposition of economy (based on input-output techniques). A medium-

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run scenario (2008-2013) for the Romanian economy is characterised in detail in the second chapter. These simulation results are compared with the official forecasts.

Chapter I: The Macromodel Used in Simulations

The macromodel represents a system of behavioural (stochastic) equations, combined with the corresponding accounting relationships (identities, technical definitions, equilibrium conditions). The specification is concordant (as much as possible) with the standard assumptions and theorems. It takes also into account the specificities of the Romanian economy. The presentation will be organised into the following sections: A. Labour Market, B. Production Function, C. Domestic Absorption, D. Foreign Trade, E. Prices and Exchange Rate, F. Interest Rate, G. Sectoral Decomposition, and H. Main Interactions of the Macromodel.

A. Labour Market

Three major relationships (critical for the functioning of the labour market mechanisms) will be analysed: the labour force participation rate, the unemployment rate, and the rate of labour income per employed person.

1. The labour force participation rate is determined as a ratio of labour force to population over 15 years.

1.1. The rate (prap) is significantly connected to employment (E). The respective series will be characterised by a positive correlation coefficient of 0.9337. The Granger causality test also has suggested a possible dependence of the labour force participation rate on the previous evolution of employment.

1.2. The macromodel specification contains the first lag for prap and the second one for E, which reflects the relatively high inertia of the labour market processes. Therefore:

$$\underset{(+)}{\text{prap}} = f(\underset{(+)}{\text{prap}}(-1), \underset{(+)}{E}(-2)) \quad (\text{I.A.1.1})$$

The signs of estimated econometric coefficients are shown under the corresponding explanatory factors.

2. The unemployment rate (ru) is the second relationship adopted for the labour market. It is defined as:

$$\text{ru} = (\text{LF} - \text{E}) / \text{LF} \quad (\text{I.A.2.1})$$

where: LF – labour force, million persons; and

E – employment, million persons.

2.1. The preliminary data analysis has shown a strong correlation of this rate with the unit labour cost rate (rIULC):

$$\text{rIULC} = \text{IULC} - 1 \quad (\text{I.A.2.2})$$

$$\text{IULC} = \text{LI} / (\text{LI}(-1) * \text{IGVAc}) \quad (\text{I.A.2.3})$$

$$\text{IGVAc} = \text{GVA} / (\text{GVA}(-1) * \text{PGDP}) \quad (\text{I.A.2.4})$$

where: LI – total labour income, billion RON;

GVA – gross value added, current prices, billion RON;

PGDP – gross domestic product deflator (previous year=1).

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Consequently, the following relationship is included in the system:

$$ru=f(ru(-1), rIULC) \quad (I.A.2.5)$$

(+) (+)

2.2. Formulated as a simple linear relationship ($ru=a_1*ru(-1)+a_2*rIULC$), the expression (I.A.2.5) allows for several interesting transformations. Thus:

$$(LF-E)/LF=a_1*ru(-1)+a_2*(LI/(LI(-1)*IGVAc)-1) \quad (I.A.2.6)$$

$$LF-E=LF*(a_1*ru(-1)+a_2*(LI/(LI(-1)*IGVAc)-1)) \quad (I.A.2.7)$$

$$-E=LF*(a_1*ru(-1)-a_2-1)+LF*a_2*LIE*E/(LI(-1)*IGVAc) \quad (I.A.2.8)$$

where LIE represents labour income per employed person (thousand RON).

$$E=-LF*(a_1*ru(-1)-a_2-1)-LF*a_2*LIE*E/(LI(-1)*IGVAc) \quad (I.A.2.9)$$

Substituting:

$$A1=-LF*(a_1*ru(-1)-a_2-1)$$

$$A2=LF*a_2/(LI(-1)*IGVAc)$$

$$E=A1-A2*LIE*E \quad (I.A.2.10)$$

$$E=A1/(1+A2*LIE) \quad (I.A.2.10a)$$

The parameters A1 and A2 have been computed for different levels of LF, IGVAc, and labour income per employed person. The simulations confirmed a negative relationship of employment and labour income. Therefore, the equation (I.A.2.10a) can be admitted as a labour demand relationship.

3. The macromodel includes also a labour income equation.

3.1. The nominal labour income per employed person, as an annual rate, is considered as the dependent variable

$$rLIE=ILIE-1 \quad (I.A.3.1)$$

$$ILIE=LIE/LIE(-1) \quad (I.A.3.2)$$

Two explicative factors have been selected.

- The variation of the unemployment rate ($\Delta ru=ru-ru(-1)$) is the first.
- The inflation rate (rCPI) is the other short run determinant.

$$rCPI=CPI-1 \quad (I.A.3.3)$$

where CPI is the consumer price index.

Consequently, the specification

$$rLIE=f(rLIE(-1), \Delta ru, rCPI) \quad (I.A.3.4)$$

(+) (-) (+)

has been retained.

The coefficient of rCPI is positive, but <1, which can be explained by the circumstance that a post factum indexation of wages has been practiced until now. The parameter of Δru is characterised by a high modulus; it means that – despite the appearances – the market mechanisms become more and more influent in the labour field.

3.2. The previous exercise is repeated, for a linear relationship (I.A.3.4), that is $rLIE=a_3*rLIE(-1)+a_4*\Delta ru+a_5*rCPI$. Therefore, we have:

$$LIE/LIE(-1)-1=a_3*rLIE(-1)+a_4*((LF-E)/LF-ru(-1))+a_5*rCPI \quad (I.A.3.5)$$

$$LIE/LIE(-1)-1=a_3*rLIE(-1)+a_4-a_4*E/LF-a_4*ru(-1)+a_5*rCPI \quad (I.A.3.6)$$

$$E=LF*(a_3*rLIE(-1)+a_4-a_4*ru(-1)+a_5*rCPI+1)/a_4-LIE*LF/(LIE(-1)*a_4) \quad (I.A.3.7)$$

and substituting:

$$B1 = LF \cdot (a_3 \cdot r \cdot LIE(-1) + a_4 - a_4 \cdot ru(-1) + a_5 \cdot rCPI + 1) / a_4$$

$$B2 = LF / (LIE(-1) \cdot a_4)$$

$$E = B1 - LIE \cdot B2 \quad (\text{I.A.3.7a})$$

The parameters B1 and B2 were also computed for different values for LF, rCPI, and labour income per employed person. The simulations have revealed an ascending slope of employment against labour income, which is typical for a labour supply curve.

4. Combining the equations (I.A.2.10a) and (I.A.3.7a), the equilibrium level results from:

$$A1 / (1 + A2 \cdot LIE) = B1 - LIE \cdot B2 \quad (\text{I.A.4.1})$$

$$B2 \cdot A2 \cdot LIE^2 - (B1 \cdot A2 - B2) \cdot LIE + (A1 - B1) = 0 \quad (\text{I.A.4.1a})$$

B. Production Function

1. The proposed production function tries to reconcile the classical framework with recent modelling approaches. Normally, this attempt takes also into account the specific features of the Romanian economy.

1.1. The starting point is the usual production function with capital and labour, expressed as yearly indices. Since the series for capital has been estimated by indirect methods, this indicator will be denoted "conventional tangible fixed assets". Therefore,

$$IGDPc = IE^\alpha \cdot ICKc^{(1-\alpha)} \cdot ITFP \quad (\text{I.B.1.1})$$

where: IGDPc – the index of gross domestic product at constant prices;

IE – the index of employment;

alpha – the elasticity of output with respect to labour;

ICKc – the index of conventional tangible fixed assets at constant prices; and

ITFP – the index of the total factor productivity.

Admitting that IE is determined by labour market equations, the production function involves estimation of ICKc, alpha, and ITFP.

1.2. The index of tangible fixed assets is defined as follows:

$$ICKc = (CK(-1) \cdot (1 - dfa) + GFCFc) / CK(-1) = 1 - dfa + GFCFc / CK(-1) \quad (\text{I.B.1.2})$$

where: CK(-1) – conventional tangible fixed assets of previous year in prices of the same year;

dfa – the depreciation rate of the tangible fixed assets;

GFCFc – the gross fixed capital formation at previous year prices (the value of gross fixed capital formation in current prices is deflated by the corresponding price index, noted PK).

Capital is interpreted in its largest sense, including here not only technological equipment and direct productive buildings, but also infrastructure and other tangible fixed assets, taking into account that all of them influence the global economic performance. We maintain the assumption that the production function may include the real capital stock as such, without corrections derived from a disputable (and not clearly defined) normal utilization rate.

1.3. As in other similar approaches, the share of labour income in gross value added defines the alpha coefficient.

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1.4. Two categories of determinants are involved in the estimation of the total factor productivity: the level of alpha itself and, on the other hand, several variables, which essentially influence the technologies and the utilisation rate of productive capacities.

2. Regarding alpha, it seems realistic to assume that:

- when actual alpha is less than its long-run (equilibrium) level, the labour force is not stimulated to reach the highest potential output;
- conversely, if alpha surpasses such an optimal level, firms are obliged to restrain their activity, which has also negative repercussions on total factor productivity.

2.1. Starting from these considerations, the econometric relationship for the index of total factor productivity (ITFP) is built according to the following restrictions:

- if $\alpha=0$ or $\alpha=1$ (that is when the production would be nonsensical for the labour force or, respectively, for capital), ITFP tends to zero;

- ITFP depends non-linearly on alpha, admitting a maximum when alpha is equal to its long-run (equilibrium) level.

The following simple functional form for ITFP would correspond to such restrictions:

$$\text{ITFP} = (\alpha - \alpha^a)^{+/-} \cdot \text{RV}^+ \quad (\text{I.B.2.1})$$

where RV captures the effect of the rest of variables. The expression $(\alpha - \alpha^a)$ positively or negatively influences the total factor productivity, depending on the level of alpha.

The first adopted assumption (when $\alpha=0$ or $\alpha=1$, $\text{ITFP}=0$) is automatically observed.

The second one is also satisfied for $a>1$. The question is: How to determine parameter a?

The long-run (equilibrium) level of alpha is denoted by α_{fao} . It is estimated separately using a specific procedure. From

$$\partial \text{ITFP} / \partial \alpha = 0 \quad (\text{I.B.2.2})$$

we have:

$$1 - a \cdot \alpha_{\text{fao}}^{a-1} = 0 \quad (\text{I.B.2.3})$$

$$1/a = \alpha_{\text{fao}}^{a-1} \quad (\text{I.B.2.4})$$

$$(1/a)^{1/(a-1)} = \alpha_{\text{fao}} \quad (\text{I.B.2.5})$$

2.2. Unfortunately, reliable data for alpha are not yet available. Under such conditions, two information sources have been considered.

- The first is the share of the registered (included in input-output tables) labour income in gross value added (α_1). There are, however, some reasons to think that α_1 underestimates the real contribution of labour factor to output. One of them comes from the difficulties to evaluate this contribution in the so-called "unobservable" economy, including the production of households for self-consumption (relatively important in Romanian economy).
- That is why a second source of data was also used: the gross disposable income of households (the corresponding share in gross value added is denoted by α_2). In contrast to α_1 , α_2 – which contains several non-labour revenues – clearly overestimates the searched coefficient.

Consequently, our final choice was a combined solution, consisting from the extension of alpha1 with a part of alphax (defined as the difference between alpha2 and alpha1). Formally:

$$\alpha = \alpha_1 + d \cdot \alpha_x \quad (\text{I.B.2.6})$$

where $\alpha_x = \alpha_2 - \alpha_1$.

The proposed procedure is built on the assumption that alpha cannot significantly change in two successive intervals. Such a hypothesis seems reasonable from a socio-economic point of view. It means that the difference between alpha and alpha(-1) must be minimised. The following operations do not need special explanations.

$$\sum (\alpha - \alpha(-1))^2 = \min \quad (\text{I.B.2.7})$$

$$\sum [(\alpha_1 + d \cdot \alpha_x) - (\alpha_1(-1) + d \cdot \alpha_x(-1))]^2 = \min \quad (\text{I.B.2.8})$$

$$\sum (\alpha_1 + d \cdot \alpha_x - \alpha_1(-1) - d \cdot \alpha_x(-1))^2 = \min \quad (\text{I.B.2.9})$$

$$\sum (\Delta \alpha_1 + d \cdot \Delta \alpha_x)^2 = \min \quad (\text{I.B.2.10})$$

$$2 \cdot \sum (\Delta \alpha_1 + d \cdot \Delta \alpha_x) \cdot \Delta \alpha_x = 0 \quad (\text{I.B.2.11})$$

$$\sum \Delta \alpha_1 \cdot \Delta \alpha_x + d \cdot \sum \Delta \alpha_x^2 = 0 \quad (\text{I.B.2.12})$$

$$d = -\frac{\sum \Delta \alpha_1 \cdot \Delta \alpha_x}{\sum \Delta \alpha_x^2} \quad (\text{I.B.2.13})$$

The resulted d has been used to estimate alpha, the extended share of labour income in GVA, as a statistical series.

2.3. The macromodel generates estimations for the registered labour income (LI) and gross value added, which allows to compute alpha1. The production function operates, however, with the parameter alpha, namely extended share of labour income in GVA. In order to approximate it, the derived coefficients are subtracted:

$$a_1 \alpha = \alpha_1 / \alpha, \quad (\text{I.B.2.14}) \text{ and}$$

$$\Delta a_1 \alpha = a_1 \alpha - a_1 \alpha(-1) \quad (\text{I.B.2.15})$$

The preliminary data analysis showed that the first order difference of alpha1 is connected, at least on medium term, to the rate of employment ($rIE = IE - 1$). Such a correlation could be explained through the influence of economic growth (reflected by rIE) on the ratio between "observable" and "unobservable" sectors of the national economy. Besides, the series $\Delta a_1 \alpha$ presents frequent oscillations due, probably, to the specific context of the transition processes. The following relationship has been retained:

$$\Delta a_1 \alpha = f(rIE, a_6^t) \quad (\text{I.B.2.16})$$

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The series t is a time trend, which has the value 1 for 1989, 2 for 1990 and so on. The coefficient a_6 is negative and under unity in modulus. It captures the mentioned oscillations and, in addition, indicates that the erratic behaviour of the $\Delta a_1 \alpha$ series is disappearing step-by-step, which may be interpreted as a temporary characteristic of transition.

Consequently, the extended share of labour income in GVA (alpha) is estimated as follows:

$$a_1 \alpha = \Delta a_1 \alpha + a_1 \alpha(-1) \quad (\text{I.B.2.17})$$

$$\alpha = \alpha_1 / a_1 \alpha \quad (\text{I.B.2.18})$$

3. The total factor productivity has been determined as an index using the relationship:

$$ITFP = IGDPc / (IE^\alpha \cdot ICKc^{(1-\alpha)}) \quad (\text{I.B.3.1})$$

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For the determination of ITFP, the following factors are included:

- the level of alpha itself - as we have mentioned;
- the intensity of the investment process;
- the demand pressure; and
- the effect of institutional changes.

3.1. Regarding alpha, we must first estimate its long-run (equilibrium) level (alpha₀). An equation for the first order differences of alpha (denoted by Δalpha) is estimated:

$$\Delta\alpha = a_7 - a_8 * \alpha(-1) \quad (\text{I.B.3.2})$$

the regression estimates are:

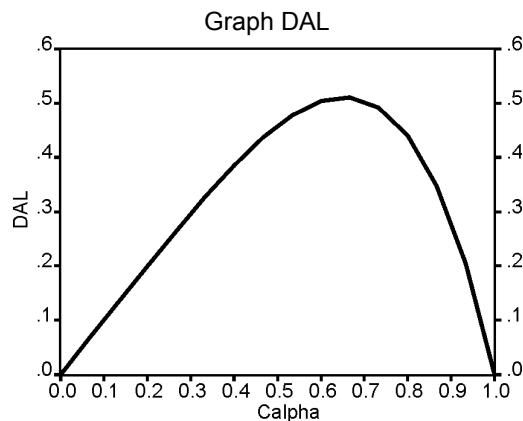
$$a_7 = 0.29661; \text{ and}$$

$$a_8 = 0.45366.$$

For Δalpha=0, we obtain alpha₀=0.653821, which is close enough to the average alpha registered in consolidated market economies. Defined as in (I.B.2.5), the parameter a is equal to 4.58235724. The above hypotheses regarding alpha are illustrated by the Graph DAL, which presents the function:

$$\text{DAL} = \alpha - \alpha^{4.58235724} \quad (\text{I.B.3.3})$$

computed for a complete alpha series (from 0 to 1), de by noted Calpha.



3.2. The investment intensity has a decisive role in the technological improvement of the production of goods and services. It is approximated by the rate, in real terms, of the gross fixed capital formation (rIGFCFc):

$$\text{IGFCFc} = \text{GFCF} / (\text{GFCF}(-1) * \text{PK}) \quad (\text{I.B.3.4})$$

$$r\text{IGFCFc} = \text{IGFCFc} - 1 \quad (\text{III.B.3.5})$$

where: GFCF – gross fixed capital formation, current prices, bill. RON;

PK – price index of tangible fixed assets (previous year=1).

Due to the delay of the positive action of investments on ITFP, the rate, in real terms, of the gross fixed capital formation is included as a geometrical moving average:

$$\text{AIGFCFc} = (\text{IGFCFc}(-1) * \text{IGFCFc})^{(1/2)} \quad (\text{I.B.3.6})$$

$$r\text{AIGFCFc} = \text{AIGFCFc} - 1 \quad (\text{I.B.3.7})$$

3.3. As we have noticed, the stock of capital is introduced as such in the production function, independently of the degree in which it is covered by orders (as we already mentioned). However, it would be difficult to reject a possible link between the demand pressure and total factor productivity because of the influence of this pressure on the utilisation rate of capacities.

The domestic demand pressure (DDP) is defined thus:

$$IDAD=DAD/DAD(-1) \quad (I.B.3.8)$$

$$IGDP=GDP/GDP(-1) \quad (I.B.3.9)$$

$$DDP=IDAD/IGDP \quad (I.B.3.10)$$

$$rDDP=DDP-1 \quad (I.B.3.11)$$

where: DAD – domestic absorption, current prices, billion RON;

GDP – gross domestic product, current prices, billion RON.

Normally, the demand pressure does not affect immediately the utilisation rate of productive capacities; its effect becomes more visible in the subsequent period. Consequently, the first lag of this factor will be included in specification.

3.4. A positive correlation has been also identified between the total factor productivity and unemployment rate (ru), which probably reflects the pressing influence of the last on labour intensity of the employed workers. A moving arithmetical average has been adopted:

$$maru=(ru(-1)+ru)/2 \quad (I.B.3.12)$$

3.5. The influence of the transitional reforms is captured by the time trend. The Hodrick-Prescott filter suggests that the initial unfavourable effects of institutional changes disappear quickly enough.

The constant is included to capture the trend of total factor productivity.

3.6. The following specification is, therefore, adopted:

$$ITFP=f(\alpha, rAIGFCFc, rDDP(-1), maru(-1), a_9/t, c) \quad (I.B.3.13)$$

$$\begin{matrix} (+/-) & (+) & (+) & (+) \end{matrix}$$

The sign of a_9 is negative, which proves the positive influence of institutional changes on global efficiency of the Romanian economy. This influence is, however, diminishing gradually.

C. Domestic Absorption

In this block, the macromodel operates with three behavioural relationships: household consumption (including private administration), public consumption, and gross fixed capital formation.

1. Special attention has been paid to the private consumption, as the main component of domestic absorption. Usually, the macromodelling practice relates it to the current income (represented frequently by the disposable income) and the interest rate. The present version of the Romanian macromodel also uses these explanatory variables.

Initially, we estimated econometrically the final consumption of households in current prices (CH), starting from:

$$IYD=YD/YD(-1) \quad (I.C.1.1)$$

$$rIYD=IYD-1 \quad (I.C.1.2)$$

$$ICH=CH/CH(-1) \quad (I.C.1.3)$$

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$$rICH=ICH-1 \quad (I.C.1.4)$$

where: YD – disposable income, current prices, billion RON;

CH – household consumption, current prices, billion RON.

Taking into account the available information, disposable income is approximated by the sum:

$$YD=GDP-(BR-TR)+NOCAE*ERE$$

where: GDP – gross domestic product, current prices, billion RON;

BR – general consolidated budget revenues, billion RON;

TR - government transfers, billion RON, which includes general consolidated budget expenditures for social protection.

However, the Granger causality test revealed no relationships among the variables.

1.1a. As a result, the values of disposable income and of final consumption of households in real terms are used. As we shall see, for similar reasons, in the case of gross fixed capital formation, the solution will be different. For the private consumption, we have:

$$IYDc=IYD/PGDP \quad (I.C.1.5)$$

$$rIYDc=IYDc-1 \quad (I.C.1.6)$$

$$ICHc=ICH/CPI \quad (I.C.1.7)$$

$$rICHc=ICHc-1 \quad (I.C.1.8)$$

where: PGDP - gross domestic product deflator;

CPI – consumer price index.

The correlation between $rICHc$ and $rIYDc$ is positive (0.641407).

1.1b. The interest rate is considered as an annual change (vIR):

$$vIR=IR-IR(-1) \quad (I.C.1.9)$$

where: IR – reference interest rate of National Bank of Romania.

The correlation coefficient between $rICHc$ and vIR is -0.595247.

1.1c. The first lag of consumption is also included as an explanatory variable.

1.2. Therefore, the following relationship has been estimated:

$$rICHc=f(rIYDc, vIR, rICHc(-1)) \quad (I.C.1.10)$$

(+) (-) (+)

2. The public consumption (CG) is determined in relation with the general consolidated budget expenditures (BE) and government transfers (TR).

2.1. With this aim, the coefficient

$$ccg1=CG/(BE-TR) \quad (I.C.2.1)$$

is computed.

The Hodrick-Prescott filter indicates an ascending trend of this variable.

Obviously, such a tendency cannot continue unlimitedly.

2.2. That is why the following specification has been adopted:

$$ccg1=f(a_{10}, a_{11}/t) \quad (I.C.2.2)$$

(+) (-)

The coefficient a_{11} reflects the increasing trend of $ccg1$, while the first approximates its asymptotical level.

3. We have an estimation of the final consumption (FC), by summing the consumption of households and the public consumption.

4. In the case of the Romanian economy, investment is correlated with three explanatory variables: disposable income, interest rate, and foreign capital inflows.

4.1a. The interaction between the disposable income and the rate of gross fixed capital formation will be presented in current prices (rIGFCF) and in real terms (rIGFCFc):

$$IGFCF = GFCF / GFCF(-1) \quad (\text{I.C.4.1})$$

$$rIGFCF = IGFCF - 1 \quad (\text{I.C.4.2})$$

$$IGFCFc = IGFCF / PK \quad (\text{I.C.4.3})$$

$$rIGFCFc = IGFCFc - 1 \quad (\text{I.C.4.4})$$

where: GFCF – gross fixed capital formation, current prices, billion RON;

PK – price index of tangible fixed assets (previous year=1).

The Granger causality tests show that the nominal indicators reveal more clearly the connection between the disposable income and investments.

4.1b. Concerning the second factor, the variation in the reference interest rate of the National Bank of Romania (vIR) is considered. In this case we preferred again the nominal indicators.

4.1c. The gross fixed capital formation has also been studied in correlation with the index of foreign direct and portfolio investment.

$$IFDPIE = FDPIE / FDPIE(-1) \quad (\text{I.C.4.5})$$

$$rIFDPIE = IFDPIE - 1 \quad (\text{I.C.4.6})$$

where: FDPIE – foreign direct and portfolio investment, billion EUR.

4.2. The gross fixed capital formation is, therefore, estimated as follows:

$$rIGFCF = f(rIYD, vIR, rIFDPIE) \quad (\text{I.C.4.7})$$

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5. The change in inventories is computed as a residual.

6. The equations concerning output and gross capital formation have been combined as a mini-system in order to examine the market equilibrium of goods and services. The simulations revealed a normal slope of IS curve.

D. Foreign Trade

1. The transition from centrally-planned to market economy determined deep changes in the exports and imports – in their geographical orientation and sectoral structure, in the foreign balance itself. The increase in openness of the Romanian economy was not a smooth process, registering important irregularities. Despite this evolution, some more or less stable interdependencies can be observed.

2. In the case of export, three explanatory variables have been analysed. We mention that this indicator refers to all transactions (with goods and services).

2.1a. The foreign demand is approximated through the index of the volume of world trade (IWTc).

2.1b. In the case of the Romanian economy, the influence of import on exports is also significant. The Granger causality tests show a clear dependence of rIXGSE on eIMGSE.

$$rIXGSE = IXGSE - 1 \quad (\text{I.D.2.1})$$

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$$IXGSE=YGSE/YGSE(-1) \quad (I.D.2.2)$$

$$rIMGSE=IMGSE-1 \quad (I.D.2.3)$$

$$IMGSE=MGSE/MGSE(-1) \quad (I.D.2.4)$$

where: XGSE - export of goods and services, billion EUR;

MGSE - import of goods and services, billion EUR.

This dependence comes from the fact that the Romanian export industries are essentially based on imported raw materials and energy resources.

2.1c. The competitiveness has been defined as follows:

$$rICOsdr=ICOsdr \quad (I.D.2.5)$$

$$ICOsdr=IERE*WTDsdr/PGDP \quad (I.D.2.6)$$

$$IERE=ERE/ERE(-1) \quad (I.D.2.7)$$

where: ERE – exchange rate, RON per EUR;

WTDsdr – world trade deflator, SDRs; and

PGDP – gross domestic product deflator.

Taking into account the structure of Romanian commercial changes, the world trade deflator in special drawing rights has been considered more adequate than other deflators.

Due to the gradual transition from a command to a market economy, the influence of international competitiveness on export manifested itself step-by-step.

2.2. Consequently, the following expression has been estimated:

$$rIXGSE=f(rIWTc, rIMGSE, (a_{12}+a_{13}/t)*rICOsdr) \quad (I.D.2.8)$$

(+) (+) (+) (-)

The econometric coefficients of $rIWTc$ and $rIMGSE$ are important, which means that the world demand and Romanian import exert a major impact on exports dynamics. As it was expected, the negative influence of specific transition circumstances decreases (the coefficient a_{13} is divided by increasing t), enforcing instead the positive effect of international competitiveness (coefficient a_{12}).

3. The import is also considered in an extended acceptance (goods and services together).

3.1a. Its dependence on the domestic absorption is present in the Romanian economy. This connection will be analysed through the following indicators:

$$rIFCc=IFCc-1 \quad (I.D.3.1)$$

$$IFCc=FC/(FC(-1)*CPI) \quad (I.D.3.2)$$

$$FC=CH+CG \quad (I.D.3.3)$$

$$rIGFCFc=IGFCFc-1 \quad (I.D.3.4)$$

$$IGFCFc=GFCF/(GFCF(-1)*PK) \quad (I.D.3.5)$$

where: CH – households final consumption, current prices, billion RON;

CG – public consumption, current prices, billion RON;

CPI – consumer price index (previous year=1);

GFCF – gross fixed capital formation, current prices, billion RON,

PK – price index of tangible fixed assets (previous year=1).

In the import specification, the annual rates ($rIMGSE$) are used.

$$PRC * cp * (Sc + kc^2) / (Sc + kc) = 1 \quad (I.E.4.10)$$

4.2. Certainly, we would be able to estimate econometrically only one price index (rCPI or rPK) and compute the other from their accounting relationship with PGDP.

- If the formula of CPI is given, the resulted price index of tangible fixed assets (PKC) would be:

$$PKC = (PGDP - shch * CPI_{eq}) / shgfcf \quad (I.E.4.11)$$

- Symmetrically, if the formula of PK is given, we should have:

$$CPIC = (PGDP - shgfcf * PKEq) / shch \quad (I.E.4.12)$$

- 4.3. Our final option was decided after a comparative analysis of these possible approaches. The relative deviation of derived series from original ones has indicated that the option which uses the corrective coefficient PRC was preferable; consequently, this was adopted in the macromodel.
- 5. In the case of the Romanian economy - besides the inertial effect - two factors were considered essential for the determination of the exchange rate: domestic inflation and foreign capital inflows.

5.1. In the statistical analysis, the yearly rates are again involved:

$$rIERE = IERE - 1 \quad (I.E.5.1)$$

$$IERE = ERE / ERE(-1) \quad (I.E.5.2)$$

$$\Delta PGDP = PGDP - PGDP(-1) \quad (I.E.5.3)$$

$$rINCINXE = INCINXE - 1 \quad (I.E.5.4)$$

$$INCINXE = NCINXE / NCINXE(-1) \quad (I.E.5.5)$$

$$NCINXE = NCINE + XGSE \quad (I.E.5.6)$$

$$NCINE = NOCAE + FDPIE \quad (I.E.5.7)$$

where: ERE – exchange rate, RON per EUR;

PGDP – gross domestic product deflator;

XGSE – export of goods and services, billion EUR;

NOCAE – net incomes and current transfers, billion EUR;

FDPIE – foreign direct and portfolio investment, billion EUR.

5.1a. The domestic inflation is represented by the first order difference of the gross domestic product deflator ($\Delta PGDP$).

5.1b. The foreign capital inflows (rINCINXE) include foreign direct and portfolio investment, net incomes and current transfers, and export of goods and services, all expressed in EUR.

5.2. The following specification has been adopted:

$$rIERE = f(rIERE(-1), \Delta PGDP, rINCINXE) \quad (I.E.5.8)$$

(+) (+) (-)

From the estimation a high value of the coefficient for rIERE(-1) was obtained, which can be considered as a consequence of a specific transition circumstance, namely the strong expectation of households and firms for the depreciation of the local currency. The current inflation plays also an important role. The most interesting is the parameter of rINCINXE, which suggests an increasing dependence of the Romanian economy on international financial markets.

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5.3. Based on the previous econometric equations the main (domestic and external) determinants of ICOSdr have been examined in detail. The simulations showed that an increasing pressure of internal aggregate demand negatively affects this indicator. Instead, such an effect is much more limited in the case of the gross domestic product deflator because of the growing nominal exchange rate induced by inflation. As expected, an accentuating external inflation clearly ameliorates the international competitiveness.

F. Interest Rate

The transition processes progressively enforced the functional role of the monetary variables.

1. Among them, the interest rate holds a particular place. Unfortunately, we had no relevant data concerning the commercial banking system, which developed slower in Romania. Experience from our previous studies indicates the series of the National Bank's reference interest rate as the most reliable information.

1.1. The present version of the Romanian macromodel includes inflation and real output as explanatory factors of the interest rate through their cumulative expression – nominal GDP. Thus the reference interest rate of NBR (IR) is correlated with rIGDP (=GDP/GDP(-1)-1).

1.2. The interest rate is also connected to the money supply through rIM2 (=M2/M2(-1)-1).

1.3. Taking into account the geographical structure of the commercial and financial flows concerning the Romanian economy, the short-term interest rate in advanced countries (STIRAE) has been considered relevant for the present version of the macromodel.

2. As a result, the following relationship has been retained:

$$IR=f(IR(-1), rIGDP, rIM2, STIRAE) \quad (I.F.1.1)$$

(+) (+) (-) (+)

3. The derived LM curve is characterised by a normal slope. Instead, simulations revealed a slope of IS curve almost horizontal, which reflects the high rigidity of the real economy to stimuli of the monetary policy. Three causes are probably responsible.

- For a relatively long period, many state companies tried to survive even with financial losses in order to preserve the existing jobs and avoid an excessive increase in unemployment.
- Some important sectors of the Romanian economy were compressed as a consequence of restructuring reforms independently of the interest rate and other monetary variables.
- The fracture between the real and nominal economies has existed, a long period during transition, by the above-mentioned monetary distortion, especially by arrears, as a perverse money substitute.

G. Sectorial Decomposition

The integration of the above described behavioural relationships with the input-output block raised some difficult problems, which resulted, in principle, from the impossibility to generate consistent sectoral supply-demand equations.

In the present version of the macromodel, the production function, the main components of domestic absorption and the foreign trade are computed as aggregate indicators at the level of the national economy. These estimations are defined concomitantly with the sectoral decomposition of the global output and of the final utilisation of resources.

1. Synthetically, the adopted solution consists in the following system:

$$GDP = GVA + NIT \quad (I.G.1.1)$$

where: GDP - gross domestic product, current prices, billion RON;
 GVA - gross value added, current prices, billion RON;
 NIT - net indirect taxes, billion RON.

$$NIT = VATO + CD - SUBP \quad (I.G.1.2)$$

where: VATO - value added tax, excises duties and other similar indirect taxes, billion RON;
 CD - custom duties, billion RON;
 SUBP - budget subsidies on goods, billion RON.

VATO, CD, and SUBP are computed using exogenous coefficients, based on fiscal policies.

$$UF = GDP + M \quad (I.G.1.3)$$

$$M = MGSE * ERE \quad (I.G.1.4)$$

where: UF - final resources, current prices, billion RON;
 M - import of goods and services, billion RON;
 MGSE - import of goods and services, billion EUR; econometric estimation;
 ERE - exchange rate, RON per EUR; econometric estimation.

$$GVA = \sum GVA_i \quad (I.G.1.5)$$

where: GVA_i - gross value added in sector i , current prices, billion RON; $i=1, 2, \dots, 6$.

The gross value added maybe obtained extracting from output the intermediary inputs:

$$GVA_i = Q_i * (1 - (a_{1i} + a_{2i} + a_{3i} + a_{4i} + a_{5i} + a_{6i})) \quad (I.G.1.6-11)$$

where: Q_i - output in sector i , current prices, billion RON; $i=1, 2, \dots, 6$;
 a_{ij} - input coefficients, $i, j=1, 2, \dots, 6$; econometric estimations.

The input coefficients are expressed in current prices, reflecting, therefore, not only technological changes, but also modifications in relative prices.

On the other hand, the output must be correlated with the structure of the total resources, as follows:

$$Q_i = DR_i - (shm_i * M + shnit_i * NIT) \quad (I.G.1.12-17)$$

where: DR_i - total resources of the sector i , current prices, billion RON; $i=1, 2, \dots, 6$;
 shm_i - share of the sector i in import, $i=1, 2, \dots, 6$; econometric estimations;
 $shnit_i$ - share of the sector i in the net indirect taxes, $i=1, 2, \dots, 6$; exogenous coefficients, based on fiscal policies.

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Total resources are distributed between final resources and intermediary inputs:

$$DR_i = UF_i + a_{i1} * Q_1 + a_{i2} * Q_2 + a_{i3} * Q_3 + a_{i4} * Q_4 + a_{i5} * Q_5 + a_{i6} * Q_6 \quad (I.G.1.18-23)$$

where: UF_i - final resources of the sector i , current prices, billion RON; $i=1,2,\dots,6$.

$$UF_i = shu_i * UF \quad (I.G.1.24-29)$$

shu_i – share of the sector i in final resources ($i=1,2,\dots,6$): econometric estimations.

The following equilibrium condition must be also valid:

$$DAD = UF - X \quad (I.G.1.30)$$

$$X = XGSE * ERE \quad (I.G.1.31)$$

with: DAD - domestic absorption, current prices, billion RON; econometric estimations;

X – export of goods and services, billion RON;

XGSE - export of goods and services, billion EUR; econometric estimation.

The identity I.G.1.30) closes this system.

2. Econometric relationships for input coefficients (a_{ij}), sectoral structure of imports (parameters shm_i) and final utilisation of resources (shares shu_i) were estimated. The coefficients $shnit_i$ (regarding the net indirect taxes) – as a fiscal instrument – are exogenous.

2.1. The econometric estimations of input coefficients (a_{ij}) are based on several hypotheses.

- Although the transition involves many transformations (changes in the sectoral structure of the economy, in relative prices, in technologies, etc.), it is assumed, nevertheless, that the input coefficients tend towards the long-run stable levels (like the consolidated functional market systems).
- This tendency is described by an autoregressive adaptive process, the differences between current coefficients and their long-run levels is influenced by past deviations.
- For uniformity, the same specification is adopted for all coefficients. Such a simplification is useful from computational reasons. It starts with:

$$a_{ij} = a_{ij}^* + b * (a_{ij}^* - a_{ij}(-1)) = a_{ij}^* * (1+b) - b * a_{ij}(-1) \quad (I.G.2.1)$$

where a_{ij}^* represent the long-run levels of a_{ij} .

It is assumed that $0 < |b| < 1$, which means that actual a_{ij} tend asymptotically towards a_{ij}^* . Correspondingly, the first order difference operator is defined as:

$$\Delta a_{ij} = a_{ij} - a_{ij}(-1) = a_{ij}^* * (1+b) - b * a_{ij}(-1) - a_{ij}(-1) = a_{ij}^* * (1+b) - (1+b) * a_{ij}(-1) = g - h * a_{ij}(-1) \quad (I.G.2.2)$$

where: $g = a_{ij}^* * (1+b)$ and

$$h = (1+b).$$

Therefore, $a_{ij}^* = g/h$.

With sufficiently long statistical series, in (I.G.2.2), $b \rightarrow 0$; consequently $h \rightarrow 1$ and $a_{ij}^* \rightarrow g$. Such a property has been illustrated using a sui generis Monte-Carlo experiment. Thus, statistical data onr Romania (1989-2001) were randomly mixed to obtain series of 1001 terms; all the horizontal vectors undergone this procedure, in order not to affect the structure of sectorial changes.

As expected, the levels of a_{ij}^* are similar in both applications - using either initial data or randomly extended series. The macromodel uses the estimates of g and h obtained from the basic sample.

2.2. The sectoral structure of imports and final utilisation of resources (parameters shm_i and shu_i) was defined starting from input-output tables. The estimation procedure was the one applied in the case of input coefficients. Evidently, the corrective coefficients were introduced in order to observe the restriction $\sum shm_i=1$ and $\sum shu_i=1$, respectively.

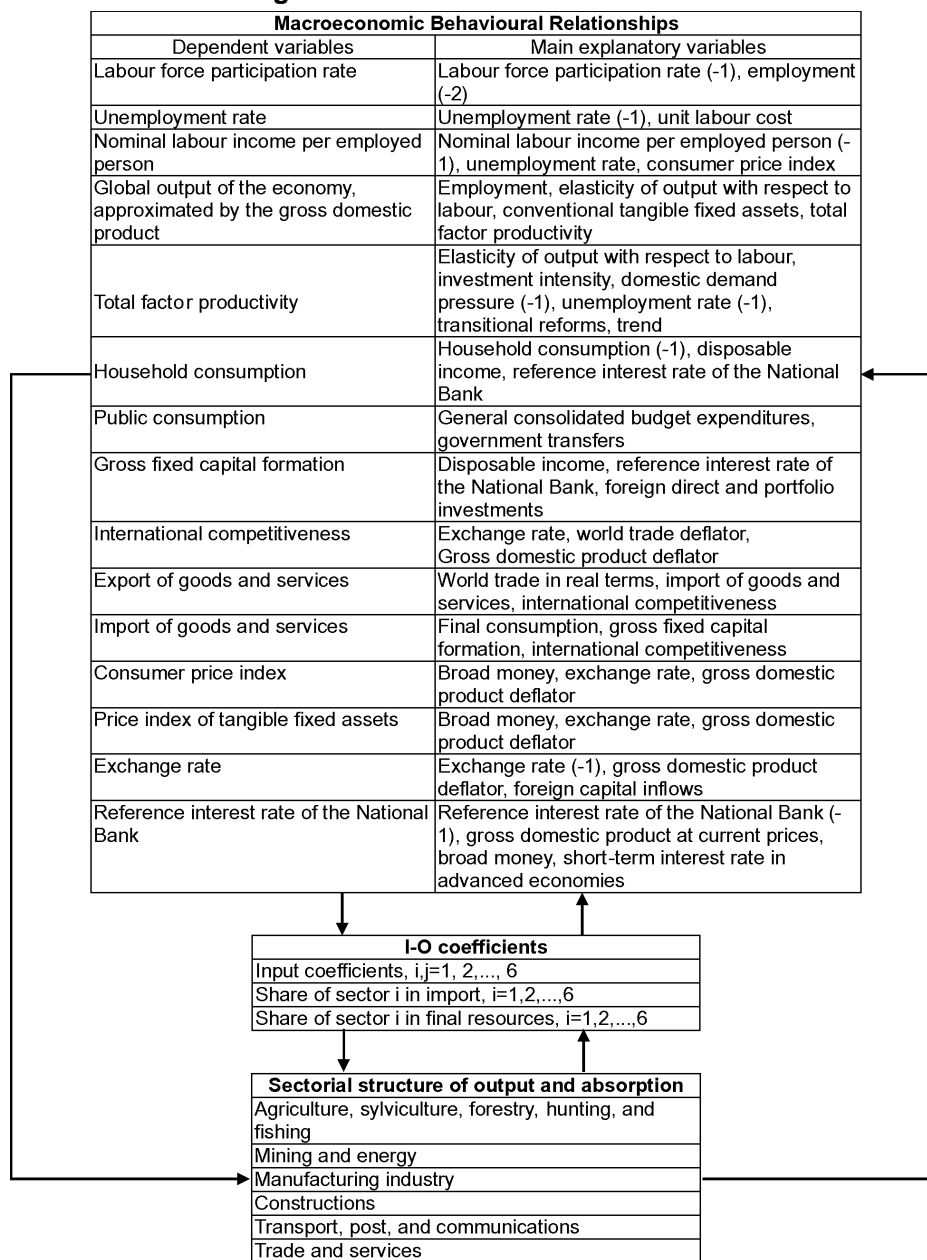
H. Main Interactions of the Macromodel

1. The main interactions of the macromodel are presented in Figure no. I.1.

The macroeconomic behavioural relationships and the input-output block are, therefore, integrated into a system of simultaneous equations. This combination enforces the interaction between the sectoral structure of the economy and aggregate indicators.

Regarding the behavioural relationships, we should remember that they were estimated under specific transition conditions. The statistical series are relatively short and often fractured, due to the deep restructuring processes and to the change of official statistics from the material production system to the recent national accounting one. As it is known, ADF test of stationarity does not offer conclusive results in the case of limited number of observations; as a rule, the series satisfying it were used. The Granger causality test was computed for one, two, and three lags. The simplest methods of estimation were also preferred. The multicollinearity effects could not be always avoided. The structural breaks in the evolution of some indicators have been handled by the inclusion of dummies. Obviously, all these circumstances weaken the stability of econometric coefficients that must be continuously updated.

The general scheme of the macromodel



2. The macromodel starts from the statistical data of previous years and several exogenous indicators, specific to the current year, which are separately obtained or extracted from other forecasts.

2.1. Among them, the expected index of disposable income (Y_D^{exp}) plays a leading role.

2.1a. Concerning the internal sources of nominal revenues, three aspects are important.

- Trade-unions exert a considerable pressure towards the modification of minimum wage legislation, in order to compensate for the already produced losses and the future potential losses induced by inflation. As a rule, such corrections have similar repercussions on all labour incomes.
- Usually, the main goal of business plans of firms is to maintain at least the achieved mark-up. This behaviour is encouraged by the existent distortions in the functioning of market mechanisms.
- The budgetary policy (public revenues and expenditures, government transfers) is transparent and defined in advance.

Summarising, there are premises to correctly estimate the most probable evolution of the nominal income from internal sources.

2.1b. The number and geographical distribution of the Romanian citizens working in other countries can be now accurately approximated. Consequently, the possible transfers from abroad could also be accurately forecasted.

2.1c. A supplementary remark: for the moment, Y_D^{exp} – as a separately established variable – seems to be a relevant attractor for the entire system of equations. In any case, the simulations operated until now have attested this assertion.

Undoubtedly, the future evolution of the Romanian economy can change the situation, possibly even substantially. It is important to outline that the proposed structure of the macromodel allows for switching to other targets - eventually more relevant.

2.2. The public budget is estimated using the following exogenous coefficients:

- $vato$ – the ratio (to GVA) of the value added tax, excises duties and other similar indirect taxes;
- cd – the ratio (to import of goods and services expressed in RON) of the custom duties;
- $dtobr$ – the ratio (to GDP) of the direct taxes and other revenues (excluding indirect taxes) of the general consolidated budget;
- $shnit_i$ – the share of the sector i in total net indirect taxes, $i=1,2,\dots,6$;
- ctr – the ratio (to general consolidated budget expenditures) of the government transfers;
- obe – the ratio (to GDP) of other expenditures (excluding government transfers) of the general consolidated budget;
- $subp$ – the ratio (to general consolidated budget expenditures) of the budget subsidies for goods.

These coefficients are defined as expert estimations, based on the corresponding statistical series and announced objectives of the Government macroeconomic policies.

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Deliberately, the version 2005 of macromodel contains a compendious structure of the general consolidated budget. Our intention is to considerably develop this section in the next variants.

2.3. The monetary policy is represented by the broad money (M2). There are sufficiently convincing empirical signs that the Central Bank has used powerful tools to effectively control this aggregate.

2.4. The international environment is characterised by the following parameters:

- NOCAE – net incomes and current transfers, billion EUR;
- FDPIE – foreign direct and portfolio investment, billion EUR;
- IWTc – yearly index of world trade, volume;
- WTDsdr – world trade deflator, SDRs;
- STIRAE – short-term interest rate in advanced economies.

These and other similar information can be obtained from the forecasts of the international financial institutions and of specialised research centres. As in the case of public budget indicators, the next versions of the macromodel could significantly extend the range of indicators regarding the international context (regional desegregation, state of the foreign financial markets, etc.).

2.5. The number of population over 15 years (AP) – involved in the determination of labour force – is extracted from the current demographic projections, elaborated by the National Institute for Statistics.

2.6. The rate of tangible fixed assets depreciation (dfa) is also set exogenously. It is approximated using statistical information and the expert estimations.

Chapter II: Possible Evolution of the Romanian Economy during 2008-2013

(A Desirable Scenario)

The macromodel has been used to estimate the short – and medium–run implications of internal policies and of changes in international environment. The present chapter describes a possible scenario for the Romanian economy during the period 2008-2013. The same time horizon has been chosen in official projections (published by the National Commission for Prognosis).

A. Computational Assumptions

1. The exogenous variables and some corrections of behavioural relationships were defined according to the following qualitative premises:

- a) inflationary expectations are gradually diminishing, so the index of the expected disposable income is also decreasing; and the money supply accommodates this tendency;
- b) the National Bank of Romania is continuing a restrictive policy regarding the non-governmental credit, which leads to a more limited expansion of the domestic demand;
- c) emigration has some negative consequences on the total factor productivity;
- d) foreign capital inflows are relatively stationary;

e) the sharp depreciation of RON especially against EUR (registered during the autumn-winter of 2007-2008) has been taken into account in the estimation of the exchange rate;

f) the public budget coefficients are aligned to the parameters of the last Government economic programmes; the structural funds received from the European Union are included explicitly in the general consolidated budget revenues;

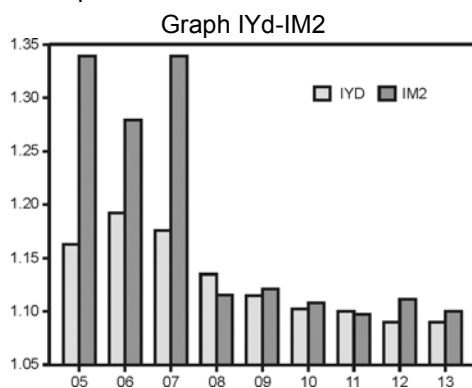
g) the rate of tangible fixed assets depreciation is constant;

h) the external environment is relatively stable,

i) the total population and the population over 15 years of age correspond to the current demographic projections;

j) some methodological correction coefficients are included in the determination of the public consumption and the unemployment rate.

2. The projection of disposable income and that of broad money are described in the Graph IYd-IM2; the corresponding yearly indices for 2008-2013 are presented comparatively with previous statistical data in order to emphasize the changes envisaged for the forecasted period.



Therefore, the disinflation is conceived to happen jointly with a prudent accommodating money supply policy.

3. As it is known, the National Bank of Romania – under the pressure of external deficits – has adopted some restrictive measures concerning the non-governmental credit, in order to limit the expansion of the domestic demand, especially of the private consumption. There are no reasons to anticipate that they will be weakened in the next period. Consequently, the relationship for the index of consumption of households (ICH) is correspondingly amended.

4. The global return of the economy was negatively influenced during the last period by several circumstances that were not taken into consideration when building the 2005 version of the macromodel. For instance, the productive potential of labour force was certainly affected by the massive (mainly after the accession in EU) emigration of relatively young and qualified workers and specialists. During the last years, the agriculture has been affected by unfavourable natural conditions, which have not only

A Desirable Scenario for the Romanian Economy during 2008-2013

immediate consequences, but lagged effects, too. At the same time, there are reasons to expect an improvement of the total factor productivity at the end of the forecasted period, as a result of intensive investments anticipated for the next years. Consequently, the equation of the index of total factor productivity (ITFP) is corrected downwards in the first part of this interval and slightly up-wards afterwards.

For the next period an increasing immigration is to be expected, which can supplementarily stress the labour market. The formula for registered unemployment is augmented by 0.01 for the second part of the interval (2011-2013).

5. The main scenario for 2008-2013 assumes an irreversible consolidation of the new market mechanisms that will allow Romania to become an attractive business environment and to successfully be integrated into European Union. There are reasons to consider that the foreign direct and portfolio investments (FDPIE) will maintain the present levels, despite the less favourable evolution of the international financial markets. In a similar way, the net transfers from abroad (NOCAE) will not decrease.

6. Generally, the parameters concerning the world trade index in real terms, world trade deflator, and short – term interest rate in advanced economies are kept at the current level. Certainly, such a stability of international conjuncture is, perhaps, a too simplified assumption. As a reference variant, it still is useful. Varying afterwards one or several of presented indicators could reveal significant information about the consequences of possible external breaks on the Romanian economy.

7. Due to changes in financial markets and the domestic macroeconomic disequilibria, RON has registered during the autumn-winter of 2007-2008 a sharp depreciation, especially against EUR. This shock has been reflected in the determination of the exchange rate for the next period.

8. The general consolidate budget revenues and expenditures are determined according to the parameters included in Table II.1.

Table II.1

General consolidated budget revenues and expenditures

Variables	Symbol	2008	2009	2010	2011	2012	2013
Revenues							
Ratio (to GDP) of the direct taxes and other revenues (excluding indirect taxes) of the general consolidated budget	dtobr	0.23	0.23	0.23	0.23	0.23	0.23
Ratio (to GVA) of the value added tax, excises duties and other similar indirect taxes	vato	0.135	0.135	0.135	0.135	0.135	0.135
Ratio (to import of goods and services expressed in RON) of the custom duties	cd	0.00469	0.00469	0.00469	0.00469	0.00469	0.00469
Structural funds of European Union, bill.	EUF	3	3.5	3.75	4	4.5	4.75

Variables	Symbol	2008	2009	2010	2011	2012	2013
EUR							
Expenditures							
Ratio (to general consolidated budget expenditures) of the government transfers	ctr	0.525	0.525	0.525	0.525	0.525	0.525
Ratio (to GDP) of other expenditures (excluding government transfers) of the general consolidated budget	obe	0.192	0.192	0.192	0.192	0.192	0.192
Ratio (to general consolidated budget expenditures) of the budget subsidies on goods	subp	0.04	0.02	0.01	0.005	0.005	0.008

As it was already mentioned, the structural funds received from EU are included explicitly in the general consolidated budget revenues. The main destination of these financial resources is economic development. Consequently, the equation of the gross fixed capital formation is supplemented by 0.85 of EU structural funds, translated into RON at model exchange rate.

The sectoral structure of the net indirect taxes, resulted from the last statistical input-output tables, do not significantly modify.

Generally, the main items of public budget expenditures (ctr and obe in Table II.1) are stable, at the level of 2008 budget projection. It was presumed a reduction in subsidies on goods (subp).

9. During the entire interval, the rate of tangible fixed assets depreciation is maintained at 0.075, acceptable for a restructuring economy.

10. The demographic indicators (Table II.2) correspond to the official forecast (of the National Commission for Prognosis).

Table II.2

Demographic variables

Indicators	Symbol	2008	2009	2010	2011	2012	2013
Total population, mill. persons	P	21.45	21.36	21.28	21.22	21.165	21.105
Population over 15 years, mill. persons	AP	18.29	18.3	18.31	18.33	18.34	18.35

11. Two methodological insertions are operated.

a) The behavioural relationships of the 2005 version of the macromodel are based on the statistical data for 1990-2004. But the series of the public consumption (CG) registers a break in 2006 when its level suddenly increased to 57 billion RON (from 20-25 billion RON). The expression of CG is multiplied by 2.25, as a correction coefficient.

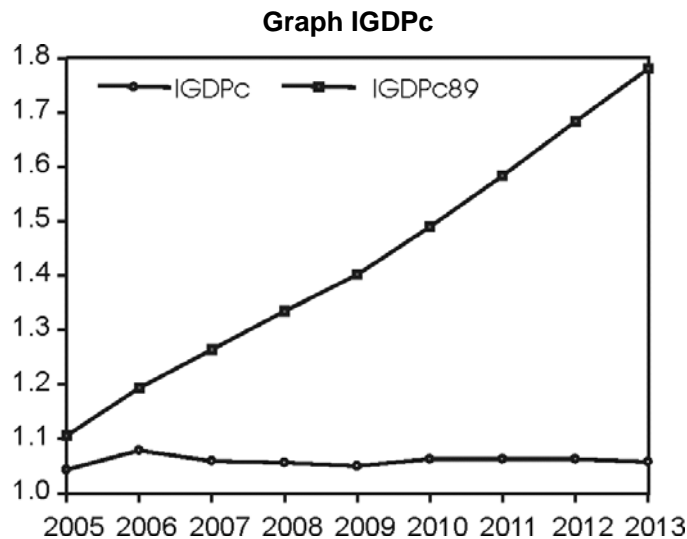
b) The definition of the unemployment rate is gradually moving towards the ILO's (International Labour Organization). The forecast elaborated by the National Commission for Prognosis estimated for Romania the following ratios between the

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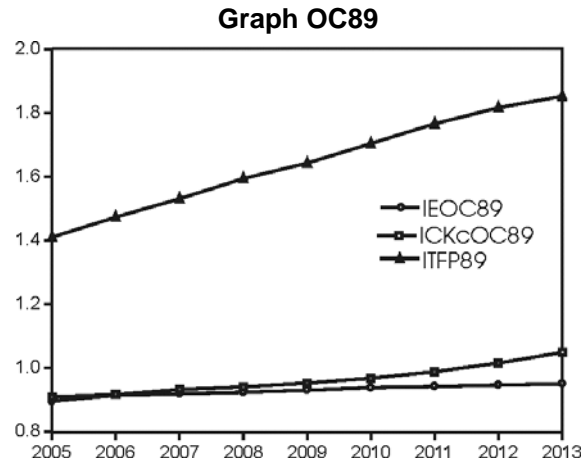
above unemployment rate the registered unemployment: 1.47697 in 2008, 1.47437 in 2009, 1.50209 in 2010, 1.48748 in 2011, 1.47392 in 2012, and 1.52019 in 2013. The same methodological equivalences will be used in macromodel.

B. The main simulation results

1. The reduction in inflationary expectation induces a compression in the nominal GDP whose index decreases from 1.1683 in 2007 to 1.087 in 2013. The real output growth rate (IGDPc) maintains its relatively high level during the entire interval. The Graph IGDPc presents the real economic growth of Romania as annual chain indices and also as indices against 1989 (the start of transition).

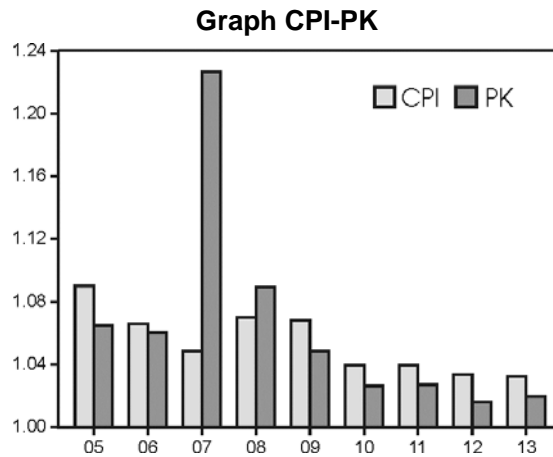


It is worth mentioning that the main resources of economic growth are the total factor productivity and the expansion of the fixed capital. Three annual indices of output contribution were calculated: $IEOC=IE^\alpha$, $ICKcOC=ICKc^{(1-\alpha)}$, and $ITFP$. These have been transformed into indices against 1989. These series are presented in Graph OC89 (the corresponding symbols are completed by the suffix 89),

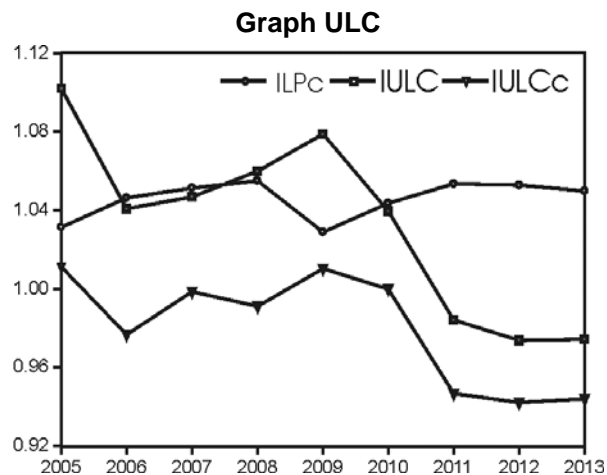


The present projection assumes, therefore, an ample technological modernization of the Romanian economy.

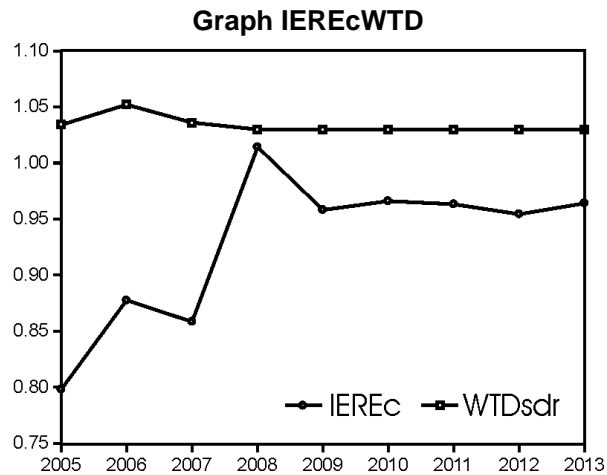
2. As expected, this evolution is accompanied by a pronounced disinflation process. (Graph CPI-PK).



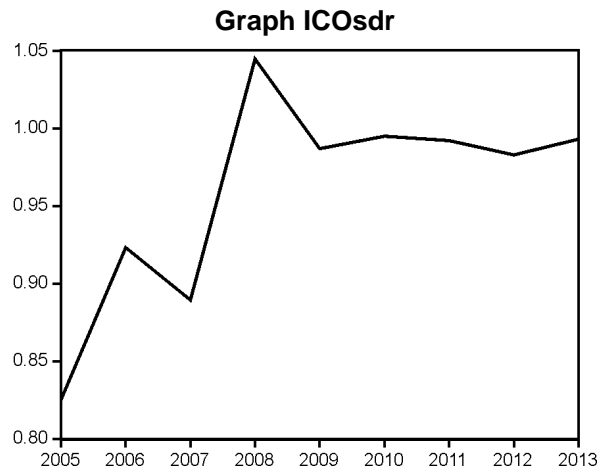
The disinflation process is sustained by supply-side factors, first of all by the improvement of the correlation between labour productivity and labour income. The Graph ULC presents yearly indices of labour productivity (ILPc), nominal unit labour cost (IULC), and real unit labour cost (IULCc=IULC/CPI).



3. Due to the adopted computational assumptions, the present projection avoids a sharp real appreciation of RON. Graph IERecWTD presents the ratios between IER and PGDP estimated by macromodel (IERec) against the world trade deflator (WTDsdr) taken into consideration as an exogenous variable.

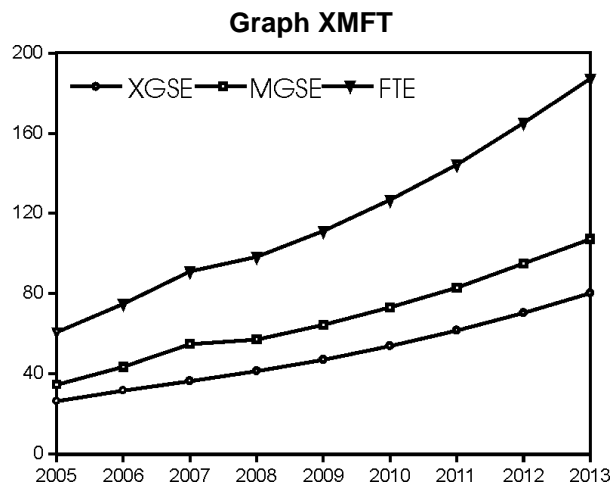


Consequently, the index of competitiveness (ICOsdr) improves comparatively with previous years, still nevertheless slightly under unity.



4. The main scenario projected for 2008-2013 is characterised by intensive development of the foreign trade, as a condition and, at the same time, as an inherent consequence of international integration of the Romanian economy.

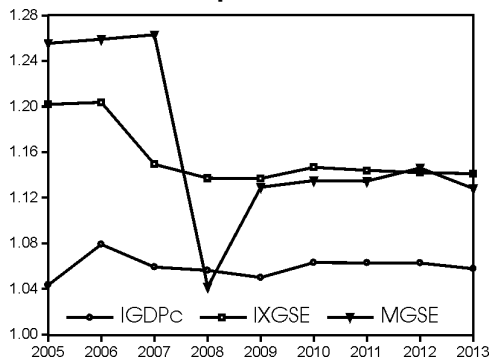
The anticipated evolution of exports (XGSE), imports (MGSE), and their sum (FTE), in billion EUR, is presented in Graph XMFT.



The yearly indices of both exports (IXGSE) and imports (IMGSE) exceed the dynamics of real output (IGDPc), as attested by Graph IGXM.

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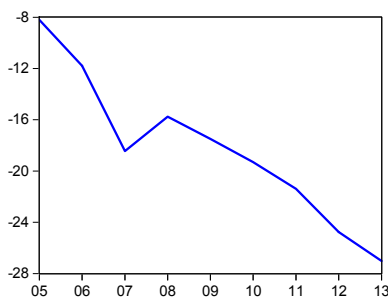
Graph IGXM



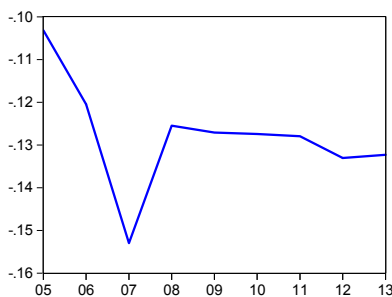
However, the balance deficit remains troublesome (12.5-13.2% of GDP). The following graphs present the evolution of this deficit in Euro ($NX = XGSE - MGSE$) and as a ratio to GDP ($rNX = NX * ERE / GDP$).

This means that the problem of actively stimulating exports and maintaining import expansions within reasonable limits should be a major preoccupation for Government institutions and the National Bank of Romania.

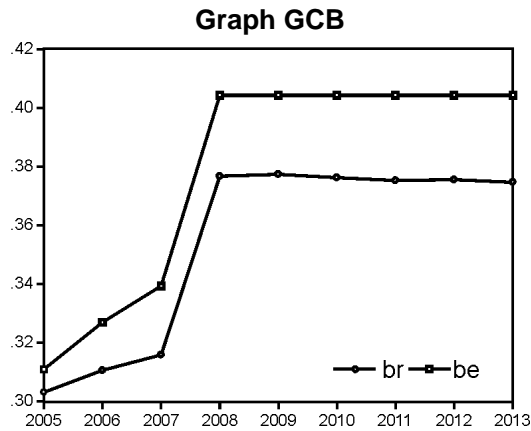
Graph NX



Graph rNX



5. Given the premises of the present simulation, the general consolidated budget corresponds to the macroeconomic framework anticipated by authorities. The ratios to GDP of its revenues (br) and expenditures (be) are plotted on the Graph GCB.

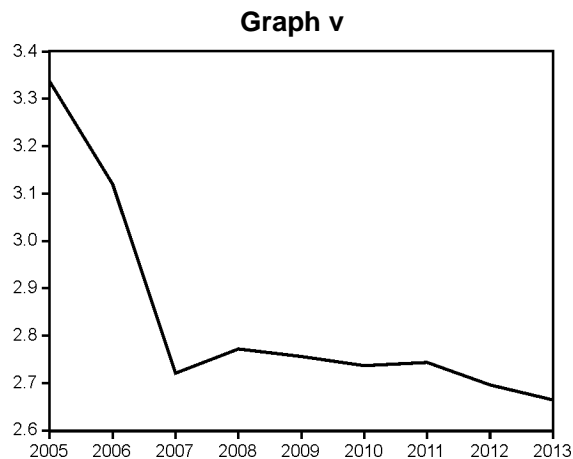


The increase in br has two main explanations: a better gathering of taxes and growing structural funds obtained from the European Union.

During the period 2008-2013, the public budget deficit, again as a ratio to gross domestic product, varies between -0.0269 and -0.0296.

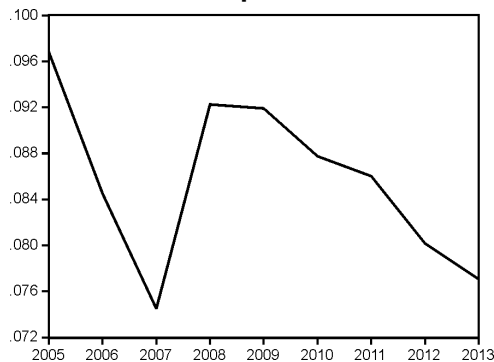
6. Comparatively with the longest part of the transition period, two monetary evolutions are representative:

- the money velocity approaches the levels registered in the consolidated market economies;
- concomitantly with a reduction in interest rate (Graphs v and IR).



A Desirable Scenario for the Romanian Economy during 2008-2013

Graph IR



This means a real re-monetisation of the Romanian economy. It would not be superfluous to outline that such a process is conditioned by a policy mix decidedly sustaining disinflation.

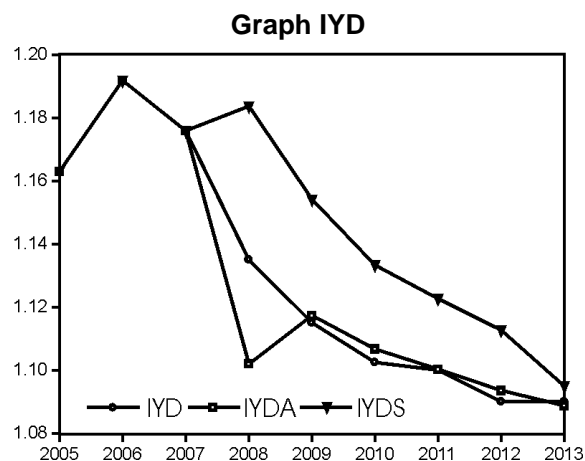
C. Comparison with Official Forecasts

The Romanian National Commission for Prognosis (NCP) published (2007-2008) three series of predictive estimations for the 2008-2013 period, in accordance to the future Government macroeconomic policies and EU Accession Treaty. The first has been elaborated in November 2007 (so-called Autumn Prognosis), the second in March 2008 (Spring Preliminary Prognosis), and the third in April 2008 (Spring Final Prognosis). In the presentation of these variants, the symbols used in the macromodel are completed with suffix A for NCP Autumn Prognosis, Sp for NCP Spring Preliminary Prognosis, and Sf for NCP Spring Final Prognosis; when both preliminary and final spring forecasts are identical, the simple suffix S is adopted.

1. One of the most important sources of differences is the expected disposable income index (IYD), explicitly defined in the macromodel (as an exogenous variable) and only implicitly introduced into the NCP prognosis. For NCP case, it will be approximated based on indices of GDP at current prices (IGDP) and using the econometric relationship $IYD = IGDP^{1.018163}$.

The indices of disposable income used as expectation in macromodel (IYD) and estimated for the NCP autumn (IYDA) and spring (IYDS) forecasts are plotted on the Graph IYD.

It is clear that in the spring prognosis of NCP the income policies are more relaxed. Taking into consideration the inflationary pressure associated with such a macroeconomic environment, the macromodel estimations are oriented to a more prudent increase of the nominal revenues. They are, from this point of view, closer to the autumn NCP forecast.



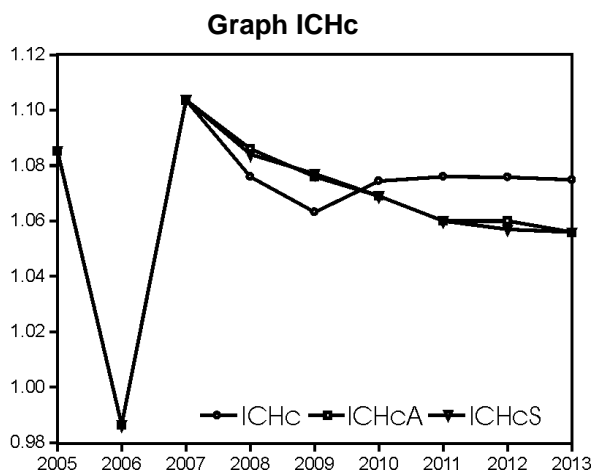
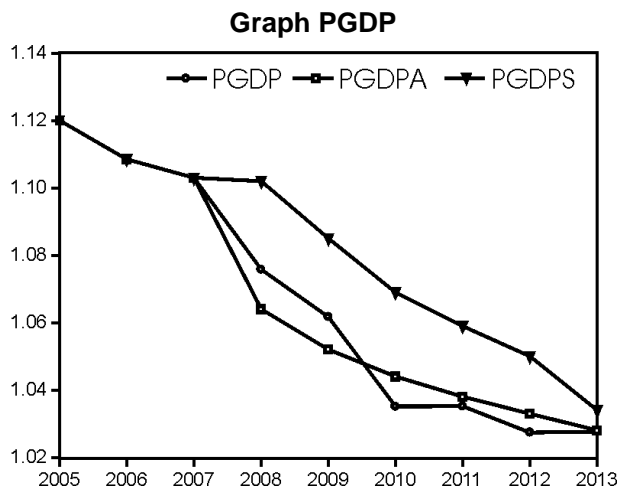
2. The autumn and spring forecasts of NCP are identical regarding annual indices of the gross domestic product at constant prices. The real economic growth has been computed also for the entire interval, as indices against 2007 (IGDPcAS7). The Table II.3 shows that there are small differences comparatively with the corresponding macromodel estimations (IGDPc7).

3. For a similar real economic growth, the discrepancies concerning the nominal revenues (IYD) are reflected mainly in inflation. The Graph PGDP presents the annual GDP deflators estimated by NCP prognosis (PGDPA and, respectively, PGDPS), compared with the macromodel scenario (PGDP).

4. For the entire 2008-2013 period, the official forecasts estimate an increase in the private consumption at constant prices by 63.33% in the autumn variant and 62.72% in the spring one; the macromodel simulation shows a slightly higher value - 68.77%. The most important differences refer to the intermediary evolution of this main component of domestic absorption (yearly indices, that is ICHc, ICHcA, and ICHcS are plotted on the Graph ICHc).

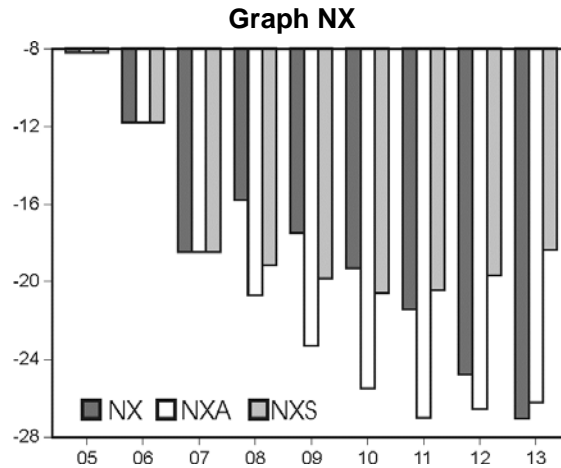
Table II.3

Year	IGDPc7	IGDPcAS7
2007	1	1
2008	1.0562	1.065
2009	1.109	1.13
2010	1.179	1.1955
2011	1.2531	1.2648
2012	1.3318	1.3369
2013	1.4086	1.4131

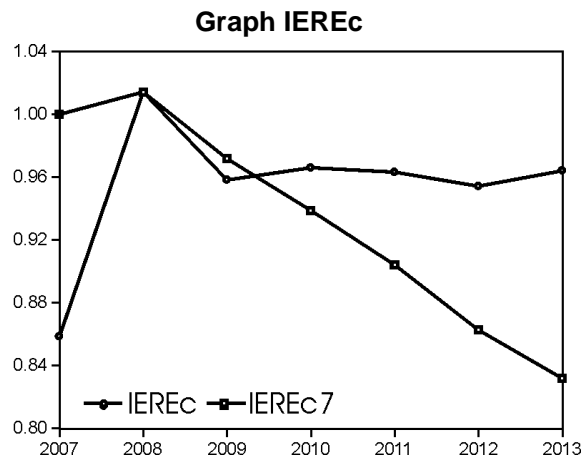


Therefore, both - official and macromodel - projections take into account that 2008 is an election year, which could involve an important expansion of the real consumption. The subsequent correction is, however, more significant in the model simulation, which admits instead higher subsequent rates.

5. As expected, all forecasts assume an important commercial deficit. The net export (billion Euro) is presented in Graph NX, where NX represents the macromodel estimation, while NXA and NXS are the autumn and, respectively, spring NCP prognosis.

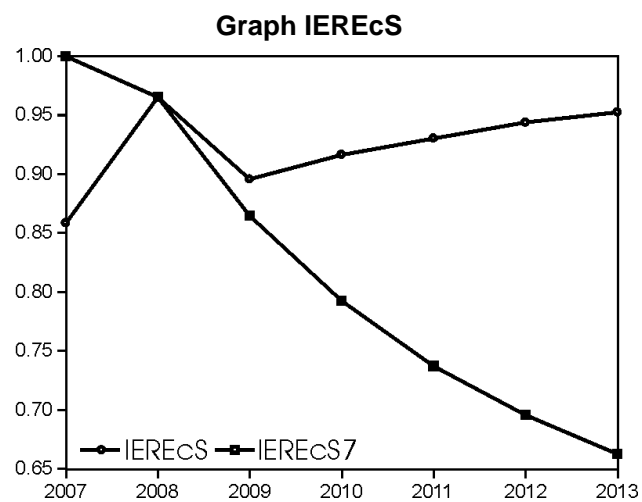
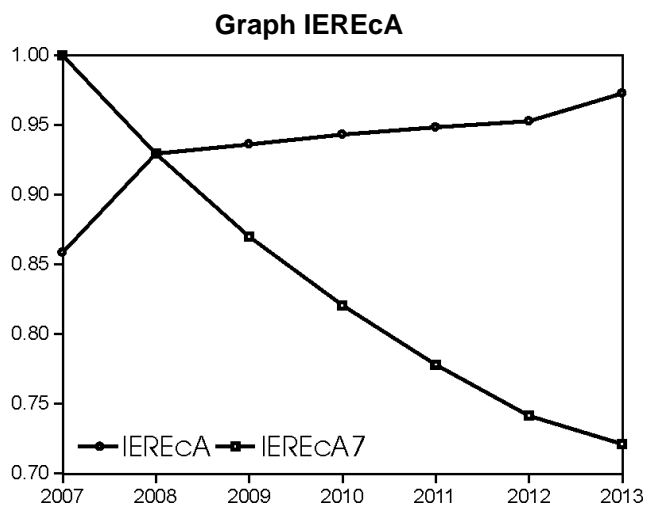


The spring NCP projection seems quite optimistic. We must underline that it is associated with a pronounced real appreciation of RON. The annual ratios of indices of nominal exchange rate to GDP deflators (IEREc, IEREcA, and IEREcS), on one hand, and the same ratios computed against 2007 (IEREc7, IEREcA7, and IEREcS7), on the other, are plotted in the following graphs:



Therefore, for the entire interval, IEREc7 diminishes by with approximately 17%, IEREcA by 28%, and IEREcS by 34%. We do not comment the plausibility of these estimations as such. But we have doubts in what concerns the possibility to obtain the

A Desirable Scenario for the Romanian Economy during 2008-2013 officially projected commercial deficits simultaneously with an accentuated real appreciation of RON.



6. As it is known, the convergence of the Romanian economy with the European Union is a very complicated process. Numerous indicators are involved in this field. We shall pay attention to the most important (probably) of them, namely per capita GDP in PPS. Based on Eurostat data (Eurostat), the classification for 2003-2005 has been computed comparatively with the average level of enlarged EU (including Romania and Bulgaria).

Table II.4

GDP per capita in PPS, EU27=1

Country	2003	2004	2005
<i>EU27</i>	1	1	1
Belgium	1.23958	1.23958	1.22917
Czech R.	0.73958	0.75	0.77083
Denmark	1.25	1.25	1.27083
Germany	1.16667	1.15625	1.14583
Estonia	0.53125	0.55208	0.625
Greece*	0.83333	0.84375	0.875
Spain	1.01042	1.010417	1.02083
France	1.125	1.125	1.125
Ireland	1.39583	1.41667	1.44792
Italy	1.10417	1.07292	1.04167
Cyprus	0.88542	0.91667	0.92708
Latvia	0.42708	0.45833	0.5
Lithuania	0.48958	0.51042	0.54167
Luxembourg	2.46875	2.51042	2.61458
Hungary	0.63542	0.63542	0.65625
Malta	0.77083	0.73958	0.72917
Netherlands	1.29167	1.30208	1.3125
Austria	1.28125	1.28125	1.28125
Poland	0.489583	0.51042	0.52083
Portugal	0.760417	0.75	0.739583
Slovenia	0.802083	0.83333	0.85417
Slovakia	0.55208	0.5625	0.59375
Finland	1.13542	1.15625	1.15625
Sweden	1.19792	1.19792	1.19791
United Kingdom	1.20833	1.22917	1.21875
Bulgaria	0.32292	0.33333	0.34375
Romania	0.3125	0.34375	0.35417
Croatia	0.47917	0.48958	0.5
FYROM	0.26042	0.26042	0.27083
Turkey	0.27083	0.28125	0.29167
Iceland	1.23958	1.29167	1.34375
Norway	1.55208	1.625	1.76042
Switzerland	1.35417	1.34375	1.34375
USA	1.52083	1.54167	1.5625
Japan	1.125	1.125	1.14583

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Considering a possible faster economic growth for the Romanian economy, its position in EU can be ameliorated from this point of view. The GDP per capita in Romania comparatively with the average of the European Union in 2013 has been computed under the following assumptions:

- the yearly average rate of economic growth (per capita GDP) in the European Union is between 1.5-3.5%;
- the relative PPS (ratios among countries) remain relatively constant during the next period;
- for Romania, both series of estimations (macromodel and NCP) are taken into consideration.

Table II.5

GDP per capita in PPS, Romania comparatively with the mean level of EU in 2013

Annual index of GDP per capita in PPS, in EU=27	GDP per capita in PPS, in Romania comparatively with the EU mean, according to macromodel estimations	GDP per capita in PPS, in Romania comparatively with the EU mean, according to NCP prognosis
1.015	0.5186	0.5203
1.016	0.5145	0.5162
1.017	0.5105	0.5121
1.018	0.5065	0.5081
1.019	0.5025	0.5042
1.020	0.4986	0.5002
1.021	0.4947	0.4963
1.022	0.4909	0.4924
1.023	0.4870	0.4886
1.024	0.4832	0.4848
1.025	0.4795	0.4810
1.026	0.4758	0.4773
1.027	0.4721	0.4736
1.028	0.4684	0.4699
1.029	0.4648	0.4663
1.030	0.4612	0.4627
1.031	0.4576	0.4591
1.032	0.4541	0.4555
1.033	0.4506	0.4520
1.034	0.4471	0.4485
1.035	0.4437	0.4451

Therefore, during the period 2008-2013, Romania can reach a per capita GDP of 45-50% comparatively with average level of the European Union. Obviously, such a result is conditioned by the promotion of adequate structural and macroeconomic policies.

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Bucharest, June 2008

Obviously, the presented scenario is reviewable taking into account the implications of the present global financial crisis. The author has presented some considerations in this matter.

Some Considerations Concerning the Global Economic Context*

Emilian DOBRESU

The American Crisis

1. What is now happening in USA cannot be separated from the general evolution of humanity. As a forerunner for the past two centuries, the American society is the first one to face the new challenges of the modern civilization.

Anyone who has followed the recent years' debates in the US can easily identify three layers of the phenomena that concern so much our contemporary world:

- a) the monetary and financial system;
- b) the real economy;
- c) the socio-cultural model, including the institutional system.

In the following, I shall briefly refer only to the first two layers. I would myself have something to say about the third one, but undoubtedly other colleagues – especially philosophers, sociologists, law specialists, theologians – can give more competent opinions on these problems.

2. Although sometimes it has been fiercely denied, the world economy and its traditional engine (USA) have entered the downward phase of the Kondratieff macro-cycle after the early 70's oil shocks. The real business cycles – more frequent and of smaller size - continued to action, but they superposed each other– sometimes evidently, other times disassembly - on this long descending wave.

What is the matter? The dominant type of economic growth - based on overdimensioned consumption (private and public), on excessive exploitation of primary resources and on aggressive environment pollution – sapped its strength. Nicholas Georgescu-Roegen – a great american scholar of Romanian origin – correctly anticipated its imminent impasse.

The most significant symptom was the diminishing return on the main production factors. As a synthetic outcome, the average net profit rate of the G7 countries (USA, Canada, Japan, Germany, United Kingdom, France, Italy), decreased from 17.6% during 1950-1970 to 13.3% afterwards (Quintos). If David Ricardo, Karl Marx or Joseph Schumpeter were still alive, they would have smiled at the ironies addressed to their famous warnings about the decreasing trend of the profit rate, under a given technological paradigm.

3. Certainly, there have been many substantial innovative reactions. Technical and scientific achievements of recent decades are really spectacular. However, it seems that they were not enough to surpass the amplifying difficulties of the post-war development pattern. As a result, the advanced economies have resorted to somewhat artificial incentives, engaging in this race other regions of the planet as well. Obviously, I refer first of all to the expansion of capital markets that maintained the demand at a relatively high level, even for the traditional sectors.*

According to some sources, the ratio of financial assets worldwide to the world gross domestic product increased from about 1 in 1980, to almost 2 in 1993 and to over 3.1 at the end of 2005 (Quintos). This trend was encouraged and accompanied by a tremendous diversification of the financial instruments. The subject is well known and I will not discuss it.

4. I do not contest that the resulting expansion of the means of payment have exerted a relaxing effect upon transactions, which in turn helped to maintain a high level tonus of economic life. Generally, such an evolution should not be blamed itself. We must not forget that, as an effect of such innovations, money supply has evolved from M0 to M1, M2, M3. Now, we might be witnessing a new stage of this process.

The dangers came from its huge scale and, mainly, from its degeneration into a "snowball" with a chaotic tumble. At a certain point, it has transformed into a "game in itself", and important areas of financial flows have been disconnected - some of them nearly completely - from the productive flows, especially from the sound revenues generated by the real economy.

Such decoupling is the core of the problem! Although it has not been shared by some of my colleagues, I shall maintain that - in one form or another - behind the more and more complicated derivatives there was a mechanism of money creation, parallel to that controlled by the central bank. Obviously, in an authentic market economy, the state should interfere as little as possible in the companies' management. But it is equally normal that the private sector - through the private banking system as its exponent - should not assume any attributes of the legally entitled monetary authority.

In a completely different way - given the specific features of a transition economy - the National Bank of Romania has also faced a similar phenomenon. I have in mind the famous inter-enterprise arrears, which used to play for a long period of time the role of a perverted money substitute.

5. Resuming our discussion on the present crisis, the experience has clearly showed that the nominal palliatives cannot have long-lasting consequences, nor are they able to replace the necessary economic restructuring transformations.

In the US case, the absence of a decisive impulse in this direction was offset by attracting massive natural resources from abroad. For example, the total US oil

* Draft prepared for the discussion organised by the Romanian Academy and the National Bank of Romania (2 October 2008). It was presented in the Seminar for Macroeconomic Modelling (7 October 2008).

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consumption is 65% covered by imports (Bradley). To this we might add the use of the external labour force either directly (through immigration) or indirectly (through the importation of cheap labour-intensive products). These windows of opportunity have constantly narrowed due to the increase in the relative prices, especially those of fuels, and to the growing expectations of a better living standard in China, India and other countries, with a corresponding increase in the labour costs in these countries.

Nearly all American specialists - whose comments I have read - believe that, in order to overcome today's long-term hardships, the United States need an immense investment program, primarily in technology and human capital. The foreign financial resources can be important, due to America's attractiveness. However, this is still not enough. Definitely, the domestic efforts remain determinant.

From this perspective, the US are in a pole position again. If the classical primitive capital accumulation was achieved at the expense of the peasantry, if the initial socialist accumulation was also grounded on the value added created in agriculture, currently the social support for such a colossal effort can only be found in the middle class. It is hard to imagine now the entire complexity of the consequences of such a process. Bush's plan seems to comply with this hypothesis.

6. Since the issue arose, the recent American debate on Bush's plan has emphasized many problems of which I will present only two.

On one hand, as many other commentators, I also think that the Republican administration had no other choice. Additionally, it is not the first time the US have resorted to a recipe like this. I quote from Eckman: "Fourth, the US government has acted before in dealing with serious financial crises. Consider these:

- *The Panic of 1792*: The US government assumed the debts of the states from the Revolutionary War...
- *The Panic of 1907*: Amid a run on the banks and trusts which had made loans for a failed attempt to corner the market on copper stock, confidence in all financial institutions was threatened. Therefore, the banking magnate JP Morgan organized other bankers to form a joint pool of capital to pay depositors at banks under duress. It worked.
- *The Great Depression*: The US government formed the Home Owners' Loan Corporation to buy defaulted mortgages from banks and refinancing them for fixed, 15-year mortgages. About 1 million Americans were affected.
- *The Savings and Loan Crisis*: From 1986 to 1995, about half of the nation's Savings and Loan institutions (3234) folded. The US government then created the Resolution Trust Corporation to take over failed properties and clean up the industry. The cost was \$124 billion.

Despite these actions by the US government throughout US history, there has never been anything like what the US government is currently doing. American capitalism is fundamentally changing - and no one really knows the degree to which this change will prevent another crisis..." It seems that long economic fluctuations are accompanied by a cyclicity of the state intervention (Dobrescu).

On the other hand, the American economists have expressed views, to which I also subscribe, that the success of the plan is fundamentally conditioned by the

simultaneous implementation of a forceful mix of measures addressing the roots of the problem. Like almost all Romanians and many other inhabitants of the earth, I sincerely hope in the success of this action plan, in the ability of America to reconfirm its status as a leader of the scientific and technological dynamism, as a promoter of democratic values.

Some pragmatic lessons for us

1. I would like to emphasize again the cautious behaviour of the Romanian Central Bank and of our banking system as a whole. However, the overly reassuring statements - which have been heard lately - that what is happening in America and in the European Union cannot have a significant impact on Romania do not seem to be an appropriate attitude to me. There are many channels through which the Romanian economy is connected to the world economy;

- the influx of foreign capital;
- the pressure on the exchange rate;
- a tightening competition on export markets, but also on the domestic one;
- last but not least, the Romanian emigration.

Moreover, the economic history teaches that very few of the states connected to the international economic flows have been able to protect themselves effectively against major foreign crises. It was possible due either to the possession of considerable and manifold resources, or to an internal dramatic austerity (generating stagnation, if not even regress).

2. It would be useful to constitute a group of specialists, which will monitor – systematically and professionally - the newly emerging rules concerning the capital markets, as they are gradually designed and implemented in the USA, in the European Union and in other developed countries, as well as in the international financial institutions. It is of utmost importance to prepare in advance our own necessary adjustments in order to maintain the compatibility with the advanced market economies, but also to safeguard Romania against becoming a receiver of some external imbalances. I think that the Department of Economic, Law Sciences and Sociology of the Romanian Academy may join this initiative.

3. It would be also pertinent to elaborate two or three basic scenarios concerning the evolution of the exchange rates of the main currencies important to our economy. An adequate strategy could be designed on this basis in order to correctly manage the currency structure of Romania's international assets portfolio and external debt. The main objective of such a strategy should be the minimization of potential losses associated with high volatility in exchange rates.

4. I also believe that credible signals concerning the domestic business environment, primarily emphasizing the fiscal stability, should be given. Moreover, the political decision-makers could initiate an in-depth debate on this matter and the opposition

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parties should engage in it. This way, the disturbing consequences that the electoral rhetoric usually has for the business environment might be attenuated.

5. Regarding the accession to the Euro Area, there are evidently enormous difficulties which we have to overcome. However, is it wise to continuously insist on its imminent postponement? Romania's previous experience accumulated in the process of integration into the EU seems to give a negative answer. It would be more appropriate to focus on what we have to do in order to reach such a historical target.

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Bucharest, 1st October 2008