FISCAL AND DEBT SUSTAINABILITY AND GROWTH CHALLENGES[1]

ALBU Lucian-Liviu
Institute for Economic Forecasting, Romanian Academy

Abstract:

Although there is a long period since the problem of public debt sustainability captures the attention of economists, today continues to be no unanimity concerning an adequate unique sustainability indicator or function generally accepted. Moreover, during the actual period of global crisis and reforming at the EU level of fiscal policy, the debt sustainability has become an extremely important issue. In this line of elaborating new models and improving methodologies in order to quantify the impact of various factors on public debt sustainability is our study. During its period of pre- and post-accession into EU, and moreover in actual crisis time, Romanian economy is facing to a number of dificile problems. Among these, the public debt sustainability plays a central role, its implications being practically expanded on all fields connected to the economic dynamics. This study is analyzing past and current situation as well as potential factors affecting fiscal and public debt sustainability over next period. A descriptive analysis of the main fiscal challenges for the the next period is made, focusing in particular on future budgetary pressures of sufficient magnitude to affect fiscal sustainability (e.g. pensions). The forecast takes into account: current fiscal policies as set out in the Fiscal Strategy, projections from international organizations, certain assumptions and own estimations, etc.

Keywords*:* public debt, sustainability function, contour plot, primary deficit, interest rate

1. Introduction

Adoption of the Euro requires that Romania complies with the fiscal targets in the EU's Stability and Growth Pact (SGP) which are designed to ensure long run fiscal sustainability. Although the current widening of the fiscal deficit is largely a cyclical phenomenon driven by the severe economic recession, Romania faces long term fiscal

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challenges, especially from quasi fiscal obligations, if it is to comply with the requirements of the SGP. The current study is analyzing past and current situation as well as potential factors affecting fiscal and public debt sustainability over next period. A descriptive analysis of the main fiscal challenges for the the next period is made, focusing in particular on future budgetary pressures of sufficient magnitude to affect fiscal sustainability (e.g. pensions). The forecast takes into account: current fiscal policies as set out in the 2011-13 Fiscal Strategy; projections from international organizations, certain presumtions and own estimations, etc.

Coming from the specialized literature, including WB and IMF studies, standard methodology is used to estimate the impact of the expected post-crisis economic recovering and fiscal policy measures on fiscal sustainability side. Taking into account that one of the main indicators of SGP is referring to the public debt ratio to GDP, on the one side, and that it is increasing rapidly last period in Romania, on the other side, the equation of public debt accumulation is used as a basic tool. Moreover, due to some stronger constraints for the next period (such as: increasing pressures from pensions and other social payments; necessity to diminish labour force and inefficient expenditures in public sectors, deficits of state owned enterprises, and arrears) more refined and adapted models could be used in order to simulate long term trajectory in matter of fiscal sustainability (as is the so-called sustainability function). Indeed, they will be integrated with official forecasts (published by national or international institutions) in order to estimate not only how the fiscal policy can adapt to the economic growth process but also how it can influence the growth rate. Moreover, based on the existing National Fiscal Strategy, a further long term mechanism of driving fiscal policy should be built (including multiannual budgeting as well as some elements of coordinating fiscal environment and rules in EU, as EU is asking last time to all members).

2. Correlations related to the fiscal and debt sustainability in last decade

Among the main macroeconomic variables used in studies on the fiscal and debt sustainability are as follows:

- Ratio between total public debt and GDP, in percentage (D%Y);
- Average interest rate on public debt, in percentage (Db%);
- Public deficit, as percentage of GDP (П%);
- Primary deficit, as percentage of GDP (Пр%);
- Average tax rate (fiscal ratio + social ratio), as percentage of GDP (Tx%);
- Saving ratio (S%);
- Investment ratio (I%);
- Real GDP growth rate, in percentage (q%);
- Inflation, as GDP Deflator (p%).

Dynamics of main macroeconomic variables during the last decade (2000-2010) is presented in Table 1 and the correlation matrix in Table 2.

Table 1. Dynamics of macroeconomic variables, 2000-2010

Year	Public debt (D%Y)	Interest rate (Db%)	Public deficit (Π%)	Primary deficit (Πp%)	Tax rate (Tx%)	Saving (S%)	Investment (I%)	Growth rate (q%)	GDP deflator (p%)
2000	31.2	28.7	4.7	0.7	30.2	15.6	19.4	2.4	43.3
2001	28.7	16.1	3.5	0.1	28.6	16.7	22.2	5.7	37.8
2002	28.9	10.7	2.0	-0.5	28.1	20.9	22.0	5.1	22.7
2003	26.0	8.5	1.5	-0.1	27.7	17.1	21.9	5.2	23.4
2004	22.6	6.4	1.2	-0.3	27.3	17.9	23.7	8.5	15.5
2005	20.4	5.7	1.2	-0.1	27.9	14.4	23.3	4.2	12.2
2006	18.4	4.5	2.2	1.4	28.6	15.9	26.5	7.9	10.6
2007	19.8	4.5	2.6	1.9	28.9	17.5	31.0	6.3	13.5
2008	21.3	5.0	5.7	5.0	27.8	19.4	31.3	7.3	15.3
2009	30.0	6.1	7.4	7.0	24.0	20.6	25.1	-7.1	2.7
2010	37.9	5.0	6.79	4.9	27.2	19.8	24.8	-1.9	6.1

Source: Computed on data from National Institute for Statistics, National Commission for Prognosis, Ministry of Finance.

Table 2. Correlation coefficients among variables, 2000-2010

	Public debt	Interest rate	Public deficit	Primary deficit	Tax rate	Saving	Investment	Growth rate	GDP deflator
Public debt	1.000	0.398	0.604	0.292	-0.202	0.443	-0.499	-0.681	0.177
Interest rate	0.398	1.000	0.073	-0.334	0.527	-0.300	-0.666	-0.046	0.894
Public deficit	0.604	0.073	1.000	0.895	-0.440	0.523	0.203	-0.748	-0.209
Primary deficit	0.292	-0.334	0.895	1.000	-0.639	0.561	0.512	-0.678	-0.576
Tax rate	-0.202	0.527	-0.440	-0.639	1.000	-0.588	-0.142	0.657	0.688
Saving	0.443	-0.300	0.523	0.561	-0.588	1.000	0.241	-0.418	-0.382
Investment	-0.499	-0.666	0.203	0.512	-0.142	0.241	1.000	0.180	-0.571
Growth rate	-0.681	-0.046	-0.748	-0.678	0.657	-0.418	0.180	1.000	0.315
GDP Deflator	0.177	0.894	-0.209	-0.576	0.688	-0.382	-0.571	0.315	1.000

Source: Computed on data from NIS, NCP, MF.

We can see that in case of Romanian economy for last decade there was a strong direct correlation between: deficit of public budget and primary deficit (+0.895); interest rate on public debt and inflation (+0.894); tax rate and inflation (+0.688); tax rate and growth rate (+0.657); public debt and public deficit (+0.604); saving and primary deficit (+0.561); interest rate and tax rate (+0.527); public deficit and saving (+0.523); and investment and primary deficit (+0.512). In the same period, significant inverse correlation was registered between: deficit of public budget and growth rate (-0.748); public debt and growth rate (-0.681); primary deficit and growth rate (-0.678); interest rate and investment (-0.666); primary deficit and tax rate (-0.639); tax rate and and saving (-0.588); primary deficit and inflation (-0.576); investment and inflation (-0.571); and investment and public debt (-0.499). Moreover, we are presenting in Annex 1 a number of 3D representations of correlations among main primary debt and fiscal policy variables (also including their attached contour plot or "geodesical" maps). From such graphical representations we can extract some important conclusions regarding the complex impact of main factors on the future trend in public debt and fiscal deficit in Romania.

3. Analysing fiscal and debt sustainability

In order to study the fiscal and debt sustainability in Romania during the period 2000-2010, we used the well-known equation of public debt dynamics:

$$D_t - D_{t-1} = i_t D_{t-1} + \Pi p_t + a_t D_{t-1} - \Delta B_t \quad (1)$$

where:

- i - the average nominal interest rate on public sector debt;
- Πp - the primary deficit (net of interest payments);
- a - the revaluation effect on existing debt (appreciation/depreciation of ROL);
- ΔB - the direct financing of budget from the Central Bank; and
- t - time.

Dividing both sides of equation (1) by nominal GDP, Y_t, and manipulating we obtain:

$$d_t - d_{t-1} = (i_t + a_t - g_t) [d_{t-1} / (1 + g_t)] + \pi p_t - b_t \quad (2)$$

where:

- d - the public sector debt to GDP ratio;
- πp - the primary public sector deficit as percent of GDP;
- g - the nominal GDP growth rate, and
- b = ΔB/Y.

Alternatively we can approximate the nominal growth rate g as the sum of the change in GDP deflator p and the real GDP growth rate q and rewrite equation (2) as follows:

$$d_t - d_{t-1} = (is_t - q_t)\,[\,d_{t-1} / (1 + g_t)\,] + \pi p_t - b_t \quad (3)$$

where **is** could be defined as the real effective average interest rate on public sector debt (it is equal to the average real interest rate, i-p, plus the revaluation effect, a).

For the last decade, the correlation coefficients among main variables involved in public debt dynamics are, as follows: corr (q, d) = -0.681; corr (a, d) = +0.456; corr (i, d) = +0.398; corr (πp, d) = +0.292; corr (p, d) = +0.177; and corr (b, d) = -0.117. Moreover, some significant correlations were demonstred: corr (p, i) = +0.894; corr (i, a) = +0.848; corr (p,a) = +0.782; corr (q, πp) = -0.678; and corr (p, πp) = -0.576. Thus, we can see that GDP growth has a favorable impact both on the decreasing of public debt (-0.681) and on the decreasing of primary deficit (-0.678). More information could be extracted by using certain 3D representations of correlations among variables involved in the public debt dynamics, as they are shown in Figures 1-3. Figure 1 demonstrates that small public debt (blue areas) can be obtained in case of high rates of GDP growth and small values of GDP deflator. From Figure 2 is resulting that the public debt can be reduced by increasing GDP and decreasing interest rate. Despite of the complex correlation illustrated in Figure 3, as a general rule we can conclude that, in the period 2000-2010, the primary deficit was near to be neutral related to the public debt, this being mainly influenced by growth rate. However, for GDP growth rate between -4% and 0% and primary deficit between 4% and 7%, the public debt should dramatically increase (areas of accentuated red colour).

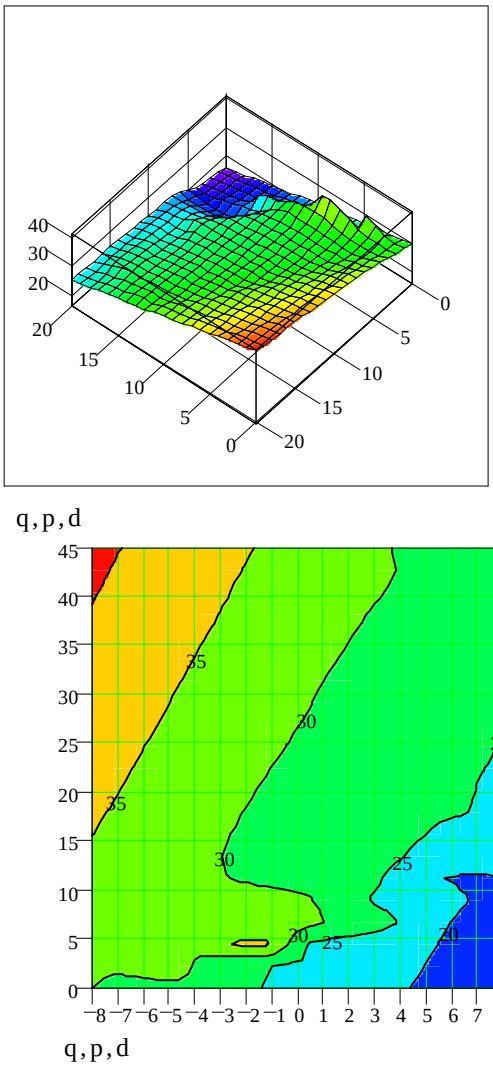


Figure 1. Correlation growth rate – GDP deflator – public debt, 2000-2010

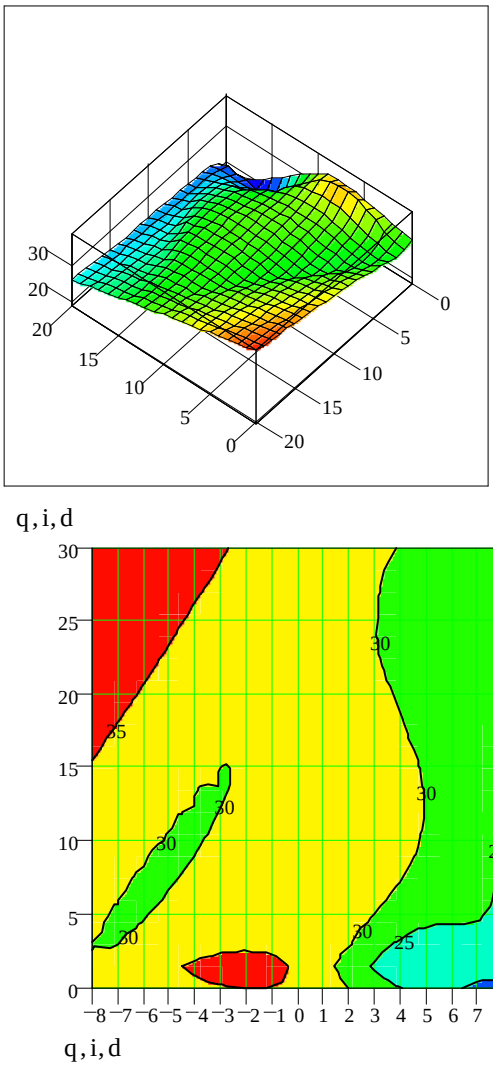


Figure 2. Correlation growth rate – interest rate – public debt, 2000-2010

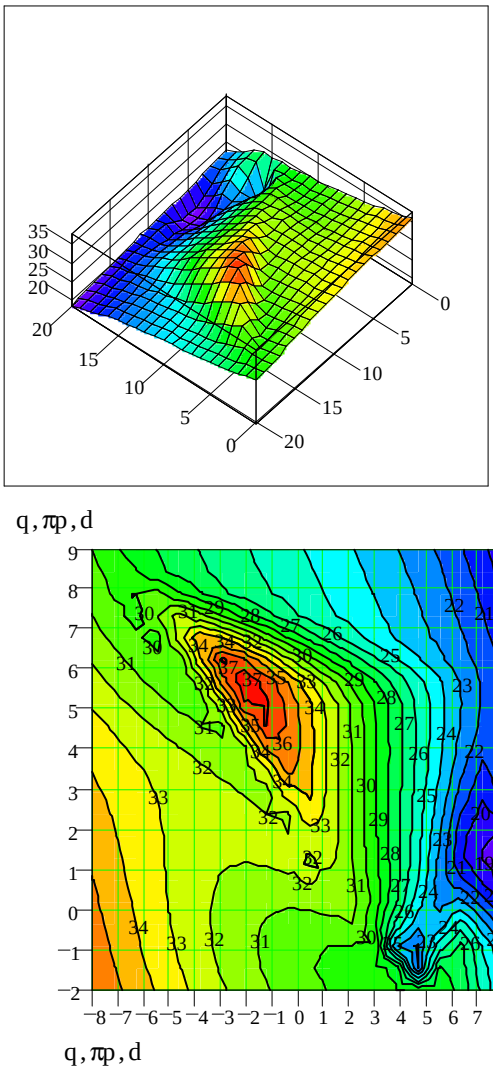


Figure 3. Correlation growth rate – prmary deficit – public debt, 2000-2010

Based on such dynamics of public debt, we used some derived indicators to characterize the sustainability. To see what the dynamics of debt accumulation involves, we can solve equation (3) recursively to obtain:

$$\mathbf{d}_T = \mathbf{d}_0 \mathbf{v}^T + \mathbf{\Sigma} (\boldsymbol{\pi}\mathbf{p}^m - \mathbf{b}_m) \mathbf{v}^{T-m} \qquad (m = 1, 2, \ldots, T) \qquad (4)$$

where:

- $\mathbf{v} = (1 + \mathbf{is} + \mathbf{p}) / (1 + \mathbf{q} + \mathbf{p})$
- the real effective interest rate, **is**, the real growth rate, **q**, and the change in the GDP deflator, **p**, are considered constant: $is_t = is$, $q_t = q$, $p_t = p$.

- values of parameter v tending to 1 mean an increase in sustainability of public debt.

Under the assumption q = is, equation (4) could be written as follows:

$$d_T = d_0 + \Sigma (\pi p^m - b_m) \quad (5)$$

The so-called sustainability function, $f(\pi p, b, is, q, p, d)$ must tend to zero in dynamics (or at least to a very small constant value), as a fundamental condition for sustainability:

$$f(\pi p, b, is, q, p, d) = [(\pi p - b) / d] + (is - q) / (1 + p + q + pq) \quad (6)$$

- First term of sustainability function (Cb_m) represents the impact of the direct governmental policies (budgetary policies) and respectively those of central monetary authorities (monetary policies).
- Second term (Cer, expressed by the ratio $(is-q)/(1+p+q+pq)$), describes the behaviour of the real economy (Albu, 2002).

In case of the period 2000-2010, dynamics of these indicators is presented in Figures 4-7 (were on horizontal axe years, t, are from 0=2000 to 10=2010).

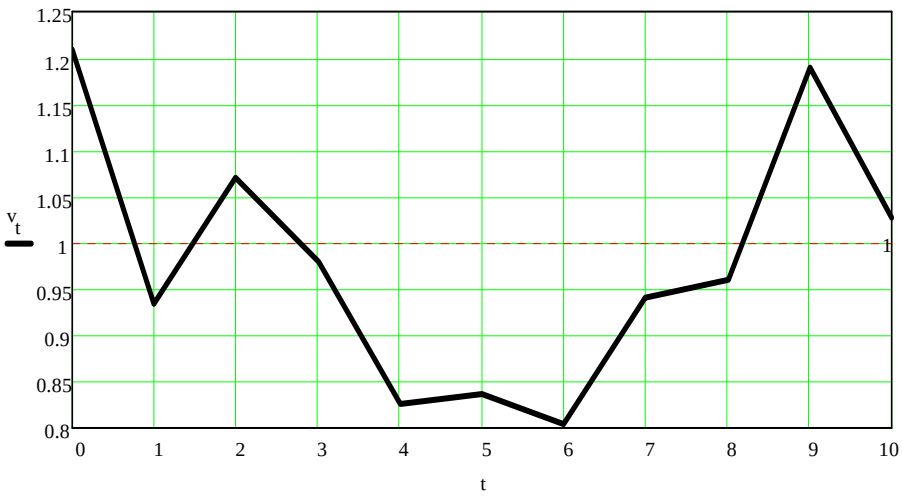


Figure 4. Dynamics of parameter v, 2000-2010

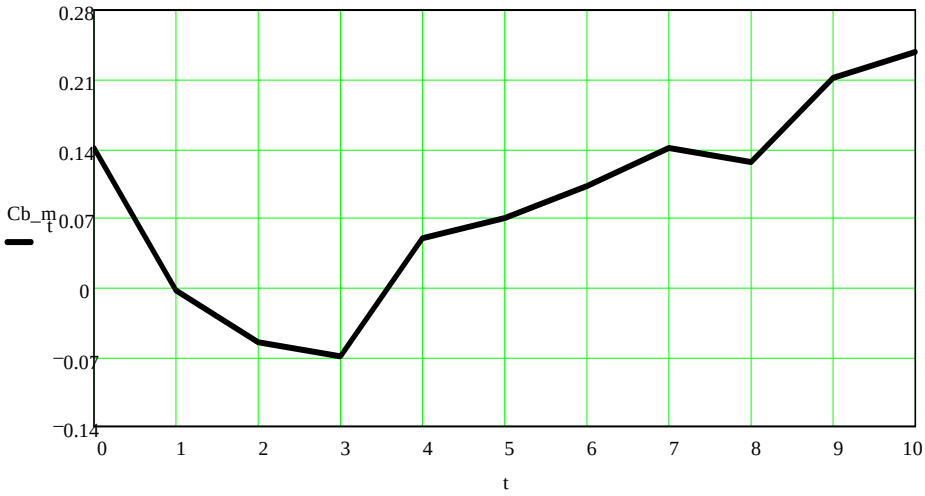


Figure 5. Dynamics of the parameter Cb_m, 2000-2010

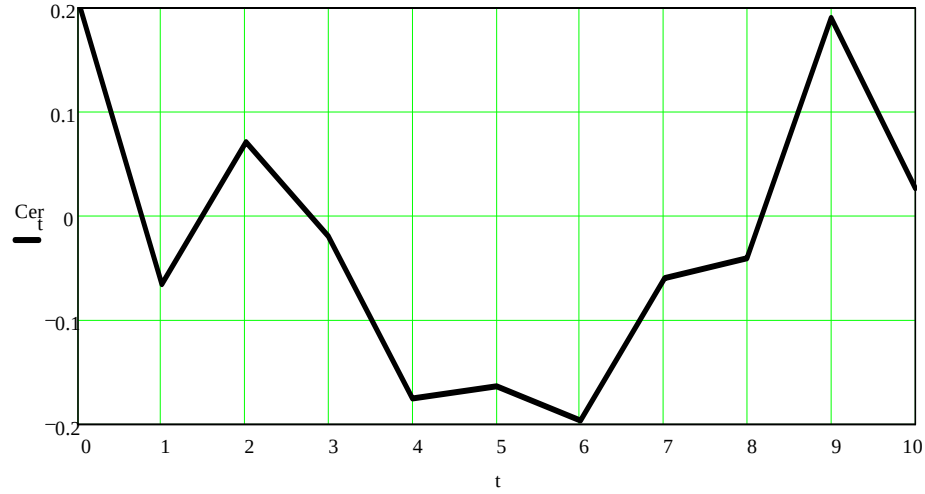


Figure 6. Dynamics of the parameter Cer, 2000-2010

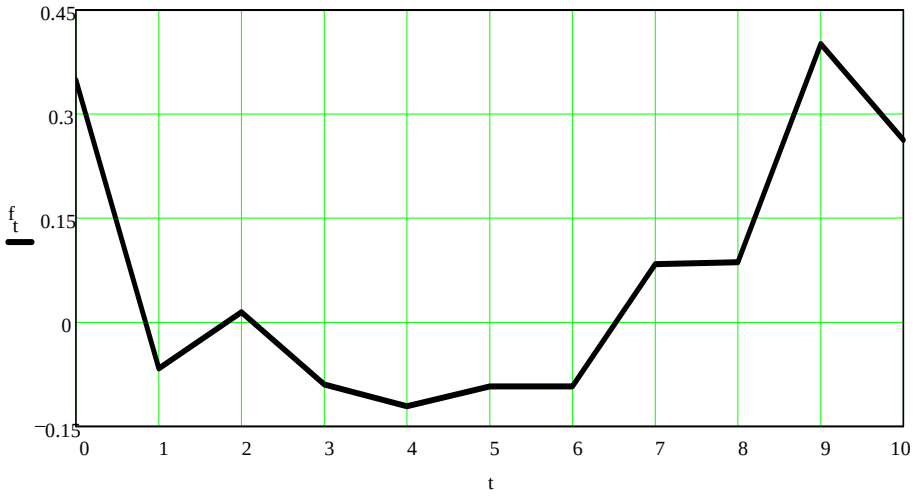


Figure 7. Dynamics of sustainability function, 2000-2010

In Figures 8-10 are shown a number of 3D representations of sustainability function (in correlation with some real variables), for the period 2000-2010. From such graphical representations we can find some conclusions regarding the complex impact of various factors on the sustainability of public debt and fiscal deficit in Romania. For instance, in case of last decade, as a general rule, we can conclude that the sustainability (that means values close to 0 of f) could be obtained for a GDP growth rate of around 5% per year.

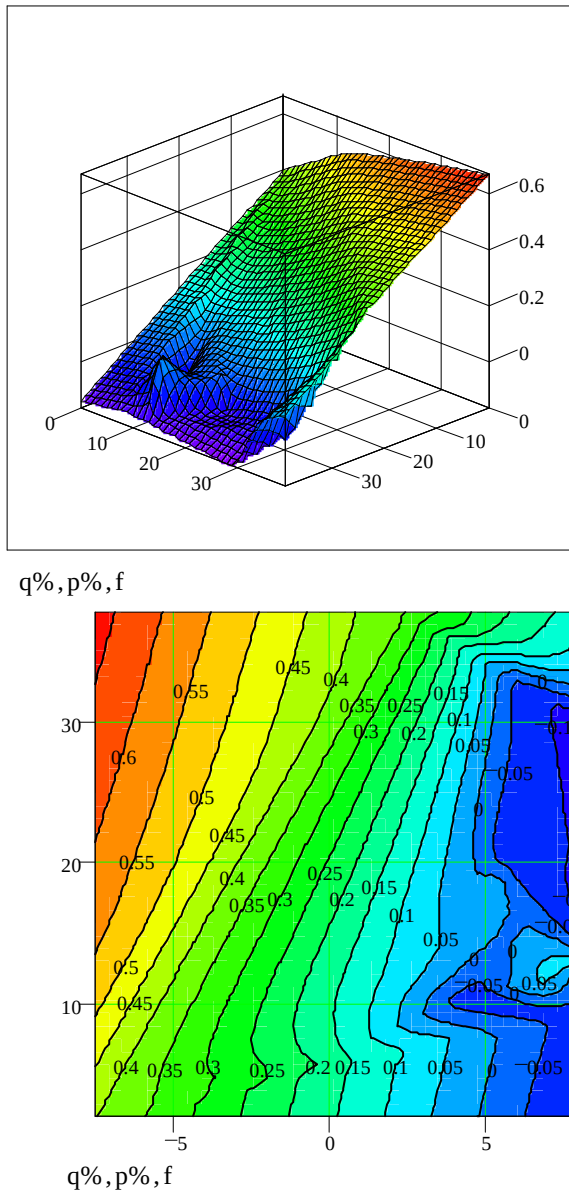


Figure 8. Correlation growth rate – inflation – sustainability function, 2000-2010

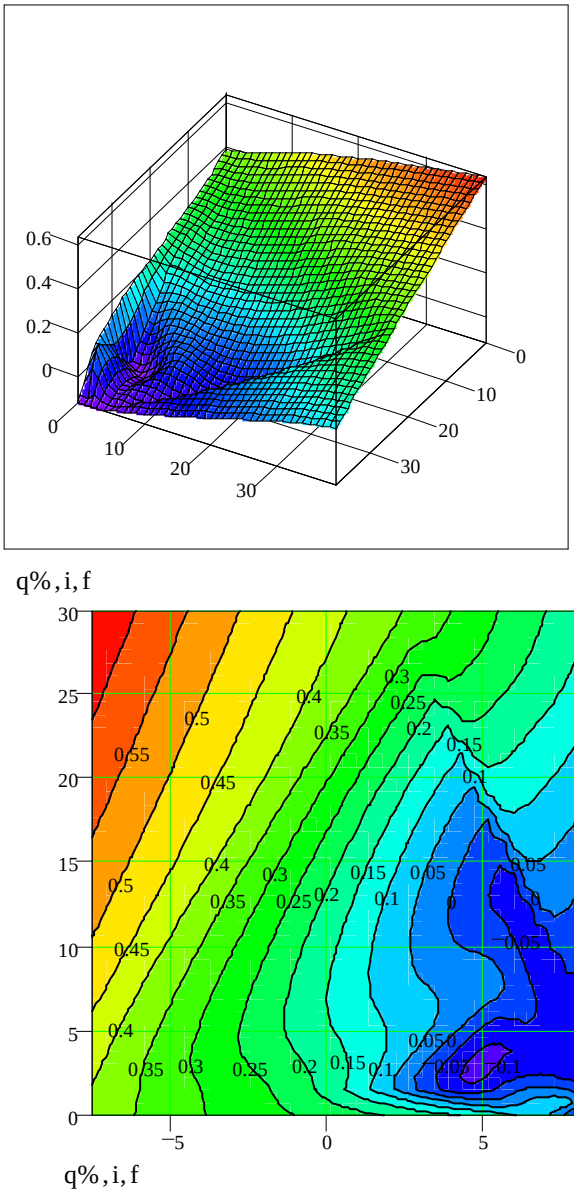
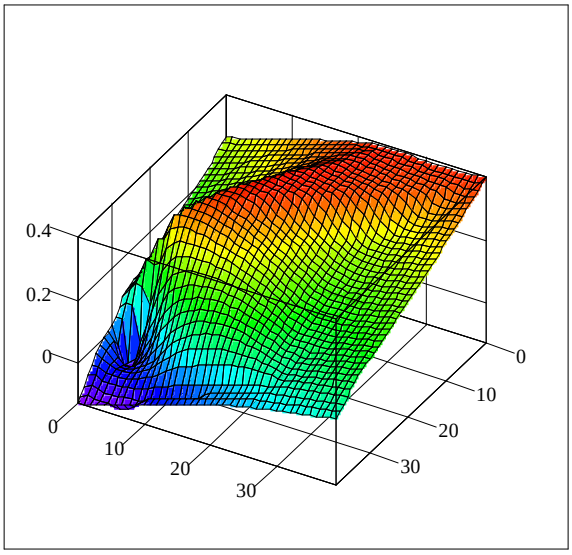
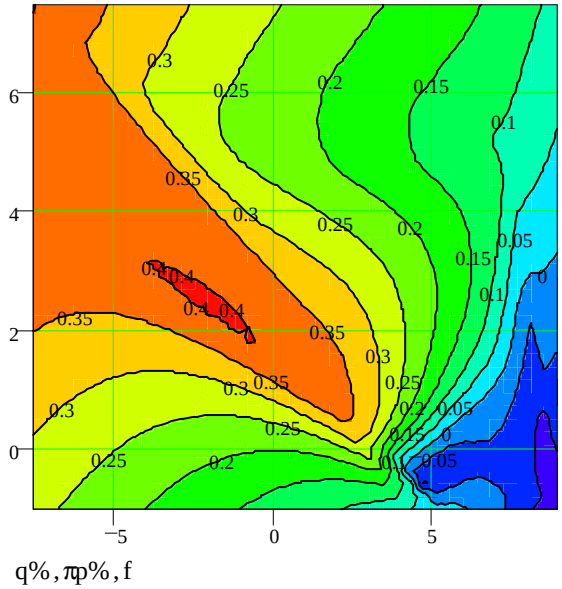


Figure 9. Correlation growth rate – interest rate – sustainability function, 2000-2010



q%, πp%, f



q%, πp%, f

Figure 10. Correlation growth rate – primary deficit – sustainability function, 2000-2010

4. Considerations on the balancing of pension budget

In recent years, due to the worsening demographic situation and the economic crisis, the public pension system has entered a phase that is becoming increasingly difficult. In recent years, the state had to allocate subsidies increasingly larger to compensate for inadequate social security funds, especially state social insurance budget (BASS). Unfavorable situation in terms of ensuring resources for the main public pension system (the so-called Pillar I) was influenced in a significant way by pension transfers to Pillar II. Our study mainly aims at estimating the impact of two options for balancing the budget, commonly used in the literature and current practice in pension policy, which essentially focuses on the increase of amounts collected to the state pension budget. These two variants, used separately or in combination, may be expressed simplified by: 1) increasing the number of employees (the contributors to the pension system) and 2) increasing the average wage. Both result in increased revenues of the pension fund. To estimate which should be theoretically increased need for balancing we use a simple simulation model, which we present briefly below.

Simplifying exposure, the fund's budget is composed of two parts, income (V) and expenses (C), with the following definition equation:

$$V = S\ s\ (\alpha + \beta) \tag{7}$$

$$C = P\ p \tag{8}$$

where S is the number of employees; s – the average gross salary; α and β – share of employee contribution in total wages and respectively the employer contribution (their sum we note $\gamma = \alpha + \beta$); P – number of pensioners, p – the average pension.

After several changes to reach budget balance provided pensions, which can be expressed by the following equality:

$$(P/S)\ (p/s) = \alpha + \beta \tag{9}$$

Three other derived indicators are useful for studying factors that influence the balance. Noting the ratio of retirees and employees with PS = P / S and the ratio between average pension and average wage ps = p / s, they may be expressed as:

$$PS\_E = (\alpha + \beta) / ps \tag{10}$$

$$ps\_E = (\alpha + \beta) / PS \tag{11}$$

$$R = PS\ ps / (\alpha + \beta) \quad (12)$$

Comparing the dynamics of real values of PS and ps indicators with those of equilibrium, denoted by the letter E attached to the indicator symbol, and the ratio R with the balance (R_E = 1) may determine the extent of deviation from equilibrium at different times (charts were constructed based on published data for the period between years 2000=0 and 2011=11 on the horizontal axis; for the entire year 2011 we made some own estimates, especialy for the number of employees). In this respect, we present in Figures 11-13 certain simulation results for the real case (the funds collected from employees, but transferred to Pillar II, were excluded: PSI_E, psI_E, RI) and for the hypothetical case (the funds collected from employees, but not transferred to Pillar II: PSII_E, ps_E, RII). Also in Annexes 2 and 3 are presented, as three-dimensional images (3D) and 'geodetic maps "(contour plot), the correlations between the main variables involved in balancing the pension system, according to the simulation based on real data from the period 2000-2011 in both versions, with Pillar II excluded and respectively included in the budget of pensions.

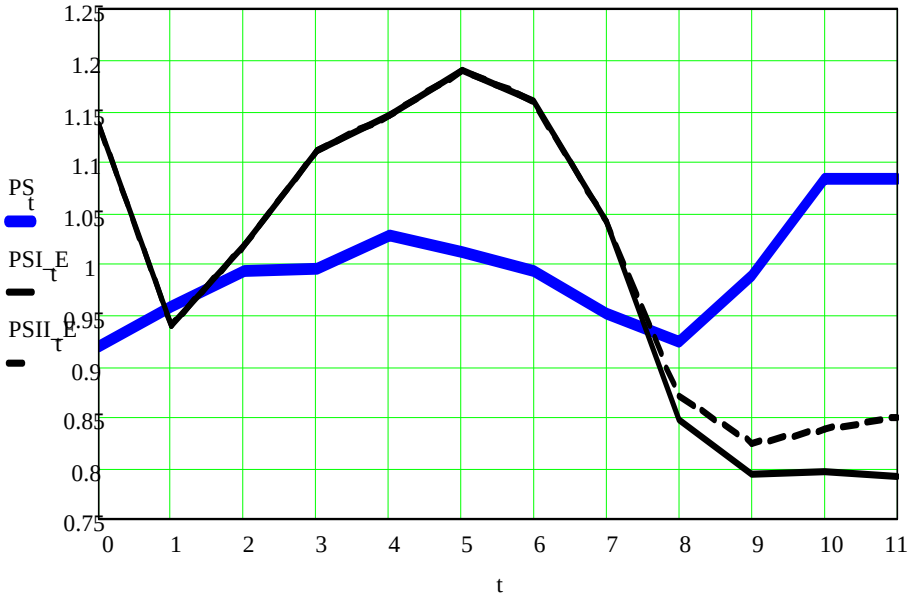


Figure 11. Dynamics of PS indicators, 2000-2010

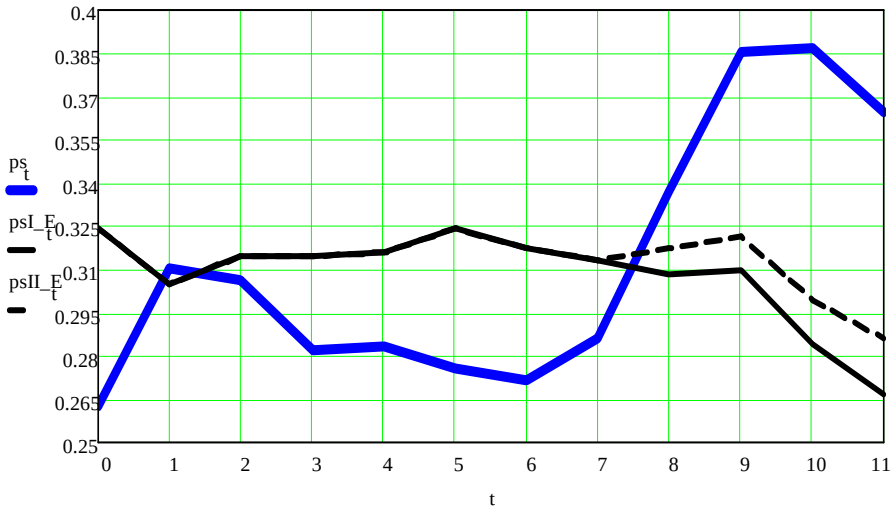


Figure 12. Dynamics of ps indicators, 2000-2010

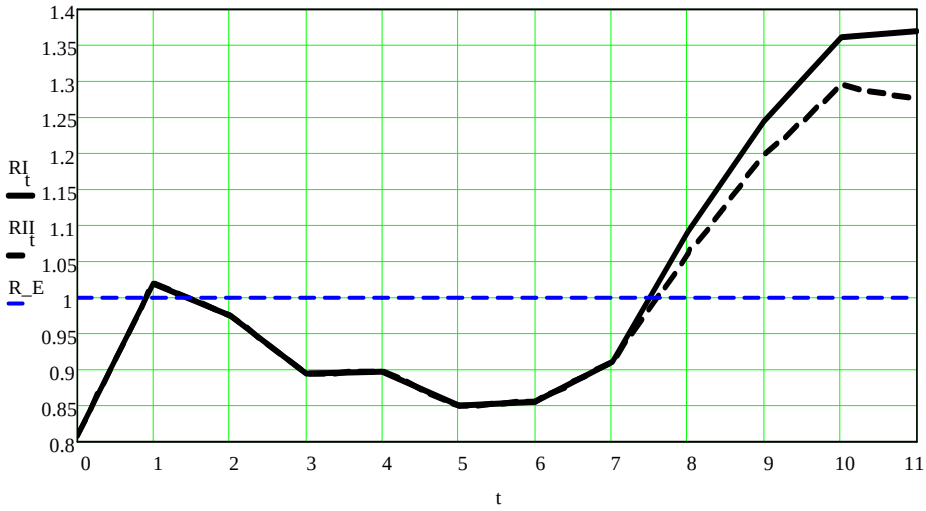


Figure 13. Dynamics of R indicators, 2000-2010

With the proposed model we can analyse the impact of dynamic variables involved in the pension budget and build a significant set of options to balance it. For example, in 2011, balancing the budget would mean (for real exclusion of Pillar II pension budget): 1) the average number of employees must increase from 4.440 million (estimated number for the entire year 2011) to 6.077 million; or 2) the increase of average gross wage from 2026 to 2773 lei per month. Data for the two variants are summarized in below (as an theoretical exercise). The two extreme alternatives are presented as only changing the number of employees or only changing the average monthly salary, by keeping other variables fixed. Of course, there is theoretically a very

large number of combinations between the two levels of both variables to achieve budgetary balance, but it remains the responsibility of policy makers to choose the best option in relation to available resources and conditions at any time.

A. Real case (Pillar II excluded from the budget)

Variant I

$$PS\_E_{11} := \frac{\alpha_{11} + \beta_{11}}{ps_{11}} \quad PS\_E_{11} = 0.792 \quad PS_{11} = 1.084 \quad S\_E_{11} := \frac{ps_{11} \cdot P_{11}}{\alpha_{11} + \beta_{11}}$$

$$S\_E_{11} = 6077.325 \quad S_{11} = 4440.000$$

Variant II

$$ps\_E_{11} := \frac{\alpha_{11} + \beta_{11}}{PS_{11}} \quad ps\_E_{11} = 0.266 \quad ps_{11} = 0.365 \quad s\_E_{11} := \frac{PS_{11} \cdot p_{11}}{\alpha_{11} + \beta_{11}}$$

$$s\_E_{11} = 2773.122 \quad s_{11} = 2026.000$$

B. Hypothetical case (Pillar II included in the budget)

Variant I

$$PS\_E_{11} := \frac{\alpha_{11} + \beta_{11}}{ps_{11}} \quad PS\_E_{11} = 0.85 \quad PS_{11} = 1.084 \quad S\_E_{11} := \frac{ps_{11} \cdot P_{11}}{\alpha_{11} + \beta_{11}}$$

$$S\_E_{11} = 5665.635 \quad S_{11} = 4440.000$$

Variant II

$$ps\_E_{11} := \frac{\alpha_{11} + \beta_{11}}{PS_{11}} \quad ps\_E_{11} = 0.286 \quad ps_{11} = 0.365 \quad s\_E_{11} := \frac{PS_{11} \cdot p_{11}}{\alpha_{11} + \beta_{11}}$$

$$s\_E_{11} = 2585.265 \quad s_{11} = 2026.000$$

5. Future trends

Applying the recurrence relation (4) on the decade 2011-2020 and considering this time as t=0 the year 2010, at the end of this decade (2020) the public debt should be 80.8% of GDP (all parameters where fixed to their values registered in 2010), but

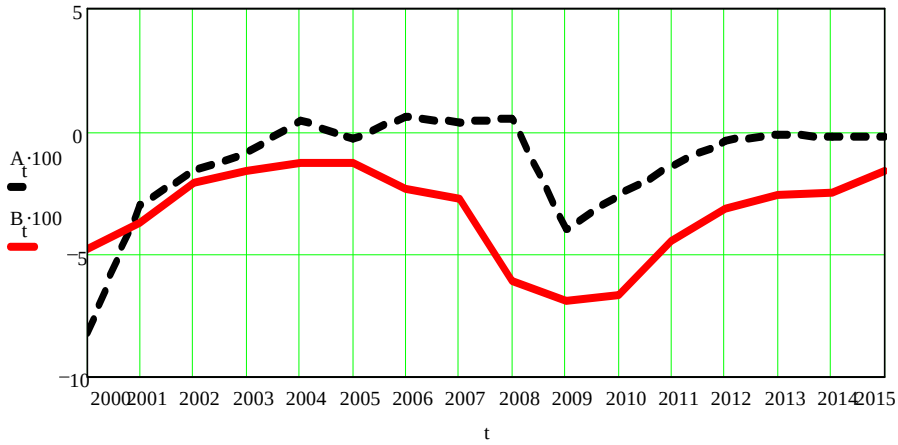
using the hypothesis is=q (relation (5)) at the end of this decade the public debt should be 65.1% of GDP (in this case, q% was fixed at level 0.9% to be equal to **is** parameter level in 2010). Thus, significant reforms, as they are highlighted in the signed accord with IMF, WB, and EU, must be introduced in order to avoid this unfavorable actual trend.

A simple way to assess the sustainability of public finances could be to link the public debt and budget deficit discounted by the interest rate, with the growth rate of GDP. Similar to some studies we can use the following relation between these variables:

$$(q\% - Db\%)\ D\%Y = (1 + q\%)\ \Pi\% \qquad (7)$$

where D%Y is the public debt as a share of GDP, Π% - the budget deficit as a proportion of GDP, q% - the real rate of GDP growth, and Db%% - the real interest rate. This expression shows that the interest at which foreign and internal borrowing take place cannot be higher that the growth rate of GDP. However, if this is the case, the budget should record a surplus in order to compensate for the expensive borrowing.

The two sides of the equation (7) are represented in Figure 8 for the period 2000-2015 (data are for the period 2011-2013 from Fiscal Strategy and for 2014 and 2015 from IMF projections; as interest rate, we considered for the period 2011-2013 the levels of implicit interest rate for debt from Fiscal Strategy, and for years 2014 and 2015 the same level as in 2013, respectively 4.8%). High sustainability corresponds to the situation when the two curves (A=(q%-Db%)D%Y and B=(1+q%)Π%) are superposed or very close to each other. As we can see, the highest sustainability was recorded in 2002, while the lowest sustainability in 2008. Corresponding to projections the evolution will continue to a better situation until 2015.



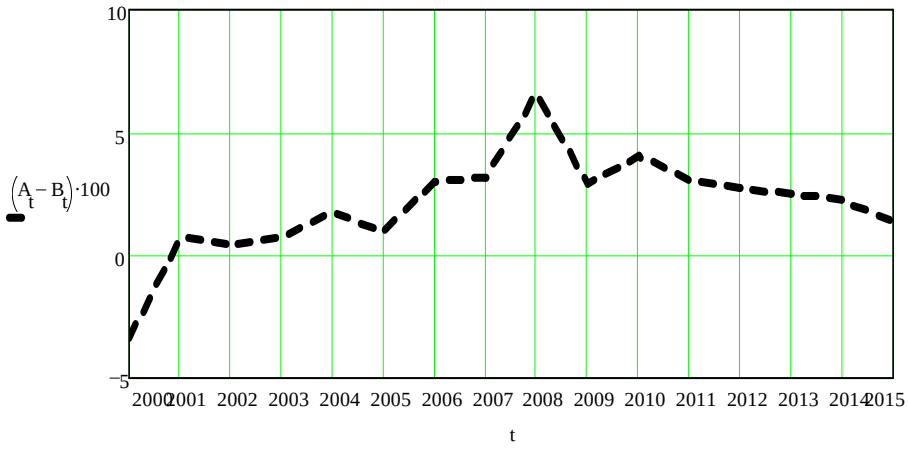


Figure 8. Trend of sustainability, expressed by parameters A and B, 2000-2015

The anti-crisis program supported by the three international organizations will continued to play a crucial role in stabilizing the Romanian economy, reversing imbalances, and setting the stage for future sustainable economic growth. Despite these improvements, the recovery will be delayed due to continued weakness in domestic demand, adverse developments in the region, and recent serious flooding.

The success of the authorities' consolidation strategy hinges on their ability to carry out structural reforms. The pension and public wage reforms are two major pillars supporting the adjustment effort, and their approval is therefore critical. There will be needed efforts to further streamline public employment, as it would allow some recovery in real incomes of the remaining, better-qualified, employees. It also strongly needed initiatives to reform the labor markets and the burdensome system of social assistance benefits. Efforts to improve tax collections may also be bearing fruit, with some improvement in the revenue performance in recent period, and should be expanded along the lines of the recent technical assistance advice. Romania's yield from major taxes remains well below that of other EU countries, suggesting that there is significant scope for improvement. To improve the absorption of the EU funds in order to meet the large infrastructure needs under tight budget constraints will be an important task for next period, as well as further reforms of the capital budgeting process to ensure adequate prioritization and valuation of the investment projects. Accelarisation of reforms of the state enterprises, while proceeding along with the restructuring of the public sector, will be also a necessity. Within the agreement with the three international organizations, the medium-term fiscal strategy remains focused on achieving the 3 percent Maastricht deficit objective by 2012, while ensuring the future stability and predictability of the tax system.

The overhaul of the social assistance benefits will provide an important support to the fiscal adjustment strategy while improving the efficiency of protections to the poorest and most vulnerable members of society. In order to improve the efficiency of

hospital services, the management of many hospitals has been transferred to local authorities. A reference price scheme for selected pharmaceuticals has been established and will be extended next period. Moreover, benchmarking systems will be set up to control pharmaceutical costs and physician service costs.

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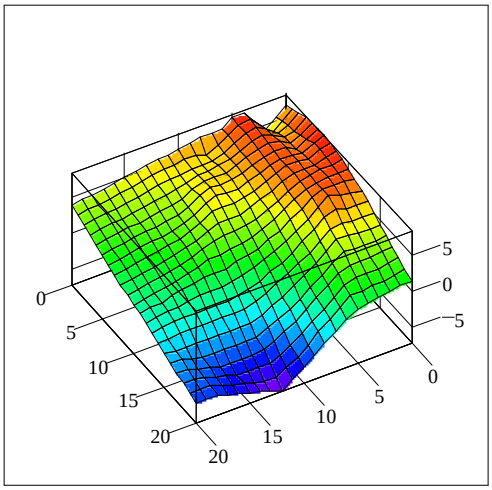
Annex 1



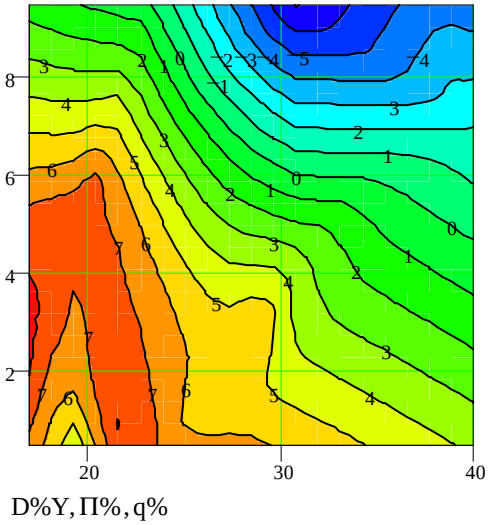
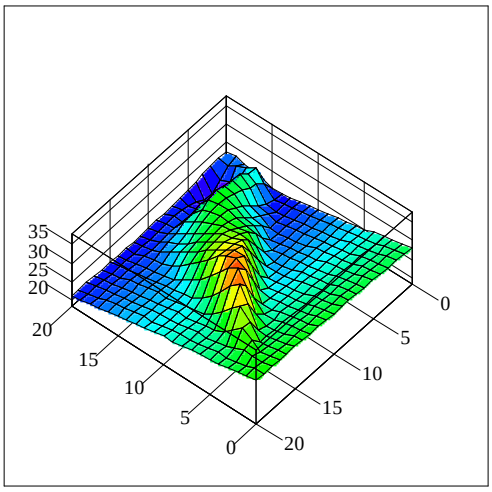


Figure A1. Correlation public debt – public deficit – growth rate, 2000-2010



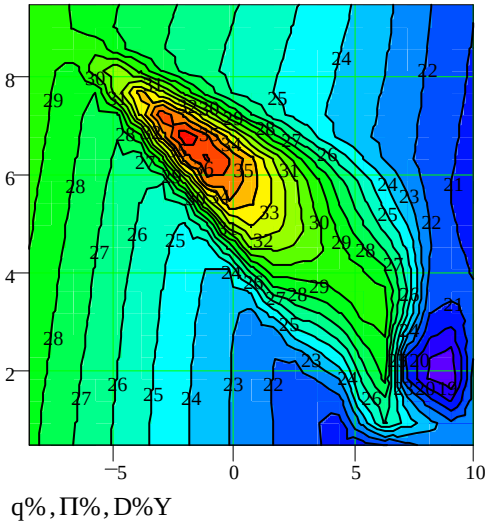
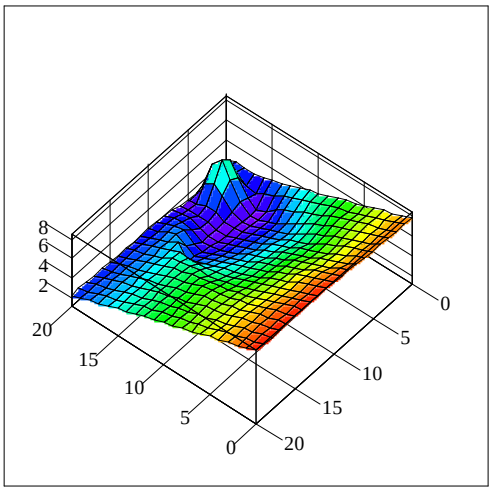
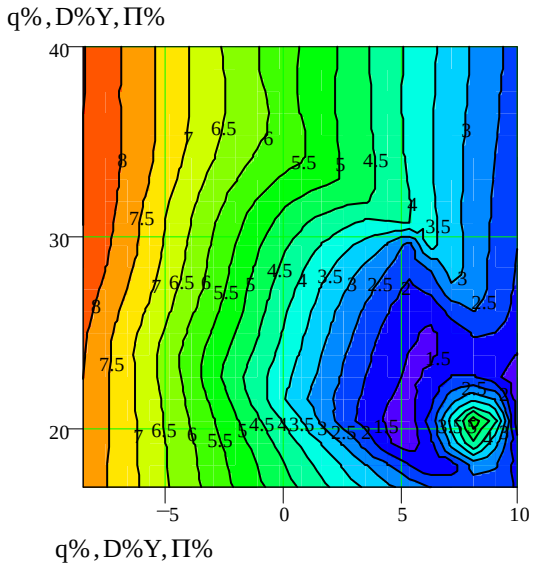


Figure A2. Correlation growth rate – public deficit – public debt, 2000-2010





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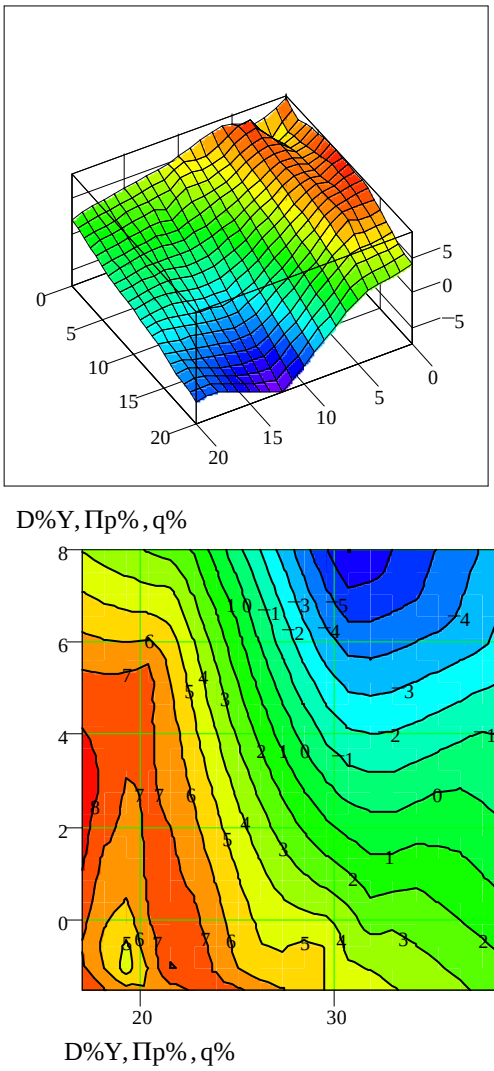
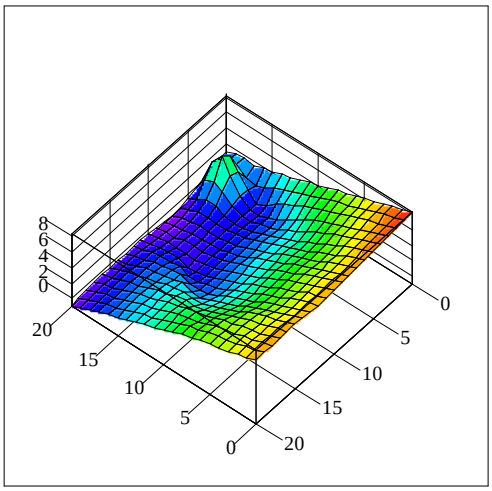


Figure A4. Correlation public debt – primary deficit – growth rate, 2000-2010



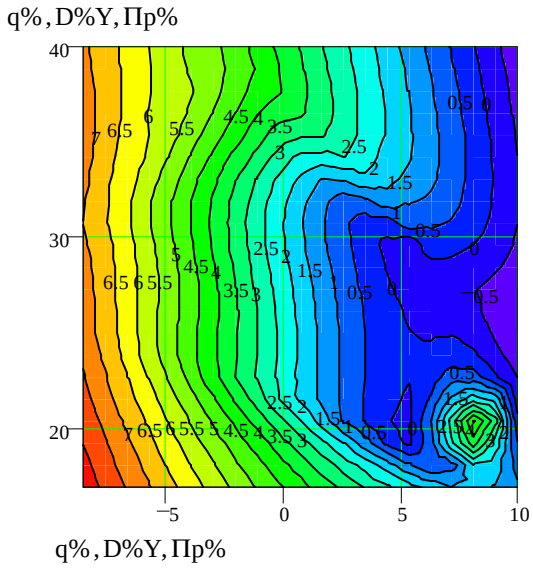


Figure A5. Correlation growth rate – public debt – primary deficit, 2000-2010

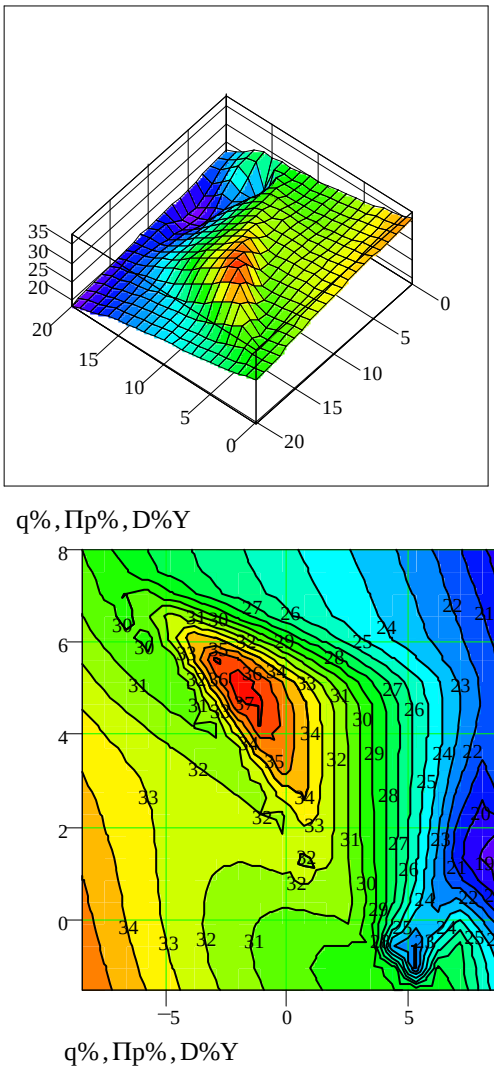
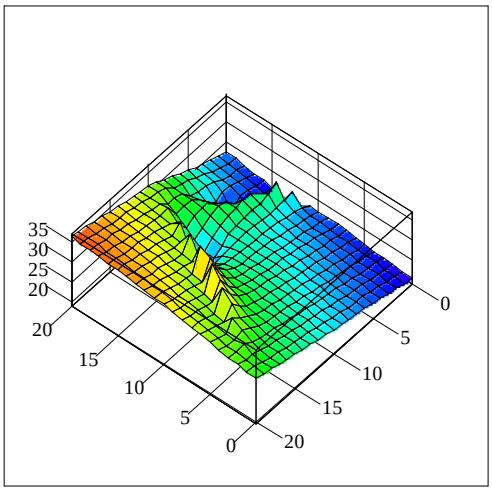


Figure A6. Correlation growth rate – primary deficit – public debt, 2000-2010



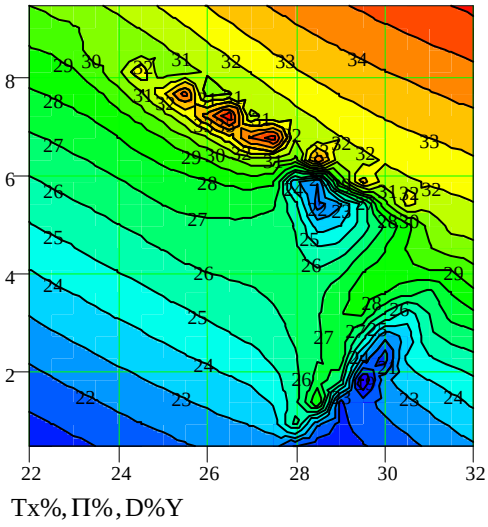
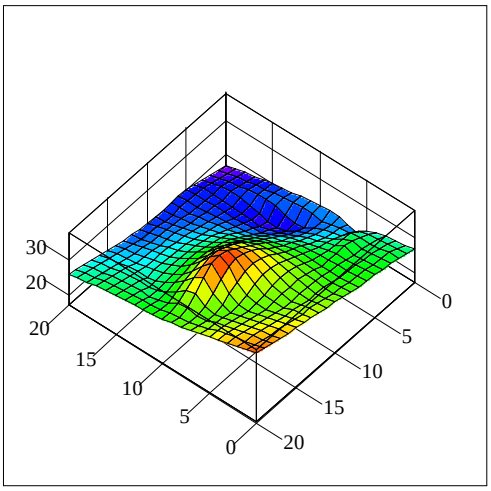


Figure A7. Correlation tax rate – public deficit – public debt, 2000-2010



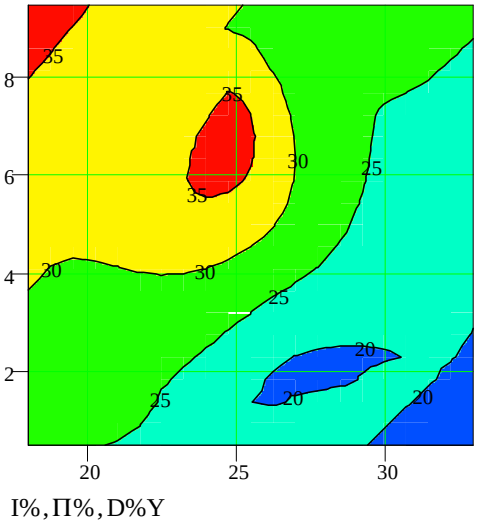


Figure A8. Correlation investment – public deficit – public debt, 2000-2010

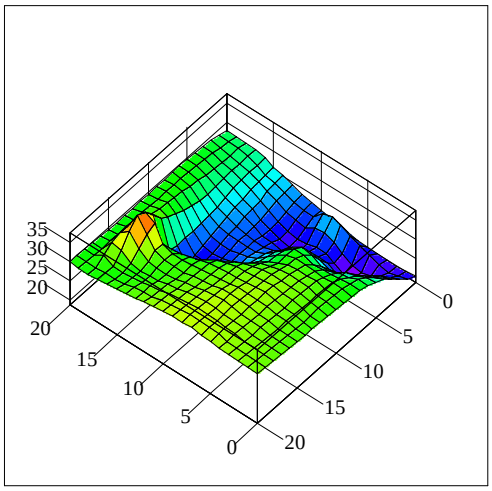
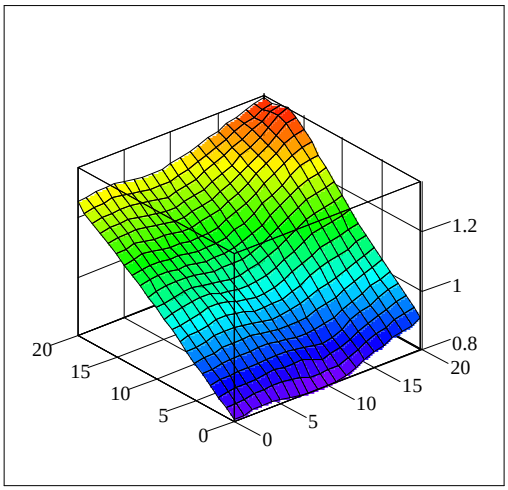
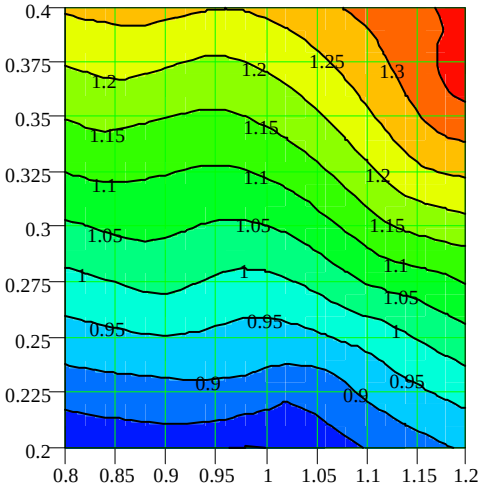


Figure A9. Correlation saving – public deficit – public debt, 2000-2010

Annex 2



PS, ps , R



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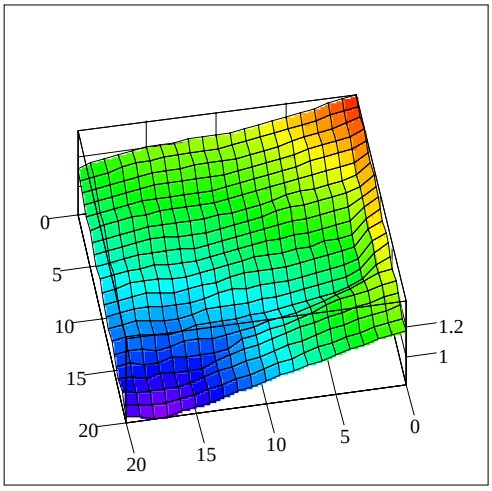

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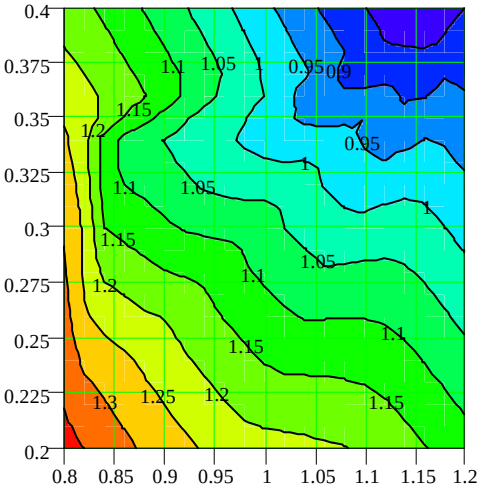

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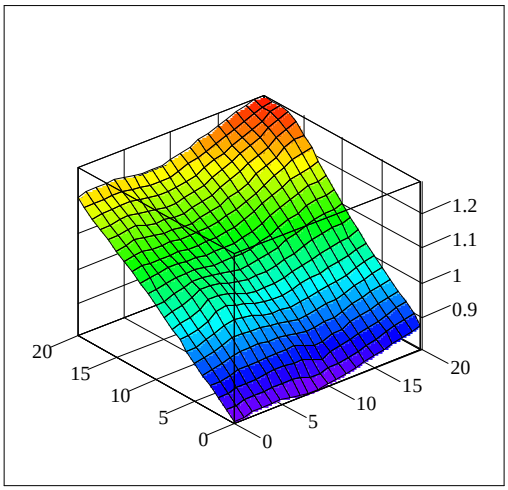
Annex 3



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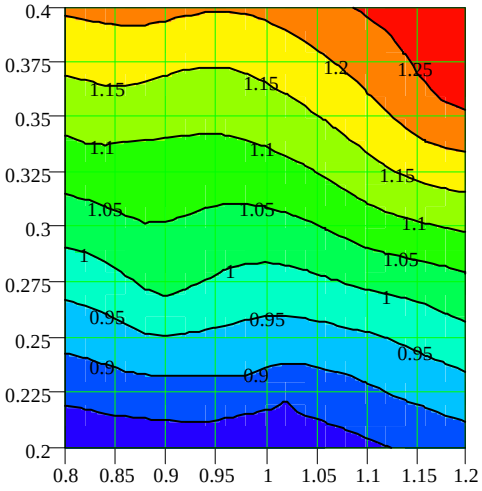

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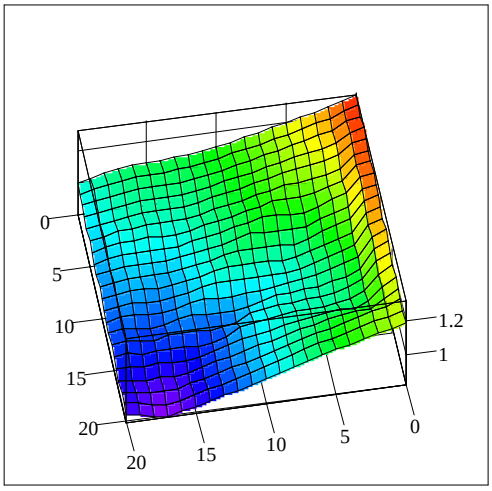

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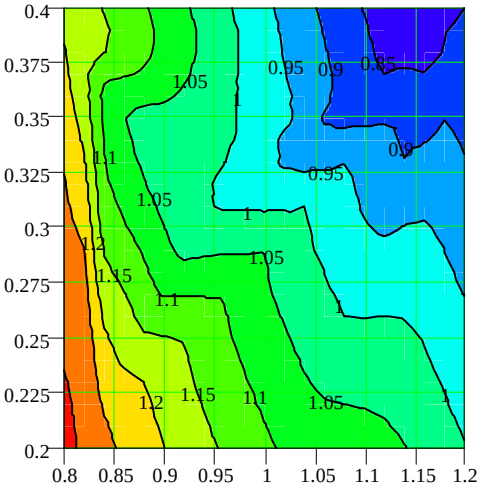

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