



USING A MACROECONOMIC MODEL TO CHECK FORECASTS CONSISTENCY

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Abstract

In macroeconomic modelling a central role is played by the forecast of state budget revenues and expenditures, since the financial-budgetary resources are the bases of income redistribution in the society and orientate economic growth. In view to achieve a trade-off between sustainable stimulation of economic growth and the optimal level of budget revenues, various scenarios should be developed, depending on the governmental policies, by using financial programming models. The article includes the presentation of a reduced model used for drawing up a macroeconomic forecast version consistent with the medium-term budgetary planning assumed by the decision makers.

Keywords: macroeconomic modelling, national accounts, budget revenues and expenditure, behavioural equations

JEL Classification: E17, E27, E62, H61, H68

1. Introduction

In the case of economies that faced restructuring periods, where data series are fractured due to the behaviour of the transition economies, but also to regular changes in the statistical methodologies, the use of financial programming models is required. This necessity is especially proven by their use as tools in orienting macro-economic policies because:

- they allow for the simulation of economy evolution trends/scenarios, starting from various ex post assumptions on the economic and social political decisions;
- they ensure the motivation of macroeconomic targets and, if assumed by the decision makers they provide a detailed set of indicators compiled depending on the envisaged targets;
- they ensure the detailed financial analysis of forecasts, from the perspective of institutional sectors, the net delimitation between government sector and the other sectors, thus allowing for more efficient policy orientations.

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Thus, one main goal of financial programming models is to check up the consistency of forecasts made for various fields by the official institutions, for example, the macroeconomic forecast made by the Government, the budgetary forecast elaborated by the Ministry of Finances, the monetary forecast issued by the Central Bank. The financial programming model has several advantages over the econometric model since:

- its structure allows for checking the consistency of individual projections with the overall logic of the model;
- it ensures the correlation between macroeconomic forecast and the budgetary projection at a high level of detail, thus allowing for carrying out qualitative analyses to be used in forecasts;
- the low share of behavioural equations enables the use of data series without the risk of inducing specification errors: in the Romanian statistics, some data series are short and fractured and they show no methodological continuity.

The presented macroeconomic model is the reduced form of a model developed during the post-doctoral activity (the Sectorial Operational Programme Human Resources Development 2007-2013, Contract No. SOP HRD/89/1.5/S/62988), consisting of three institutional sectors and three main blocks: the central block, the budgetary block, and the private sector block.

By means of the correspondence specific to the Social Accounting Matrix (Integrated Economic Accounts Table in the System of National Accounts) the set of main blocks indicators are translated into the derivate accounts of the institutional sectors for the forecasting period: Current Account (recording income generation, distribution and use operations) and Capital Account (recording capital investments and transfers, as well as changes in assets and liabilities).

The purpose of checking forecasts consistency could be achieved by separating the private sector and analysing the correlations between the economic indicators of growth and labour force, specific to this sector. The private sector is residual, in the sense that it is determined if knowing the macroeconomic indicators at national level and the indicators specific to the budgetary sector. Conversely, by limiting the private sector behaviour by setting certain parameters specific to the model, assumptions could be made on the forecasts of the private sector and, afterwards, by adding the budgetary sector, the forecasts of national economy indicators are substantiated.

As a general characteristic, one mention should be made about the balanced proportion of the target variables (exogenous) and the output variables (endogenous), so that the economic policies could be followed at a more detailed level. In the current version of the model, the following macroeconomic targets are used:

a. Policy variables

- Inflation
- Average gross wage and employment in the government sector
- The package of fiscal and budgetary policies

b. Inertial variables

- The growth rate of Gross Domestic Product (GDP)

- Average gross wage

In order to check up more precisely the assumptions concerning the behaviour of target variables during the forecasting period, as well as to check the consistency between them, some sustainability tests were designed within the model:

- The test calculating the expected GDP level based on the production function;
- The test that estimates the expected private consumption according to disposable income of the private sector;
- The test that estimates the expected gross investment according to the gross operating surplus;
- The test calculating the average level of the effective tax rates during the forecasted period.

The model organisation in blocks is similar to the standard structure of the IMF (Mikkelsen. G. Jan, 1998) and World Bank models, but certain causal relations between the blocks are different. One of the original elements consists in the direct correlation between GDP, labour statistics and budget account, through the decomposition of GDP into the factors' incomes (Stănică, C.N. 2011, 2007, 2004).

A version of the World Bank RMSM-X model was adapted in Romania with the assistance program granted by ADE (*ADE: Romania, Public Investment Prioritising Project*, 1996, 1997) for the National Commission for Economic Forecasting, and it represented an important reference for the author in the development of the model.

Likewise, certain references related to the computation and estimation of certain parameters characterising the budgetary revenues collection are to be found in the complex macroeconomic models applied in Romania (Dobrescu, E. 2010, 2006, 2002, Ciupagea, C. 2000 and Mohora, M.C. 2006).

2. Specific Structure of the Model

2.1. Taxation Bases, Empirical Parameters

The purpose of the model is not to be used for making own forecasts, but for checking the consistency between the official forecast and the budgetary planning, as well as for modelling the budget revenues in relation to the changes in fiscal policies. Thus, the budgetary block has an important role in the model with a specific functionality: the fiscal policy scenarios and the target variables exogenously set up determine the behaviour of the **taxation bases**. Budget revenues are further on estimated on the basis of taxation bases and the empirical parameters of the model. Conversely, setting up the assumptions regarding budget revenues collection, one can estimate the taxation bases consistent with the planned budgetary revenues and, thus, determine the development of the main macro-economic variables during the forecasting period.

According to the National Accounts, GDP is a sum of incompletely taxed or impure taxation bases (containing non-observed economy and various non-taxed components). In the case of the Romanian economy, the non-taxation degree is high. The non-observed economy has a share of about 20% in the Gross Domestic Product,

to which the influence of agriculture, with a share of 10% should be added. The incompletely taxed bases are decomposed, in their turn, into an official component and an unofficial one.

The GDP decomposition by the income method in the central block of the model allows for the identification of taxation bases for direct taxes (Table 1):

Tax on wages and social security contributions have as a common taxation base the official gross wages according to the civil register (OW).

The private gross operating surplus is considered as an impure taxation base for taxes on profit (PGOS).

The two main components of gross value added GVA (Gross wages and salaries and Private gross operating surplus) are correlated in the forecasts with the official gross wages and the tax on profit, by means of the estimated elasticities. The official gross wages are correlated in their turn with the direct taxes. Thus, overall, GVA is correlated with the direct budgetary taxes, the average gross wage and the number of employees. The mixed income of households, with a share of about 20% in the GVA, represents the single independent component remaining stable when the fiscal policies are changing.

Table 1 points out, by statistical data, the relationship between the explanatory variables of the model (official gross wages, tax on profit through the assumptions of PGOS taxation degree, employers' social contributions) and the taxation bases from National Accounts, as GVA components. The respective shares could be extended to the forecasting period based on econometric or expert analyses.

Table 1

GVA Decomposition by the Income Method

National economy		2005	2007	2008	2010	2011
billion lei						
GVA	Gross value added	255.2	368.3	458.5	471.9	509.3
WS	(1) Gross wages and salaries	93.1	134.4	182.5	175.7	185.4
	Share in GVA	36.5%	36.5%	39.8%	37.2%	36.4%
OW	Official gross wages	53.0	81.8	106.7	99.9	107.0
	Share in Gross wages and salaries	56.9%	60.9%	58.5%	56.8%	57.7%
PGOS	(2) Gross operating surplus - private sector	72.0	114.6	136.1	156.9	175.2
	Share in GVA	28.2%	31.1%	29.7%	33.2%	34.4%
	PGOS taxation degree	56.7%	57.6%	60.0%	40.3%	36.8%
IH	(3) Mixed income of households	63.4	83.4	96.1	95.7	105.0
	Weight in GVA	24.8%	22.6%	20.9%	20.3%	20.6%
SCF	(4) Employers' social contributions	18.2	24.7	30.3	28.8	30.8
	Weight in GVA	7.1%	6.7%	6.6%	6.1%	6.0%

Source: Romanian National Institute of Statistics and model computations.

The official gross wages hold a share of about 57%-58% in gross wages and salaries (also including the undeclared income), thus having an important reserve for increasing, on long term, the budget revenues from social security contributions and taxes on income. It is worth mentioning that the legal tax relaxation in 2005 entailed a decrease in number of employees from non-observed economy during the next years, 2006-2007, as noticed from the high share of official gross wages (60.9% in 2007).

Also, a surplus of salary earnings is noticed in 2008 (with a share of 39.8% in GVA), following the indexations made in the budgetary sector and of the economic growth, after which a gradual diminution was noticed during the economic crisis period of 2009-2011.

The taxation degree of gross operating surplus (PGOS) shows the share of it that would have been entirely taxed in accordance with regulations. During the forecasting period, the taxation degree is established around a trend, thus allowing for direct correlation between the tax on profit and the corresponding taxation base PGOS. Between 2005 and 2008, this parameter showed an upward trend, pointing out the improvement of collecting the taxes on profit, afterwards being followed by a gradual decrease during the economic crisis period of 2009-2011.

As regards the fiscal reform effect upon the direct tax collection, the revenues decrease due to the legal tax relaxation in 2005 was compensated by the expansion of taxation bases (as additional resources for the budget revenues) as well as by the improvement of tax administration. In 2005, a moderate reduction in the direct taxes occurred (7.6% for the tax on profit instead of 36%, and 13% for the tax on income instead of 33%, respectively). Starting in 2006, the tax on income and the social security contributions amplified their increase as consequence of the indirect effect of the gross wage expansion. The tax on income reached high growth rates, of about 36%-40%. After only one year, the share of these budget revenues in the GDP reverted to the 2004 level.

GDP decomposition by the expenditure method in the central block of the model, indicating private consumption, allows for the identification of taxation bases for indirect taxes (Table 2). The taxation base for the value-added tax (VAT - the main budgetary income for sales) is the market private consumption, consisting of the goods purchases by population and the market services rendered to population.

Table 2

Decomposition of Private Consumption

	National economy	2005	2007	2008	2010	2011
	billion lei					
PC	Private consumption	200.9	278.4	333.8	334.4	358.4
SC	(1) Self-consumption and peasant market	28.1	30.0	36.1	31.6	37.2
	Share in private consumption	14.0%	10.8%	10.8%	9.5%	10.4%
MPC	(2) Market private consumption	172.8	248.4	297.6	302.8	321.2
	Share in private consumption	86.0%	89.2%	89.2%	90.5%	89.6%
	Market consumption taxation degree	68.6%	66.2%	72.3%	60.3%	62.2%

Source: Romanian National Institute of Statistics and model computations.

Within households' consumption, the highest share, of about 89%-90%, is held by the market consumption, the remaining 10% being self-consumption and peasant market, thus an important reserve for the increase in value-added tax being provided by introducing the agricultural products into the commercial circuit. Since the VAT quota is not applied to all the products purchased by population and certain products are taxed at a lower rate, it appears that only 60%-70% of the market private consumption is entirely taxed at the average legal quota.

The market consumption taxation degree is a measure of VAT collection rate, being an important parameter of the model. During the forecasting period, its value is established around a trend, thus allowing for the direct correlation of the value-added tax with private consumption. A very good collection was noticed in 2008 (72.3%), followed by a dramatic diminution in collection during the 2009-2011 economic crisis, a determinant factor being also the increase in the legal VAT quota from 19% to 24% in 2010.

In accordance with the main purpose of the model, the parameters on budgetary revenues collection become relevant, in other words **(empirical) effective tax rates** (Table 3). Their realism represents the core condition for the credibility of budgetary projections. The macroeconomic model compiles the effective tax rates by reporting each tax to the corresponding taxation base. In the empirical evidence, they have a different level as compared to the legal tax rates due to the impurity of taxation bases. The correlation between effective tax rates and the legal rates is ensured in the model by the **(empirical) collecting degrees** (Table 3), they being specific parameters whose values are set up during the forecasting period around a trend or are estimated based on certain econometric tests.

Table 3

Evolution of Taxation Rates and Collecting Degrees

Taxation rates and collecting degrees		2005	2007	2008	2010	2011
rsc	Effective tax rate_Social security contributions	51.2%	47.2%	44.9%	46.0%	45.7%
	Legal tax rate_Social security contributions	49.5%	46.4%	43.7%	44.4%	44.4%
	Change of collecting degree	0.6%	-4.5%	0.8%	2.8%	-0.6%
rwt	Effective tax rate_Taxes on income	12.0%	14.1%	14.2%	15.5%	14.9%
	Legal tax rate_Taxes on income	16.0%	16.0%	16.0%	16.0%	16.0%
	Change of collecting degree	11.5%	7.0%	0.9%	0.9%	-3.6%
rpt	Effective tax rate_Taxes on profits	9.1%	9.2%	9.6%	6.4%	5.7%
	Legal tax rate_Taxes on profits	16.0%	16.0%	16.0%	16.0%	16.0%
	Change in collecting degree	41.4%	6.5%	4.2%	-20.2%	-12.2%
Taxation rates and collecting degrees		2005	2007	2008	2010	2011
rvt	Effective tax rate_Value-added tax	13.0%	12.6%	13.7%	13.0%	14.9%
	Legal tax rate_Value-added tax	19.0%	19.0%	19.0%	21.5%	24.0%
	Change in collecting degree	9.8%	-5.9%	9.2%	-6.3%	3.1%

Source: Model computations.

The collecting degree is the ratio of the empirical rate to the legal rate, so that its behaviour does not depend on the taxation policies, but only on the companies' capacity and willingness to pay their taxes. In the case of the Romanian economy, the series of collecting degrees for the taxes on profits and value added tax are stationary TS (10% level) and they are modelled by AR (1) regressions with GDP real rate as explanatory variable (assuming that the increase in economic activity has a positive effect on improving the collection). The series of collecting degrees of the taxes on income and security contributions are 1st order integrated series, so AR regressions for variables in differences are proposed. The BDS test results show that the residuals are independent and R-squared is significant in all cases.

The relaxation of taxes on income and profit during the 2005-2008 economic growth period led to the real improvement of collecting degree, as compared to the

progressive taxation of 2004 (improvement by 11.5%, and 41.4%, respectively, in 2005 for the tax on wages and tax on profits, and by 24% in the case of tax on income). Starting with the economic crisis of 2009-2011, the accelerated diminution in collecting degree was noticed.

The relaxation of taxes on income and profit had direct effects on the collection of these taxes and an indirect effect on the collection of taxes on sales, like VAT and excises.

The accelerated dynamics of value-added tax in 2005 and 2006 is explained by keeping a high dynamics of market private consumption, but also by improving the collecting degree. A worsening of collecting VAT and customs duties was noticed in 2007 because of shifting to the Intrastat commodities regime. Nonetheless, the collection will be placed around a slightly upward trend due to increase in households' consumption faster than GDP.

The direct correlation between the main budget revenues and the main indicators of National Accounts (taxation bases) results from the **budgetary block equations**. Part of the parameters established by the model for the forecasting period refer to the effective tax rates, which are proportional to the legal tax rates, by means of collecting degrees. The settings of model parameters are based on the expert analyses concerning their behaviour during the historical period 1990-2011. Since it is a financial programming model, it allows for a detailed analysis of budgetary revenues and expenditures, at the same time with a detailed set of macroeconomic indicators at national level and at private sector level.

The evolutions presented in Tables 1-3 indicate that, during economic growth periods the parameters should be set around an upward trend, while during the depression years the parameters should be gradually decreased. Likewise, empirical findings for the Romanian economy prove that any reduction in taxation during the economic growth periods (the reduction of flat tax in 2005) results in the acceleration of taxation basis increase (OW, PGOS, MPC, Tables 1 and 2), which partially compensate for the loss in budget revenues due to the diminution in legal quota. These results demonstrate the positive reaction of the companies to fiscal relaxation during the periods with high economic resources, in particular improving the employment by reducing the "hidden economy". In the case of depression, the tax relaxation would have a neutral impact on the financial indicators of the private sector, so that any diminution in legal quotas is proportionally transposed into a reduction in budget revenues, or even in higher losses in revenues.

The official Government forecast drawn up in the spring of 2012 is not foreseeing the change in fiscal policies during 2012-2014, but is based on the assumption of gradually recovery of the economic growth. This situation would correspond to the acceptance, within the forecasts, of a slow improvement of the model parameters related to revenues collection.

2.2. Specification of Equations

The model equations from the three main blocks ensure the correlation between the main macroeconomic indicators and the budgetary indicators (income/expenditure) on the one hand, and the indicators specific to the private sector, on the other hand.

The main equations of the budgetary block refer to the revenues forecast:

$$R = PT + WT + SCC + VT + CD + EU + OR$$

where:

R = Budget revenues

PT = Taxes on profits

WT = Taxes on income and salaries

SCC = Social security contributions

VT = Value-added tax, excises

CD = Customs duties

EU = EU assistance

OR = Other budget revenues

$$PT = rpt * PGOS$$

$$WT = rwt * E * W * (1 - Lsce) * (12/1000)$$

$$SCC = rsc * E * W * (12/1000)$$

$$VT = rvt * MPC$$

$$CD = rcd * M$$

$$OR = ror * GDP$$

where:

GDP = Gross domestic product

PGOS = Private gross operating surplus

E = Number of employees

W = Average gross wage

MPC = Market private consumption

M = Imports of goods and services

Lsce = Legal taxation quota for employees' security contributions

rpt, rwt, rsc, rvt, rcd and **ror** represents the effective tax rates depending on the tax collection assumption.

The budgetary block estimates the main indicators of the general government according to the national accounts, among which gross value added, compensation of employees, government consumption and taxes on products are used for GDP compilation. They depend on the budgetary revenues and expenditures, thus ensuring the direct correlation between the central block and the budgetary block:

$$TSP = TSP_{(t-1)} * (VT + CD) / (VT + CD)_{(t-1)}$$

$$GC = rwsg * WSG + rgs * GS + rgc$$

$$WSG = f_{WSG} (Eg, Wg)$$

$$GVAg = CEMg + GGOS$$

$$CEMg = f_{CEMg} (Eg, Wg)$$

GGOS = Estimated on the basis of real terms dynamics

where:

TSP = Taxes less subsidies on products

GC = Government consumption

WSG = Wages and salaries from the consolidated budget

GS = Expenditure on goods and services from the consolidated budget, exogenously estimated

Eg = Number of employees in the budgetary sector

Wg = Average gross wage of budgetary employees
 GVAg, CEMg, GGOS = Gross value added, compensation of employees and gross operating surplus of the budgetary sector
rwsg and **rgs** are parameters estimated by econometric methods from historical data

The main equations of the central block, relevant to the model, refer to GDP computation by the income and expenditure methods:

$$GDP = TSP + PGOS + WS + SCF + (IH + GGOS)$$

$$GDP = MPC + GC + GCF + X - M + (SC)$$

$$WS = f_{WS}(OW) - \text{determined based on an empirically established elasticity}$$

$$OW = E * W * (12/1000)$$

where:

WS = Gross wages and salaries, according to the national accounts

OW = Official gross wages paid within the national economy

SCF = Employers' social contributions, taken over from the budget

GCF = Gross capital formation (gross investments)

X = Exports of goods and services

IH = Mixed income of households

SC = Self-consumption and peasant market

TSP = $TSP_{(t-1)} * (VT + CD) / (VT + CD)_{(t-1)}$ from the budgetary block

PGOS = $(1 / \mathbf{rpt}) * PT$ by inversion, from the budgetary block

MPC = $(1 / \mathbf{rvt}) * VT$ by inversion, from the budgetary block

GC = $\mathbf{rwsg} * WSG + \mathbf{rgs} * GS + \mathbf{rgc}$ from the budgetary block

GCF = $ICOR_{(t+1)} * (GDP_{(t+1)} - GDP)$

ICOR (Incremental Capital Output Ratio) = Relation between gross investments (gross capital formation) and expected GDP growth, namely how much of GDP increase in the next year is due to investments made in the current year

IH, GGOS, SC are considered as being independent of fiscal policies, exogenously established based on empirical analyses of the expert.

These equations determine the level of macroeconomic variables from National Accounts according to the level of variables from the budgetary block, thus allowing for the harmonisation of official macroeconomic forecast with the budgetary planning.

The equations of the private sector block are, generally, accounting equations, from which the private sector indicators are directly calculated by subtracting the budgetary sector from the indicators forecasted at national level.

$$GVA = GDP - TSP$$

$$GVAp = GVA - IH - GVAg$$

$$CEMp = CEM - CEMg = GVAp - PGOS$$

$$Ep = E - Eg$$

$$Wp = (W * E - Wg * Eg) / (E - Eg)$$

where:

GVA, GVAp, CEM, CEMp correspond to gross value added and to compensation of employees at national level and at private sector level

E, Ep, W, Wp correspond to average number of employees and to average gross wage at national level and at private sector level

The relevance of the model is that macroeconomic indicators specific to the budgetary sector could be estimated, thus allowing for the compilation of private sector accounts. According to economic theory, the private sector provides the most secure rules on macroeconomic indicators correlation and it therefore allows for checking up the forecasts consistency, e.g. which is the optimal level of gross wage consistent with the GDP growth.

3. Use of the Model - Checking and Adjusting the Official Forecast Consistent with the Budgetary Planning

When checking for the consistency, the logic of the model functioning is as follows: having the planned budget revenues as macroeconomic targets, the model equations estimate the taxation bases which are consistent with the planned budget revenues, based on which several indicators existing in the official forecasts are derived.

As a first step, the behaviour of model parameters (collecting degrees, elasticities) is analysed on the basis of historical data and their level for the forecasting period is established.

At a second step, the correlations between the main economic indicators of growth and labour force specific to the private sector are analysed. If inconsistencies are noticed between the evolutions of private sector indicators (number of employees, gross earnings, private sector growth), then certain corrections are to be made for budgetary revenues and expenditures, until reaching the desired consistency.

The model also benefits of sustainability tests allowing for cross-checking the forecasts on income components from the GDP structure with the expenditure components from the GDP structure, such as checking the consistency between WS and MPC, and between PGOS and GCF (marginal propensities of consumption and investments), respectively.

The obtained results may lead to changing the ratio of the direct taxes to the indirect taxes planned in the budgetary programme and the subsequent revision of their level. Finally, the forecast resulting from the model could differ, within certain limits, from the official forecast and from the budgetary planning and, therefore, corrections of macroeconomic targets and of the budgetary programme assumed by official institutions could be done.

The spring prognosis of the National Commission for Forecasting represented the basic official document substantiating the macroeconomic framework of the state budget, approved by Emergency Ordinance of Government. Consequently, its evaluation based on the model represents a compulsory phase for the projection of the budgetary revenues.

The spring prognosis covers the 2012-2015 period and consists of a set of indicators regarding gross domestic product by formation and utilization, the foreign trade, the

labor force and prices, representing the indicators corresponding to the modules of the model, less the indicators from the general consolidated budget.

As regards INS data dissemination programme, the GDP components calculated on the basis of income method are not precisely known for 2011, mentioning here the gross wages and salaries, the gross operating surplus, the mixed income of households. These variables represent the impure taxation bases for direct taxes that are correlated, in the model, with labour force indicators, among which the gross wage and average number of employees. None of these last two indicators are precisely known for 2011, since the first statistical information was to be published in the second part of 2012. Also, they are estimated in the official forecast for 2011, this being the base year for the forecast related to 2012-2015.

Given these findings, it is necessary to identify more precisely through the model the estimated level of the two labour force indicators, both for 2011 and for the forecasting period 2012-2015.

As regards the general consolidated budget, this is precisely known for 2011 and, therefore, the average number of employees at national level consistent with the budgetary situation could be compiled through the model, the calculation being further on extended to the forecasting period 2012-2015, where the state budget forecast made by the Ministry of Finances is the reference.

As for the credibility of average gross wage at national level, this could be investigated in the model within the private sector block, by analysing the correlation between private gross wage and private economic growth (private GVA).

The number of employees and gross wage in the budgetary sector are estimated with a high level of accuracy for 2011, based on the monthly data provided by the INS and the Ministry of Finance. This information accounts for inputs in the model in view to compile the macroeconomic indicators of the budgetary sector, since gross value added and final consumption of the budgetary sector are precisely known.

As such, by separating budgetary sector from the national economy, the univocal correspondence between the macroeconomic indicators of the national economy and those related to the private sector results from the model. This would allow for correcting the official forecast by checking the private sector consistency:

- GDP univocally correlated with GDP of the private sector (gross value added of the private sector);
- Final national consumption univocally correlated with private consumption; the latter represents the taxation base for VAT and excises, meaning a direct correlation with indirect budgetary taxes;
- Average number of employees at national level univocally correlated with the average number of employees of the private sector;
- National gross wage univocally correlated with private gross wage.

3.1. Checking up the Private Sector 2011-2013, the Number of Employees and the Average Gross Wage

The private sector, compiled by the model based on the official forecast, shows a uniform trend of economic growth, with a gradual recovery during 2011-2013. It is

worth mentioning that the economic crisis effect of earnings reduction will also partially manifest during the forecasting period so that, despite the economic growth, the salary indexations will not exceed the growth level. The private sector will be prudentially evolving, attempting to consolidate its productivity.

Thus, it could be noticed in the table that **the official forecast is consistent with the sustainable growth of the private sector** (Table 4).

Table 4

Economic Growth of the Private Sector and Budgetary Sector

Real growth as against to previous year (compiled with GDP deflator)	2011	2012	2013
Gross Value Added			
private sector	1.6	1.8	2.9
budgetary sector	-12.9	-1.5	3.1
Compensation of Employees			
private sector	0.2	1.6	2.6
budgetary sector	-10.7	-1.3	4.1
Gross Operating Surplus			
private sector	3.2	2.0	3.1
budgetary sector	8.5	-2.2	0.0

Source: Computations of the model based on official forecast.

The fluctuation of economic growth at national level is, however, determined by the budgetary sector behaviour. The restructuring carried out during 2011-2012 entailed a worsening of this sector indicators, GVA diminution, in real terms, by 12.9% in 2011, due to employees salary cut off.

The analyses on the correlations between macroeconomic indicators could be carried out only at the private sector level. The budgetary sector has an "administrative" driven behaviour, while the private sector behaves in accordance with the economic theory laws.

The average number of employees from the official forecast was checked both at the national and the private sector level by analysing **the elasticity of official gross wages (OW) in relation to gross wages and salaries (WS)**. As WS is a component of GVA based on the national accounts methodology, its value is set up according to the GDP growth and private sector GVA growth and it is fixed by the official forecast. After correcting the elasticity (Table 5), the number of employees decreased by 100 thousand (2.3%) in 2011, as compared to the official forecast. The same result was sustained by the collecting degrees of social contributions and taxes on wages, which show an excessive worsening in 2011, if compiled under the conditions of the official forecast (Table 3).

For the years 2012-2013, the adjustment in the number of employees meant a diminution by 130-150 thousand persons due to the propagation of the resulting difference from 2011.

As for the average gross wage from the official forecast, it was noticed that its evolution was not consistent with the economic growth at the private sector level. Thus, this indicator was corrected on the basis of estimated elasticity (Table 5) in relation to the private GVA: in 2011 it was only a minor change (decrease by 0.3%), while for 2012-2013 the average gross wage was diminished by 2%.

Table 5

**Comparison between the Official Forecast and the Model Results
Regarding the Behavioural Parameters**

PRIVATE SECTOR	2011	2012	2013
Elasticity of official gross wages / gross wages and salaries			
model	93%	91%	91%
official forecast	132%	152%	102%
Elasticity of average gross wage / private GVA growth			
model	41%	39%	35%
official forecast	42%	59%	35%

Note: The private sector results shown in the table are influenced by the author's assumptions on the budgetary sector evolution during 2012-2013. Source: Computations of the model based on official forecast.

After reaching the forecasts consistency for the private sector indicators, by reducing both the number of employees and the average gross wage, the inconsistency between the macroeconomic forecast and the budgetary planning is still noticed. This situation is observed from the changes in collecting degrees of social contributions and taxes on wages which show negative values for 2012 (Table 6). Since the economic growth begins to consolidate during 2011-2013, it results that the economic agents will change their behaviour by improving tax collection. Thus, social contributions and income tax are to be increased in 2012-2013 by 2.1%-2.8% and 0.8%-0.9%, respectively, this being the optimal value resulting from the model's simulations.

Table 6 indicate the new level of the two direct taxes as compared to the budgetary programme, which corresponds to positive values for the change in collecting degree.

Table 6

Correction of Direct Taxes by Setting up of Collecting Degrees

	2011	2012	2013
% Change in collecting degree_Social security contributions			
model - after budgetary correction	2.0%	0.3%	0.1%
official forecast	-0.6%	-4.4%	-0.8%
Surplus of revenues by correction (mil. Lei)	-	1100	1540
% Change in collecting degree_Taxes on income			
model - after budgetary correction	-1.1%	0.3%	0.2%
official forecast	-3.6%	-3.4%	-0.2%
Surplus of revenues by correction (mil. Lei)	-	170	200

Source: Computations of the model.

3.2. Checking up the GDP Expenditure Components 2012-2013

GDP components using the expenditure method are exactly determined for 2011; considering this, consistence analysis will be made for the forecasting period 2012-2013.

Final consumption (C) is evaluated in the model through its two elements:

$$C = GC + PC$$

- Government consumption (GC), based on the information related to expenditure on wages (WSG) and expenditure on goods and services (GS) from the consolidated budget

$$GC = rws_g * WSG + rgs * GS + rgc$$

- Private consumption (PC), of which market private consumption (MPC), based on the information related to Value added tax (VT) of the planned budgetary revenues

$$MPC = (1 / rvt) * VT$$

Checking up the consistency between the official macroeconomic forecast and the budgetary programme would entail a compromise between the correction applied to consumption components, on the one hand, and the correction applied to budgetary expenditure, on the other hand.

Government consumption is modelled according to the empirical parameters rws_g , rgs , and rgc . Otherwise, the use of the official forecast for GC and budgetary planning for WSG and GS to calculate these parameters shows an accentuated reduction in rws_g (Table 7), while the other two are consistent with the historical data. Coefficient rws_g can be corrected either by modifying the expenditure on wages, or by adjusting government consumption. The reduction in expenditure on wages by 0.8% in 2012 and 3% in 2013 (Table 7) is necessary in order to preserve the correlation between WSG and the compensation of employees in the government sector (average gross wage and employment).

Table 7

Correction of Expenditure on Wages from the Consolidated Budget

	2011	2012	2013
Empirical coefficient (rws_g) of government consumption related to expenditure on wages from the consolidated budget			
model	1.39	1.38	1.37
budgetary planning	1.39	1.37	1.33
WSG weight in compensation of employees of the government sector			
model	94.9%	95.3%	95.4%
budgetary planning	94.9%	96.0%	98.3%
Modification of WGS by correction (mil. Lei)	–	-300	-1300

Source: Computations of the model.

The consumption components MPC and GC are conditioned by the GDP expenditure identity:

$$MPC + GC = GDP - GCF - SC - M + X$$

where their sum is fixed by several aggregated indicators provided in the official forecast.

As for the market private consumption, the collecting degree values show that its evolution is not consistent with the value added tax (VAT). Considering the official forecast levels for government consumption and market private consumption, VAT has to be adjusted in order to reach the optimal values for the changes in the collecting degree (Table 8).

Table 8

Correction of Indirect Taxes by Setting up Collecting Degrees

	2011	2012	2013
% Change of collecting degree_Value added tax			
model - after budgetary correction	3,1%	1,7%	1,5%
official forecast	3,1%	-2,2%	2,7%
Surplus of revenues by correction (mil. Lei)	–	2000	1500

Source: Computations of the model.

4. Conclusions

Generally, the financial programming model may be applied to check the consistency between the official macroeconomic forecasts and the approved general consolidated budget. In fact, a comparative analysis of the macroeconomic forecasts (offering indications on the taxation criteria) and the budgetary forecasts offer the possibility to identify situations in which there are inconsistencies between the taxation bases and the revenues planned to be collected. If the model points out such discrepancies, the experts should develop analyses for identifying the factors responsible for these deviations. At the same time it is necessary to take into account the legislative changes, the improvement of the collection, a change in the taxation bases, as well as the factors linked to the domestic and international framework in the case of the economic evolution.

The projections obtained using the economic model have the advantage of emphasizing the turning points, considering that empirical parameters (collecting degrees, empirical taxation rates) are constant. As regards the macroeconomic forecasts of the presented model, some features of the indicators' evolution should be mentioned:

- after correcting the elasticity (Table 5), the number of employees in the economy will decrease by 100 thousand (2.3%) in 2011, as compared to the official forecast, and for the years 2012-2013 a diminution by 130-150 thousand persons by the propagation of the resulting difference in 2011 is expected; these results should be accepted with caution, because of the microeconomic decisions which were not taken or cannot be taken into account in the model;
- a second turning point refers to the evolution of the average gross wage; in this case a minor change in 2011 (decrease by 0.3%) is noticed, while for 2012-2013 average gross wage was diminished by 2%;
- the model simulations indicate a consistence among the national accounts indicators from the official forecast and the sustainable growth of the private sector and thus they remain unchanged in the model forecasts.

The adjustment of labour force macroeconomic indicators has direct impact upon the change in direct taxes, therefore resulting in some differences as against their level in the approved budget. Thus, social contributions and income tax increase by 2.1%-2.8% and 0.8%-0.9%, respectively, in 2012-2013, these being the levels which correspond to the positive values in the change in collecting degrees.

Another adjustment refers to VAT increase by 4.0%-2.8% in 2012-2013, considering the level of market private consumption taken from the official forecast and the positive values in the change of collecting degrees.

We suggest that all these differences should be taken into account when drawing up the 2012 autumn forecast of the National Commission for Forecasting, which represents the macroeconomic framework for the draft state budget 2012.

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