9. MODELLING THE BUDGET REVENUES ON THE BASIS OF APPROPRIATE MACROECONOMIC INDICATORS. A CASE STUDY FOR ROMANIA

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Abstract

The paper aims to identify if there is an interdependence between the main budgetary revenues and the macroeconomic indicators which can be found in the official forecasts. The proposed econometric method may constitute an alternative way of checking the consistency between the forecast of the budgetary indicators and the macroeconomic ones and can highlight at the same time the impact of some governmental policies on the public sector.

Keywords: budget revenues, macroeconomic indicators, modelling budget revenues, Romanian macroeconomic model, taxation, GDP, GNP, Hidden Economy, Macroeconomic Model

JEL Classification: C4, E1, H2

1. Introduction

In the published literature, one may find plenty of models which use a distinct module for the general consolidated budget and public administration main indicators. The module also includes the equations that link the budgetary revenues to the relevant macro indicators, either econometric or accounting ones, having also parameters which quantify the fiscal policies. Thus, using mainly the gross domestic product and its components, several scenarios may be prepared describing the behavior of the budgetary revenues in accordance with the fiscal and budgetary policies, such as a tax rate reduction or fiscal facilities implementation. These represent the set of parameters that are used in the

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econometric equations and that may be changed according to the specific of the policy taken into consideration.

Analyzing the structure of the budgetary revenues in Romania, it may be highlighted that indirect taxation prevails (40.7% of total revenues in 2018) followed by social security contributions' revenues (40.5%). If up to 2018 the revenues from contributions have represented around 30%, once the legislation has changed, their share in total revenues has increased by more than 10 percentage points, placing Romania in top 5 EU member states which rely on this type of revenues. The legislative changes, in place starting January 1st, 2018, refer to the reduction in the contribution rate by 2 p.p. (from 39.25% to 37.25%) and the cut in the number of compulsory contributions from 9 to 3, simultaneously with the transfer of the contribution due by the employer to the employee, but still established, declared and paid by the employer.

The budgetary revenues from direct taxes have represented less than 20% in total in 2018; only in Hungary and Croatia the share is lower. The decrease in 2018 was due to the cut in the personal income tax from 16% to 10%.

As regards the revenues from taxes and contributions, with a share of 26.3% in the GDP Romania is the last among the EU member states and by around 14 p.p. below the EU27 average.

2. Literature Review

Modeling the budgetary revenues and expenditures linked to the macroeconomic indicators is a complex process and it needs specific models for each type of economy.

The developed economies apply econometric models, having stable equations on medium term and depending on certain parameters of public policies. The updates of the Fiscal Code and of the national strategies on public expenditures (earnings, investments, etc.) are reflected in the changes to the parameters of the model's equations, which correspondingly determine different trends on medium term, both for the macroeconomic and the budgetary indicators.

The forecast of the budgetary indicators in Romania was done with two econometric models: the Romanian macroeconomic model created by Academician E. Dobrescu and the World Bank's RMSM-X model.

The Romanian macroeconomic model represents the single original econometric Romanian model well known in the forecasting activity. The model was created starting from the hypothesis that the Romanian economy is a weakly structured system. Because of this an objective function is used, which minimizes the difference between the computed value and the expected value for a certain target variable, being also the core element when preparing forecasts. The new version of the macro-model includes 8 sections: employment, capital and labor revenues; production function and output-gap; prices, exchange rate and other monetary variables; general consolidated budget and public debt; balance of payments and external debt; sector structure of the economy and primary energy consumption and CO2 emissions. The integrated system includes 298 accounting relations and 181 econometric ones.[5]

[5]*The new version of the macro-model was developed in the project "Strengthening the institutional capacity in evaluating and formulating macroeconomic policies for EU economic convergence, within the National Commission of Prognosis", SMIS code 27153.*

The World Bank's RMSM-X model (Revised Minimum Standard Model – X) consists of two modules: the flow-of-funds module and a foreign debt module. The basic version of the RMSM-X contains four economic agents or sectors: Public, Private, Financial and Foreign.[6]

The RMSM-X model, in addition to the standard RMSM, includes the financial programming approach of the International Monetary Fund (IMF).

The IMF's approach is based on the Polak model, which integrates monetary, income and balance of payments analysis. The standard Polak model contains two behavioral relationships: the demand for money function and the function of the demand for imports, and two identities: for the money supply and for the balance of payments[7].

When talking about fiscal forecasting, the profile institutions have a large variety of tools, such as: simple regression equations, time series methods, structural macro-econometric models, a mix of the previous mentioned techniques and, of course, expert judgment. It is difficult to say which is the best option, but generally, some combination of different alternatives is preferred.

A couple of analyses, such as Bretschneider *et al*. (1989) favor a combination of judgment and simple econometric equations, against time series and complex econometric models. The main reason for this is the knowledge of special events forecasters might have.

Also, Grizzle and Klay (1994) show evidence for combining judgment and simple methods against more complicated or automated techniques, Lawrence *et al*. (1998) return to simple regression methods on the basis of transparency, and Fullerton (1989) and Litterman&Supel (1983) provide some evidence to support the combination of different forecasting techniques.

Pike and Savage (1998), Sentance *et al*. (1998), Cao and Robidoux (1998), Giles and Hall (1998) and Willman *et al*. (2000) present the fiscal side of structural macroeconomic models. The macroeconomic models as iteration tools for preparing the budgetary forecasts allow for estimating the effects of fiscal policy on the economic activity. Moreover, they guarantee the consistency between the macroeconomic, inflation and budgetary projections. However, it is often the case that such models are too aggregated to produce sufficiently detailed government revenue and expenditure projections, which are necessary for a thorough assessment of public finances[8].

The most relevant international institutions use complex models, in which the fiscal blocks are generally integrated. Thus, we can mention the European Commission's Quest model[9], the IMF's MULTIMOD Mark III[10] or the OECD's INTERLINK Model[11].

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[10] *Laxton, D., Isard, P., Faruqee, H., Prasad, E., Turtelboom, B., (1998). "MULTIMOD Mark III: The core dynamic and steady-state models". Occasional Paper 164, IMF, Washington DC.*

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3. Methodology

Although the forecasts of budgetary indicators emerge from the econometric and financial programming models, using the general equilibrium equations with parameters established according to the economists' expertise, a new round of forecast check is needed.

Upon studying the published literature, the proposed method is an econometric one, each budgetary revenue being determined within the forecasting interval, as endogenous variable, depending on a proxy indicator, which is the taxable amount corresponding to the budgetary revenues' category, chosen in accordance with the fiscal legislation.

The budgetary revenue is forecasted based on the regression equations estimated according to the explanatory variable, which is the taxable amount. The general consolidated government revenues that undergo the statistical analysis and estimation are classified as follows:

R= total revenues
FR= fiscal revenues, *which are:*
PT= profit and dividends tax
WT= personal income tax
LT= local taxes mainly from population
SCC= employer's social contributions
SCE= employees' social contributions
VAT= value added tax
OIT= other indirect taxes
CD= custom duties
NFR= non-fiscal revenues
CR= capital revenues
OBR= other budgetary revenues

Profit Tax (PT)

The tax base of the profit tax, in microeconomics, is the taxable profit determined as difference between the total revenues and the total spending, as they are registered in the taxpayer's accounting, excluding the deductions and adding the non-deductible expenses.

The profit tax is calculated by applying the tax rates to the taxable profit. The payment of the tax is made quarterly by the economic operators.

Upon analyzing the legislation in the field, the taxable amount is considered the profit of the economic agents (PN), which in the national accounts system corresponds to the proxy indicators:

a) PT1 = GDP
b) PT2 = GOSC, where:

GDP is the gross domestic product*,*
GOSC represents the gross operational surplus of the economic agents calculated as the difference between the gross operational surplus in the economy (GOS) and the gross operational surplus of the households (GOSH) and public administration (GOSG):

GOSC = GOS – GOSH – GOSG

Thus, two estimation methods are tested:

*PT=pt1*GDP*
*PT=pt2*GOSC*

Personal Income Tax (WT)

Regarding the national legislation, the dependence of the personal income tax on the gross earnings received by the population is considered valid. Two methods of calculation are chosen for the tax base:

*EW = E*W* = Gross earnings fund on the whole economy

EWS = EW – SCE0 = Gross earnings fund except employees' social contributions *(SCE0)*, computed by the formula:

*SCE0=Lsce*EW,* where: Lsce represents the legal rate for employees' social contribution.

*WT = wt1*EW,* and

*WT = wt2*EWS,* respectively.

where: wt1 and wt2 depend on the fiscal policy.

E and *W* represent the average number of employees and gross earnings.

The two evaluation methods are tested with the Eviews program, analyzing the fiscal coefficients wt1, wt2, and the degree of correlation between WT and the considered EW and EWS tax bases.

Social Contributions (SC)

Social contributions are calculated by applying quotas on the gross earnings fund, EW.

*SC= sc*EW*

If the budgetary data are available to split the contributions, then the employer's and employees' social contributions can be estimated:

SCC = scc EW*

SCE = sce EW*

according to EW and the scc, sce rates which depend on the fiscal policies.

Value Added Tax (VAT)

The VAT was introduced on July 1st, 1993 and is applicable to operations regarding the delivery of movable assets, the transfer of immovable property (housing, other constructions and the land on which they are built), the import of goods, the services supply, as well as the operations assimilated to them.

The tax base is the value of the delivered goods and services, of which value added tax has been deducted. VAT is calculated by applying the established quota on the tax base, at every stage in the economic circuit until it reaches the final consumer, which is why it may be considered a relationship that is dependent on the private consumption (CH) and the government consumption (CG). A more accurate tax base can be calculated by excluding the households' own consumption from the final consumption. Another method considers the dependency between VAT and the gross value added (GVA), of which the gross value added of the households (GVAH) may be deducted.

Five methods for determining the value added tax as tax base limitation are analyzed:

*VAT = vat1*GDP*

*VAT = vat2*GVA*

VAT = vat3(GVA – GVAH)*

VAT = vat4(CH + CG)*

VAT=vat5(CH+CG-SCH)*

The evaluation methods are tested with the Eviews program, analyzing the *vat1-vat5* fiscal coefficients and the correlation degree between VAT and the considered tax bases.

Other Indirect Taxes (OIT)

The legislative standards mainly refer to excise duties, which constitute the most relevant elements of the indirect taxes (except for VAT). Excise duties are special consumption taxes owed to the state budget for certain local or imported products.

As they are mostly consumption taxes, two tax bases are considered: the final consumption of the household (CH) and gross domestic product (GDP):

*OIT = itp1*CH*
*OIT = itp2*GDP*

Custom Duties (CD)

Custom duties are levied on import, export and transit of goods. For the imported merchandise, the custom duties and the custom fee is applied first, followed by the excise duties at their custom value + custom duties + custom fee, then the value added tax for the same value + excises.

The econometric assessment considers the import (M) as the appropriate tax base:

*CD = cd*M*

Local Tax Mainly from Population (LT)

Local taxes mostly consist of the taxes paid by the population. They are income and estate taxes and depend on the net disposable income (NDI). Still, the earnings are difficult to estimate due to the various transfers of the households from other sectors, the net interest and the dividends, which together have a share of over 15% in the available income.

According to the available data, the net wages in the national accounts methodology are chosen for the calculation (NDI), plus the social security pensions (SP):

*LT=lt*NDI,* where:
NDI = GW+SP-SCE-WT, with
GW representing gross wages, a component of GDP.

Other budgetary revenues (non-fiscal revenues, capital revenues, EU funds) are unpredictable, although econometric autoregressive equations and equations with explanatory variables that reflect the general tendency of the revenues in economy, such as GDP or earnings, can be analyzed.

The coefficients from the budgetary revenues estimation equations according to the tax bases are modeled by econometric equations. On the other hand, the following legal tax rates, included in the Fiscal Code are identified:

Lpt= for the profit tax
Lwt=for the income tax
Lsc=for the social contributions
Lvat=for the value added tax

By calculating the ratio of the four specific coefficients to these legal rates, the empirical coefficients are obtained, being econometrically estimated taking into account the temporal variable or other variables.

pt0 = pt / Lpt
wt0 = wt / Lwt
sc0 = sc / Lsc
vat0 = vat / Lvat

4. Results and Discussions

Available Data

A particular focus has been on building an annual data base covering the 1995 - 2020 period.

The data for 2020 are estimations made by the National Commission for Strategy and Prognosis and the Ministry of Public Finance within the 2020 summer forecast and budget amendment. The annual data for the 1995 - 2019 time period are taken from the *"Dobrescu model database for employers/employees social contributions"*, from the official data published by the Ministry of Public Finance for the budget indicators and from the official data published by the National Institute of Statistics for the macroeconomic indicators and the earnings/ number of employees. Also, the series indicating the legal tax rates were built based on the information taken annually from the Fiscal Code.

The derived series which have been analyzed econometrically were calculated from the primary series of the database and are the empirical coefficients showing the "tax collection level" for each type of tax. They are calculated as the ratio of the primary series to the specific tax base. The econometric equation can help estimating the collection level, in which case the budgetary income in the prognosis interval can be achieved, having the relevant tax base established. The following series for "tax collection levels" are used:

coef0PT1=(PT/GDP)/Lpt
coef0PT2=(PT/GOSC)/Lpt
coef0WT1=(WT/EW)/Lwt
coef0WT2=(WT/EWS)/Lwt
coef0SC=(SC/EW)/Lsc
coef0SCC=(SCC/EW)/Lscf
coef0SCE=(SCE/EW)/Lsce
coef0VAT1=(VAT/GDP)/Lvat
coef0VAT2=(VAT/GVA)/Lvat
coef0VAT3=(VAT/(GVA – GVAH))/Lvat
coef0VAT4=(VAT/(CH + CG))/Lvat
coef0VAT5=(VAT/(CH + CG– SCH))/Lvat
coefCD=CD/M
coefITP1=OIT/CH
coefITP2=OIT/GDP
coefLT=LT/NDI = LT/(GW+SP-SCE-WT),

calculated for the main taxes taking into account the legal tax rates previously mentioned: *Lpt; Lwt; Lsc; Lscf (employers); Lsce (employees); Lvat.*

Most of the coefficients' series are stationary.

The ADF test (Augmented Dickey Fuller, Schwarz Info Criterion) is below the critical threshold of 1%, 5% and 10%. For the coefficients which characterize profit tax, income tax

and local tax collection, where the series are not stationary, the ADF test in first difference was applied.

The results are presented in Table 1.

Table 1

Null Hypothesis: Series/D(Series)/D2(Series) Has a Unit Root

		coef0SCC	coef0SCE	coef0VAT1	coef0VAT2
Augmented Dickey-Fuller test statistic		-3.033634	-2.919600	-3.318888	-3.336103
Test critical values:	1% level	-3.724070	-3.737853	-4.374307	-4.374307
	5% level	-2.986225	-2.991878	-3.603202	-3.603202
	10% level	-2.632604	-2.635542	-3.238054	-3.238054
		coef0VAT3	coef0VAT5	coefCD	coefITP1
Augmented Dickey-Fuller test statistic		-2.991417	-2.380451	-2.251070	-2.373704
Test critical values:	1% level	-3.724070	-3.724070	-2.660720	-4.374307
	5% level	-2.986225	-2.986225	-1.955020	-3.603202
	10% level	-2.632604	-2.632604	-1.609070	-3.238054
				-3.6584	
		coefITP2	Dcoef0PT1	Dcoef0WT1	DcoefLT
Augmented Dickey-Fuller test statistic		-2.660736	-5.470388	-3.255778	-4.229473
Test critical values:	1% level	-3.724070	-3.737853	-3.737853	-3.737853
	5% level	-2.986225	-2.991878	-2.991878	-2.991878
	10% level	-2.632604	-2.635542	-2.635542	-2.635542

Source: Authors' results using the E-views software.

The ADF test value is also below the threshold for the following series D(coef0PT), D(coef0WT) and D(coefLT), thus being integrated of the first order.

Stationary series may be obtained using the difference in values as compared to the previous year:

$\Delta(yt) = yt - y(t-1)$

5. Econometric Modelling

Profit Tax Collection Coefficient

According to the Augmented Dickey Fuller (ADF) test, *coef0PT* series are I(1) type, first order integrated. On the other hand, when using variance ratio test, for the 1995-2020 period it results that the two series are of random walk with drift type, so they cannot be forecasted.

In order to estimate the series, the used method is Least Squares with Breaks, including in the equation an explanatory variable, 1/TEMP, because an improved efficiency process in the collection activity on long term is assumed.

The results of the estimation show a break in time series in 2005, given the change in the legislation by switching from progressive to flat tax rate.

The pattern of the residuals has also been analyzed in order to check the existence/inexistence of cointegration. The results of the test show that the residuals are not correlated.

Table 2.1.

Profit Tax Collection Coefficient Test 1

Dependent Variable: coef0PT1				
Method: Least Squares with Breaks				
Break: 2005				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
1995 - 2004 -- 10 obs				
C	0.088400	0.005266	16.78668	0.0000
1/T	0.006848	0.013377	0.511925	0.6138
2005 - 2020 -- 16 obs				
C	0.066179	0.010667	6.204393	0.0000
1/T	0.978781	0.178030	5.497830	0.0000
R-squared	0.789724	Mean dependent var		0.110336
Adjusted R-squared	0.761050	S.D. dependent var		0.022762
F-statistic	27.54153	Durbin-Watson stat		2.053714
Prob(F-statistic)	0.000000			

Source: Authors' results using the E-views software.

Table 2.2.

Profit Tax Collection Coefficient Test 2

Dependent Variable: coef0PT2				
Method: Least Squares with Breaks				
Break: 2005				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
1995 - 2004 -- 10 obs				
C	0.362548	0.019087	18.99450	0.0000
1/T	-0.029378	0.048485	-0.605915	0.5508
2005 - 2020 -- 16 obs				
C	0.142138	0.038661	3.676531	0.0013
1/T	4.594094	0.645273	7.119616	0.0000
R-squared	0.738272	Mean dependent var		0.387125
Adjusted R-squared	0.702582	S.D. dependent var		0.073950
F-statistic	20.68556	Durbin-Watson stat		1.627640
Prob(F-statistic)	0.000001			

Source: Authors' results using the E-views software.

According to the results, the coef0PT1 coefficient is chosen, namely to correlate the evolution of the profit with GDP, as follows:

*PT = Lpt *coef0PT* GDP*

and the results for the coefficient, using the 2005-2020 period are as follows:

*coef0PT = 0.0662 + 0.9788*1/T.*

Income Tax Collection Coefficient

The income tax is directly applied to the income obtained by the natural persons taking into account the tax rates according to the law: incomes from wages, independent activities, investments, pensions, dividends, interests, agricultural activities, gambling, real estate transactions, other sources.

The used tax base is the earnings' fund, which covers over 80% of the labor incomes, so the correlation is consistent even if it does not accurately highlight the influences in the evolution of other types of revenues on the global tax.

The series which describes the collection levels, namely the coef0WT1 and coef0WT2 coefficients, are not random walk with drift (variance ratio test), but coef0WT1 presents 3 points with shift in trends in 1998, 2005 and 2015 and coef0WT2 has 2 points in 2005 and 2016. Considering these correlations and taking into account the fact that the tax base EWS is closer to the legal meaning of the taxed income, coef0WT2 is analyzed.

The parameters of the estimated equation through the classical method LS and specific method LSB are presented below.

Table 3.1.

Income Tax Collection Coefficient Test 1

Dependent Variable: coef0WT2				
Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.176230	0.064396	18.26561	0.0000
1/T	-0.475729	0.254093	-1.872261	0.0739
R-squared	0.132251	Mean dependent var		1.103615
Adjusted R-squared	0.094523	S.D. dependent var		0.270114
F-statistic	3.505362	Durbin-Watson stat		0.247070
Prob(F-statistic)	0.073940			

Source: Authors' results using the E-views software.

Table 3.2.

Income Tax Collection Coefficient Test 2

Dependent Variable: coef0WT2				
Method: Least Squares with Breaks				
Breaks: 2005, 2016				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
1995 - 2004 -- 10 obs				
C	0.726268	0.031718	22.89778	0.0000
1/T	0.297404	0.080569	3.691275	0.0014
2005 - 2015 -- 11 obs				
C	1.932121	0.099495	19.41934	0.0000
1/T	-9.457222	1.495878	-6.322187	0.0000
2016 - 2020 -- 5 obs				
C	0.915955	0.507653	1.804292	0.0863
1/T	7.763883	12.12009	0.640580	0.5291
R-squared	0.949111	Mean dependent var		1.108267
Adjusted R-squared	0.936389	S.D. dependent var		0.265717
F-statistic	74.60261	Durbin-Watson stat		2.188326

Dependent Variable: coef0WT2				
Method: Least Squares with Breaks				
Breaks: 2005, 2016				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Prob(F-statistic)	0.000000			

Source: Authors' results using the E-views software.

The LSB method provides proper results, thus the equation is as follows:

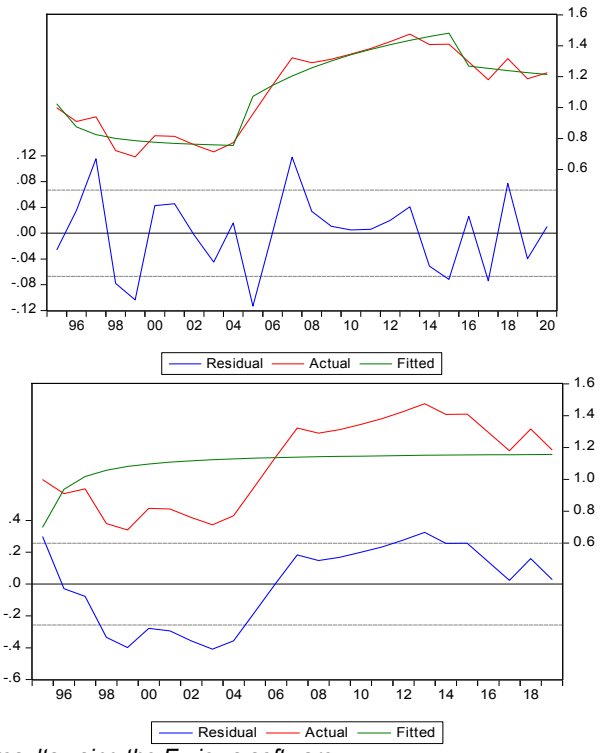
*WT = Lwt *coef0WT *EWS = Lwt *(1 – Lsce)*coef0WT *EW*

with the estimation equation for the coefficient:

*coef0WT = 0.9160 + 7.7639*1/T.*

Figure 1

The LSB and LS Estimates



Source: Authors' results using the E-views software.

Social Contributions Coefficient

As regards the coef0SC coefficient, which describes the social security contribution collection, an auto-regression equation with 1/TEMP as the exogenous variable is presented:

*coef0SC = 1.1219 - 5.6344*1/T + 0.0979*coef0SC(-1)*

*SC = Lsc *coef0SC*EW*

Table 4

Social Contributions Coefficient Test

Dependent Variable: coef0SC				
Method: Least Squares with Breaks				
Breaks: 2004, 2016				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
1996 - 2003 -- 8 obs				
C	0.930122	0.122987	7.562743	0.0000
1/T	-0.571836	0.090771	-6.299792	0.0000
2004 - 2015 -- 12 obs				
C	0.952647	0.142812	6.670651	0.0000
1/T	-0.024118	0.417209	-0.057809	0.9545
2016 - 2020 -- 5 obs				
C	1.121860	0.192069	5.840933	0.0000
1/T	-5.634380	3.936346	-1.431373	0.1695
Non-Breaking Variables				
COEF0SC(-1)	0.097871	0.123766	0.790773	0.4394
R-squared	0.957050	Mean dependent var		0.985103
Adjusted R-squared	0.942733	S.D. dependent var		0.090156
F-statistic	66.84860	Durbin-Watson stat		2.636394
Prob(F-statistic)	0.000000			

Source: Authors' results using the E-views software.

Furthermore, the residuals' pattern has been analyzed in order to check if there is or not cointegration. The BDF test results highlight that the residuals are not correlated.

Value Added Tax Collection Coefficient

VAT is another tax having an important contribution to the state budget revenues, as the previous three categories, and which has a legal tax rate in place. The coefficient which describes the collection level depends on the choice of the tax base.

The coef0VAT series is stationary I(0) according to Augmented Dickey Fuller test.

The series' stationarity was the factor which has imposed the check of several equations according to TEMP variable, approximating the fluctuations around the trend. The coefficients checking the equations with a high estimation degree are the following:

coef0VAT1=(VAT/GDP)/Lvat
coef0VAT4=(VAT/(CH + CG))/Lvat

which confirms the statistical theory that the suitable tax base for VAT is consumption or GDP.

The parameters of the equations for these two coefficients are presented below.

Table 5.1.

Value Added Tax Collection Coefficient Test 1

Dependent Variable: coef0VAT1				
Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.179047	0.063588	2.815728	0.0101
1/T	-0.113437	0.056523	-2.006899	0.0572
COEF0VAT1(-1)	0.572519	0.155903	3.672284	0.0013
R-squared	0.596653	Mean dependent var		0.386290
Adjusted R-squared	0.559985	S.D. dependent var		0.039399
F-statistic	16.27178	Durbin-Watson stat		2.173061
Prob(F-statistic)	0.000046			

Source: Authors' results using the E-views software.

Table 5.2.

Value Added Tax Collection Coefficient Test 2

Dependent Variable: coef0VAT4				
Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.190605	0.067864	2.808629	0.0102
1/T	-0.183656	0.077652	-2.365103	0.0273
COEF0VAT4(-1)	0.649093	0.130216	4.984735	0.0001
R-squared	0.737093	Mean dependent var		0.480002
Adjusted R-squared	0.713193	S.D. dependent var		0.064440
F-statistic	30.83992	Durbin-Watson stat		2.314139
Prob(F-statistic)	0.000000			

Source: Authors' results using the E-views software.

6. Conclusion

The results highlight the fact that high accuracy tax modelling may be done for the categories which are directly regulated by the Fiscal Code, where you can find a suitable tax base and a legal tax rate that may be applied, and also a coefficient measuring the tax collection level. This coefficient is separately estimated according to the temporal variable or to its previous values.

The precision is lower for the direct taxes (profit tax, income tax, social security contributions) because the collecting coefficients are not stationary series for the whole analysed period (1995-2020), but only on intervals.

In these cases, it is better to use the Least square with Breakpoints as the estimation method. On the other hand, a high degree of accuracy may be noticed in the case of value added tax, where the collection coefficient has a regulated behaviour and is a stationary series.

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