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Business Administration and Business Economics

The Statistical Analysis of GDP, Tax Pressure and Tax Revenue with EViews 7 between 2000 – 2009

Associate Professor Pripoaie Rodica, PhD
„Danubius" University Galati, Romania
rodicapripoaie@univ-danubius.ro

Pripoaie Silviu, PhD
„Dunărea de Jos" University Galati, Romania
silviupripoaie@yahoo.com

Abstract: The general characteristic of modern economies is given by the rapid growth of the demand of financial resources as compared to the possibility of acquiring them. Fiscal pressure data series and tax revenues are used to determine descriptive indicators and to conduct statistical or graphical estimation of econometric models. Evolution of the two variables analyzed: the tax burden and tax revenue in the period 2001-2009 is presented using EViews 7.

Keywords: GDP; tax pressure broadly; tax pressure strictly; tax revenue

JEL Classification: C10; C18; C19

1. Tax Pressure Broadly and Tax Pressure Strictly

The obligation to pay taxes appeared along with the emergence of the State and of Law in the human society and the attempt to elude this system was more or less strong according to the increase or decrease of tax burden.

The *tax pressure* indicator (or tax rate) represents the ratio between inland revenues (of the State and of local communities) and GDP or NDP, expressed in percentages. This indicator measures the share of tax in the obtained wealth and thus allows determining the tax burden.

The change of the tax rate and / or of the share of budget resources categories in the total State revenue varies with the economic situation: when economy boost is wanted, in case of recession, the tax rate will be low, direct taxes will be less

burdening, etc, while in case of economic overheating, contrary measures shall be adopted.

In the analysis of the impact of State's fiscal policy on the economic growth, an important part is played by the phenomena of underground economy development and of tax evasion stimulation generated by the enforcement of much too high tax rates. Tanzi Vito[1] analyses the effects of a tax system with arbitrary exceptions and other distorter elements: the degree of corruption increases, production and, consequently, physical capital stock decreases; corruption reduces the rate of economic growth through the distortion caused on resource allocation, destroying the relationship between the social profitability and the financial profitability of an investment.[2]

The rate of tax pressure officially communicated by the Statistic Annual drawn up by the National Institute of Statistics is calculated as follows:

$$R = \frac{VF}{PIB} \bullet 100 \text{ , where}$$

R – the rate of tax pressure,

VF – tax incomes,

PIB – the volume of gross domestic product

If tax incomes are deemed to be made of taxes, duties and contributions, *the rate of tax pressure, broadly speaking,* is calculated as follows:

$$R = \frac{I + T + C}{PIB} \bullet 100 \text{ , where}$$

[1] Vito Tanzi, *Corruption, Governmental Activities and Markets*, IMF working paper, 1995, p.15
[2] Laura Obreja Braşoveanu, *Impactul politicii fiscale asupra creşterii economice*, Editura ASE, Bucureşti, 2007, p. 117

I – the volume of collected taxes,

T – the total sum of collected duties,

C – State social security contributions;

The rate of tax pressure, strictly speaking, can also be calculated by excluding State social security contributions from the numerator:

$$R = \frac{I + T}{PIB} \bullet 100$$

2. The Evolution of Tax Pressure between 2000 and 2009

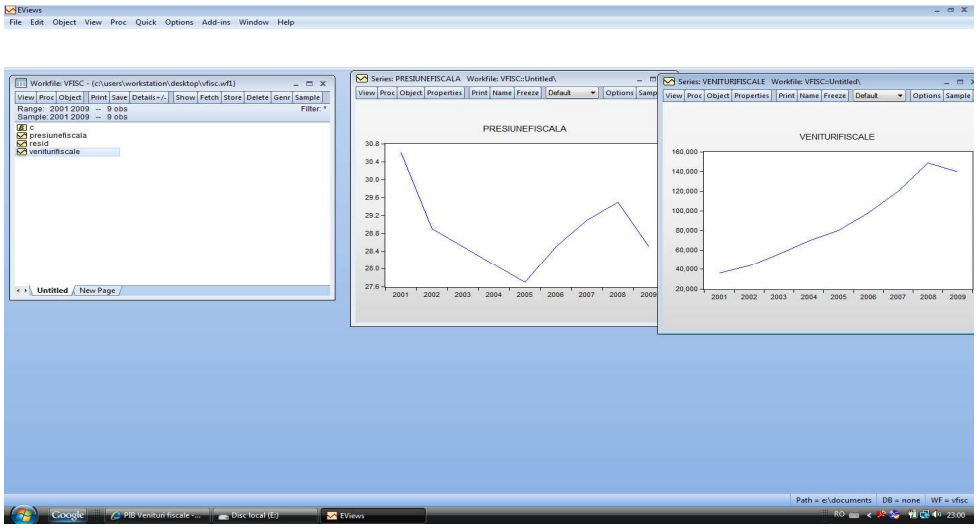
Given the data provided by the National Institute of Statistics and by the Tax Council, we proceeded to the calculation of the level of tax pressure for the period 2000 - 2009, the data obtained being centralised in the table below:

Year	**GDP mil. Lei**	**Tax incomes % GDP**	**Direct taxes % GDP**	**Indirect taxes % GDP**	**Social contributions % GDP**	**Tax pressure broadly speaking**	**Tax pressure strictly speaking**
2000	80984.6	30.6	7.0	12.2	11.4	30.6	19.2
2001	117945.8	28.9	6.4	11.3	11.2	28.9	17.7
2002	152017.0	28.5	5.8	11.6	11.1	28.5	17.4
2003	197427.6	28.1	6.0	12.2	9.9	28.1	18.2
2004	247368.0	27.7	6.4	11.6	9.7	27.7	18.0
2005	288954.6	28.5	5.3	12.9	10.3	28.5	18.2
2006	344650.6	29.1	6.0	12.8	10.3	29.1	18.8
2007	412761.5	29.5	6.7	12.3	10.5	29.5	19.0
2008	503958.7	28.5	6.7	11.7	10.1	28.5	18.4
2009	491273.7	28.0	6.6	11.0	10.4	28.0	17.6

3. The Analysis of Data Series with EViews 7

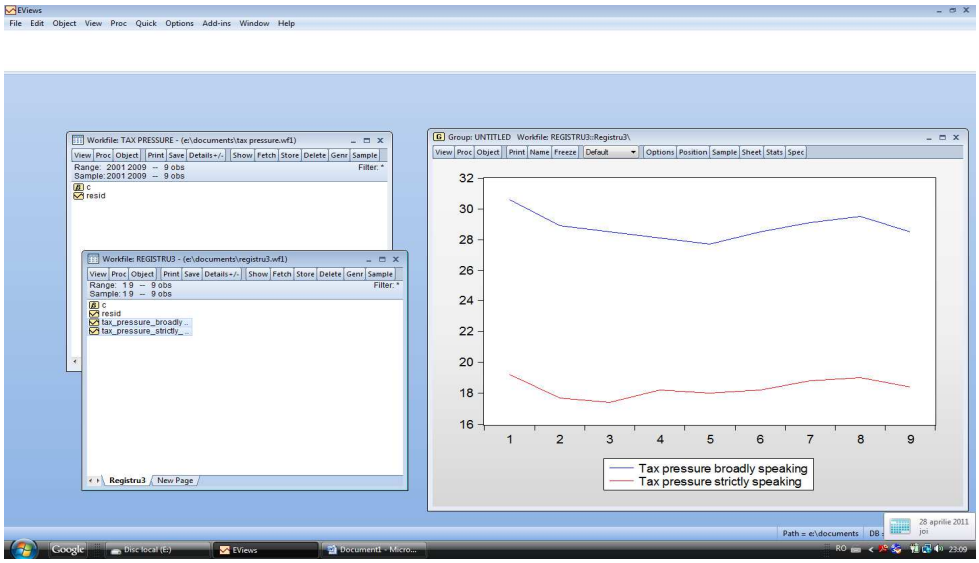
Fiscalpressuredata seriesandtax revenuesareusedto determinedescriptive indicatorsandto conductstatisticalorgraphicalestimationof econometric models.

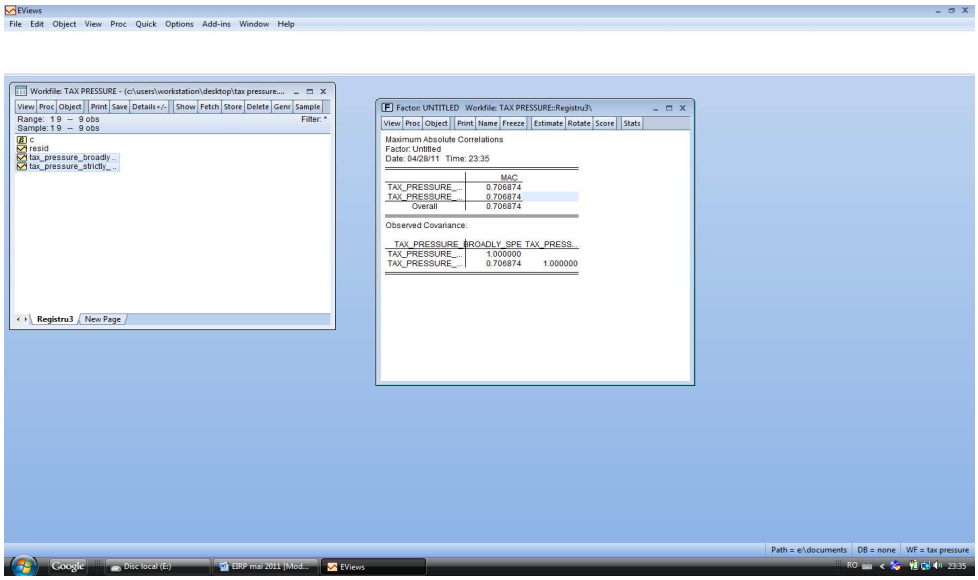
Evolutionof the twovariablesanalyzed: the tax burdenandtax revenuein theperiod2001-2009ispresentedusing EViews7, as follows:



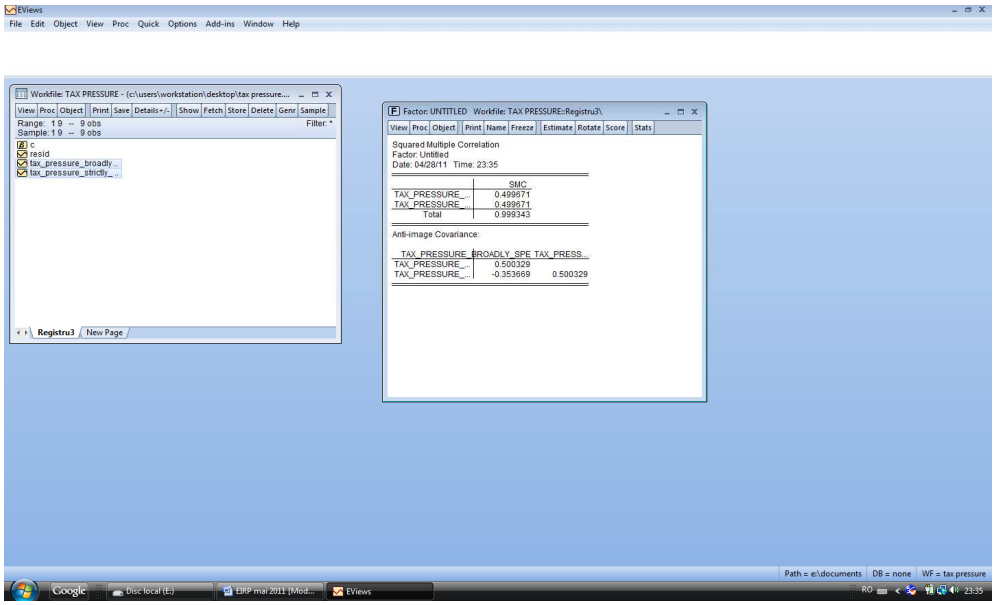
It appears that the tax burden was greatest in the early period, respectively in 2001 and then to decrease continuously and record a minimum in 2005, then began rising again in 2008 achieving a relative maximum. Throughout this period, tax revenues have increased continuously, achieving a relative maximum in 2008 also.

The following figure shows that tax pressure broadly have a relatively similar to that of tax pressure strictly during the nine years analyzed.



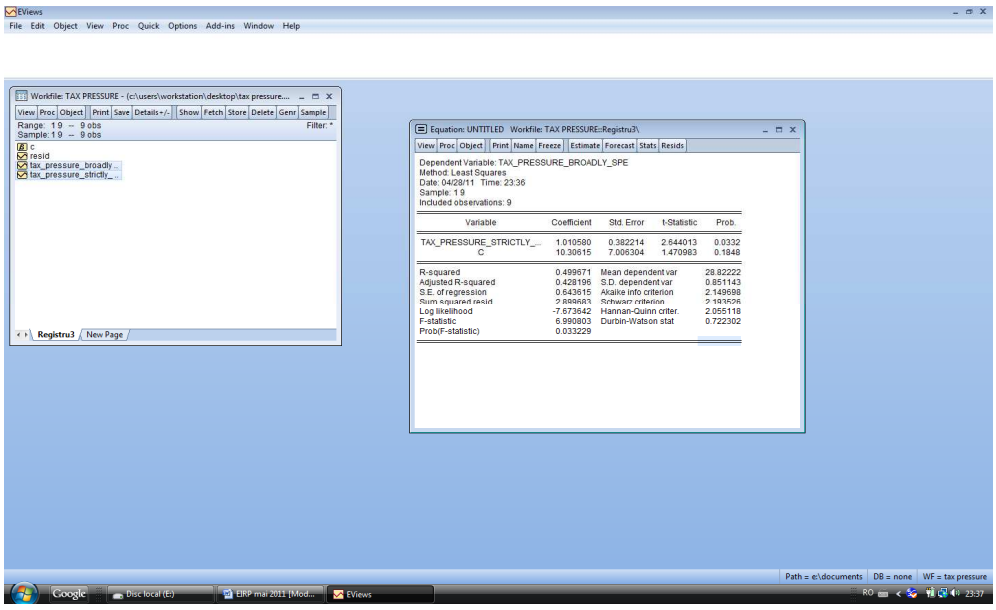


It appears that the two variables broadly tax pressure and strictly tax pressure is a direct correlation and very strong.

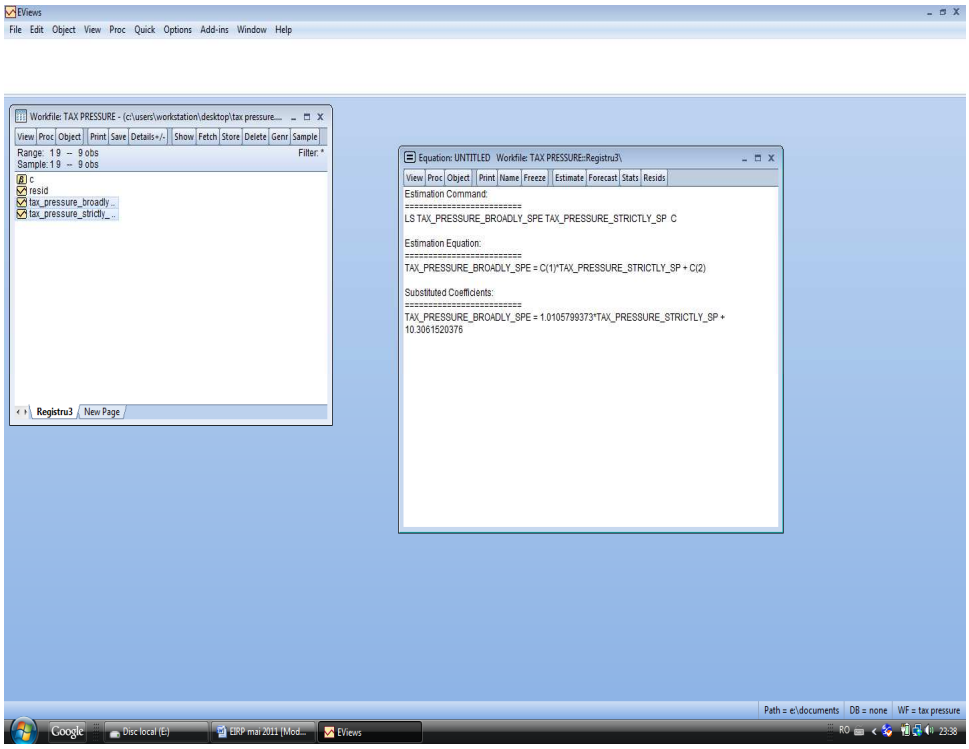


The previous conclusion is confirmed by the Squared Multiple Correlation shown in previous figure.

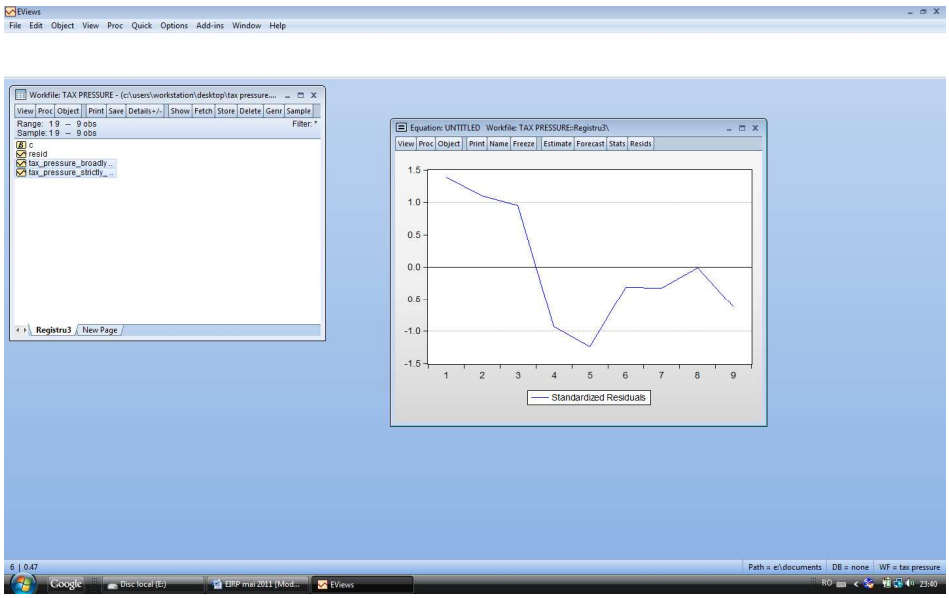
To determine the regression equation applies Least Squares Method.

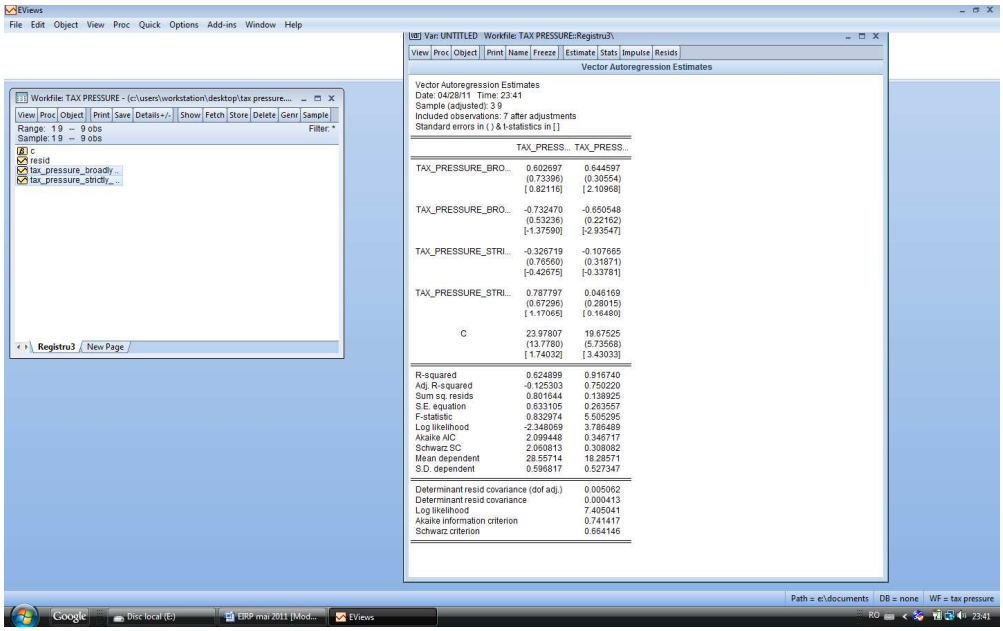


So, we obtain the following regression equation:



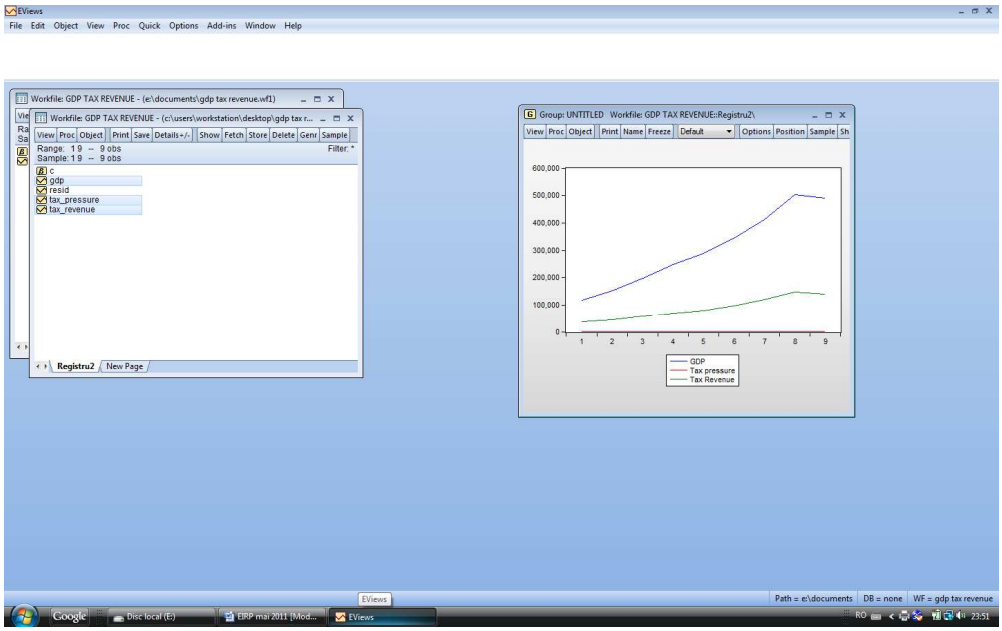
Standardized residuals are represented as follows:



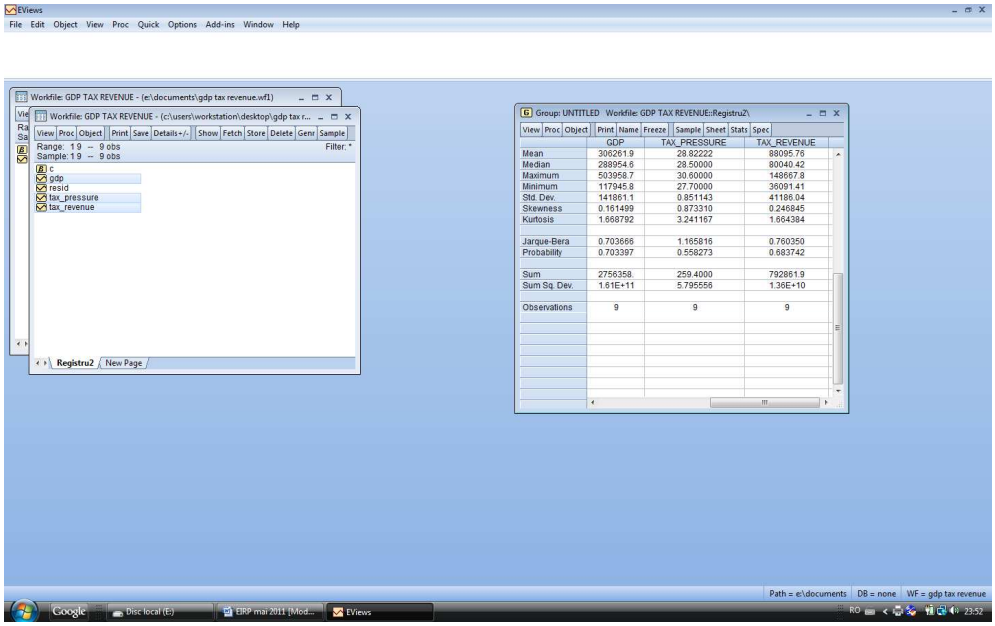


The data series GDP, tax revenue and tax pressure are used to determine descriptive indicators and to conduct statistical or graphical estimation of econometric models.

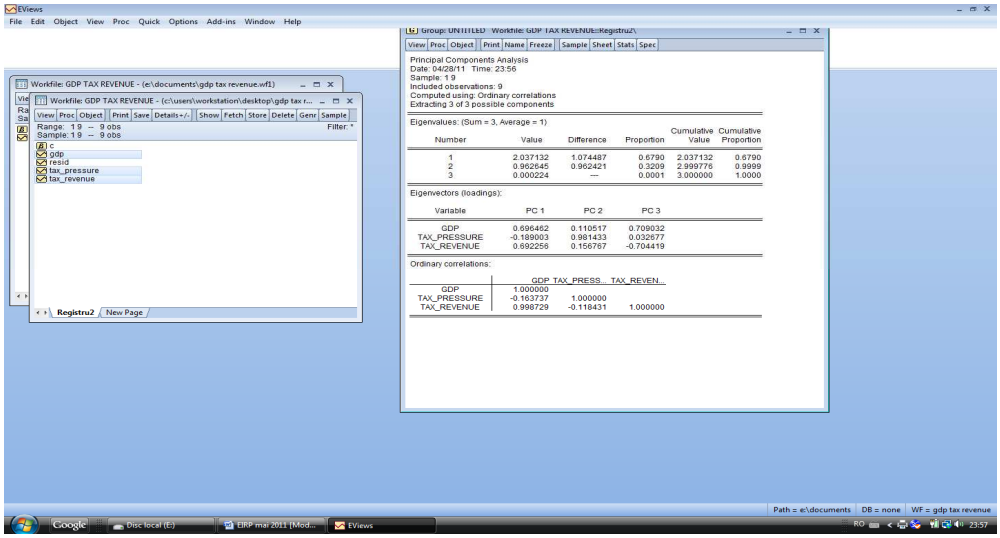
Evolution of the variables analyzed: GDP, tax revenue and tax pressure in the period 2001-2009 is presented using EViews 7, as follows:



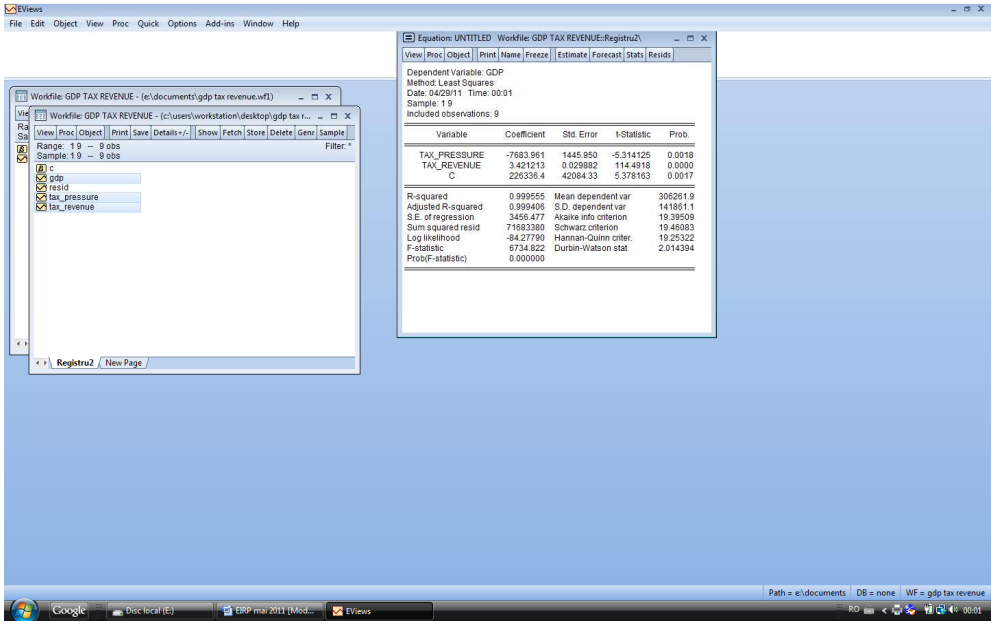
Descriptive indicators for GDP data series, tax pressure and tax revenue is as follows:



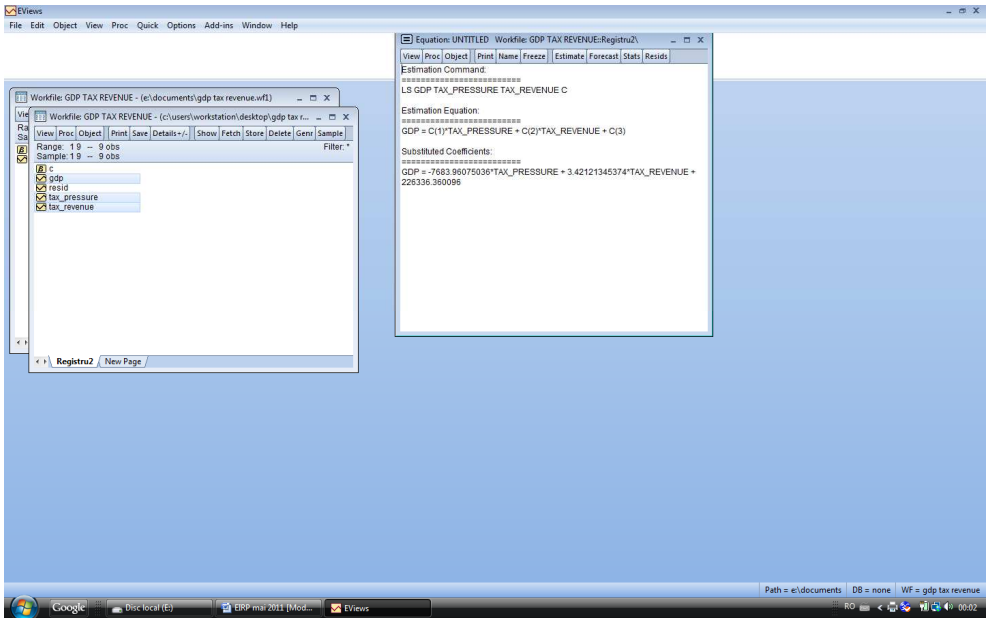
Ordinary correlation between the three series GDP, tax revenue and tax pressure is as follows:

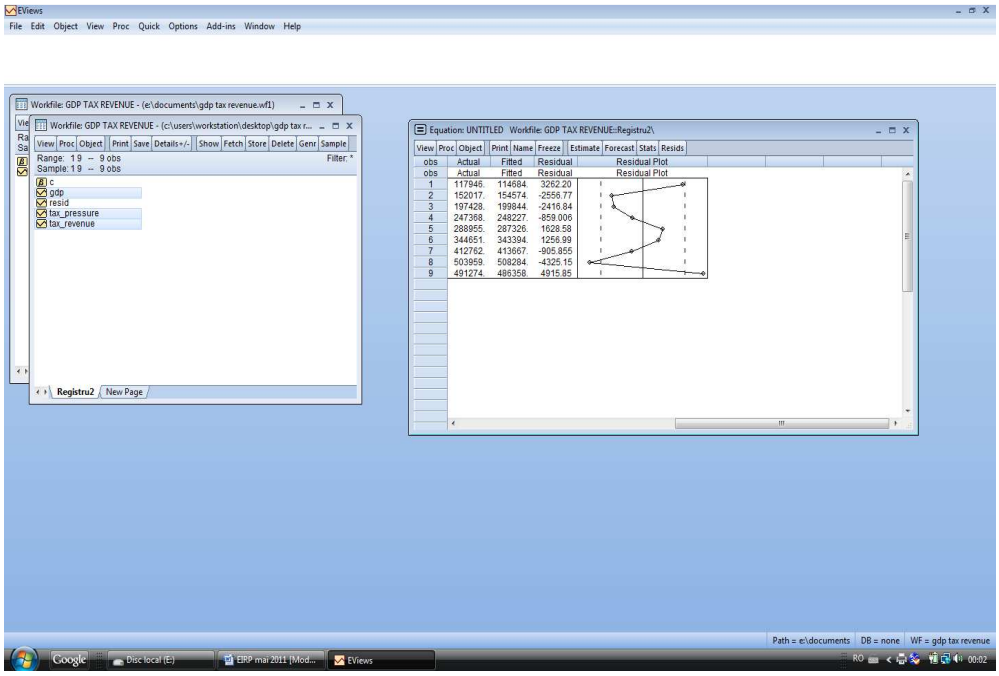


To determinetheregressionequationappliesLeastSquaresMethod.



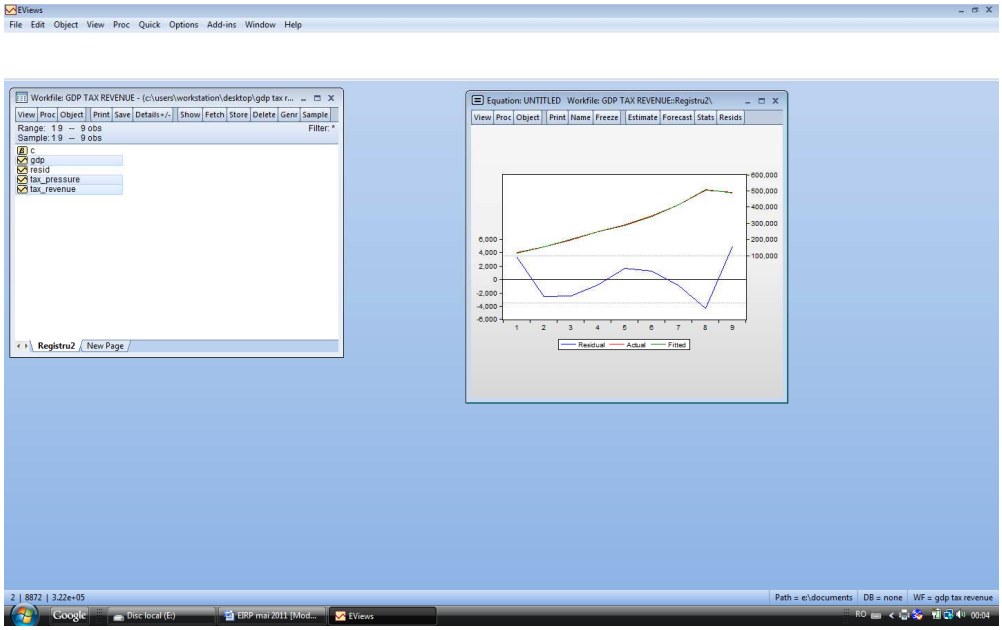
So, we obtain the following regression equation:

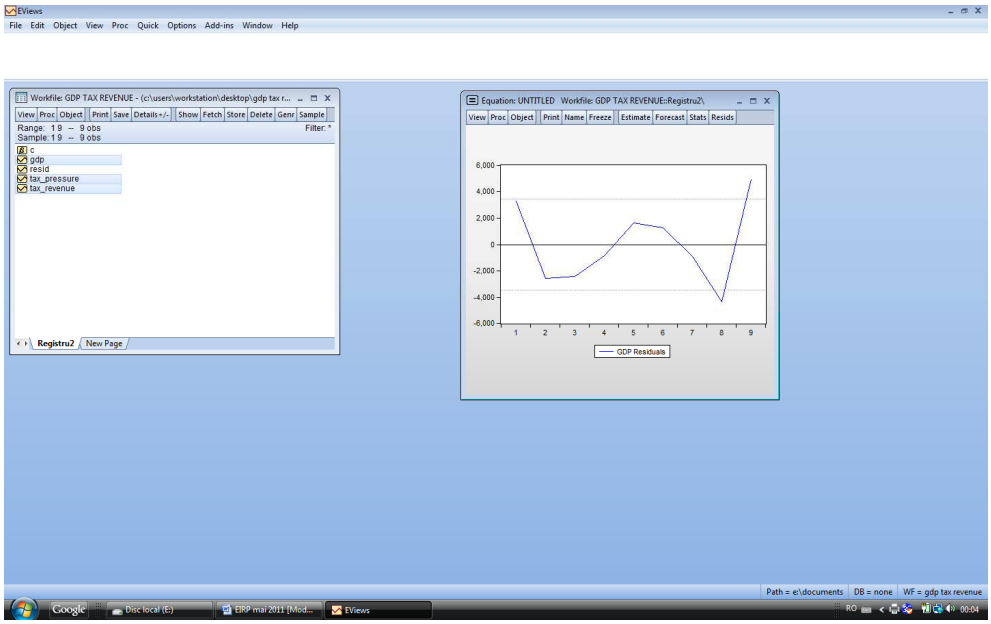

EViews
File Edit Object View Proc Quick Options Add-ins Window Help
Equation: UNTITLED Workfile: GDP TAX REVENUE::Registru2\
View Proc Object Print Name Freeze Estimate Forecast Stats Resids
Estimation Command:
LS GDP TAX_PRESSURE TAX_REVENUE C
Estimation Equation:
GDP = C(1)*TAX_PRESSURE + C(2)*TAX_REVENUE + C(3)
Substituted Coefficients:
GDP = -7683.96075036*TAX_PRESSURE + 3.42121345374*TAX_REVENUE + 226336.360096
Workfile: GDP TAX REVENUE - (e:\documents\gdp tax revenue.wf1)
Workfile: GDP TAX REVENUE - (c:\users\workstation\desktop\gdp tax r...
Range: 1 9 -- 9 obs
Sample: 1 9 -- 9 obs
Filter: *
c
gdp
resid
tax_pressure
tax_revenue
Registru2
New Page
Path = e:\documents
DB = none
WF = gdp tax revenue

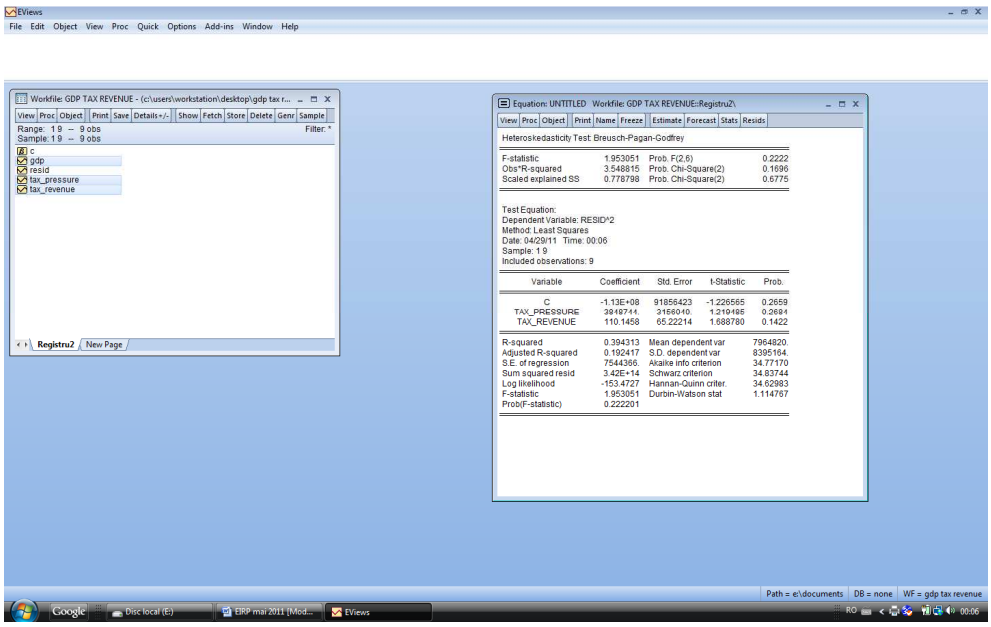

EViews
File Edit Object View Proc Quick Options Add-ins Window Help
Equation: UNTITLED Workfile: GDP TAX REVENUE::Registru2\
View Proc Object Print Name Freeze Estimate Forecast Stats Resids
obs Actual Fitted Residual Residual Plot
1 117946. 114684. 3262.20
2 152017. 154574. -2556.77
3 197428. 199844. -2416.84
4 247368. 248227. -859.006
5 288955. 287326. 1628.58
6 344651. 343394. 1256.99
7 412762. 413667. -905.855
8 503959. 508284. -4325.15
9 491274. 486358. 4915.85
Workfile: GDP TAX REVENUE - (e:\documents\gdp tax revenue.wf1)
Workfile: GDP TAX REVENUE - (c:\users\workstation\desktop\gdp tax r...
Range: 1 9 -- 9 obs
Sample: 1 9 -- 9 obs
Filter: *
c
gdp
resid
tax_pressure
tax_revenue
Registru2
New Page
Path = e:\documents
DB = none
WF = gdp tax revenue

In the previous figure are actual and estimated values of the feature analysis (Y) and the residual variable values and chart series.

Anotherway ofpresentingtheresidual variable: Actual, Fitted, ResidualGraphis presented inthe following figure:




EViews
File Edit Object View Proc Quick Options Add-ins Window Help
Workfile: GDP TAX REVENUE - (c:\users\workstation\desktop\gdp tax r...
Range: 1 9 -- 9 obs
Sample: 1 9 -- 9 obs
Filter: *
c
gdp
resid
tax_pressure
tax_revenue
Registru2
New Page
Equation: UNTITLED Workfile: GDP TAX REVENUE::Registru2\
View Proc Object Print Name Freeze Estimate Forecast Stats Resids
6,000
4,000
2,000
0
-2,000
-4,000
-6,000
1 2 3 4 5 6 7 8 9
GDP Residuals
Path = e:\documents
DB = none
WF = gdp tax revenue


EViews
File Edit Object View Proc Quick Options Add-ins Window Help
Workfile: GDP TAX REVENUE - (c:\users\workstation\desktop\gdp tax r...
Range: 1 9 -- 9 obs
Sample: 1 9 -- 9 obs
Filter: *
c
gdp
resid
tax_pressure
tax_revenue
Registru2
New Page
Equation: UNTITLED Workfile: GDP TAX REVENUE::Registru2\
View Proc Object Print Name Freeze Estimate Forecast Stats Resids
Heteroskedasticity Test: Breusch-Pagan-Godfrey
F-statistic 1.953051 Prob. F(2,6) 0.2222
Obs*R-squared 3.548815 Prob. Chi-Square(2) 0.1696
Scaled explained SS 0.778798 Prob. Chi-Square(2) 0.6775
Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 04/29/11 Time: 00:06
Sample: 1 9
Included observations: 9
Variable Coefficient Std. Error t-Statistic Prob.
C -1.13E+08 91856423 -1.226565 0.2659
TAX_PRESSURE 3946744. 2166040. 1.210495 0.2694
TAX_REVENUE 110.1458 65.22214 1.688780 0.1422
R-squared 0.394313 Mean dependent var 7964820.
Adjusted R-squared 0.192417 S.D. dependent var 8395164.
S.E. of regression 7544366. Akaike info criterion 34.77170
Sum squared resid 3.42E+14 Schwarz criterion 34.83744
Log likelihood -153.4727 Hannan-Quinn criter. 34.62983
F-statistic 1.953051 Durbin-Watson stat 1.114767
Prob(F-statistic) 0.222201
Path = e:\documents
DB = none
WF = gdp tax revenue

4. Conclusions

To achieve an as accurate analysis as possible, we must study the following:

- the level of real economy, meaning that it must be calculated after the deduction of the official GDP of the percentages representing hidden economy, given that these incomes are characterised by tax avoidance,

- the existence of a significant amount of activities exempt from certain categories of taxes - the favourable tax regime applicable to free zones, duty-frees, disfavoured areas, etc,

- parafiscality, respectively the existence of an impressive number of taxes and duties which are not to be found in the State budget but in the budgets of certain agencies;

- the analysis of the level and of the structure of tax pressure must be correlated with the **intensity of tax regulations**, that is, with the large number of normative documents, frequent amendments, bureaucratic formulations, legal overlapping, etc. The most eloquent example is that of Law no. 571/ 2003 on the Tax Code which between December 2003 and August 2010 was modified by no less than 75 amending documents and Decision no. 92 / 2003 on the Fiscal Procedure Code was amended 15 times during the same period.

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