EMPIRICAL ANALYSIS OF THE CORRELATION BETWEEN FISCALITY RATE-GDP-TAX INCOMES. ROMANIA'S CASE

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1. Theoretical basis

Studying the relation between the tax pressure and tax incomes, A. Laffer together with V.A. Canto and D.H. Joines (1978) in their paper "Taxation, GNP and Potential GNP", reached the conclusion that the growth of the tax pressure does not necessarily determine the adequate accumulation of tax incomes, in exchange, *the diminution of the tax pressure generates favorable conditions for the growth of tax incomes*. This conclusion was based on a mathematical argument according to which the capital and the work are rewarded according to the marginal income.

The analysis pattern introduces a series of simple hypothesis, this why they are considered as the *weak point of the theoretical basis* (Samuelson and Northaus, 1992) :
- the compensation rates of the capital factor and work factor are achieved taking into account their marginal value and they are expressed according to the output value;
- the net reward of the capital factor and work factor differs from the gross reward due to the taxation rates applied to the incomes of the factors.

The expressed hypothesis lead to the following preliminary conclusions:
- for a certain output level, any change interfering between the rates of gross reward of the factors changes the demand of capital and work factors in the case of enterprises;
- any change of the net rewards of the factors changes the market tender within the administration department, by substituting a factor in a certain proportion with the other one.

The elementary character of these hypothesis regarding the rate elasticity of tax drawings and the curve analysis, considered as a reflection of the tax history specific to a country and the last stage in the evolution of the tax system, determined the French economist Henri Sempe (1981) to propose the study of a fragment of their evolution, in order to prevent the risk of obtaining an exchange economy and the disappearance of the State.

In the American literature, a series of American authors contradict the legitimacy of the Laffer curve (McConnell and Brue, 1990; Dornbusch and Fischer, 1990) as well as the effects generated by the diminution of the tax rate at the American economy level, the critics engendered fervent reactions from the supporters part (see J.R. Clark, Dwight R. Lee, „Sentencing Laffer Curves: response to the Critics", 1996) . Other critics regarding the Laffer curve (Mirowski, P., 1982; Denicolo, V., 1988) are related to its empirical character, the lack of relevant variables and controversies concerning the underground economy.

Subsequently, in a paper, Arthur Laffer (2005) illustrates the expected effects giving concrete examples which confirm his theory. There have been three major periods of tax-rate cut in the U.S. history: the Harding-Coolidge cuts of the mid-1920s; the Kennedy cuts in the 1960s and the Reagan cuts in the 1980s. The most recent examples

belong to the ex-socialist States, where unique tax-rates are experimented for the first time.

The representation of the tax burden area for a certain country, on the Laffer curve, considering the tax burden level, is hard to accomplish as long as the maximum threshold admitted theoretically has always been exceeded. As a rule, when a country is represented in the inadmissible area, an increased tax base and the growth of tax incomes is expected, generated by the simulative effect of all measures adopted for stimulating the output and the investment process.

The same effects are wanted for a country registered within the admissible area. It is possible that the expected effect do not manifest, when population claim new public utilities, and the funds allotted in this case are neither possible in a first stage, nor wanted, due to the rigidity of the work tender. In addition to this, a policy of tax extension rejects the extension of the public economy to the exchange economy detriment, because of the negative impact over the global tender.

Considering the relation between the tax incomes level and the gross domestic product, we may notice that (Văcărel, I., 2005) a highly developed country from the economic point of view possesses numerous possibilities for the reallocation of public financial resources (resulting from taxes, duties and contributions) in order to satisfy the general needs of the society.

Presently, a number of governments (we mention here Romania) *register a reduced GDP per inhabitant* compared to that registered by the European Community countries, and the GDP reallocation percentages through taxes and duties are superior to those registered by highly industrialized countries. The explanation for this situation consists in the reduced level of GDP registered within those countries and in the existence of numerous unsolved economic and social issues (for a reduced GDP, the necessary resources results from the growth of the tax rate).

An important research elaborated by the specialists of the Economic and Social Council of France (Le Clezio, Philippe, 2005) pointed out the way in which the public budget proportion of 18 developed countries of the world influences the economic growth, the GDP level/inhabitant and the poverty rate of those countries. The study entitled "Prélèvements obligatoires: compréhension, efficacité économique et justice sociale" clearly substantiates the fact that *there is no coordination, between the value of taxes and duties reported to the GDP value and the economic growth*. Countries as Norway, Finland, Denmark or Sweden, with public budgets which represent more than 50% of the GDP, registered the last decade an economic growth more important than that in Japan (with a public budget of 29% of the GDP). Moreover, Norway registered the highest rhythm of economic growth among the most developed States, with a public budget of over 55% of the GDP (here the taxes and duties paid by Norwegians are very high).

The French specialists tried to establish a correlation between the public budget income level and the GDP/inhabitant, but they didn't succeed in achieving such a correlation. Norway and U.S.A. are highly developed countries (over 35.000 dollars/inhabitant), even if the tax rate in Norway registers the highest value, and in U.S.A., its value is among the smallest. In exchange, one may notice the existence of a very tight correlation between the public budget importance and the limitation of the inequality level, or the return of poverty in the case of children. If programs of social support were not enforced, financed from taxes and duties, the poverty rates among children would be very close in Sweden and U.S.A., of 23.4%, respectively 26.7%. In reality, as a result of the enforcement of social support measures, these rates represent 2.6% in Sweden and 22.4% in the U.S.A.

Considering all these aspects, our paper tries to test the correlation

between fiscality rate, GDP and tax income flux in Romania.

2. Research methodology

Necessary data used for the representation of the Laffer curve (table 1) are provided by the National Institute of Statistics and the Ministry of Economy and Finance. The influence of the tax rate over the total amount of collected tax incomes at general public budget level is registered for the following time interval 1991-2006.

To represent Laffer curve for Romania (in the way of the progressive rate fiscality), we used a plotting function with two parameters, and to obtain better representation over the data statistical evolution, we modeled the tendency using a fourth degree polynomial (using Matlab program).

In order to obtain the values corresponding to the GDP and to the tax incomes, the inflation impact has been ignored. The values assigned to the parameters have been transformed into comparable values by reducing them to the same basis of comparison (year 1991), all data have been calculated using euro. The studied period, 1991-2006, registered important currency exchange fluctuations as well as measures concerned with the national currency denomination. In order to reduce the effects generated by these situations, the values of the variables have been changed in euro using the average currency exchange registered during the last year of the interval 2006.

For the analysis of the causes which have led to the tax rate fluctuation registered in Romania, there have been used the statistic analysis of the correlations established between different variables which influence the tax level.

The correlation between the real GDP and the real tax incomes has been tested of the special software SPSS.

Several patterns have been employed for the determination of the regression pattern, the best result proved to be the parabolic pattern.

According to the tendencies registered by the indicators during the studied period (1991-2006), a graphical representation was made estimating these indicators during the period 2007-2009 (the dotted black lines existing in the graphic representation).
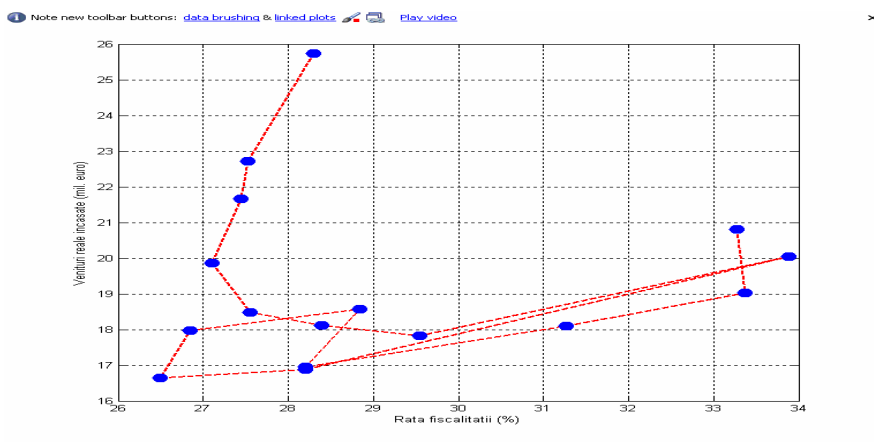
3. Results and discussions

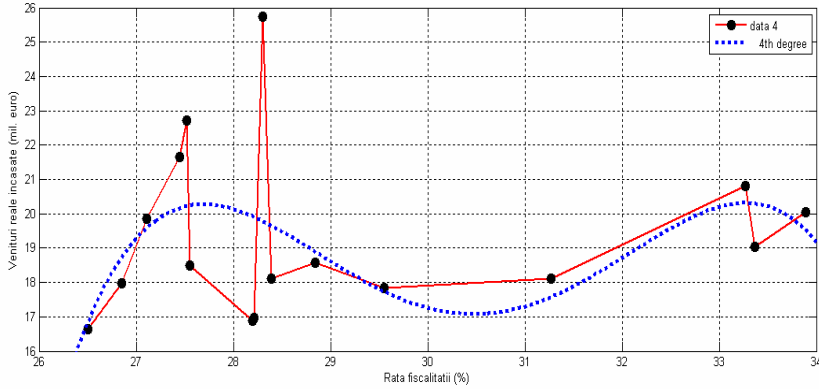**Figure no 1. Temporal evolution (1991-2006) of tax rate and of collected real incomes**

Figure no 2. Laffer curve representation for Romania
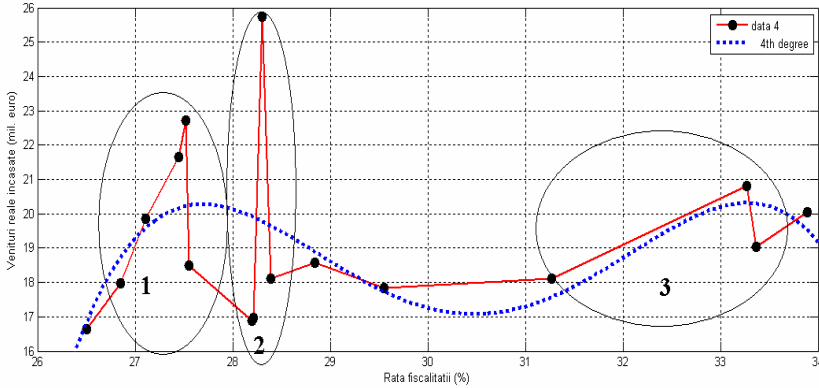**(**graphical adaptation using the 4th degree polynomial equation)

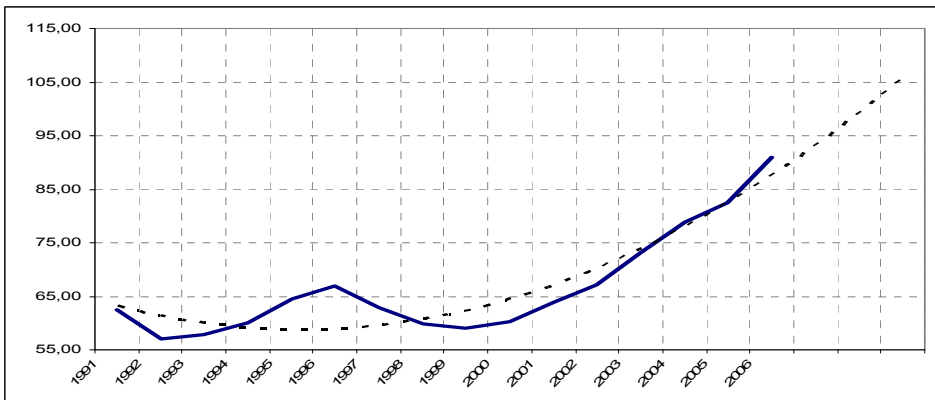**Figure no 3. „Cyclicity" of Laffer curve representation in Romania**

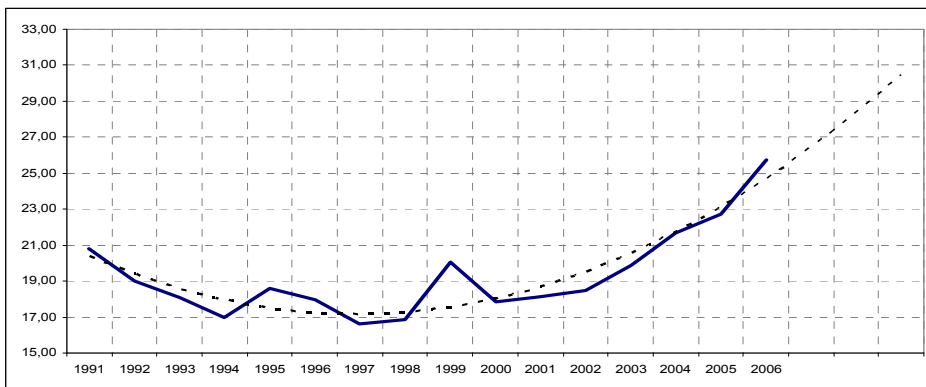**Figure no 4. Real GDP evolution in Romania 1991=100% (mil.€)**

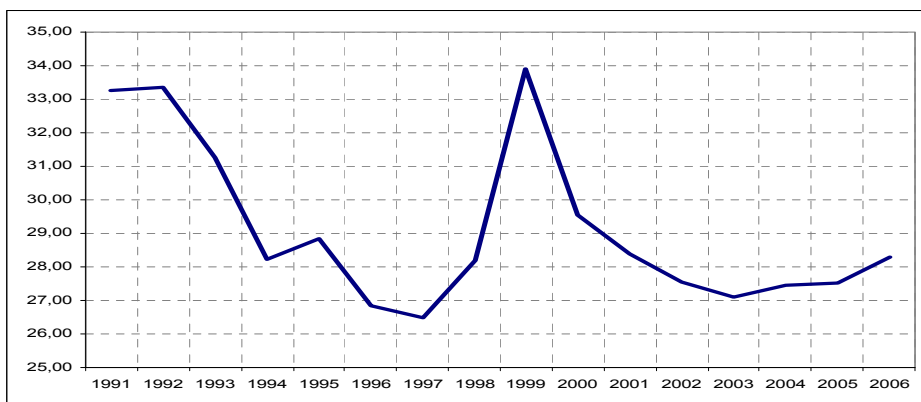**Figure no 5. Real tax incomes in Romania 1991=100 (mil.€)**

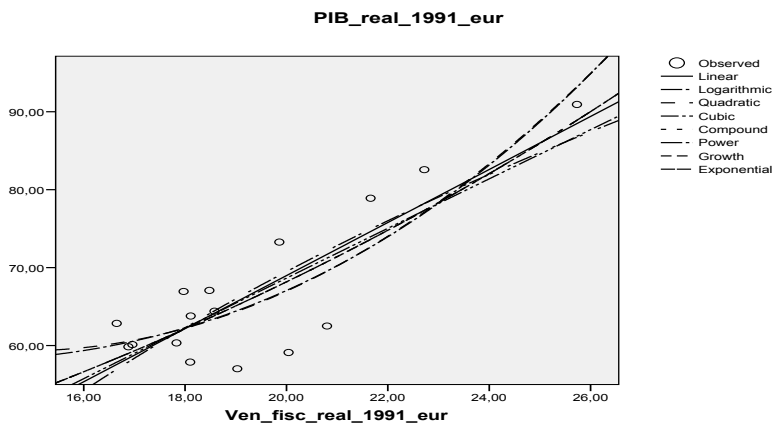**Figure no 6. Tax rate in Romania (%)**

Figure no 7.Correlogramme real GDP – Real tax incomes for the period 1991-2006, Romania

Table no 1. Real GDP, real tax incomes and tax rate evolution, 1991-2006

Year	Nominal tax incomes*) (mil. lei)	Nominal GDP (mil. lei)	GDP deflation indicator	Real GDP (mil lei)	Real tax incomes (mil lei)	Real GDP (1991=100%) (mil. lei)	Real tax incomes 1991=100% (mil. lei)	Real GDP **) 1991=100% (mil. eur)	Real tax incomes **) 1991=100 (mil. eur)	Tax rate (%)
1991	73,3	220,3	2,951	74,65	24,84	220,30	73,30	62,51	20,80	33,27
1992	201,2	603,0	3,000	201,00	67,07	201,00	67,07	57,03	19,03	33,37
1993	626,6	2003,6	3,274	611,97	191,39	203,99	63,80	57,88	18,10	31,27
1994	1404,2	4977,3	2,391	2.081,68	587,29	211,94	59,79	60,13	16,96	28,21
1995	2080,3	7213,5	1,353	5.331,49	1.537,55	227,02	65,47	64,41	18,58	28,84
1996	2924,8	10892,0	1,453	7.496,21	2.012,94	235,92	63,35	66,94	17,97	26,85
1997	6701,4	25292,5	2,473	10.227,46	2.709,83	221,53	58,69	62,85	16,65	26,50
1998	10541,6	37379,9	1,552	24.084,99	6.792,27	210,95	59,49	59,85	16,88	28,20
1999	18493,7	54573,0	1,478	36.923,55	12.512,65	208,37	70,61	59,12	20,04	33,89
2000	23748,7	80377,3	1,443	55.701,52	16.457,87	212,68	62,84	60,34	17,83	29,55
2001	33145,5	116768,7	1,374	84.984,50	24.123,36	224,87	63,83	63,80	18,11	28,39
2002	41739	151475,9	1,234	122.751,94	33.824,15	236,40	65,14	67,07	18,48	27,55
2003	53564,9	197564,8	1,194	165.464,66	44.861,73	258,23	70,01	73,27	19,86	27,11
2004	67623,6	246371,6	1,158	212.756,13	58.396,89	278,08	76,33	78,90	21,66	27,45
2005	79032,3	287186,3	1,114	257.797,40	70.944,61	290,98	80,08	82,56	22,72	27,52
2006	96847,1	342198,4	1,082	316.264,70	89.507,49	320,44	90,69	90,92	25,73	28,30

*) this category includes taxes, duties social security contribution
**) Reported to the exchange currency eur/lei registered in 2006
Source: Processed data based on National Institute of Statistics, Romania

Table no 2.

		Real GDP	Real tax incomes
Real GDP	Pearson Correlation	1	,843(**)
	Sig. (2-tailed)		,000
	N	16	16
Real tax incomes	Pearson Correlation	,843(**)	1
	Sig. (2-tailed)	,000	
	N	16	16

** Correlation is significant at the 0.01 level (2-tailed).

Quadratic

Table no 3.Model Summary

R	R Square	Adjusted R Square	Std. Error of the Estimate
,867	,751	,713	5,241

The independent variable is Real tax incomes.

Table no 4.ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Regression	1078,539	2	539,270	19,630	,000
Residual	357,127	13	27,471		
Total	1435,666	15			

The independent variable is Real tax incomes.

Table no 5.Coefficients

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta	B	Std. Error
Real tax incomes	-8,409	8,081	-2,083	-1,041	,317
Real tax incomes ** 2	,284	,194	2,933	1,465	,167
(Constant)	121,602	83,072		1,464	,167

According to A. Laffer's theory, taking into account the evolution of tax incomes and rates, one may identify two areas:

- the „admissible" area (*normal range*), where the increase (diminution) of the tax burden is followed by the corresponding increase (diminution) of the tax incomes to the State general consolidated budget;

- the „inadmissible" area (*prohibitive range*).

In **Romania** (see table no 1), existed, during the analyzed interval, *11 periods of „admissibility",* respectively, the years 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2004, 2005 and 2006. During the intervals mentioned above, *the increase of the tax pressure was followed by the increase of tax incomes to the budget* in 6 years (1995, 1998, 1999, 2004, 2005 and 2006), for the rest of the interval (1993, 1994, 1996, 1997 and 2000) the diminution of the tax pressure led to the corresponding diminution of tax incomes.

In the year 1992, the increase of 0.1 percentage points registered by the tax rate determined a diminution of 1.7 million euros of the tax incomes (or, the increase of the tax pressure admitted under the circumstances of the tax incomes diminution generates a more important diminution of the GDP). For the years 2001, 2002 and 2003, though the diminution of the tax pressure determined or corresponded to an increase of tax incomes, they remain in the inadmissible area representation of the Laffer curve, due to the fact that the tax pressure level, whose diminution determines the increase of tax incomes, is superior to that adequate tax pressure which provides the maximum value of tax incomes, meaning that it can be reduced until it reaches the optimum level (or, the diminution of the tax pressure admitted under the circumstances of the tax incomes growth is rather the result of a higher increase of the denominator, represented by the gross domestic product, in the case of the tax rates diminution for the main taxes).

Although, the affirmation according to which the tax pressure diminution is followed by the tax incomes diminution, situation placed in the admissible area representation on the curve, and the tax pressure diminution is followed by the tax incomes increase, situation placed in the inadmissible area representation, seems a little bit illogical, the estimation should be done

according to Laffer's theory, **reported to the optimum level of the tax pressure** which provides the maximum amount of incomes, thus, for the first situation the tax pressure level is placed below the optimum level, and for the second situation, above the optimum level.

The most suggestive tendency of Laffer curve representation for Romania has been achieved through the adaptation by means of the 4th degree polynomial equation (figures no 2 and no 3).

One may notice a tendency following a cyclic rhythm: first cycle with a length of time of 5-6 years, second cycle with a length of time of 3 years and third cycle with a length of time of 3-4 years.

The existence of the three tax „pillars" which maximize the tax incomes flux involves the existence of *three levels of „optimum taxation: the first level represents a tax rate between 27-28%; the second level consists in a tax rate between 28-29% and the third level of tax rate being a little bit over 33%.*

In **Romania**, the real **gross domestic product** (figure no 4) indicates a parabolic type tendency. The minimum values are registered in the year 1992 (an important rise in prices was registered in this year) and the year 1999 (as a result of the period of massive restriction of the State enterprise activity and of a private sector inadequately developed, unable to attenuate this effect).

The second half of this interval (1999-2006) clearly indicates a stabilization tendency based on increasing values.

The **real tax incomes** (figure no 5) register a parabolic type tendency indicating a minimum value in 1997 and important fluctuations during 1994-2000 (generated by frequent changes of the tax level). The last part of the analyzed period (2000-2006) points out a continuous increase of the value of this variable.

The **tax rate** (figure no 6) presents an evolution registering important fluctuations, with an absolute minimum in 1997 caused by a minimum level of real tax incomes during the same year and an absolute maximum in 1999 (generated, this time, by the combination: local maximum for tax incomes and local minimum for the GDP).

A study of the **correlation between the real GDP and tax incomes** (figure no 7) reveals the fact that there exists a strong correlation between these two, illustrated by a direct non-linear graphical representation. The tests performed confirm the fact that this correlation is very significant (table 2). In order to determine the regression pattern, several other patterns were tested, the best proved to be the parabolic pattern (tables 3-5).

$$\text{Real GDP} = 121{,}602 - 8{,}409 \cdot \text{Real tax incomes} + 0.284 \cdot \text{Real tax incomes}^2$$

4. Conclusions

According to this analysis, the tax optimum level remains an illusion. The results of the analysis reflect the fact that the real issue consists in the tax general level correlated to its effects over the social environment. The existence of the three tax „pillars" which maximize the tax incomes flux involves the existence of three levels of „optimum taxation: the first level represents a tax rate between 27-28%; the second level consists in a tax

rate between 28-29% and the third level of tax rate being a little bit over 33%.

In *Romania,* the enforcement of the unique tax rate of 16% (2005) led, on average term, to the *evidence of the economic effect suggested by Laffer*: the growth of tax incomes. This growth is determined by three causes: (i) the emergence of a part of the dark economy; (ii) the increase of the private consumption due to high salaries, which led to the increase of VAT incomes; (iii) the increase of the investments made by companies.

The reaction manifested by the Romanian economy to the tax policies was in accordance with the economic laws based on economic theories. Presently, Romania adopts an optimistic attitude, based on the statistic tendencies which confirm Arthur Laffer's theory, applied by other countries in the Eastern Europe. Though, the form of the Laffer curve for Romania is not identical to that introduced by the American economist, this fact evidenced that the *tax pressure can not be considered as a variable of the economic conduct or as an economic indicator*, for the given period.

On the other hand, the reduced tax level in Romania (under the circumstances that the tax rates for the main taxes are similar to those adopted by other countries in the Eastern Europe), points out *a reduced collection of taxes* mainly due to the tax payment evasion phenomenon.

The continuous diminution of the tax level in Romania, after the year 2000, considering the considerable increase, in real terms, of the gross domestic product and, respectively, the diminution of the tax rates for the main taxes, may be explained as it follows: (i) the increase of the tax base is insufficient in order to compensate the loss of incomes generated by the diminution of the tax rates; (ii) the diminution of the tax pursuance level and the spread of the tax dodger phenomenon.

In Romania, the real GDP value directly depends in a great extent on the real tax incomes value. Thus, the increase of its values is generated by the increase of the real tax incomes to the limit consented by the tax payers (reaching the tax optimum level).

Direct relation of dependency between GDP and real fiscal incomes brings up to the following conclusion: the stimulation, through the State involving, of GDP growing will inevitably leads, through *redistribution process*, an economic development with positive implications to autochthonous capital, too.

REFERENCES

Canto, Victor; Joines, Douglas, Laffer, Arthur, (1978),	*Taxation, GNP and Potential GNP*, Proceeding of the Business and Economics statistics sections, 1978 (Washington, DC: American Statistical Association)
Clark, J. R.; Lee, Dwight R, (1996),	*Sentencing Laffer Curves*: *Response to the Critics*, Social Science Quarterly (University of Texas Press), Jun 96, Vol. 77 Issue 2
Le Clezio, Philippe, *(*2005),	*Prélèvements obligatoires : compréhension, efficacité économique et justice sociale,* Journal officiel de la République française, avis et rapports du Conseil économique et social
Denicolo, Vicenzo, (1988),	*Some analytics of the Laffer curve*, Journal of Public Economics, Feb88, Vol. 35 Issue 1
Dornbusch, R.; Fischer, S, (1990),	*Macroeconomics*, New York: McGraw, Hill International Editions.
Drăcea, R., Cristea, M., Ionaşcu, C., Irteş, M.,(2008),	*Correlation between the Fiscality rate, the GDP and the Tax incomes flux: Case study Romania and Turky*, Conference on Applied Business&Economics, Proceedings 2-4 October 2008, Thessaloniki, Greece
Gandhi, V.P.; L.P. Ebrill; G.A. Mackenzie et al., (1987),	*Supply-Side Tax Policy. Its Relevance to Developing Countries*. Washington, DC: International Monetary Fund
McConnell, C.R., and S.L. Brue. (1990),	*Economics: Principles, Problems, and Policies*. New York: McGraw-Hill.
Laffer, Arthur, (2004),	*The Laffer Curve: Past, Present, and Future* , Policy Research & Analysis, June 1, The Heritage Foundation.
Mirowski, Philip, (1982),	*What's wrong with the Laffer Curve?,* JEI, Journal of

	Economic Issues, vol. XVI, septembrie
Padovano, F., and E. Galli, (2001),	*Tax Rates and Economic Growth in the OECD Countries (1950–1990)*, Economic Inquiry, vol. 39, no. 1
Samuelson, Paul. Northaus, William D, (1992),	*Economics*, 14th edition, McGraw-Hill, New York
Spiegel, Uriel; Templeman, Joseph, (2004)	*A non-singular peaked Laffer curve: debunking the traditional Laffer curve*, American Economist, Fall 2004, Vol. 48 Issue 2
Văcărel, Iulian şi colab.(2004)	Finanţe publice, Editura Didactică şi Pedagogică, Bucureşti
*****	www.insse.ro, Institutul Naţional de Statistică, Romania
*****	www.mfinante.ro, Ministerul Economiei şi Finanţelor