

Empirical Analysis Concerning the Correlation Fiscality Rate – Tax Incomes in Romania

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***Abstract.** In the specialized literature it is reviewed the taxation from all points of view and the question raised by the last decade analysts is: what is the optimum level of taxation? The difficulty in answering to this question stands in the opposite interests: State wants a high level of taxation due to the increasing trend of public expenses while the tax payers wants a low level in order to benefit of greater financial funds.*

Starting from Laffer theory, the objective of this paper is the empirical analysis of the correlation between fiscality rate and the tax incomes in Romania, using Matlab program and SPSS software. The paper is structured in three parts: first part it is review the specialized literature, in the second part is described the research methodology while the third part compound results and discussions. The paper is finished by conclusions.

Keywords: Laffer curve; taxation ratio; fiscal incomes; statistical analyse; correlations.

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JEL Codes: E62, H21, C22.

REL Codes: 8K, 13F.

Introduction

Using as source of the analysis the US market economy saddled with mathematical arguments, the American economist Arthur B. Laffer (1978) pointed out, by means of a curve, *the relation between the tax pressure rate and the tax incomes flux*, recently known under the denomination of Laffer Law. This law became fast the theoretic groundwork and the reference support for the theoreticians of the offer economy. The Laffer curve is considered in almost every study dealing with the fiscality level, due to its suggestive feature, and it reflects the relation between the tax pressure represented on the abscissa and the tax incomes on the ordinate.

The representation of the tax pressure area for a certain country, on the Laffer curve, is difficult as long as the maximum threshold admitted theoretically has always been exceeded. As a rule, when a country is represented in the inadmissible area (*prohibitive range*) an increased tax base and the growth of tax incomes is expected, generated by the stimulative effect of all measures adopted for stimulating the output and the investment process (Witte, 1985). The same effects are wanted for a country registered within the admissible area (*normal range*). 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 effects on the global tender.

The practical issue of each government consists in the determination of the *adequate taxation rate* level, meant to register high tax incomes for the government (Government or local, regional authority). The adequate level is defined from the point of view of the institution entitled to decide the tax rate, the tax incomes maximization representing the objective function.

Starting from the premise that the taxation method is less important (flat or progressive tax) than the general level of taxation (tax burden), the purpose of this paper consists in the empirical analysis of the correlations between the tax pressure rate and the tax incomes flux within Romania.

1. Theoretical basis

Studying the relationship 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"⁽¹⁾, 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 favourable 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:

$$P = K^{\alpha} \times M^{1-\alpha}, \quad (1)$$

where:

$$0 < \alpha < 1;$$

α and $1-\alpha$ – elasticity of factors K and M;

P – output value;

K – capital factor;

M – work factor.

The analysis pattern introduces a series of simple hypothesis, this is why they are considered as the *the weak point of the theoretical basis* (Samuelson, Northaus, 1992):

- the compensation rates of the capital factor (R_v) and work factor (W_v) are achieved taking into account their marginal value and they are expressed according to the output value (P):

$$R_v = \frac{\partial P}{\partial K} \text{ and } W_v = \frac{\partial P}{\partial M} \quad (2)$$

- the net reward of the capital factor (R) and work factor (W) differs from the gross reward ($R_{v \text{ and } W_v}$) due to the taxation rates (t_k and t_w) applied to the incomes of the factors:

$$R_v = R(1 + t_k) \text{ și } W_v = W(1 + t_w) \quad (3)$$

- the functions of the capital and work tender are:

$$K_0 = \left(\frac{R}{W} \right)^a \times R^e, \quad a < 0, e < 0 \quad (4)$$

$$M_0 = \left(\frac{W}{R} \right)^b \times W^e, \quad b < 0, e > 0 \text{ and } a + e > 0; b + e > 0 \quad (5)$$

The expressed hypothesis lead to the following preliminary conclusions:

- for a certain output level, any change interfering between the rates (R_v and W_v) 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 (R and W) 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 litterature, a series of American authors contradict the legitimacy of the Laffer curve (McConnell, Brue, 1990, Dornbusch, 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 (Clark, Dwight, 1996). Other critics regarding the Laffer curve (Mirowski, 1982, Denicolo, 1988) are related to its empirical character, the lack of relevant variables and controversies concerning the underground economy.

Subsequently, in a recent article, 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 US 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⁽²⁾.

The representation of the tax pressure area for a certain country, on the Laffer curve, considering the tax pressure 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 stimulative 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.

The displaced Laffer curve (Hoanță, 1997) describes all the elements in a different way (Figure 1).

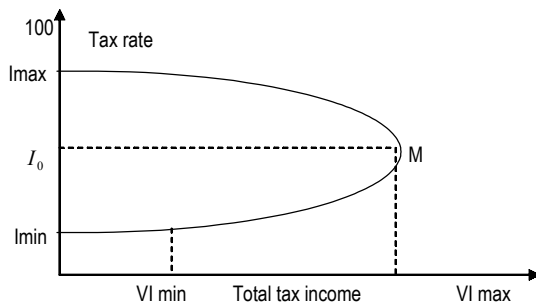


Figure 1. Displaced Laffer Curve

The minimum tax rate I_{min} corresponds to a minimum budget meant to provide a reduced bureaucracy, and efficiency for the government’s improved fiscal situation. The adequate tax rate I_0 places the drawing of the largest amount of incomes resulting from taxes, retained by the government. All possible rate between I_{min} and I_0 represent tax rates which are available for the government – business entity in a market economy.

The maximum tax rate I_{max} indicates the tax rate which satisfies the following relation:

$$I_{max} = V - \sum \frac{VPD}{V} \times 100 \quad (6)$$

where V is the income achieved by the population of a country, during one year, and VPD represents the individual income established by the public authority which becomes totalitarian.

So, if for the interval I_{min} and I_0 the activity of collecting incomes is functional and equitable, reaching the maximum value in point M, for the interval I_0 and I_{max} it is not the same situation, the collected incomes retained by the government tend to a sudden increase, which is not the result of the taxation effect, but of the seizure performed within imposed working conditions stripped of freedom of initiative.

Considering the relationship between the tax incomes level and the gross domestic product, we may notice that (Văcărel, 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 higher than 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, 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 Japon (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 USA are highly developed countries (over 35,000 dollars/inhabitant), even if the tax rate in Norway registers the highest value, and in USA, 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 USA, 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 USA.

Considering all these aspects, our paper tries to test the correlation between fiscal rate and tax income flux in Romania.

2. Research methodology

Necessary data used for the representation of the Laffer curve (table 1 and table 2) 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⁽³⁾ at general public budget level is registered for the following time interval 1991-2006.

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 the same currency – euro. The studied period, 1991-2006 for Romania, 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.

Taking into account all available data, a file in Matlab (6.5 version) has been saved where the available data concerning the real GDP, the nominal GDP, the GDP deflator, the tax rate, the real level of incomes, the period specific to each set of data, have been imported, distributed on columns.

Subsequently, elementary functions of graphical representation and adaptation of data tendency have been applied using this file. This projection follows to display how the available data falls into different representations – a line or a curve, meant to illustrate the evolution along the 16 years considered as the study framework, therefore, the prognosis on future data is not processed.

Figure 2 illustrates the graphical representation of GDP deflator by applying a function of graphical representation meant to display the set of data, and processing the data

in the columns which stand for the values of the deflator and the years of reference. The two columns, consisting of processed data, in fact, represent the parameters specific to the function of graphical representation.

The same function of graphical representation is used for the real GDP (million lei), during the 16 years and for the nominal GDP (million lei), in figure 3. The representation function gives four parameters, in this case (all data specific to the analyzed interval are considered twice, for the real GDP and for the nominal GDP).

Figures 4 and 5 illustrate the graphical analysis of the percentage-evolution of real GDP and nominal GDP, during the 16 years

taken into consideration. Two graphics were performed, adjusting the data tendency – this adjustment practically indicates the elaboration of a line which joins the points characterizing the entire range of data. As means of adaptation, the linear tendency has been chosen (1st degree).

Figure 8 refers to the evolution of real incomes expressed in million euros according to the tax rate registered within the considered interval, using as in figure 2 a representation function based on two parameters (the two correlated values). The distribution of data in figure 10 is displayed by means of a 4th degree polynomial, in order to obtain a clearer image on the statistical evolution of data (dotted blue line).

3. Results and discussions

Evolution of real GDP, real tax incomes and tax rate. Considered period 1991-2006 (Romania)

Table 1

Year	Nominal tax incomes*) (mil. lei)	Nominal GDP (mil. lei)	GDP deflator index	Real GDP (mil. lei)	Real tax incomes (mil. lei)	Real GDP (1991=100%) (mil. lei)	Real tax incomes 1991=100% (mil. lei)	Real GDP **) (mil. eur)	Real tax incomes **) (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	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 duties, taxes and social security contribution

**) According to the exchange value eur/lei registered in 2006

Source: Statistical Annuary of Romania.

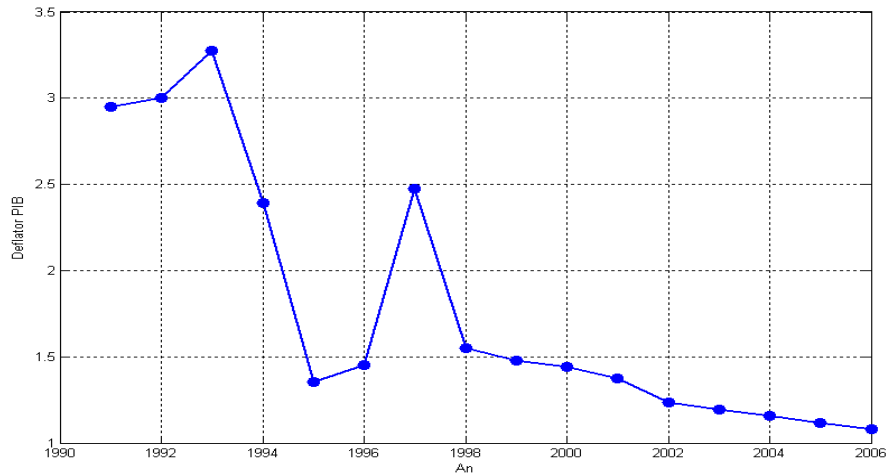


Figure 2. Graphical representation of GDP deflator evolution

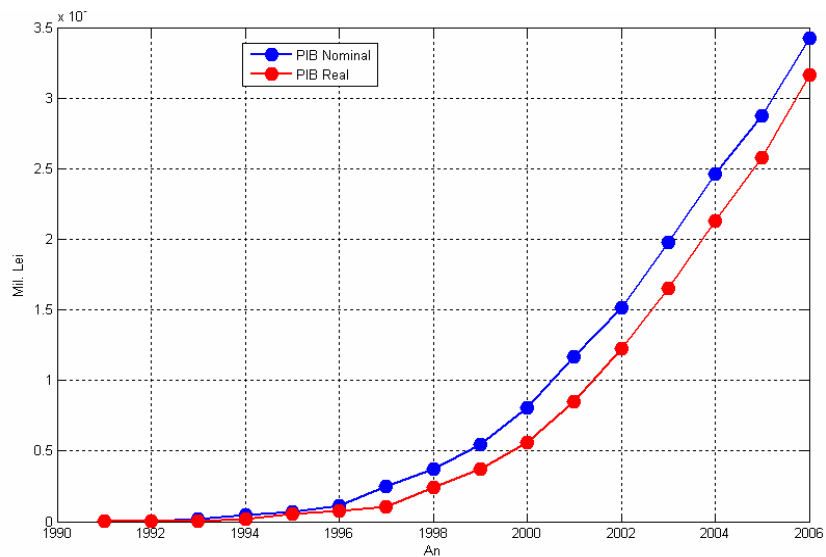


Figure 3. Graphical representation of real GDP and nominal GDP evolution (mil. lei)

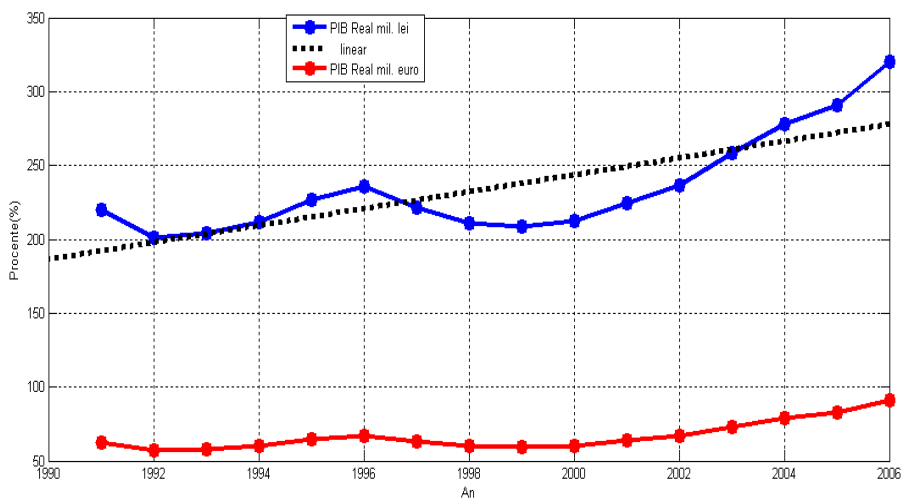


Figure 4. Graphical representation of real GDP evolution (mil. lei and mil. euro)

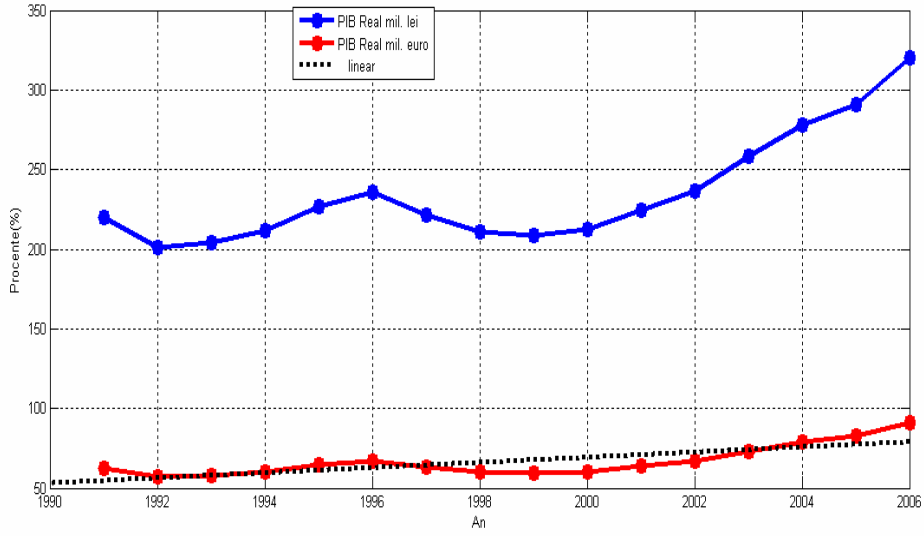


Figure 5. Graphical representation of real GDP evolution (mil. lei and mil. euro)

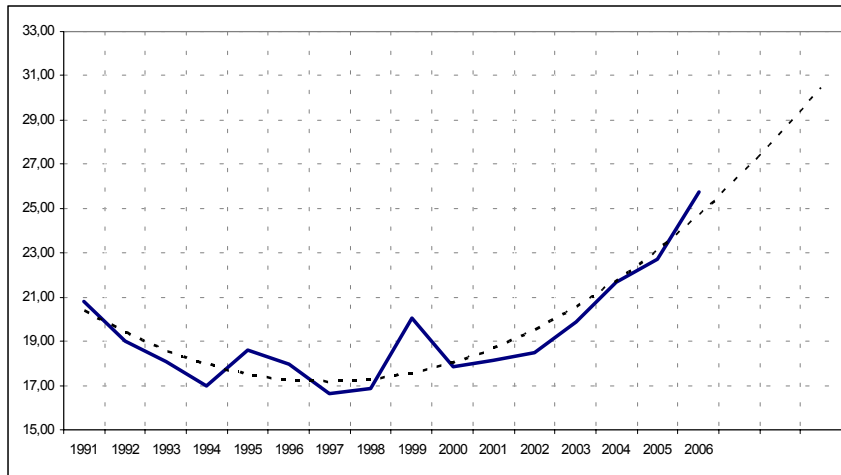


Figure 6. Real tax incomes in Romania 1991=100 (mil. euro)

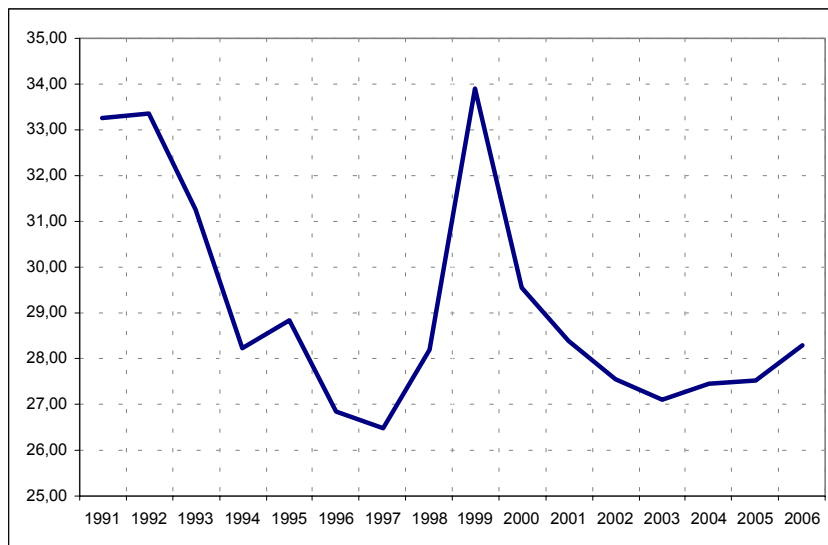


Figure 7. Tax rate in Romania (%)

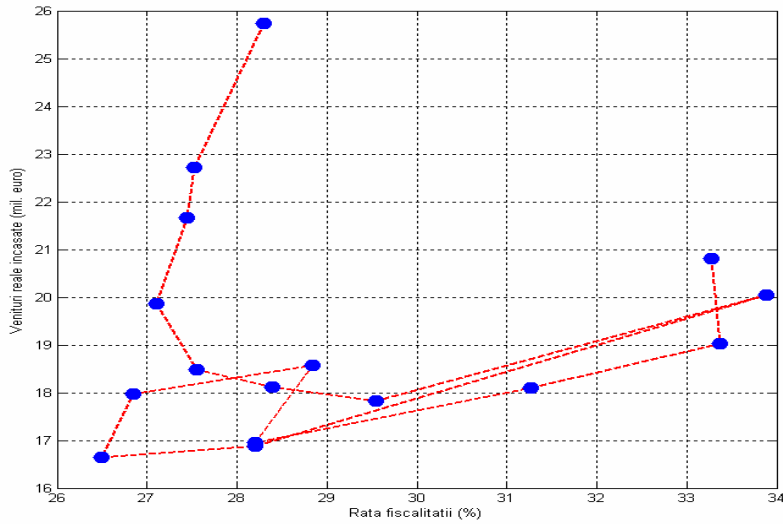


Figure 8. Temporal evolution (1991-2006) of tax rate and of collected real incomes

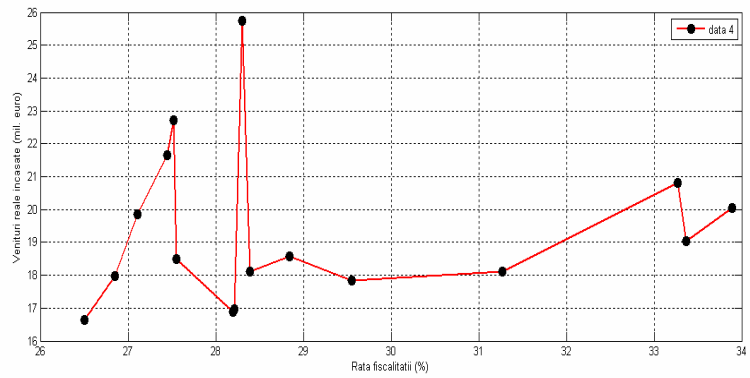


Figure 9. Laffer curve representation for Romania
(evolution concerning the progressive growth of tax percentages)

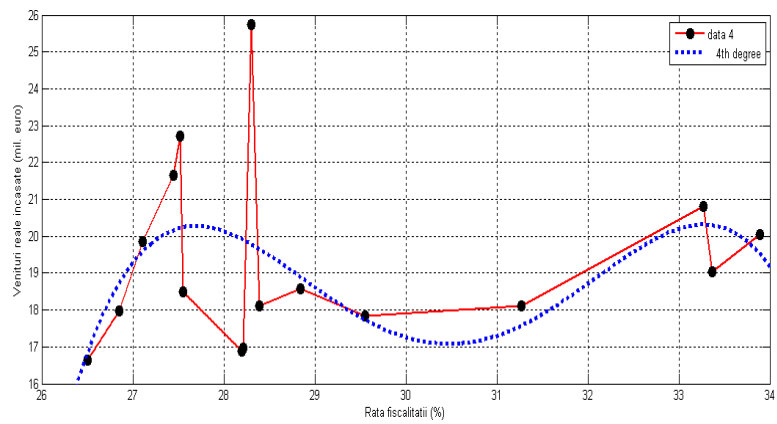


Figure 10. Laffer curve representation for Romania
(graphical adaptation using the 4th degree polynomial equation)

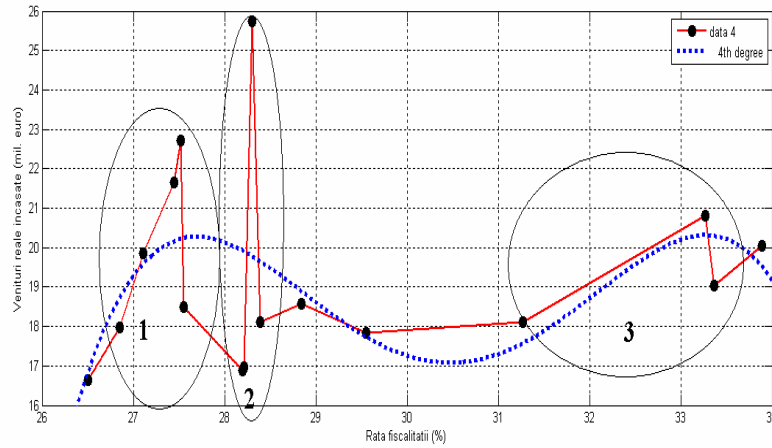


Figure 11. „Cyclicity” of Laffer curve representation in Romania

In Romania, the real *gross domestic product* (Figure 4) indicates a linear 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 activity restriction of the State enterprises 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.

As one may observe in Figures 4 and 5, the evolution of the real GDP expressed in euro differs from that of the real GDP expressed in million lei, fact deriving from the currency exchange. This difference becomes evident in the last three years of the studied interval (2004, 2005, 2006). No currency exchange average is used for the last three years of the interval, considering that differences would be rather details than practical. The black lines corresponding to each curve (linear tendency of data) register almost the same parameters and the same inclination reported to the OY axis, for each set of data, which enforces the situation

mentioned above, according to which the possibility of considering a larger interval of years, for the currency exchange analysis, proves to be an action of detail rather than an useful information.

The *real tax incomes* (Figure 6) register a parabolic type tendency indicating a minimum value in 1997 and more 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 7) 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).

According to 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 pressure is followed by the corresponding

increase (diminution) of the tax incomes to the State general consolidated budget;

- the „inadmissible” area (*prohibitive range*), where the increase of the tax pressure is followed by the diminution of tax incomes.

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 (Figure 10). 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.

3. Conclusions

According to this analysis, the tax optimum level remains an illusion. The results of the analysis reflects 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).

Notes

- ⁽¹⁾ See Human Rights Report – electronic database includes statistics concerning different economic and statistic indicators, <http://www.cato.org/pubs/journal/cj1n1/cj1n1-1.pdf>
- ⁽²⁾ In 1994, Estonia introduces a unique tax rate of 26%, generating an annual average economic growth of 5.2%. Subsequently, the unique tax rate has been reduced to
- ⁽³⁾ Total amount of collected tax incomes including direct, indirect taxes and social security contributions.

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