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TAXES IN POST - ACCESSION ROMANIA: CONCENTRATION AND SPECIALIZATION IN THE STATE BUDGET AND LOCAL BUDGETS

Abstract. *This article valorises the statistical theory of concentration – diversification in the field of the Romanian taxation, especially post - accession. Section 1 presents the main tax concepts and other general theoretical aspects from the theory of taxation, section 2 basically represents a brief retrospection of the economic and statistical literature of the concentration – diversification analyses with dominant instrumental highlights, section 3 describes the method of Onicescu informational energy or the cohesion's system and Gini – Struck coefficients, and section 4 expands these instruments in the budgetary analysis, formulating an original statistically founded tax law, according to which the excessive concentration within certain categories of revenues or expenses from the state budget inevitably leads to diversification within the local budgets and vice-versa, the negative elasticity coefficient of the relation between the state and local budgets being validated through econometric tests. A final section provides two physical modelling solutions (specific to the interpretations of the energetic systems and statistical physics), with a pronounced econopsyhical sense, sustains and generalizes the multidisciplinary tax analysis.*

Key words *state budget, local budgets, concentration - diversification, Gini-Struck coefficient, stratified statistical coefficients (reversed correlated), equidistribution law of energy in the chaotic systems.*

JEL Classification: C22, G31, E62, E64, Z19

I. INTRODUCTION

The budgetary and tax issues were and remain the most important issues for the European Union, within the context of economic, monetary and political unification of Europe. The current diversity of the budgets of the budgets from the Member States of the European Union describes a multiple reality, with major impact on the budgetary and tax policies, both through certain aspects related to the trends and sustainability of

the economic development, social and cultural traditions, but also through direct correlation with the structural, conjectural and even short – term elements. If from the legal point of view, the budget represents a document which provides and authorizes the annual state revenues and expenses, the statistical – mathematical approach of the budget concept underlines specific correlations, associations, structural evolutions and trends reported to each individual European economy.

The state budget includes a structure and a volume of revenues and expenses according to the economic and social development, the internal social – political conditions, the international economic situation, and the structural modifications can represent elements which anticipate favourable or unfavourable evolutions. As official document, the state budget highlights both the approved level of expenses to be performed in the future and the size of the revenues which could be mobilized at the state disposal, as well as the time frame for which it is elaborated. The revenues, mainly resulting from taxes and charges, are detailed within the report with their tax or non – tax content and source of origin, within certain major categories and their divisions, establishing the level of collections, but also their historical structure, while the expenses for the insurance of certain social needs materialized in social products and services, etc., are registered according to their content and destination, establishing both their level and especially their structure throughout time.

If at the European level dominates the budgetary diversity or the presence of a budget system which gradually coexists and consolidates itself, in a differentiated manner from state to state reported to the organizational structure of that country, from the declarative and constitutionally unitary (Romania, France, etc.) to the federal ones (Germany, etc.), the components of this budget system are duly regulated. For example, in our country, according to the Law on public finances no. 500 from 2002, published in the Official Journal no. 597 from August 13, 2002 and periodically updated (Law no. 314/2003, Law no. 96/2006, Government Decision no. 1865/2006, Government Emergency Decision no. 34/2009, Law no. 305/2009, Government Emergency Decision no. 57/2010, Government Emergency Decision no. 121/2010 published in the Official Journal no.890 from 30.12.2010), the national budget system includes the state budget, the budget of the state social insurances, the local budgets, the special funds budget, the state treasury budget, the budgets of other institutions with autonomous character, practically reunited in the general consolidated budget (established according to the general theory of systems, not only based on the mentioned components, but also through the internal, respectively structural connections between revenues and expenses or through the macro-financial correlations between the budget deficit and the balance of the current account of external payments and the gap between the investments (including the investment balance between the foreign investments registered and the investments of certain economic entities owned by co-nationals from overseas) and saving. This paper attempts to analyze from the statistical – mathematical point of view the economic process of concentration – diversification specific to the contemporary

budget aggregation from the macroeconomic level, providing a more extended future approach alternative, but equally correlated on local or microeconomic budgetary structures. Its main original aspect relates to the balances integration of the concentration – diversification phenomenon in the contemporary state budget perceived as a contradictory rigorous and progressive phenomenon between the insurance of revenues in order to perform expenses, valorising the statistical – mathematical theory of concentration – diversification instruments and the method of statistical indices.

II. A BRIEF REVIEW OF THE ECONOMIC AND STATISTICAL LITERATURE

Any brief retrospective of the economic and statistical – mathematical literature of the concentration – diversification analyses focusing on the dominating instruments cannot avoid the Hirschmann, Herfindahl, Gini, Gini-Struck etc., range of coefficients and indices. The diversification phenomena in the budget analyses and the ones with exclusively tax content describe the equidistribution tendencies as impact and importance of revenues and expenses, separately interpreted, which confirm a favourable trend for the budget collection and for the utility of the funds thus collected. The concentration phenomena reflect abnormal situations, from crises or recessions, to unrealistic approaches of the budgetary collection and they underline the fact that there is a significant discrimination of certain revenues reported to other revenues, respectively of certain expenses compared to the other categories of expenses from the budget. In the statistical – mathematical literature with applications in economy we can highlight structural changes, thresholds or limits through a wide instrumental range of models and instruments, from the Gini index, whose applications were continuously improved, generating multiple territorial evaluation forms of concentration and specialization, Krugman (1991), Aiginger (2004), Aiginger and Rossi-Hansberg (2006), to other means based on more explicit delimitative forms, respectively with Gini–Struck or Gini-Struck coefficients registered in the ABC curve, Săvoiu et al. (2010), in parallel with the maintenance in the stages of calculation of certain classical statistical Hirschman instruments, Hirschman (1943), Herfindahl, Acar and Sankaran (1999), Liston-Hayes and Pilkington (2004), Herfindahl – Hirschman, Nauenberg, Basu and Chand (1997) increasingly multiplied nowadays. The multiple interventions on one and the same concentration – specialization statistical instrument generated increasingly delicate specializations through destinations and construction, through detail degree of the analyses, extending the population of these measurement statistical instruments. An adequate example would be the statistical measurement instrument initially called the Grubel-Llyod index, which subsequently became Brülhart, Greenaway, Hine and Milner etc., thus increasing its relevance through a vertical and horizontal percentage, intra and inter- industrial. The analysis of the concentration – diversification phenomena from the broad universe of taxation multiplied the statistical elements, but also the

detailed instrumental knowledge of their selection according to limitative, hierarchical, structural criteria, as compensation and impact degrees, Săvoiu & Dinu (2012).

The statistical analysis identifies a veritable system of instruments specific to the characterization of frequencies from a series of financial or tax data. The approach through deciles is one of the frequently used solutions. A generalized solution which we propose in the determination of a quantile of S_i rank implies the following relation: $Cv(Si/S) = X_{Cv} + h \frac{\frac{S_i}{S}(\sum_{i=1}^{m} n_i + 1) - \sum_{i=1}^{Cv(S_{i-1})} n_i}{n_{Cv(Si/S)}}$, where: X_{Cv} = the inferior limit of te quantile's interval; h = the height of the quantile interval; $n_{Cv(Si/S)}$ = the frequency of the quantile interval; $\sum_{i=1}^{Cv(S_{i-1})} n_i$ = the cumulated frequency of the intervals up to the quantile interval. Another practical solution often used is based on the system of indices of concentration - diversification degree or of the closeness of a frequencies distribution series reported to the equal distribution series or equidistribution series includes: a) the coefficient of medial (Ml)-median (Me) deviation; b) the coefficient of Gini average deviation. In order to evaluate the structural tendencies and to know the impact of these structural modifications, in this paper we valorised the Hirschman, Gini – Struck coefficients and additionally their values were circumscribed to the ABC curve, in order to allow the identification of certain concentration and diversification limits in national or local tax arrears (excessive concentration budgets or excessive diversified budgets), thus adapting a new statistical instrument. The determination of Hirschman index is classically (simplified) performed in the following manner: $H\text{-}H = \sum_{i=1}^{n} g_i^2$, where *n* is the number of categories specific to the revenues (expenses) and it highlights the lowest level of concentration, "n" defines the number of structures generated by certain categories of revenues (expenses) etc., and "gi" represents the weight of the category of revenues (expenses)) "i" in total. Corrado Gini's coefficient was improved by Struck R. with the defined purpose to stabilize the belonging, thus becoming the Gini-Struck coefficient through a transformation of the unstable inferior limit in a constant one, which made its field of values $\left[\frac{1}{\sqrt{n}}; 1\right]$ to become [0,1]: $G\text{-}S = \sqrt{\frac{n\sum_{i=1}^{n} g_i^2 - 1}{n-1}}$, where n remains the number of specific categories of revenues (expenses). An essential contribution in the field of concentration – diversification belongs to the mathematician Octav Onicescu, respectively to the quantification through the adjusted computational

relationship of the informational energy or of the system cohesion $E_{Onicescu} = \sum_{i=1}^{n} p_i^2$, where p_i as a frequency function defined for a random discrete variable can be assimilated with g_i, Onicescu and Ştefănescu (1979). The identification of certain concentration and diversification limits was gradually performed in several articles, Săvoiu at al. (2010), Săvoiu, Dinu and Tăchiciu (2012), Săvoiụ & Dinu (2012).

Budgetary or tax evaluations with delimitation character of concentration – diversification within the ABC curve

Table no. 1.

Structure (revenues or expenses)	Weight (g_i) in the budget		Excessive concentrated budget		Excessive diversified budget	
	diversified	concentrated	g_i (%)	$(g_i)^2$	g_i (%)	$(g_i)^2$
A	0.60	0.333	60.0	0.3600	33.33	0.1111
B	0.25	0.333	25.0	0.0625	33.33	0.1111
C	0.15	0.333	15.0	0.0225	33.33	0.1111
Total	1.00	1.000	100.0	0.4450	100.00	0.3333

Source: Săvoiu and Dinu (2012), was adapted to the budgetary or tax phenomenon.

Typologies of local or state budgets, put in perspective and structured according to the ABC curve (following the analysis of the concentration – diversification phenomena)

Table no. 2.

Index limits	Concentrated budgets	Diversified budgets
Hirschman Coefficient (n = 3)	0.212	0
Simplified Hirschman Coefficient	0.667	0.577
Gini-Struck Coefficient	0.409	0

Source: Săvoiu and Dinu (2012), was adapted to the budgetary or tax phenomenon.

The results of this attempt of methodical improvement represents a statistical element with signalling rile (structural threshold) of budgetary or tax concentrations (specializations) and diversifications.

III. METHOD AND DATA BASES

The concrete application of the method described in the second section is performed in two distinct taxation layers, the aggregate layer of the state budget and the detailed layer of the local budgets maintaining the same analysis structures, in order to insure the statistical comparability of the analysis, starting from the data base promptly provided by monthly INS statistical bulletins (especially the ones from December, from the conclusion of the tax year for the post – accession period of Romania's economy).

In order to unitary evaluate from the methodological point of view, we used a standardized structure of the revenues and expenses, briefly presented in table no. 3.

Standardized structure of the revenues and expenses in the state budget and in the local budgets, valorized in the analysis

Table no. 3.

Categories of revenues	Categories of expenses
V1.Tax on profit V2. Tax on revenue V3. Tax and charges on property V4. Value added tax V5.Accises V6.Other fiscal taxes and charges V7. Non – fiscal revenues V8. Amounts received from the EU for the payments performed V9. Subventions	C1.Expenses with the personnel C2. Goods and services C3. Interests C4. Subventions C5. Transfers between the units of the public administration and other transfers C6. Projects with financing from non – reimbursable external funds and expenses with reimbursable financing programs C7. Social assistance C8. Equity expenses and financial operations

Source: Collection "Monthly Statistical Bulletin" (2007-2012), NSI, Bucharest.

The concentration – diversification phenomenon was practically quantified on a structure of nine components of essential revenues and only eight major expenses, with frequent or continuous appearance and which exceed 97% of the total of the two classes, respectively revenues and expenses of the state or local budgets analyzed.

IV. RESULTS AND DISCUSSIONS

A section of results and discussions expands the importance of these general analysis instruments of the structural standardization – diversification in the budgetary analysis, formulating an interesting and original statistically – mathematically founded tax law, according to which the excessive concentration within certain categories of revenues or expenses from the state budget inevitably leads to diversification within the local budgets and vice-versa. A final remark on the tax systemic balance and interlayers concludes this paper.

The evolution of taxation throughout the last twenty-two years in Romania presents both a multiplying tendency of charges and taxes, without precedent, and an oscillating evolution in terms of concentration, as well as a shift of the specific importance by reversing and radicalizing the weight of the indirect taxes reported to the direct taxes, Bălțat, Crăciuneanu and Săvoiu (2009). The upwards evolution throughout time of the value held by the Gini-Struck reveals a tendency towards concentration, and the downwards dynamic reveals a definite diversification (standardization).

Weight of indirect and direct taxes in total tax revenues and evolution of concentration and diversification phenomenon, throughout 1992 -2001

Table no. 4

Taxes in budget	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**
Indirect taxes	0.389	0.485	0.453	0.491	0.513	0.488	**0.626**	0.688	**0.725**	0.700
Direct taxes	**0.611**	0.515	0.547	0.509	0.487	0.512	0.374	0.312	0.275	0.300
Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
$E_{Onicescu}$	0.525	0.500	0.504	0.500	0.500	0.500	0.532	0.571	0.601	0.580
Gini – Struck	0.222	0.030	0.094	0.018	0.026	**0.024**	0.252	0.376	**0.450**	0.40

Source: The calculations were performed by the authors based on the data from the *Romanian Statistical Yearbook* (1992-2012), NSI, Bucharest.

Between 1992 and 2001, the Romanian taxation evolves in an oscillating, but constant manner, towards a reduction of the rate of direct taxes in the favor of indirect taxes, thus alternating relatively stable diversification processes, with equidistribution aspect between the direct and indirect taxes between 1992 and 1997, with a concentration tendency which becomes excessively only throughout three years, respectively between 1997 and 2000 (the indirect taxes practically holding ¾ of the total this years and the value of Gini-Struck coefficient identifying for the first time the leap over the excessive concentrated budget threshold).

Weight of indirect and direct taxes in total tax revenues and evolution of concentration and diversification phenomenon, throughout 2002 -2011

Table no.5

Taxes in budget	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Indirect taxes	0.751	0.787	0.749	0.740	**0.696**	0.655	0.642	0.630	0.674	0.700
Direct taxes	0.249	0.213	0.251	0.260	0.304	0.345	0.358	0.370	0.327	0.301
Total	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
$E_{Onicescu}$	0.626	0.665	0.624	0.615	0.577	0.548	0.540	0.534	0.560	0.580
Gini - Struck	0.502	0.574	0.498	0.48	**0.392**	0.3092	0.2834	0.2598	0.347	0.399

Source: The calculations were performed by the authors based on the data from the *Romanian Statistical Yearbook* (1992-2012), NSI, Bucharest.

As we can notice, after 2011 up to 2005 dominates a concentration process, localized in the excessive area, with values exceeding the excess concentration threshold, but with a slow default diversification trend. From 2006, the budget is suddenly no longer excessively concentrated and it continues the diversification trend up to the year of completely installed recession, namely up to 2009, and it reenters into a fast concentration trend throughout only two years, up to the end of 2011. If the diversification phenomenon can be considered beneficial also in taxation, a budget with excessive concentration in the field of indirect taxes will finally display the lack of alternatives in the Romanian tax policy throughout the world recession.

The previous analysis imposes an in-depth approach at the level of revenues and expenses, much more detailed, especially after the accession of Romania to the

European Union, both of the state budget and of the local budgets. In the new statistical quantifications performed, we used the standardized structure of revenues and expenses in the state budget and in the local budgets (according to table 3), the annual results being presented in detail in tables 6-9 and synthetically in tables 10, 11 and 12.

Concentration – diversification of revenues in the state budget of Romania, after the accession to the EU

Table no. 6

Revenues	AmountA mil. lei	2007 $(gi)^2$	AmountB mil. lei	2008 $(gi)^2$	AmountC mil. lei	2009 $(gi)^2$	AmountD mil. lei	2010 $(gi)^2$	AmountE mil. lei	2011 $(gi)^2$
V1.	10,528.8	0.02048	13,039.9	0.02022	10,435.1	0.01651	10,090.9	0.01124	10,289.2	0.00945
V2.	13,828.8	0.03527	18,398.3	0.04024	16,866.3	0.04314	17,852.3	0.03516	18,846.6	0.03168
V3.	0.40	0.00000	91.40	0.00000	54.1	0.00000	4.50	0.00000	0.00	0.00000
V4.	31,243.2	0.18003	40,873.6	0.19856	31,180.9	0.14738	39,246.0	0.16999	47,917.4	0.20467
V5.	11,207.8	0.02316	12,382.5	0.01823	12,984.0	0.02557	16,212.3	0.02900	17,805.9	0.02826
V6.	3,711.9	0.00254	3,208.5	0.00123	2,403.0	0.00088	2,202.8	0.00053	2,083.9	0.00039
V7.	3,113.5	0.00178	3,737.2	0.00166	6,352.3	0.00612	8,125.0	0.00729	7,315.2	0.00476
V8.	0.00	0.00000	0.00	0.00000	947.3	0.00014	953.7	0.00010	1,650.7	0.00024
V9.	0.00	0.00000	0.00	0.00000	0.00	0.00000	500.9	0.00003	0.00	0.00000
TOTAL	73,634.4	x	91,731.4	x	81,223.0	x	95,188.4	x	105,908.9	x
$E_{Onicescu}$	x	0.26324	x	0.28008	x	0.23968	x	0.25336	x	0.27947
G-S*		0.4137		0.4360		0.3803		0.400		0.4352
G-S**		0.3748		0.4001		0.3620		0.400		0.3992

Data source: Collection "Monthly Statistical Bulletin" (2007-2012), NSI, Bucharest. *Gini – Struck calculated for n = 9 **Gini – Struck recalculated without the groups of null values.

The debut in the integration period of Romania in the EU reveals certain important trends in the state budget according to the evolution of the large categories of revenues, respectively a prior concentration of the crisis followed by a deep diversification in 2009 throughout the peak period of recession in order to insure the budget resources.

Concentration – diversification of expenses in the state budget of Romania, after the accession to the EU

Table no.7

Expenses	AmountA mil. lei	2007 $(gi)^2$	AmountB mil. lei	2008 $(gi)^2$	AmountC mil. lei	2009 $(gi)^2$	AmountD mil. lei	2010 $(gi)^2$	AmountE mil. lei	2011 $(gi)^2$
C1.	13,184.3	0.0443	15,834.4	0.0399	14,048.6	0.0296	14,764.5	0.0212	15,682.2	0.0224
C2.	3,776.2	0.0036	4,605.3	0.0034	3,832.6	0.0022	3,718.4	0.0013	4,244.3	0.0016
C3.	2,249	0.0013	2,942	0.0014	4,712.2	0.0033	6,319.1	0.0039	7,736.5	0.0054
C4.	4,997.8	0.0064	5,809.1	0.0054	4,644.6	0.0032	4,663.1	0.0021	4,290.7	0.0017
C5.	20,209.7	0.1041	26,254.8	0.1097	27,656.7	0.1146	38,395.6	0.1432	39,835.6	0.1442
C6.	0	0.0000	0	0.0000	5,448.2	0.0044	8,647.1	0.0073	11,634.8	0.0123
C7.	11,932.2	0.0363	16,085.1	0.0412	16,511.6	0.0409	19,283.7	0.0361	15,007.7	0.0205
C8.	6,283.5	0.0101	7,756.5	0.0096	4,826.5	0.0035	5,682.6	0.0031	6,464.2	0.0038
TOTAL	62,632.7	x	79,287.2	x	81,681.0	x	10,1474.1	x	104,896.0	x

$E_{Onicescu}$	x	0.2061	x	0.2104	x	0.2018	x	0.2182	x	0.2119
G-S*		0,3044		0,3124		0,2963		0,3263		0,3151
G-S**		0,2716		0,2807		0,2963		0,3263		0,3151

Data source: Collection "Monthly Statistical Bulletin" (2007-2012), NSI, Bucharest. *Gini – Struck calculated for n = 8 **Gini – Struck recalculated without the groups of null values.

The expenses redo the path of revenues, excepting the year, 2011, when we register a process opposite to the focus of revenues, on a pillar of a lower Gini–Struck coefficient.

Concentration – diversification of revenues in the local budgets of Romania, after the accession to the EU

Table no. 8

	AmountA	2007	AmountB	2008	AmountC	2009	AmountD	2010	AmountE	2011
Revenues	mil. lei	$(gi)^2$	mil. lei	$(gi)^2$	mil. lei	$(gi)^2$	mil.lei	$(gi)^2$	mil. lei	$(gi)^2$
V1.	29.5	0.0000	19.5	0.0000	21.5	0.0000	24.3	0.0000	19.9	0.0000
V2.	11,598	0.1360	1,4328.5	0.1376	13,881.3	0.1227	14,425.7	0.1094	14,468.9	0.1068
V3.	2,944.5	0.0088	3,162.5	0.0067	3,179.7	0.0064	3,797.1	0.0076	3,976.9	0.0081
V4.	14,552.5	0.2142	18,644.8	0.2329	15,813.7	0.1592	14,982.8	0.1180	13,175.4	0.0886
V5.	0	0.0000	0	0.0000	0	0.0000	0	0.0000	0	0.0000
V6.	1,018.3	0.0010	11,82.5	0.0009	1,029.1	0.0007	1,293.6	0.0009	1,382.2	0.0010
V7.	1,303.5	0.0017	12,93.8	0.0011	1,164.1	0.0009	1,547.5	0.0013	2,169.1	0.0024
V8.	0	0.0000	0	0.0000	565.5	0.0002	2,245.1	0.0027	3,463.6	0.0061
V9.	0	0.0000	0	0.0000	3,972.9	0.0101	5,294.7	0.0147	5,619.7	0.0161
TOTAL	31,446.3	x	38,631.6	x	39,627.8	x	43,610.8	x	44,275.7	x
$E_{Onicescu}$	x	0.3617	x	0.3793	x	0.3002	x	0.2545	x	0.2290
G-S*		0.5310		0.5492		0.4612		0.4017		0.3642
G-S**		0.4838		0.5051		0.4474		0.3848		0.3448

Data source: Collection "Monthly Statistical Bulletin" (2007-2012), NSI, Bucharest. *Gini – Struck calculated for n = 9 **Gini – Struck recalculated without the groups of null values.

The tendency of revenues in the local budgets, after a slight annual inertia, becomes opposite to the tendency of the revenues in the state budget, the concentration phenomena in the state budget being opposed to the diversification tendencies in the local budgets.

Concentration – diversification of expenses in the local budgets of Romania, after the accession to the EU

Table no. 9

Expenses	Amount A	2007	Amount B	2008	Amount C	2009	Amount D	2010	Amount E	2011
	mil. lei	$(gi)^2$	mil. lei	$(gi)^2$	mil. lei	$(gi)^2$	mil. lei	$(gi)^2$	mil. lei	$(gi)^2$
C1.	11,116.4	0.1095	15,310.5	0.1348	15,188.8	0.1679	13,584.3	0.1107	11,241.3	0.0666
C2.	7,609.7	0.0513	9,431.5	0.0511	7,363.6	0.0395	8,506.4	0.0434	9,488.6	0.0474
C3.	296.1	0.0001	635.6	0.0002	862.9	0.0005	746.2	0.0003	773	0.0003
C4.	1,872.5	0.0031	2,084.8	0.0025	2,052.5	0.0031	2,060.6	0.0025	2,105.5	0.0023
C5.	2,924.6	0.0076	3,547.3	0.0072	3,408	0.0085	4,160.6	0.0104	3,708.8	0.0072
C6.	0	0.0000	0	0.0000	214.9	0.0000	1,743.1	0.0018	4,360.2	0.0100

C7.	2,660.3	0.0063	3,227.1	0.0060	2,596.9	0.0049	3424	0.0070	2,872.3	0.0043
C8.	7,113.8	0.0448	7,465.5	0.0320	5,384.1	0.0211	6,598.4	0.0261	9,022.7	0.0429
TOTAL	33,593.4	x	41,702.3	x	37,071.7	x	40,823.6	x	43,572.4	x
$E_{Onicescu}$	x	0.22269	x	0.23394	x	0.24541	x	0.20240	x	0.18112
G-S*		0.3341		0.3528		0.3710		0.2974		0.2533
G-S**		0.3052		0.3260		0.3710		0.2974		0.2533

Data source: Collection "Monthly Statistical Bulletin" (2007-2012), NSI, Bucharest. *Gini – Struck calculated for n = 8 **Gini – Struck recalculated without the groups of null values.

The concentration tendencies of the expenses of the local budgets follow a maximum progressive level in the same peak year of recession in Romania, but this index type also profiles infra – recession, a conflicting tendency reported to the national budget.

Throughout the recession period, the analysis illustrates certain interesting tendencies which can be visible in a simpler manner from tables 10 and 11.

Characteristic coefficients of the revenues of state budget and of the local budgets

Table no.10

Revenues - National budget E and GS	**2007**	**2008**	**2009**	**2010**	**2011**
(E)$E_{Onicescu}$	0.26324	0.28008	0.23968	0.25336	0.27947
GS (Gini – Struck)	0.4137	0.4360	0.3803	0.400	0.4352
Revenues - Local budgets E and GS	**2007**	**2008**	**2009**	**2010**	**2011**
(E)$E_{Onicescu}$	0.36172	0.37926	0.30018	0.25456	0.22902
GS (Gini – Struck)	0.5310	0.5492	0.4612	0.4017	0.3642

Practically, within the conditions of recession, a reverse elasticity is validated between the coefficients of the state budget and of the local budgets, Onicescu informational energy ($E_{Onicescu}$) or Gini – Struck : GS, although there is a gap of about 1 year or even 1-2 years, within the context of the cyclical economic evolution, both in the analysis of revenues, and of expenses.

Characteristic coefficients of the expenses of state budget and of the local budgets

Table no.11

Expenses -National budget E and GS	**2007**	**2008**	**2009**	**2010**	**2011**
(E)$E_{Onicescu}$	0.20608	0.21038	0.20180	0.21818	0.21189
GS (Gini – Struck)	0.3044	0.3124	0.2963	0.3263	0.3151
Expenses- Local budgets E and GS	**2007**	**2008**	**2009**	**2010**	**2011**
(E)$E_{Onicescu}$	0.22269	0.23394	0.24541	0.20240	0.18112
GS (Gini – Struck)	0.3341	0.3528	0.3710	0.2974	0.2533

The informational relevancy of Gini – Struck coefficient remains an opened subject, at hand for everyone who want to use it in the specific budgetary practice.

Gini-Struck concentration/diversification coefficient manifests a more accentuated concentration tendency also on a pillar of high revenues at the level of 2008 and 2009, a

veritable "specialization" into a single group of revenues or expenses. The local budgets develop excessive concentration thresholds and higher than the state budget.

Synthesis of concentration coefficients and statistical confrontation State budget – local budgets

Table no.12

Year	Revenues				Year	Expenses			
	$E_{Onicescu}$		GS (Gini – Struck)			$E_{Onicescu}$		GS (Gini – Struck)	
	BS*	BL**	BS*	BL**		BS*	BL**	BS*	BL**
	SER01	SER02	SER03	SER04		SER05	SER06	SER07	SER08
2007	0.26324	0.36172	0.4137	0.5310	2007	0.20608	0.22269	0.3044	0.3341
2008	0.28008	0.37926	0.4360	0.5492	2008	0.21038	0.23394	0.3124	0.3528
2009	0.23968	0.30018	0.3803	0.4612	2009	0.20180	0.24541	0.2963	0.3710
2010	0.25336	0.25456	0.400	0.4017	2010	0.21818	0.20240	0.3263	0.2974
2011	0.27947	0.22902	0.4352	0.3642	2011	0.21189	0.18112	0.3151	0.2533

Note *BS = state budget and **BL = local budget

An analysis of the correlation matrixes throughout the five years analyzed identifies post - accession a law of reverse elasticity state budget – local budgets, intense at the expenses chapter.

Correlation matrix of the concentration – diversification coefficients for the post – accession period of Romania to the EU

Table no. 13

	SER01	SER02	SER03	SER04	SER05	SER06	SER07	SER08
SER01	1.000000	0.139048	0.999811	0.089485	0.348910	-0.463103	0.363803	-0.463527
SER02	0.139048	1.000000	0.140731	0.998752	-0.440322	0.732644	-0.433700	0.749548
SER03	0.999811	0.140731	1.000000	0.091147	0.357148	-0.468694	0.372016	-0.468204
SER04	0.089485	0.998752	0.091147	1.000000	-0.460497	0.761051	-0.454589	0.778006
SER05	0.348910	-0.440322	0.357148	-0.460497	1.000000	**-0.688269**	0.999871	-0.662719
SER06	-0.463103	0.732644	-0.468694	0.761051	**-0.688269**	1.000000	-0.691136	0.998617
SER07	0.363803	-0.433700	0.372016	-0.454589	0.999871	-0.691136	1.000000	**-0.665657**
SER08	-0.463527	0.749548	-0.468204	0.778006	-0.662719	0.998617	**-0.665657**	1.000000

Software used: Eviews

The same analysis of the correlation matrix for the three years of major recession, between 2009 and 2011, identifies a reverse elasticity state budget – local budgets, equally intense at the revenues chapter and at the expenses chapter. The intensity of the reverse association or of indirect correlations is extremely high:

Correlation matrix of the concentration – diversification coefficients for the recession period of Romania, between 2009 and 2011

Table no.14

	SER01	SER02	SER03	SER04	SER05	SER06	SER07	SER08
SER01	1.000000	**-0.942775**	0.999858	-0.952746	0.460276	-0.931906	0.470971	-0.948558
SER02	**-0.942775**	1.000000	-0.948262	0.999510	-0.729947	0.999513	-0.738154	0.999842
SER03	0.999858	-0.948262	1.000000	**-0.957731**	0.475175	-0.937888	0.485774	-0.953760
SER04	-0.952746	0.999510	**-0.957731**	1.000000	-0.708204	0.998046	-0.716684	0.999909

SER05	0.460276	-0.729947	0.475175	-0.708204	1.000000	**-0.750929**	0.999927	-0.717672
SER06	-0.931906	0.999513	-0.937888	0.998046	**-0.750929**	1.000000	-0.758855	0.998799
SER07	0.470971	-0.738154	0.485774	-0.716684	0.999927	-0.758855	1.000000	**-0.726035**
SER08	-0.948558	0.999842	-0.953760	0.999909	-0.717672	0.998799	**-0.726035**	1.000000

Software used: Eviews

Four models can be identified, which are presented below through the software Eviews, which econometrically describe the diversity of standardization of a new original law quantified in the article, as a inversely proportional evolution of the state budget and of the local budgets (at both chapters, both revenues and expenses).

Econometric models based on revenues

Table no.15a

Dependent Variable: SER01 Method: Least Squares Sample: 2009 2011

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.395628	0.049159	8.047883	0.0787
SER02	**-0.528700**	0.186984	-2.827513	0.2164

R-squared	0.888825	Mean dependent var	0.257503
Adjusted R-squared	0.777650	S.D. dependent var	0.020216
S.E. of regression	0.009533	Akaike info criterion	-6.233467
Sum squared resid	9.09E-05	Schwarz criterion	-6.834392
Log likelihood	11.35020	F-statistic	7.994827
Durbin-Watson stat	2.948288	Prob(F-statistic)	0.216412

Table no.15b

Dependent Variable: SER03 Method: Least Squares Sample: 2009 2011

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.627910	0.067222	9.340899	0.0679
SER04	**-0.544561**	0.163565	-3.329330	0.1858

R-squared	0.917249	Mean dependent var	0.405167
Adjusted R-squared	0.834498	S.D. dependent var	0.027812
S.E. of regression	0.011315	Akaike info criterion	-5.890728
Sum squared resid	0.000128	Schwarz criterion	-6.491653
Log likelihood	10.83609	F-statistic	11.08444
Durbin-Watson stat	2.966285	Prob(F-statistic)	0.185758

Software used: Eviews

These models are validated with the software package Eviews and they underline the standardization with a negative elasticity coefficient of the relationship between the two types of state and local budgets (according to table 15a and 15b), where ser01 and ser02 are the data series throughout the recession of informational energy $E_{Onicescu}$ of the revenues from the state budget and local budgets, and ser03 and ser04 are the data series throughout the recession of the G-S coefficients (Gini – Struck) of the revenues from the state budget and local budgets.

Econometric models based on expenses

Table no. 16 a

Dependent Variable: SER05 Method: Least Squares Sample: 2009 2011				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.250342	0.035213	7.109461	0.0890
SER06	**-0.189459**	0.166614	-1.137112	0.4592
R-squared	0.563895	Mean dependent var		0.210623
Adjusted R-squared	0.127790	S.D. dependent var		0.008263
S.E. of regression	0.007717	Akaike info criterion		-6.656028
Sum squared resid	5.96E-05	Schwarz criterion		-7.256954
Log likelihood	11.98404	F-statistic		1.293025
Durbin-Watson stat	2.926631	Prob(F-statistic)		0.459212

Table no. 16 b

Dependent Variable: SER07 Method: Least Squares Sample: 2009 2011				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.369435	0.054530	6.774854	0.0933
SER08	**-0.185097**	0.175313	-1.055810	0.4827
R-squared	0.527128	Mean dependent var		0.312567
Adjusted R-squared	0.054255	S.D. dependent var		0.015160
S.E. of regression	0.014743	Akaike info criterion		-5.361427
Sum squared resid	0.000217	Schwarz criterion		-5.962353
Log likelihood	10.04214	F-statistic		1.114735
Durbin-Watson stat	2.958980	Prob(F-statistic)		0.482722

Software used: Eviews

Unfortunately, this is not applicable for the econometric models built with $E_{Onicescu}$ and G-S for the expenses (table 16a and 16b), which, although they promised in the series of years a more intense correlation, they prove to be simple "spurious correlations" or apparent correlations which are not validated with the F test.

V. CONSTRAINTS, BALANCE AND IRREVERSIBILITY – PREMISES OF A PHYSICAL MODELING OF THE TAX PHENOMENON

For a physical generalization of the tax phenomenon analyzed, we can assume, with an obvious econophysical sense, the fact that the budgets analyzed form a non-insulated system, which can be treated as a part of a composed system which is or can be theoretically and practically insulated (Figure no 1).

A non-insulated system treated as parts of a complex insulated system

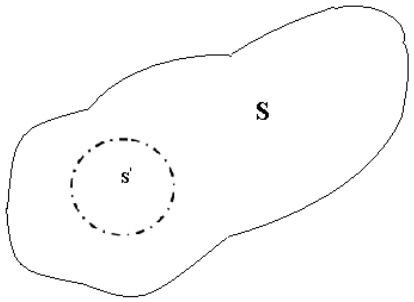

Figure 1

As we know from the statistical physics, Reif (1964), Reif (1965) and Reif (1999) a system satisfies certain conditions which can be described at the macroscopic scale through the specification of a macroscopic parameter (γ) of the system (or the values of some of these parameters). These states act as constraints, which narrow down the conditions in which the system can be to the ones that match with the respective conditions, namely what we usually known as "accessible states".

Thus thee Ω number of these accessible states depends on the constraints to which the system is subject, subsequently $\Omega = \Omega(\gamma)$ is a certain function of the macroscopic parameter, respectively of the system. The statistical description implies probabilistic considerations over an assembly of such systems, all being subject to the same constraints. If the system is balanced, this will be found with equal probability in each of its Ω accessible states and vice-versa. If the system does not find itself with equal probability in each of the Ω accessible states, then the statistical situation depends on time, in other words, the system will tend to change its state in time up to the point when it will reach, in the end, a balance situation where it will find itself with equal probability in each of its Ω accessible states. These statements represent the content of the fundamental postulates of the statistic physics.

Starting from the hypothesis that a system is insulated and initially situated in balance, where Ωi states are accessible to it, then the system finds itself with equal probability in each of these states. It is assumed that certain constraints have been eliminated, because the system undergoes less restrictions than before, the number of its accessible states will normally be higher. Marking with Ωf this final number of states in the presence of the new constraints, we can note that $\Omega f \geq \Omega i$. Immediately after the elimination of the initial constraints, the probability for the system to find itself in any of its states will be the same as before. Due to the fact that the initial system had equal probabilities to be in any of its Ωi accessible states, the system analyzed will still be,

immediately after the elimination of the initial constraints, with equal probability in each of these Ωi states.

Two distinct situations are registered:

- the particular case where $\Omega f = \Omega i \rightarrow$ the balance state of the system remains undisturbed through the elimination of the constraints;
- the usual case when $\Omega f > \Omega i \rightarrow$ immediately after the elimination of the initial constraints the system has equal possibility to find itself in each of the Ωi initial states, but it has the "0" possibility to find itself in any of the additional states ($\Omega f - \Omega i$) which also became accessible.

This distribution of non-uniform probability does not correspond to a balance situation, subsequently the system tends to modify throughout time, up to the point where, in the end, it will reach a balance situation where it will find itself with equal probability in each of the Ωf states, which now become accessible.

We can consider a composed system A*, where A and A' which can interact with other (Figure no. 2). According to the situation from physics where we can assume, for instance, that A is a copper block and A' a container filled with water, in economy, A can be reinterpreted as system of the state budget and A' as system of the local budgets.

A composed physical system A* (A and A' interact with each other)

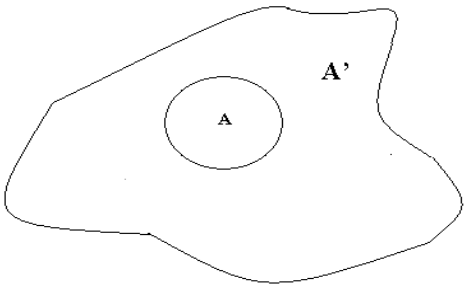

Figure 2

In this case, the following notations are defined: EA = total energy of the system A (copper block or state budget) and EA' = total energy of the system A' (container filled with water or local budgets). The total energy of the composed system A* = A + A' or written under other form E* = EA + EA' = constant. The initial energies $E_A^{(i)}$ and $E_{A'}^{(i)}$ are different usually. It results that the energies corresponding to each of the two systems which interact with each other are also different:

$\frac{E_A^{(i)}}{A} = \bar{\varepsilon}_i$ and $\frac{E_{A'}^{(i)}}{A'} = \bar{\varepsilon}_i'$ respectively $\bar{\varepsilon}_i \neq \bar{\varepsilon}_i'$.

In this case the initial distribution of energy in the composed system A* is not very chaotic and it will not last throughout time. The systems A and A' will shift energy up to the point where they will reach a balance state corresponding to the most chaotic distribution of the energy, the average energies on the system unit thus becoming equal (law of equidistribution of energy in the chaotic system)

$\bar{\varepsilon}_f = \bar{\varepsilon}_f'$ respectively $\frac{E_A^{(f)}}{A} = \frac{E_{A'}^{(f)}}{A'}$

In the interaction process between the A and A' systems, which leads to the final balance state, the system with lower average initial energy gains energy, while the system with higher initial average energy loses energy. The v^2 or p^2 dependant energy from physics (the energy of the particle can be expressed both with velocity *v*, through $E = \frac{1}{2}mv^2$, and with the impulse p, respectively $E = \frac{p^2}{2m}$) or by c^2 (according to the generalization in Einstein spirit which became the famous $E = mc^2$) is identified in the dynamics of economic or tax concentration and diversification, which can be determined through $E_{Onicescu}$ or through the Gini - Struck coefficient.

VI. CONCLUSIONS

The processed data of this paper are preliminary data, from operational sources like *Monthly Statistical Bulletin*, *State and local budget published information*, etc. This aspect required to identify the level of relative errors, for the published data in statistical yearbooks for series 2007, 2008, 2009. The low level of errors between final and preliminary data for these three years (an average level of only 1-5%) allowed the formulation of the next conclusions.

A European country has a diversified budget both for revenues and for expenses, with a value of Onicescu informational energy or the system cohesion or the of Gini – Struck coefficient aiming to zero. In Romania, the budgetary revenues, both state and local, are characterized through a strong concentration, especially at the level of the current group of revenues. Unlike the revenues, the budgetary expenses are characterized through a diversification tendency in the first part of the analyzed period, expressed especially at the level of revenues group defined by indirect taxes, with highlight on the value added tax and a negative elasticity tendency between the national layer defined through the state budget and the local layer defined by the local budgets.

This is the main original contribution of this article, the formulation of a concentration law compensated by diversification in the successive budgetary layers, respectively state and local. An inversely proportional relation, confirmed by the final econometric models, dominates the taxation and the state and local budget execution. In

Romania, the main group of revenues continues to be represented throughout severe recession by the group of indirect revenues, despite the fact that the revenues from the local economy tend to continuously diversify. The main group of expenses within the state budget is the one of transfers between the units of the public administration and other transfers, while the local budgets are structurally dominated by the expenses with the personnel and expenses with goods and services.

Definitely, there are many pertinent explanations, similar to certain physical and thermodynamic processes in closed adiabatic sites, connected to the fact that the revenues of the population are relatively stable, although both the state budget and the local budgets act upon them, but the compression of revenues in recession revealed a inversely proportion and negative elasticity coefficients between the national budgetary layer and the local ones according to the concentration analyses conducted with specialized statistical coefficients. The incertitude can be substituted with scenarios based on probabilities deducted through the analysis of the concentration – diversification processes, in economic societies which evolve in an oscillating and conjectural manner, specific to the theory of market economy, but the normality condition will always be the one represented by the diversification of both revenues and expenses, regardless of the apparent incertitude, probabilistically quantified or of the determinist certitude, but unrealistic regarding the achievement of certain revenues of the need for certain social expenses. Both the econometric and the physical modelling reveals in a specific and generalized manner an increased accuracy of the method based on Onicescu informational energy or of the system cohesion or of the Gini – Struck coefficient, as well as interesting laws of concentration – diversification in composed system or simultaneously approachable on the national and territorial level, which make reference to the law of equidistribution of energy in the chaotic system.

A well founded hope of the authors is that the tax treaties and other tax regulations would include this econometrically modelled statistical law within the context of the economic realities which are worthy to be retained in perspective.

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