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Statistical Approaches Concerning the Influences of the Exports and Imports over the Dynamics of the Informational Energy

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ABSTRACT

The statistical analysis concerning the foreign trade from Romania cans to be reflected through by means of the informational energy who is adjusted and influenced by the weights of exports, respectively imports. In any country, the export represents an important source for the growth of G.D.P. and for this reason we must to offer a particular attention and to analyse him dynamics, in order to touch this target which contributes at the economic development.

1. Introduction

In this research, I present a personal contribution which reflects the architecture of the influences represented by the weights of the export, respectively import, over of the dynamics concerning the informational energy in 2012 face to 2007, in Romania, with the help of „Factors Path Method". The sections 2 reflects the methodology for the achieve the architecture concerning the models of trends for the exports, respectively imports, in Romania, in the period 2007-2012. The section 3 expresses the calculation of the influences regarding the weights of the exports, respectively the weights of the imports, over of the dynamics concerning the informational energy who is adjusted, in Romania, in 2007-2012. The state of the art in this domain is represented by the essential research belongs to Ioan Florea, who elaborated „Factors Path Method"[3] and the researche belongs to Onicescu Octav, who generated the notion of informational energy [10], [11] .

2. The modeling of the trends concerning the weights of the exports, respectivelly the weights of the imports, in Romania, between 2007-2012

In the table number 1, we observe the evolution of the foreign trade in Romania, in the period 2007 – 2012, and by means of the weights for the dates of the export, respectively import, we can to calculate the values of the informational energy who are adjusted and who serve at the measurement of them degree for concentration.

Table 1. The evolution of the foreign trade in Romania in the period 2007-2012

Years	The values of the high tides concernig the foregin trade in Romania		
	Export F.O.B. (millions EUR)	Import C.I.F. (millions EUR)	Total (millions EUR)
2007	29.549	51.322	80.871
2008	33.725	57.240	90.965
2009	29.084	38.953	68.037
2010	37.368	46.902	84.270
2011	45.041	54.824	99.865
2012	47.068	54.495	101.563

Source: dates debated from Romania in dates 2012, page 62, I.N.S.S.E., Bucharest.

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For beginning, we use the architecture of the informational energy in this shape [10]:

$$E_{iaj} = 2f_1^2 + 2f_2^2 - 1$$

where: E_{iaj} = informational energy who is adjusted;
f_1 = the weights for export;
f_2 = the weight for import.

If we note $f_1 = x$ and $f_2 = y$, then the indicator informational energy who is adjusted has the next formula:

$$E_{iaj} = 2x^2 + 2y^2 - 1 = \varphi(x, y)$$

Consequently, x(0) = 0,3654; y(0) = 0,6346; *x(1)* = 0,4634; *y(1)* = 0,5366.
where: „1" is the reported year 2012 and „0" represents the year of base 2007.

With the help on the dates from the table no. 1, we can calculated the values of the weights for export, respectively import, in the period 2007-2012, as well as the values of the informational energy who is adjusted, in the same period of time, according to the next table:

Table 2. The weights of the export, respectivelly import in the foreign trade of Romania, as well as the development of the informational energy who is adjusted, in the period 2007 – 2012

Years	**The weights of the exports and imports**				f_1^2	f_2^2	**The informational energy** $E_i = \sum_{i=1}^{2} f_i^2$	**The informational energy who is adjusted**	
	Export (*f1*)		**Import (*f2*)**						
		(%)		**(%)**					**(%)²**
2007	0,3654	36,54	0,6346	63,46	0,13351716	0,35129329	0,53623432	0,07246864	724,69
2008	0,3707	37,02	0,6293	62,93	0,13741849	0,40271716	0,53343698	0,06687396	668,74
2009	0,4275	42,75	0,5725	57,25	0,18275625	0,39601849	0,51051250	0,02102500	210,25
2010	0,4434	44,34	0,5566	55,66	0,19660356	0,32775625	0,50640712	0,01281424	128,14
2011	0,4510	45,10	0,5490	54,90	0,20340100	0,30980356	0,50480200	0,00960400	96,04
2012	0,4634	46,34	0,5366	53,66	0,21473956	0,30140100	0,50267912	0,00535824	53,58

In the case of the **geometrycal decomposition** for the dynamics of the indicator E_{iaj} through „Factors Path Method", we obtain the next factoryal indexes [3]:

$$I_{1/0}^{\varphi(x/y)} = e^{\int_{(P_0P_1)} \frac{\varphi_x^{'}(x,y)}{\varphi(x,y)} dx} \quad ; \quad I_{1/0}^{\varphi(y/x)} = e^{\int_{(P_0P_1)} \frac{\varphi_y^{'}(x,y)}{\varphi(x,y)} dy}$$

Yet,

$$\varphi_x^{'}(x, y) = 4x \quad \text{and} \quad \varphi_y^{'}(x, y) = 4y$$

So:

$$I_{1/0}^{\varphi(x/y)} = e^{\int_{(P_0P_1)} \frac{4x}{2x^2+2y^2-1} dx} \quad ; \quad I_{1/0}^{\varphi(y/x)} = e^{\int_{(P_0P_1)} \frac{4y}{2x^2+2y^2-1} dy}$$

For to calculate the factoryal indexes we must to establish the type of function reflected by the road from each factor, *X*, respectively *Y*, between P_0 and P_1. In this sense, if we apply the method of the coefficients for to study the variation, the real method of selection for the best model of tendency and we consider the year from the middle of the series for each factor, as origin of calculation, while through the achievement of the substitution $\sum_{i=-m}^{m} t_i = 0$, we obtain the next parametres:

IN THE CASE OF THE FACTOR *X*:

- if we formulate the null hypothesis H_0^*: who mentions the assumption of the existence for the model of tendency of the factor *X* right the function $x_{t_i} = a + b \cdot t_i$, then the parametres *a* and *b* of the adjusted function of the premier degree, can to be calculated by means of the next system:

$$\begin{cases} n \cdot a = \sum_{i=-m}^{m} x_i \\ b \cdot \sum_{i=-m}^{m} t_i^2 = \sum_{i=-m}^{m} t_i \cdot x_i \end{cases}$$

Therefore, $a = \frac{\sum_{i=-m}^{m} x_i}{n}$ and $b = \frac{\sum_{i=-m}^{m} t_i \cdot x_i}{\sum_{i=-m}^{m} t_i^2}$

Table 3. The estimates of the values for the variation coefficients in the case of the adjusted function of the premier degree, in the hypothesis concerning the linear evolution of the weights for exports, in 2007-2012

YEARS	**The weights of the exports** $f_1 = x_i$	**LINEAR TREND**				
		t_i	t_i^2	$t_i x_i$	$x_{t_i} = a + bt_i$	$\lvert x_i - x_{t_i} \rvert$
2007	0,3654	-3	9	-1,0962	0,36982262	0,0044
2008	0,3707	-2	4	-0,7414	0,386626191	0,0159
2009	0,4275	-1	1	-0,4275	0,403429762	0,0241
2010	0,4434	+1	1	0,4434	0,437036904	0,0064
2011	0,4510	+2	4	0,9020	0,453840475	0,0028
2012	0,4634	+3	9	1,3902	0,470644046	0,0072
TOTAL	2,5214			0,4705	2,521399998	0,0608

If we calculate the statistical dates for to adjust the liniar function, we obtain for the parametres *a* and *b* the values:

$$a = \frac{2,5214}{6} = 0,420233333 \quad \text{and} \quad b = \frac{0,4705}{28} = 0,016803571$$

Hence, the coeficient of variation for the adjusted function of the premier degree is:

$$v_I = \left[\frac{\sum_{i=-m}^{m} \lvert x_i - x_{t_i}^I \rvert}{n} : \frac{\sum_{i=-m}^{m} x_i}{n} \right] \cdot 100 = \frac{\sum_{i=-m}^{m} \lvert x_i - x_{t_i}^I \rvert}{\sum_{i=-m}^{m} x_i} \cdot 100 = \frac{0,0608}{2,5214} \cdot 100 = 2,41\%$$

- in the situation of the alternative hypothesis H_1^*: who specifies the assumption of the existence for the the model of tendency of the factor *X* right the parabolical function $x_{t_i} = a + b \cdot t_i + ct_i^2$, the parametres *a*, *b* şi *c* of the adjusted function of the second degree, can to be calculated by means of the system:

$$\begin{cases} n \cdot a + c \sum_{i=-m}^{m} t_i^2 = \sum_{i=-m}^{m} x_i \\ b \cdot \sum_{i=-m}^{m} t_i^2 = \sum_{i=-m}^{m} t_i \cdot x_i \\ a \cdot \sum_{i=-m}^{m} t_i^2 + c \sum_{i=-m}^{m} t_i^4 = \sum_{i=-m}^{m} t_i^2 \cdot x_i \end{cases}$$

Consequently,

$$a = \frac{\sum_{i=-m}^{m} t_i^4 \cdot \sum_{i=-m}^{m} x_i - \sum_{i=-m}^{m} t_i^2 \cdot \sum_{i=-m}^{m} t_i^2 \cdot x_i}{n \cdot \sum_{i=-m}^{m} t_i^4 - (\sum_{i=-m}^{m} t_i^2)^2};$$

$$b = \frac{\sum_{i=-m}^{m} t_i \cdot x_i}{\sum_{i=-m}^{m} t_i^2}; \qquad c = \frac{n \cdot \sum_{i=-m}^{m} t_i^2 \cdot x_i - \sum_{i=-m}^{m} t_i^2 \cdot \sum_{i=-m}^{m} x_i}{n \cdot \sum_{i=-m}^{m} t_i^4 - (\sum_{i=-m}^{m} t_i^2)^2}$$

Table 4. The estimates of the values for the variation coefficients in the case of the adjusted function of the second degree, in the hypothesis concerning the parabolic evolution of the weights for exports, in 2007-2012

YEARS	The weights of the exports $f_1 = x_i$	PARABOLIC TREND				
		t_i^2	t_i^4	$t_i^2 \cdot x_i$	$x_{t_i} = a + bt_i + ct_i^2$	$\lvert x_i - x_{t_i} \rvert$
2007	0,3654	9	81	3,2886	0,359899	0,0055
2008	0,3707	4	16	1,4828	0,388153	0,0175
2009	0,4275	1	1	0,4275	0,411827	0,0157
2010	0,4434	1	1	0,4434	0,445435	0,0020
2011	0,4510	4	16	1,8040	0,455369	0,0044
2012	0,4634	9	81	4,1706	0,460723	0,0027
TOTAL	2,5214		196	11,6169	2,521406	0,0478

In this way, if we calculate the statistical dates for to adjust the second function, we obtain for the parametres *a*, *b* and *c* the next values:

$$a = \frac{196 \cdot 2{,}5214 - 28 \cdot 11{,}6169}{6 \cdot 196 - (28)^2} = 0{,}430921; \quad b = \frac{0{,}4705}{28} = 0{,}016804;$$

$$c = \frac{6 \cdot 11{,}6169 - 28 \cdot 2{,}5214}{6 \cdot 196 - (28)^2} = -0{,}002290$$

So, the coeficient of variation for the adjusted function of the second degree has the value:

$$v_{II} = \left[\frac{\sum_{i=-m}^{m} \lvert x_i - x_{t_i}^{II} \rvert}{n} : \frac{\sum_{i=-m}^{m} x_i}{n} \right] \cdot 100 = \frac{\sum_{i=-m}^{m} \lvert x_i - x_{t_i}^{II} \rvert}{\sum_{i=-m}^{m} x_i} \cdot 100 = \frac{0{,}0478}{2{,}5214} \cdot 100 = 1{,}90\%$$

- in the case of the alternative hypothesis H_2^**:* who describes the supposition the assumption of the existence for the the model of tendency of the factor *X* right the exponential function $x_{t_i} = ab^{t_i}$, then the parametres *a* and *b* of the adjusted exponential function, can to be calculated by means of the next system:

$$\begin{cases} n \cdot \lg a = \sum_{i=-m}^{m} \lg x_i \\ \lg b \cdot \sum_{i=-m}^{m} t_i^2 = \sum_{i=-m}^{m} t_i \cdot \lg x_i \end{cases}$$

Thus,

$$\lg a = \frac{\sum_{i=-m}^{m} \lg x_i}{n}$$

and

$$\lg b = \frac{\sum_{i=-m}^{m} t_i \cdot \lg x_i}{\sum_{i=-m}^{m} t_i^2}$$

Table no. 5 The estimates of the values for the variation coefficients in the case of the adjusted exponential function, in the hypothesis concerning the exponential evolution of the weights for exports, in 2007-2012

YEARS	The weights of the exports $f_1 = x_i$	EXPONENTIAL TREND					
		$\lg x_i$	t_i	$t_i \lg x_i$	$\lg x_{t_i} = \lg a + t_i \cdot \lg b$	$x_{t_i} = ab^{t_i}$	$\lvert x_i - x_{t_i} \rvert$
2007	0,3654	-0,437231457	-3	1,311694371	-0,431504668	0,3703	0,0049
2008	0,3707	-0,430977414	-2	0,861954827	-0,413800028	0,3857	0,0150
2009	0,4275	-0,369063880	-1	0,36906388	-0,396095388	0,4017	0,0158
2010	0,4434	-0,353204311	+1	-0,353204311	-0,360686108	0,4358	0,0026
2011	0,4510	-0,345823458	+2	-0,691646916	-0,342981468	0,4540	0,0030
2012	0,4634	-0,334043970	+3	-1,002131912	-0,325276828	0,4729	0,0025
TOTAL	2,5214	-2,27034449		0,495729939		2,5204	0,0438

Consequently, if we calculate the statistical dates for to adjust the exponential function, we obtain for the parametres *a* and *b* the values:

$$\lg a = \frac{-2{,}27034449}{6} = -0{,}378390748$$

$$\lg b = \frac{0{,}495729939}{28} = 0{,}01770464$$

Accordingly, the coeficient of variation for the adjusted exponential function has the next value:

$$v_{\exp} = \left[\frac{\sum_{i=-m}^{m} \left| x_i - x_{t_i}^{\exp} \right|}{n} : \frac{\sum_{i=-m}^{m} x_i}{n} \right] \cdot 100 = \frac{\sum_{i=-m}^{m} \left| x_i - x_{t_i}^{\exp} \right|}{\sum_{i=-m}^{m} x_i} \cdot 100 = \frac{0{,}0438}{2{,}5214} \cdot 100 = 1{,}74\%$$

We observe that: $v_{\exp} = 1{,}74\% = v_{II} = 1{,}90\% < v_I = 2{,}41\%$

Therefore, **the road follows by the factor *X*, the weights of export, from to P_0 at P_1, is an exponential model** of shape $x_{t_i} = ab^{t_i}$.

IN THE CASE OF THE FACTOR *Y*:

- in the situation of the nulle hypothesis H_0^{**} *:* who supposes that the model of tendency of the factor *Y* is the liniary function $y_{t_i} = a + b \cdot t_i$, then the parametres *a* and *b* of the adjusted function for premier degree, can to be calculated by the help of the next formulas:

$$a = \frac{\sum_{i=-m}^{m} y_i}{n}$$

and

$$b = \frac{\sum_{i=-m}^{m} t_i \cdot y_i}{\sum_{i=-m}^{m} t_i^2}$$

Table 6. The estimates of the values for the variation coefficients in the case of the adjusted function of the premier degree, in the hypothesis concerning the linear evolution of the weights for imports, in 2007-2012

YEARS	The weights of the imports $f_2 = y_i$	LINEAR TREND				
		t_i	t_i^2	$t_i y_i$	$y_{t_i} = a + bt_i$	$\left| y_i - y_{t_i} \right|$
2007	0,6346	-3	9	-1,9029	0,630080951	0,0045
2008	0,6293	-2	4	-1,2586	0,613309523	0,0160
2009	0,5725	-1	1	-0,5725	0,596538094	0,0240
2010	0,5566	+1	1	0,5566	0,562995238	0,0064
2011	0,5490	+2	4	1,0980	0,546223810	0,0028
2012	0,5366	+3	9	1,6098	0,529452382	0,0072
TOTAL	3,4786			-0,4696	3,478599998	0,0609

If we calculate the statistical dates for to adjust the liniar function, we obtain for the parametres *a* and *b* the values:

$$a = \frac{3{,}4786}{6} = 0{,}579766666 \quad \text{and} \quad b = \frac{-0{,}4696}{28} = -0{,}016771428$$

Hence, the coeficient of variation for the adjusted function of the premier degree is:

$$v_I = \left[\frac{\sum_{i=-m}^{m} \left| y_i - y_{t_i}^{I} \right|}{n} : \frac{\sum_{i=-m}^{m} y_i}{n} \right] \cdot 100 = \frac{\sum_{i=-m}^{m} \left| y_i - y_{t_i}^{I} \right|}{\sum_{i=-m}^{m} y_i} \cdot 100 = \frac{0{,}0609}{3{,}4786} \cdot 100 = 1{,}75\%$$

- in the situation of the alternative hypothesis H_1^{**} *:* who specifies the existence with the view at the model of tendency of the factor *Y* right the parabolical function $y_{t_i} = a + b \cdot t_i + ct_i^2$, the parametres *a*, *b* și *c* of the adjusted function of the second degree, can to be calculated by means of the formulas:

$$a=\frac{\sum_{i=-m}^{m}t_i^4\cdot\sum_{i=-m}^{m}y_i-\sum_{i=-m}^{m}t_i^2\cdot\sum_{i=-m}^{m}t_i^2\cdot y_i}{n\cdot\sum_{i=-m}^{m}t_i^4-(\sum_{i=-m}^{m}t_i^2)^2}\ ;\ b=\frac{\sum_{i=-m}^{m}t_i\cdot y_i}{\sum_{i=-m}^{m}t_i^2};\ c=\frac{n\cdot\sum_{i=-m}^{m}t_i^2\cdot y_i-\sum_{i=-m}^{m}t_i^2\cdot\sum_{i=-m}^{m}y_i}{n\cdot\sum_{i=-m}^{m}t_i^4-(\sum_{i=-m}^{m}t_i^2)^2}$$

Table no. 7 The estimates of the values for the variation coefficients in the case of the adjusted function of the second degree, in the hypothesis concerning the parabolic evolution of the weights for imports, in 2007-2012

YEARS	**The weights of the imports** ***f2= yi***	**PARABOLIC TREND**				
		t_i^2	t_i^4	$t_i^2\cdot y_i$	$y_{t_i}=a+bt_i+ct_i^2$	$\lvert y_i-y_{t_i}\rvert$
2007	0,3654	9	81	5,7114	0,640002	0,0054
2008	0,3707	4	16	2,5172	0,611781	0,0175
2009	0,4275	1	1	0,5725	0,588140	0,0156
2010	0,4434	1	1	0,5566	0,554598	0,0020
2011	0,4510	4	16	2,1960	0,544697	0,0043
2012	0,4634	9	81	4,8294	0,539376	0,0028
TOTAL	2,5214		196	16,3831	3,478594	0,0420

If we calculate the statistical dates for to adjust the second function, we obtain for the parametres *a, b* and *c* the next values:

$$a=\frac{196\cdot 3{,}4786-28\cdot 16{,}3831}{6\cdot 196-(28)^2}=0{,}569079\ ;\ b=\frac{-0{,}4696}{28}=-0{,}016771428\ ;$$

$$c=\frac{6\cdot 16{,}3831-28\cdot 3{,}4786}{6\cdot 196-(28)^2}=0{,}002290$$

Accordingly, the coeficient of variation for the adjusted function of the second degree has the value:

$$v_{II}=\left[\frac{\sum_{i=-m}^{m}\lvert y_i-y_{t_i}^{II}\rvert}{n}:\frac{\sum_{i=-m}^{m}y_i}{n}\right]\cdot 100=\frac{\sum_{i=-m}^{m}\lvert y_i-y_{t_i}^{II}\rvert}{\sum_{i=-m}^{m}y_i}\cdot 100=\frac{0{,}042}{3{,}4786}\cdot 100=1{,}21\%$$

- in the case of the alternative hypothesis H_2^{**}*:* who describes the supposition the assumption of the existence for the the model of tendency of the factor *Y* right the exponential function $y_{t_i}=ab^{t_i}$, then the parametres *a* and *b* of the adjusted exponential function, can to be calculated by means of the next formulas:

$$\lg a=\frac{\sum_{i=-m}^{m}\lg y_i}{n}\qquad \text{and}\qquad \lg b=\frac{\sum_{i=-m}^{m}t_i\cdot\lg y_i}{\sum_{i=-m}^{m}t_i^2}$$

Table no. 8 The estimates of the values for the variation coefficients in the case of the adjusted exponential function, in the hypothesis concerning the exponential evolution of the weights for imports, in 2007-2012

YEARS	**The weights of the imports** ***f2= yi***	**EXPONENTIAL TREND**					
		$\lg x_i$	t_i	$t_i\lg y_i$	$\lg y_{t_i}=\lg a+t_i\cdot\lg b$	$y_{t_i}=ab^{t_i}$	$\lvert y_i-y_{t_i}\rvert$
2007	0,6346	-0,197499932	-3	0,592499796	-0,200252925	0,6306	0,0043
2008	0,6293	-0,201142268	-2	0,402284536	-0,212729755	0,6127	0,0166
2009	0,5725	-0,242224509	-1	0,242224509	-0,225206585	0,5954	0,0029
2010	0,5566	-0,254456798	+1	-0,254456798	-0,250160245	0,5621	0,0035
2011	0,5490	-0,260427655	+2	-0,520855311	-0,262637075	0,5462	0,0018

YEARS	The weights of the imports $f_2 = y_i$	EXPONENTIAL TREND					
		$\lg x_i$	t_i	$t_i \lg y_i$	$\lg y_{t_i} = \lg a + t_i \cdot \lg b$	$y_{t_i} = ab^{t_i}$	$\lvert y_i - y_{t_i} \rvert$
2012	0,5366	-0,270349331	+3	-0,811047995	-0,275113905	0,5307	0,0019
TOTAL	3,4786	-1,426100493		-0,349351263		3,4777	0,0310

Also, if we calculate the statistical dates for to adjust the exponential function, we obtain the next values:

$$\lg a = \frac{-1{,}426100493}{6} = -0{,}237683415 \quad \text{and} \quad \lg b = \frac{-0{,}349351263}{28} = -0{,}01247683$$

So, in the case of the exponential function who is adjusted, the coeficient of variation is:

$$v_{\exp} = \left[\frac{\sum_{i=-m}^{m} \lvert y_i - y_{t_i}^{\exp} \rvert}{n} : \frac{\sum_{i=-m}^{m} y_i}{n} \right] \cdot 100 = \frac{\sum_{i=-m}^{m} \lvert y_i - y_{t_i}^{\exp} \rvert}{\sum_{i=-m}^{m} y_i} \cdot 100 = \frac{0{,}031}{3{,}4786} \cdot 100 = 0{,}89\%$$

We observe that: $v_{\exp} = 0{,}89\% = v_{II} = 1{,}21\% < v_I = 1{,}75\%$

In conclusion, **the road follows by the factor *Y*, the weights of import, from to P_0 at P_1, is an exponential model** of shape $y_{t_i} = ab^{t_i}$.

3. The calculation of the influences regarding the weights of the exports, respectively imports, over of the dynamics concerning the information energy, in Romania, in 2012 face to 2007.

Because the factor *X* varies after a exponential function $x_{t_i} = ab^{t_i}$, then in the situation of the **geometrycal decomposition** of the dynamics for the informational energy who is adjusted, in 2012 face to 2007, under the influences represented by the weights of the export, respectively import, in the foreign trade from Romania, we have the conditions:

- the influence in relative sizes, regarding the weight of the export over of the dynamics concerning the informational energy who is adjusted, in Romania, in the year 2012 face to the year 2007, is:

$$I_{1/0}^{\varphi(x/y)} = e^{\int_{(P_0P_1)} \frac{4x}{2x^2+2y^2-1} dx}$$

- the influence in relative sizes, concerning the weight of the import over of the dynamics concerning the adjusted informational energy, in Romania, in 2012 face to 2007, is:

$$I_{1/0}^{\varphi(y/x)} = e^{\int_{(P_0P_1)} \frac{4y}{2x^2+2y^2-1} dy}$$

Thus, in the hypothesis through which the factor *X* varies after an exponential function $x_{t_i} = ab^{t_i}$, then:

$$x(0) = a \quad \text{and} \quad x(1) = a \cdot b = x(0) \cdot b, \quad \text{namely} \quad b = i_{1/0}^{x}.$$

Hence,

$$x = x(0) \cdot (i_{1/0}^{x})^t$$

On the other share, *lnx=lna+tlnb* $\Rightarrow \frac{1}{x} \cdot dx = \ln b \cdot dt$

Accordingly, $dx = x(0) \cdot (i_{1/0}^{x})^t \cdot \ln i_{1/0}^{x} \cdot dt$.

In analogous mode, $y = y(0) \cdot (i_{1/0}^{y})^t$ and $dy = y(0) \cdot (i_{1/0}^{y})^t \cdot \ln i_{1/0}^{y} \cdot dt$

So, we calculate the next integral, if we hold account that *x + y = 1*:

$$\int_{(P_0P_1)} \frac{4x}{2x^2+2y^2-1} dx = 4 \int_{x(0)}^{x(1)} \frac{x}{2x^2+2(1-x)^2-1} dx = 4 \int_{x(0)}^{x(1)} \frac{x}{4x^2-4x+1} dx = 4 \int_{x(0)}^{x(1)} \frac{x}{(2x-1)^2} dx =$$

$$= 4 \int_0^1 \frac{x(0) \cdot (i_{1/0}^{x})^t \cdot x(0) \cdot (i_{1/0}^{x})^t \cdot \ln i_{1/0}^{x}}{[2x(0) \cdot (i_{1/0}^{x})^t -]^2} dt = 4x^2(0) \cdot \ln i_{1/0}^{x} \cdot \int_0^1 \frac{(i_{1/0}^{x})^{2t}}{[2x(0) \cdot (i_{1/0}^{x})^t - 1]^2} dt$$

We accomplish the substitution: $(i^x_{1/0})^t = z$ in the conditions in wich: $t = 0 \Rightarrow z = 1$

while if $t = 1 \Rightarrow z = i^x_{1/0} = \frac{x(1)}{x(0)} = \frac{0,4634}{0,3654} = 1,2682$

Also:

$$t \cdot \ln i^x_{1/0} = \ln z \Rightarrow \ln i^x_{1/0} \cdot dt = \frac{1}{z} \cdot dz \Rightarrow dt = \frac{dz}{z \cdot \ln i^x_{1/0}}$$

Then:

$$\int_{(P_0P_1)} \frac{4x}{2x^2 + 2y^2 - 1} dx = 4x^2(0) \cdot \ln i^x_{1/0} \int_1^{1,2682} \frac{z^2}{[2x(0) \cdot z - 1]^2 \cdot z \cdot \ln i^x_{1/0}} dz = 4x^2(0) \int_1^{1,2682} \frac{z}{[2x(0) \cdot z - 1]^2} dz =$$

$$= 4x^2(0) \int_1^{1,2682} \frac{z}{[4x^2(0) \cdot z^2 - 4x(0) \cdot z + 1]} dz = \frac{1}{2} \int_1^{1,2682} \frac{4x^2(0) \cdot 2z - 4x(0)}{[4x^2(0) \cdot z^2 - 4x(0) \cdot z + 1]} dz + \int_1^{1,2682} \frac{2x(0)}{[4x^2(0) \cdot z^2 - 4x(0) \cdot z + 1]} dz =$$

$$= \frac{1}{2} \ln[4x^2(0) \cdot z^2 - 4x(0) \cdot z + 1] \Big|_1^{1,2682} + 2x(0) \int_1^{1,2682} \frac{dz}{[2x(0) \cdot z - 1]^2} =$$

$$= \frac{1}{2} \left[\ln[4 \cdot (0,3654)^2 \cdot (1,2682)^2 - 4 \cdot (0,3654) \cdot (1,2682) + 1] - \ln[4 \cdot (0,3654)^2 \cdot 1 - 4 \cdot (0,3654) \cdot 1 + 1] \right] +$$

$$+ 2x(0) \int_1^{1,2682} \frac{dz}{4x^2(0) \cdot \left[z - \frac{1}{2x(0)} \right]^2} = \frac{1}{2} \ln \frac{0,005358158}{0,07246864} + \frac{1}{2x(0)} \int_1^{1,2682} \frac{dz}{\left[z - \frac{1}{2x(0)} \right]^2} = \frac{1}{2} \ln 0,073937609 - \frac{1}{2x(0)} \cdot \left[\frac{1}{z - \frac{1}{2x(0)}} \right] \Bigg|_1^{1,2682}$$

$$= -1,302266829 - \frac{1}{2 \cdot 0,3654} \left(\frac{1}{1,2682 - \frac{1}{2 \cdot 0,3654}} - \frac{1}{1 - \frac{1}{2 \cdot 0,3654}} \right) = -1,302266829 + 9,946596487 = 8,644329658$$

Therefore, $$I^{\varphi(x/y)}_{1/0} = e^{\int_{(P_0P_1)} \frac{4x}{2x^2 + 2y^2 - 1} dx} = e^{8,644329658} = 5677,859874$$

In analogous mode, we obtaine:

$$\int_{(P_0P_1)} \frac{4y}{2x^2 + 2y^2 - 1} dy = 4 \int_{y(0)}^{y(1)} \frac{y}{(2y - 1)^2} dy = 4y^2(0) \ln i^y_{1/0} \int_0^1 \frac{(i^y_{1/0})^{2t}}{[2y(0) \cdot (i^y_{1/0})^t - 1]^2} dt$$

If we accomplish the substitution: $(i^y_{1/0})^t = w$ and we take in attention the situations in wich, if:

$t = 0 \Rightarrow w = 1$ and if $t = 1 \Rightarrow w = i^y_{1/0} = \frac{y(1)}{y(0)} = \frac{0,5366}{0,6346} = 0,845572013$

On other side, $$t \cdot \ln i^y_{1/0} = \ln w \Rightarrow \ln i^y_{1/0} \cdot dt = \frac{1}{w} \cdot dw \Rightarrow dt = \frac{dw}{w \cdot \ln i^y_{1/0}}$$

Consequently,

$$\int_{(P_0P_1)} \frac{4y}{2x^2 + 2y^2 - 1} dy = 4y^2(0) \cdot \ln i^y_{1/0} \int_1^{0,845572013} \frac{w^2}{[2y(0) \cdot w - 1]^2 \cdot w \cdot \ln i^y_{1/0}} dw = 4y^2(0) \int_1^{0,845572013} \frac{w}{[2y(0) \cdot w - 1]^2} dw =$$

$$= 4y^2(0) \int_1^{0,845572013} \frac{w}{[4y^2(0) \cdot w^2 - 4y(0) \cdot w + 1]} dw = \frac{1}{2} \int_1^{0,845572013} \frac{4y^2(0) \cdot 2w - 4y(0)}{[4y^2(0) \cdot w^2 - 4y(0) \cdot w + 1]} dw + \int_1^{0,845572013} \frac{2y(0)}{[2y(0) \cdot w - 1]^2} dw =$$

0,845572013

$$=\frac{1}{2}\ln[4y^2(0)\cdot w^2-4y(0)\cdot w+1]\Big|_1^{0,845572013}+\frac{1}{2y(0)}\int_1^{0,845572013}\frac{dw}{\left[w-\frac{1}{2y(0)}\right]^2}=$$

$$=\frac{1}{2}\ln\frac{4\cdot(0,6346)^2\cdot(0,845572013)^2-4\cdot 0,6346\cdot 0,845572013+1}{4\cdot(0,6346)^2\cdot 1^2-4\cdot 0,6346+1}-\frac{1}{2y(0)}\cdot\left[\frac{1}{w-\frac{1}{2y(0)}}\right]\Bigg|_1^{0,845572013}$$

$$=\frac{1}{2}\ln\frac{0,00535824}{0,07246864}-\frac{1}{2\cdot 0,6346}\left(\frac{1}{0,845572013-\frac{1}{2\cdot 0,6346}}-\frac{1}{1-\frac{1}{2\cdot 0,6346}}\right)=-1,302259177-9,946681135=-11,24894031$$

Hence,

$$I_{1/0}^{\varphi(y/x)}=e^{\int_{(P_0P_1)}\frac{4y}{2x^2+2y^2-1}dy}=e^{-11,24894031}=0,000013021$$

In the case of the **arithmetical decomposition** concerning the dynamics of the indicator E_{iaj} through Factors Path Method, we calculated the values in absolute sizes of the separated influences of the factors X, respectively Y [3]:

$$\Delta_{1/0}^{\varphi(x/y)}=\int_{(P_0P_1)}\varphi_x^{'}dx=4\int_{(P_0P_1)}xdx \quad \text{and} \quad \Delta_{1/0}^{\varphi(y/x)}=\int_{(P_0P_1)}\varphi_y^{'}dx=4\int_{(P_0P_1)}ydy$$

Consequently,

$$\Delta_{1/0}^{\varphi(x/y)}=\int_{(P_0P_1)}\varphi_x^{'}dx=4\int_{(P_0P_1)}xdx=4\int_{x(0)}^{x(1)}x(0)(i_{1/0}^x)^t dx=4x(0)^2\ln i_{1/0}^x\int_0^1(i_{1/0}^x)^{2t}dt=4x(0)^2\ln i_{1/0}^x\int_0^1 e^{2t\ln i_{1/0}^x}dt=$$

$$=2x^2(0)\cdot e^{2t\ln i_{1/0}^x}\Big|_0^1=$$

$$=2x^2(0)\cdot(e^{2\ln i_{1/0}^x}-1)=2x^2(0)\cdot[(i_{1/0}^x)^2-1]=2[x^2(1)-x^2(0)]=2[(0,4634)^2-(0,3654)^2]=0,1624448$$

In analogous mode, we obtaine:

$$\Delta_{1/0}^{\varphi(y/x)}=2[y^2(1)-y^2(0)]=2[(0,5366)^2-(0,6346)^2]=-0,2295552$$

Hence, in the case in which the road of the factors X and Y follows an exponential trend, the influence in absolute sizes regarding the weights of the exports, respectively imports, over the dynamical of the informational energy, who is adjusted, in 2012 face to 2007, consisted in a growth with 0,162448, respectively a subtraction with – 0,2295552.

On the other side,

- the index of the dynamical concerning the level of the informational energy, who is adjusted, under the influence of both factors X and Y, respectively the weights of the exports and the weights of the imports, in the foreign trade from Romania, in 2012 face to 2007, is:

$$I_{1/0}^{\varphi(x\cup y)}=\frac{(E_{iaj})_{2012}}{(E_{iaj})_{2007}}=\frac{0,00535824}{0,07246864}=0,07393$$

- the absolute variation of the informational energy, who is adjusted, under the influence of both factors X and Y, with another words of the weights of the exports and the weights of the imports, in the foreign trade from Romania, in 2012 face to 2007, is:

$$\Delta_{1/0}^{\varphi(x\cup y)}=(E_{iaj})_{2012}-(E_{iaj})_{2007}=0,00535824-0,07246864=-0,0671104$$

We observe that, in the conditions when the separated roads of the factors represented by the weights of the exports and the weights of the imports, follow an exponential model of tendency, the outcome of the factorials indexes numbers is equal with the index number who reflects the total dynamics regarding the level of the informational energy, who is adjusted, under the influence of both factors X and Y:

$$I_{1/0}^{\varphi(x\cup y)}=I_{1/0}^{\varphi(x/y)}\cdot I_{1/0}^{\varphi(y/x)} \quad \text{or} \quad 0,07393=5677,85987\cdot 0,000013021$$

Also we can say, that in the hypothesis when the separated road of the factors reflects an exponential model of tendency, the sum of the separated influences, in the absolute sizes, manifested over the dynamics concerning the informational energy, who is adjusted, in 2012 face to 2007, is equals with the total absolute turning off from the value of the adjusted informational energy under the influence of both factors *X* and *Y*, in the respective period of time:

$$\Delta_{1/0}^{\varphi(x \cup y)} = \Delta_{1/0}^{\varphi(x/y)} + \Delta_{1/0}^{\varphi(y/x)} \quad \text{or} \quad -0{,}0671104 = 0{,}1624448 + (-0{,}2295552)$$

If we analysis the weights of the exports and the weights of the imports, in the period 2007-2012, in the foreign trade from Romania, we observe diminutions concerning the values of the adjusted informational energy, as it follows: from to 0,07246864 in 2007 at 0,06687396 in the year 2008, at 0,021025 in 2009, to 0,01281424 in 2010, while in continuation is subtracts at 0,009604 in 2011 and then at 0,00535824 in 2012.

In these situations appears an negative phenomenon, the diminutions concerning the values of the adjusted informational energy and automatical the development of the entropy, are reflected by the rises of the expenses for imports in Romania in the period 2007-2012.

Also, the maximum of the adjusted informational energy is obtained in the year 2007 through the value of 0,07246864, which it correspond to the development regarding the degree of concentration for the characteristic weight from the respectively year. This is an positive reality from the economic point of view, because we want the relative rise concerning the importance of the exports [8], [9].

3. Conclusions

The effect of the calculation concerning the adjusted informational energy, in this research, consists in the achievement of the statistics analyses, who is objective, of the significances reflected by the both weights of statistics dates: the weights of the exports and the weights of the imports, in the context of the development of the foreign trade from Romania in the period 2007-2012, and also, in the analysis in dynamics regarding the variation of the levels for the factors who influences the adjusted informational energy, as well as of the connection between these.

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