



**International Economy**

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**PROCESSES OF GLOBALIZATION  
AND TRANSNATIONALIZATION:  
THEORETICAL AND METHODOLOGICAL  
APPROACH TO COMPREHENSIVE  
EVALUATION**

**Abstract**

Modern tendencies of world economy development are researched. The complex methods of working-out of description models of modern indicators, identified by authors as index of world transnationalization, index of total globalization and index of financial globalization and also an algorithm of their calculation and graphical interpretation is created. The authors' methods of determination of developed indices of world transnationalization, total globalization, and financial globalization, which is on basis on comparative principles of theoretical generalization and improvement of key definitions and on generalization of conceptual approaches to prognosis of state of complex economic phenomenon are presented. Directions of improvement of appropriate methods of supporting of national safety on the basis of usage of formed by authors' indices which provides the possibility to evaluate state of economic safety comprehensively and to

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give scientific credence the most favorable and safe script of integration process for Ukraine are proposed.

### Key words:

Globalization, transnational transformations, transnationalization, total globalization, financial globalization, direct foreign investments, corporate (individual) transnationalization, world transnationalization.

JEL: O16, O52.

*(Continuation, the beginning in the previous issue)*

On the basis of the computations concerning the researched countries rating of world countries by their rates of globalization is being annually published (table 8).

Since the presented information characterizes rating position of the country against its globalization volume, we offer our own variant to determine the globalization index.

Grounding on the available and published after *FP* ratings of the countries, we will perform a number of methodical transformations in order to construct a new economic index. With this aim we will add the additional column to table 8 as an initial base to show the arithmetic sum of numbers (rating positions) in each line:

$$R_{ij} = \sum_{i=1}^{12}$$

Having taken the available number of rating criteria ( $i$ ) (columns 8–19 (table 8)) in a total number of 12 and taking into account the potential to expand the range of research throughout the world map ( $j = [1; n]$ ), we will determine, that the value of general rating position ( $R_{ij}$ ) will fluctuate within the limits from 12 to 2400, that is:

$$R_{ij} = \sum_{i=1}^{12} \in [12; 2400].$$

The highest rating will pertain to the country with the least  $R$  value.

To evaluate the behavior of globalization processes development we will construct the generalized table of ratings for the whole researched period from 2001 to 2006 (table 9).

Table 8

Ranging the world countries by globalization index in 2005–2006 [32]  
(sampled)

Place in 2006	Country	Change against 2005	Rating dimension				Criteria of rating dimension													Place in 2005
			Economic	Individual	Technological	Political	Eco- nomic in- tegration		Individual contacts			Techno- logical ties			Political partici- pation					
							Trade	FDI	Telephone	Trips	Money transfers	Number of users	Number of Internet-hosts	Number of servers	International organizations	UNO peacekeeping missions	International agreements	Governmental aid programmes		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
1	Singapore	0	1	3	12	29	1	1	1	4	49	10	12	13	33	10	42	47	1	
2	Switzerland	1	9	1	7	23	17	7	2	6	2	17	15	5	33	9	42	10	3	
3	USA	1	58	40	1	41	62	36	18	33	52	6	1	1	1	25	58	38	4	
4	Ireland	-2	4	2	14	7	4	5	3	3	9	26	20	8	11	1	31	12	2	
5	Denmark	2	8	8	5	6	20	6	6	16	16	12	3	7	11	13	6	8	7	
...	...																			
39	Ukraine	-1	17	38	46	46	12	38	44	28	19	47	42	48	48	40	31	30	38	
...	...																			
47	Russia	5	33	52	42	36	43	22	51	37	44	40	37	46	25	26	42	40	52	
...	...																			
62	Iran	0	57	62	48	61	46	62	55	49	60	46	57	57	58	58	58	61	62	

Having taken maximally admissible value of  $R_{ij} = 2400$  for 100 % (or for 1), we will calculate the respective **indexes of the countries globalization levels** ( $IF_{ij}$ ) dividing  $R_{ij}$  by constant value of 2400:

$$IF_{ij} = 100 - \left( \left( \frac{R_{ij}}{2400} \right) \times 100 \right),$$

where  $IF_{ij}$  – index of globalization level of the country;

$R_{ij}$  – value of general rating position of the country.

Table 9.

**Behavior of the countries' globalization level for 2001–2006**  
(on the basis of the authors' methods)

№	Countries	General rating position ( $R_{ij}=[12;2400]$ ) and value of globalization index $II_{ij}$											
		2001		2002		2003		2004		2005		2006	
		$R_{1j}$	$II_{1j}$	$R_{2j}$	$II_{2j}$	$R_{3j}$	$II_{3j}$	$R_{4j}$	$II_{4j}$	$R_{5j}$	$II_{5j}$	$R_{6j}$	$II_{6j}$
1	Singapore	1061,69	44,24	1277,8	53,24	1602,8	66,79	1405,4	58,56	557,63	23,23	811,11	33,80
2	Switzerland	1124,32	46,85	415,17	17,30	1029,8	42,91	2182,7	90,95	1153,8	48,08	1988,71	82,86
3	USA	802,77	33,45	571,29	23,80	1623,9	67,66	1150,3	47,93	1075,8	44,83	1492,82	62,20
4	Ireland	307,49	12,81	887,69	36,99	1589,9	66,25	1856,7	77,37	1474,7	61,45	1629,19	67,88
5	Denmark	697,38	29,06	479,65	19,99	1683,7	70,16	784,75	32,70	2154,5	89,77	434,54	18,11
6	Canada	1750,88	72,95	1417,2	59,05	1468,4	61,19	616,55	25,69	1797,8	74,91	1469,10	61,21
7	Holland	1186,31	49,43	1257,0	52,38	878,57	36,61	778,43	32,43	1257,9	52,42	1372,66	57,19
8	Australia	572,19	23,84	517,08	21,55	899,40	37,47	1445,1	60,21	1141,9	47,58	1050,10	43,75
9	Austria	792,55	33,02	1705,6	71,07	842,33	35,10	371,98	15,50	997,23	41,55	607,08	25,30
10	Sweden	462,04	19,25	395,16	16,46	1355,3	56,47	1991,5	82,98	603,66	25,15	2009,16	83,72
11	New Zealand	549,96	22,92	892,15	37,17	1916,6	79,86	1906,4	79,44	1850,7	77,12	1095,47	45,64
12	Great Britain	1519,11	63,30	873,20	36,38	451,02	18,79	396,54	16,52	1046,3	43,60	1683,93	70,16
13	Finland	449,36	18,72	770,51	32,10	1170,4	48,77	837,00	34,88	1554,2	64,76	762,96	31,79
14	Norway	478,32	19,93	1330,3	55,43	1172,5	48,85	1336,1	55,67	556,39	23,18	1621,29	67,55
15	Israel	1372,65	57,19	1832,1	76,34	1883,2	78,47	702,41	29,27	1959,1	81,63	1580,27	65,84
16	Czech Republic	617,42	25,73	407,03	16,96	663,81	27,66	449,13	18,71	1332,6	55,53	1215,92	50,66
17	Slovenia	955,47	39,81	1255,2	52,30	390,29	16,26	1197,7	49,90	1629,3	67,89	1669,96	69,58
18	Germany	1468,99	61,21	670,44	27,93	1988,2	82,84	1117,0	46,55	1685,8	70,24	1778,60	74,11
19	Malaysia	1791,49	74,65	1188,0	49,50	841,45	35,06	1094,3	45,60	1844,5	76,86	1257,14	52,38
20	Hungary	1056,92	44,04	1068,0	44,50	1013,9	42,25	1231,1	51,30	835,58	34,82	535,13	22,30
21	Panama	1787,21	74,47	1461,9	60,91	353,41	14,73	1805,4	75,23	2156,1	89,84	660,83	27,53
22	Croatia	1052,96	43,87	1338,0	55,75	1196,9	49,87	1693,5	70,56	1125,0	46,88	1395,06	58,13
23	France	478,02	19,92	1498,0	62,42	931,83	38,83	1371,1	57,13	1377,9	57,41	490,41	20,43
24	Portugal	1470,85	61,29	1214,2	50,60	871,12	36,30	986,86	41,12	689,01	28,71	720,31	30,01
25	Spain	575,18	23,97	1006,1	41,92	1997,9	83,25	463,02	19,29	2051,60	85,48	1082,89	45,12
26	Slovakia	1654,34	68,93	1378,3	57,43	1769,3	73,72	709,77	29,57	1076,2	44,84	651,97	27,17
27	Italy	1075,94	44,83	504,91	21,04	1245,6	51,90	571,58	23,82	1555,0	64,79	1824,59	76,02
28	Japan	1089,88	45,41	1539,7	64,16	1856,8	77,37	1289,1	53,71	960,63	40,03	1444,25	60,18
29	South Korea	1565,95	65,25	1358,2	56,60	1825,5	76,06	1582,2	65,93	1844,4	76,85	595,60	24,82

№	Countries	General rating position ( $R_{ij}=[12;2400]$ ) and value of globalization index $IG_{ij}$											
		2001		2002		2003		2004		2005		2006	
		$R_{1j}$	$IG_{1j}$	$R_{2j}$	$IG_{2j}$	$R_{3j}$	$IG_{3j}$	$R_{4j}$	$IG_{4j}$	$R_{5j}$	$IG_{5j}$	$R_{6j}$	$IG_{6j}$
30	Romania	1494,89	62,29	1596,7	66,53	1282,4	53,43	1720,6	71,70	1640,5	68,35	1278,28	53,26
31	Philippines	1137,17	47,38	1461,9	60,92	1925,3	80,22	1650,5	68,77	461,22	19,22	1569,00	65,38
32	Greece	918,03	38,25	1530,67	63,78	1722,45	71,77	587,14	24,46	1492,02	62,17	814,24	33,93
33	Poland	1249,80	52,08	455,78	18,99	689,03	28,71	522,62	21,78	1866,75	77,78	1234,16	51,42
34	Chile	1649,86	68,74	1058,59	44,11	626,94	26,12	1466,82	61,12	562,59	23,44	530,34	22,10
35	Taiwan	624,70	26,03	1788,45	74,52	1361,79	56,74	359,14	14,96	1768,59	73,69	855,81	35,66
36	Uganda	539,08	22,46	1002,10	41,75	1207,40	50,31	1700,92	70,87	2181,96	90,91	1796,66	74,86
37	Tunisia	1132,97	47,21	1882,78	78,45	1312,12	54,67	1762,93	73,46	1142,37	47,60	1832,94	76,37
38	Botswana	1686,72	70,28	460,93	19,21	1746,40	72,77	2092,66	87,19	1532,44	63,85	1141,49	47,56
39	Ukraine	1088,55	45,36	434,96	18,12	1633,03	68,04	1065,01	44,38	1021,56	42,56	454,88	18,95
40	Morocco	462,15	19,26	1179,88	49,16	1980,23	82,51	2101,91	87,58	864,42	36,02	1734,13	72,26
41	Senegal	1574,65	65,61	1033,60	43,07	1210,55	50,44	1256,59	52,36	493,70	20,57	2024,46	84,35
42	Mexico	1444,93	60,21	1262,32	52,60	905,22	37,72	2121,47	88,39	437,79	18,24	846,15	35,26
43	Argentina	999,51	41,65	1577,83	65,74	1890,15	78,76	945,20	39,38	863,23	35,97	1435,95	59,83
44	Saudi Arabia	521,00	21,71	1722,49	71,77	1001,14	41,71	2033,59	84,73	1803,66	75,15	1357,49	56,56
45	Thailand	573,60	23,90	1100,60	45,86	1755,38	73,14	1875,04	78,13	690,43	28,77	739,92	30,83
46	Sri Lanka	1172,01	48,83	512,88	21,37	674,36	28,10	575,96	24,00	1154,60	48,11	1164,92	48,54
47	Russia	1150,02	47,92	682,52	28,44	1695,51	70,65	1752,84	73,04	1405,29	58,55	1299,18	54,13
48	Nigeria	1149,06	47,88	463,88	19,33	1742,96	72,62	1125,38	46,89	1037,11	43,21	369,60	15,40
49	South Africa	766,63	31,94	1560,11	65,00	761,93	31,75	1168,03	48,67	1897,70	79,07	695,57	28,98
50	Peru	850,18	35,42	1269,02	52,88	458,56	19,11	1949,01	81,21	1121,05	46,71	1308,54	54,52
51	China	891,87	37,16	695,69	28,99	1007,55	41,98	1791,21	74,63	1218,14	50,76	1287,92	53,66
52	Brazil	851,09	35,46	1177,82	49,08	369,30	15,39	532,93	22,21	1955,02	81,46	1800,18	75,01
53	Kenya	828,09	34,50	988,89	41,20	538,20	22,43	903,68	37,65	1650,50	68,77	1401,89	58,41
54	Colombia	1516,74	63,20	859,42	35,81	1032,07	43,00	1261,14	52,55	596,72	24,86	1126,01	46,92
55	Egypt	1237,55	51,56	1795,90	74,83	1940,61	80,86	553,87	23,08	2151,92	89,66	616,84	25,70
56	Pakistan	1321,85	55,08	1283,06	53,46	1503,46	62,64	1250,99	52,12	2184,54	91,02	1560,09	65,00
57	Turkey	1252,05	52,17	625,81	26,08	1543,18	64,30	857,08	35,71	656,76	27,36	728,46	30,35
58	Bangladesh	1191,13	49,63	1538,43	64,10	631,21	26,30	550,61	22,94	1617,02	67,38	622,60	25,94
59	Venezuela	1369,23	57,05	700,99	29,21	398,10	16,59	681,75	28,41	1073,99	44,75	406,44	16,94
60	Indonesia	1492,35	62,18	559,50	23,31	1183,11	49,30	1019,06	42,46	1474,37	61,43	2027,67	84,49
61	India	1671,21	69,63	1334,61	55,61	366,33	15,26	383,53	15,98	569,18	23,72	851,31	35,47
62	Iran	1742,62	72,61	1642,20	68,43	1070,14	44,59	712,22	29,68	1709,30	71,22	1350,33	56,26

Proceeding from the received indexes, it is worth noting that that country is maximally globalized which will have the minimal value of  $R_{ij}$  value, and maximal  $I\Gamma_{ij}$  value, accordingly.

Thus, the offered method enables the system determination of globalization level of certain countries, which significantly improves and enriches theoretical acquisitions in globalization study. Nevertheless, the clear picture of overall global involvement into the named process still has not been made. From our point of view, our developed efficient model will meet the task of computation of statistical average **index of total globalization** ( $I_{CR}^-$ ), and it could be like the following:

$$I_{CR}^- = \frac{\sum_{i=1}^n I\Gamma_{ij}}{n} = \frac{(I\Gamma_{1j} + I\Gamma_{2j} + \dots + I\Gamma_{nj})}{n},$$

where  $I\Gamma_{ij} = 100 - \left( \left( \frac{R_{ij}}{2400} \right) \times 100 \right)$  is the globalization index after the authors' method;

$i = [1; m]$ ;

$m$  – a number of rating criteria (according to the authors' approach of  $m = 12$ );

$j = [1; n]$ ;

$n$  – a number of rated countries (according to the authors' approach of  $n = 62$ ).

#### 4.3. Indexes for evaluation of financial globalization process

Since the processes of financial globalization primarily affect national economies, and the main players determining the redistribution of global financial flows are TNCs and international organizations we recommend to research these processes in two following panels: country and corporate dimensions.

**A.** Financial globalization of countries. For analysis and evaluation of the financial globalization development rate with a breakdown into *one individual world country* we recommend introducing index ( $I_{\Phi K_p}$ ), which will show the rate of the country's involvement into the processes of global financial resources accumulation:

$$I_{\Phi K_p} = \sqrt{(1 - I_{AK})^2 + (1 - K_{PA})^2 + (1 - K_{I3})^2},$$

where  $I_{AK}$  – index of capital accumulation:

$$I_{AK} = \frac{(FA + FL)}{GDP},$$

where  $FA$  – involved aggregate foreign financial assets of the country,

$FL$  – cleared off foreign financial liabilities of the country

$GDP$  – GDP of the individual world country

$K_{PA}$  – coefficient of regulatory activity of the country:

$$K_{PA} = \frac{\left( \frac{M}{t} \times \frac{M_{\Lambda}}{M_n} \right)}{M},$$

where  $M$  – total number of regulation regimes change for a certain period;

$M_{\Lambda}$  – more favorable (liberal) conditions for FDI,

$M_n$  – less favorable (protectionist) conditions for FDI,

$t$  – period duration (years);

$K_{I3}$  – level of integration relations among national financial markets.

The duality of integration relations manifests in two opposite directed processes, i. e. on the one hand, the country involvement rate to foreign markets, which are described by ratio of a number of national emitters presented on international financial markets to aggregate number of all emitters who float the securities on international markets, and on the other hand, ratio of a number of presented non-resident emitters on national market to total number of emitters on national market.

The received index of the *country's involvement to financial globalization* enables to get results concerning level and rate of financial globalization of an individual country within the world scope (table 10).

Nevertheless, to ensure the criteria for comparison with other whole world processes and phenomena a new indicator has been developed to determine the level of global capital flows – *average statistical index of global accumulated capital flows throughout the world countries* ( $I_{\Phi K_P}$ ), which is calculated by the below formula :

$$I_{\Phi K_P} = \frac{\sum_{j=1}^n I_{\Phi K_P}^{ij}}{n} = \frac{(I_{\Phi K_P}^{1j} + I_{\Phi K_P}^{2j} + \dots + I_{\Phi K_P}^{nj})}{n}.$$

Table 10.

## Index of the country's involvement in financial globalization in 2009\*

Country	Index of financial globalization			
	$I_{AK}$	$K_{PA}$	$K_{I3}$	$I_{\Phi K P}$
Singapore	82,55	76,09	84,76	74,96
Switzerland	98,26	90,03	93,15	92,71
USA	72,40	82,99	70,62	70,50
Ireland	77,23	79,15	79,28	77,21
Denmark	58,24	51,66	44,77	45,30
Canada	79,98	76,36	83,35	64,21
...	...	...	...	...
Venezuela	35,33	44,25	40,55	30,80
Indonesia	30,74	39,09	42,86	32,42
India	30,63	34,44	45,50	29,32
Iran	21,98	26,84	19,99	21,56

\* The computation results are sampled.

**B.** Financial globalization on corporate level. Similar to financial globalization evaluation on the country level, we will research the financial globalization rate of *one individual TNC*, that is calculated on the basis of the determined by the author's component indexes characterizing the level of individual TNC participation in financial globalization, specifically the following:

- Coefficient of FDI export to import ratio ( $K_{\Pi I}$ );
- Coefficient of portfolio investments export to import ratio ( $K_{\text{Портф.Инв.}}$ );
- Coefficient of external to internal ratio of credit resources flows ( $K_{KP}$ );
- Shares of stocks gained from merges and absorbtions within the total volume of assets ( $K_{AP.}$ );
- Coefficient of TNC financial position ( $K_{\Phi \Pi}$ ), implying ratio of total volume of emitted securities in nominal value to the volume of TNC market capitalization;
- Coefficient of financial services export to import ratio ( $K_{\Pi \Phi}$ ) (for non-financial TNCs);
- Coefficient of royalty payments and licensed agreements inflows to outflows ratio ( $K_{P, \text{ЛУ}}$ );



- Frequency of the company's international transactions ( $K_{MT}$ ):

$$K_{MT} = \left( \frac{\text{quantity of international transactions per year}}{360} \right)$$

- Coefficient of average value of one company's transaction ( $K_{CBT}$ ):

$$K_{CBT} = \left( \frac{\text{average value of one company's transactions}}{\text{total value of company's transactions}} \right)$$

Consequently, index of involvement of an individual world TNC in financial globalization ( $i_{\Phi T} THK$ ) is calculated by the given formula:

$$i_{\Phi T} THK = \sqrt[2]{(1-K_{III})^2 + (1-K_{\text{Портф.Инв.}})^2 + (1-K_{KP})^2 + (1-K_{AP})^2 + (1-K_{\Phi\Pi})^2 + (1-K_{\text{P,ЛУ}})^2 + (1-K_{MT})^2 + (1-K_{CBT})^2}$$

and demonstrates the following results (table. 11):

Table 11.

**Index of individual world TNC's involvement in financial globalization in 2009\***

TNC	Indicators of financial globalization									$i_{\Phi T} THK$
	$K_{III}$	$K_{\text{Портф.Инв.}}$	$K_{KP}$	$K_{AP}$	$K_{\Phi\Pi}$	$K_{\text{P,ЛУ}}$	$K_{MT}$	$K_{CBT}$		
General Electric	77,2	77,3	73,7	71,3	79,9	73,1	74,3	82,9	82,8	70,86
Vodafone Group Plc	71,74	72,86	74,37	84,27	77,08	73,38	83,71	78,53	75,58	70,63
Royal Dutch/Shell Group	80,50	76,46	81,30	81,92	72,58	73,05	74,39	72,06	72,99	73,60
British Petroleum Company Plc	84,42	75,69	74,78	79,28	72,62	74,60	81,20	83,12	71,09	74,17
Exxon Mobil	81,78	71,41	78,92	83,74	84,06	82,51	81,33	83,68	71,73	73,50
...	...	...	...	...	...	...	...	...	...	...
Kazatomprom	78,66	75,05	75,87	79,03	75,63	78,41	76,92	71,95	72,43	77,37
PGE	77,48	75,32	76,57	74,51	75,68	81,42	73,39	79,92	80,86	79,73
PGNiG	71,37	78,77	74,23	73,48	73,65	77,94	79,89	74,65	79,77	76,00
Severstal	73,97	73,44	78,45	72,35	71,82	71,13	72,50	73,25	74,54	79,49
Mechel	76,56	71,70	75,86	81,06	77,92	73,33	76,54	81,43	79,95	70,23

\* The computation results are sampled.

To make the research of this process possible on corporate level within the global scope we propose to introduce the indicator of *average statistical index of global accumulated capital flows of world TNCs* ( $\overline{I_{\phi_T THK}}$ ), enabling to extrapolate the received results to the world area, which will characterize the development of financial globalization with a breakdown into all world TNCs within the world-wide scope:

$$\overline{I_{\phi_T THK}} = \frac{\sum_{i=1}^n I_{\phi_T THK_{ij}}}{n} = \frac{(I_{\phi_T THK_{1j}} + I_{\phi_T THK_{2j}} + \dots + I_{\phi_T THK_{nj}})}{n},$$

where  $I_{\phi_T THK}$  – index of individual world TNC's involvement in financial globalization;

$n$  – number of TNCs for calculation;

$m$  – number of analyzed years;

$i = [1; n]$ ;

$j = [1; m]$ .

Thus, proceeding from the noted and calculated above – *average statistical index of global accumulated capital flows throughout the world countries* ( $\overline{I_{\phi_{TK_p}}}$ ) and *average statistical index of global accumulated capital flows of world TNCs* ( $\overline{I_{\phi_T THK}}$ ), we will develop a formula of general index of financial globalization ( $I_{\phi_T}$ ), that will look like the following:

$$I_{\phi_T} = \sqrt{\left(1 - \overline{I_{\phi_{TK_p}}}\right)^2 + \left(1 - \overline{I_{\phi_T THK}}\right)^2}.$$

## 2. Approbation of the method and making empiric calculations

The method approbation for the development of quantified evaluation models of the processes of trans-nationalization, comprehensive globalization and financial globalization is based on the developed by the authors algorithm, and provides for fulfillment of actions according to the tasks set within the fifth up to seven stages.

### **Stage 5. Empiric calculations on the basis of the developed system of indicators**

**5.1. Calculation of statistical average index of global trans-nationalization** (table 12) is based on the developed by the authors base matrix

providing for symbiosis of vertical 100-element TNCs dynamic series (choice of corporations is based on TNC ranking, published in WIR UNCTAD 2009 report [32, 33] according to tables of «top 25 TNCs of developed countries» «top 25 TNCs of developing countries, «top 25 TNCs of CEE countries» «top 25 financial TNCs), and 100-element time series ( from 1910 to 2009 with forecast up to 2020) with separating intermediate results of each out of four groups.

Table 12

**Calculation of average statistical index of global trans-nationalization\***

№	TNC	Home country	Priority branch	1920	1970	2000	2009	2015	2020
Group 1: Top 25 TNCs of the developed countries									
1	General Electric	USA	Electronic and electric equipment	10,14	55,50	50,38	58,93	91,78	94,53
2	Vodafone Group Plc	Great Britain	Telecommunications	14,00	57,62	47,60	50,23	87,69	94,99
...	...	...	...	...	...	...	...	...	...
24	Eads	Netherlands	Aircraft industry	6,48	56,33	44,61	57,25	86,97	94,09
25	Nestlé SA	Switzerland	Food and tobacco industries	7,07	57,37	93,42	90,51	94,65	94,07
<i>Total in group № 1</i>				<i>9,78</i>	<i>57,44</i>	<i>48,39</i>	<i>55,55</i>	<i>89,71</i>	<i>93,10</i>
Group 2: Top 25 TNCs of the developing countries									
26	Hutchison Whampoa Limited	Hong-Kong	Multi – branch-wise	*	36,51	57,43	58,88	61,81	58,88
27	Cemex S.A.	Mexico	Chemical industry	*	38,94	54,69	51,04	62,89	51,04
...	...	...	...	...	...	...	...	...	...
49	Flextronics International Ltd.	Singapore	Electro-technical	*	35,33	54,49	56,09	63,83	56,09
50	New World Development Co.	Hong-Kong	Multi – branch-wise	*	38,01	58,05	45,73	64,33	45,73
<i>Total in group № 2</i>				<i>*</i>	<i>36,21</i>	<i>57,33</i>	<i>42,60</i>	<i>22,75</i>	<i>42,60</i>

№	TNC	Home country	Priority branch	1920	1970	2000	2009	2015	2020
Group 3: Top 25 TNCs of the CEE countries									
51	Gazprom	Russia	Oil and gas industries	*	*	54,06	54,18	78,90	79,29
52	PKN Orlen	Poland	Oil industry	*	*	56,22	49,63	72,24	80,08
...	...	...	...	...	...	...	...	...	...
74	Severstal	Russia	Metallurgy	*	*	47,77	53,61	77,20	76,05
75	Mechel	Russia	Metallurgy	*	*	45,76	51,01	75,84	82,72
<i>Total in group № 3</i>				*	*	50,85	54,72	77,39	78,32
Group 4: Top 25 financial world TNCs									
76	GE Capital Services	USA	Financial services	*	40,07	23,89	42,85	78,12	86,57
77	Citigroup	USA	Financial services	*	43,28	19,00	41,67	76,80	86,50
...	...	...	...	...	...	...	...	...	...
99	Royal Bank of Canada	Canada	Financial services	*	42,67	17,32	44,86	77,82	89,95
100	Banca Intesa	Italy	Financial services	*	43,97	18,20	44,65	83,90	80,66
<i>Total in group №4</i>				*	42,35	18,28	46,02	79,44	85,96
Index of global trans-nationalization				9,78	45,33	43,71	56,18	83,66	87,39

\* To simplify visual study of the table the sampled data are presented

The above calculations enable to evaluate the state of transnationalization processes not only in the world-wide dimension, but also in different groups of TNCs.

### 5.2. Calculation of statistical average index of total globalization

On the basis of empiric calculations of the globalization level of world countries (R) presented in table 9, we will determine average statistical index of total globalization ( $\overline{I_{GR}}$ ) for the period of 2001 to 2009 years (table 13).

The computations showed that the index of total globalization is tended to grow in spite of the available irregularity. The decrease of index from 49.71 to 46.23 in time interval from 2001 to 2003 can be explained by range expansion of the researched countries, most of which were significantly lagging behind the global leading countries in many factors which were taken for a basis at the be-

gining of expert rating. Having the index reached 50 % in 2007 it strongly demonstrates that globalization has already entered the stage of complete domination, implying that most areas of vital activity are completely globalized both in territorial and in branch-wise vectors.

Table 13.

**Dynamics of average statistical index of total globalization in 2001–2009**

Year $j = [1; m]$	Average statistical index of total globalization (%) $I_{cr}$	Increase rate %	
		against previous year	against reference year
2001	49,71	–	–
2002	47,86	–3,72	–3,72
2003	46,23	–3,41	–3,28
2004	46,94	1,54	1,43
2005	48,52	3,37	3,18
2006	49,97	2,99	2,92
2007	54,57	9,21	9,25
2008	55,69	2,05	2,25
2009	51,13	–8,19	–9,17

**5.3. Calculation of average statistical index of financial globalization**

Proceeding from the components of the index of financial globalization we will make the empiric calculations of that index in 2001–2009 (table 14).

**Stage 6. Graph construction of major indicators behavior for visual interpretation and additional argumentation of revealed trends and regularities to logically combine them with stage 7, that is, analytical evaluation of the process, creation of prognosticated information and development of relevant action plans on the level of national, either on international structures.**

**6.1. Construction of graph model of the index dynamics of global trans-nationalization and its analytical evaluation**

The results of index dynamics of global trans-nationalization calculated on the base of our method allowed to construct the graph model of that process development (fig. 3). According to the model, the  $T$  curve clearly reflects at the background of intense growth of the indicator with peculiar maximal extremes in points  $T1$ ,  $T3$ ,  $T5$ ,  $T7$  cyclical downswing (segments  $T1T2$ ,  $T3T4$ ,  $T5T6$  and  $T7T8$ ).

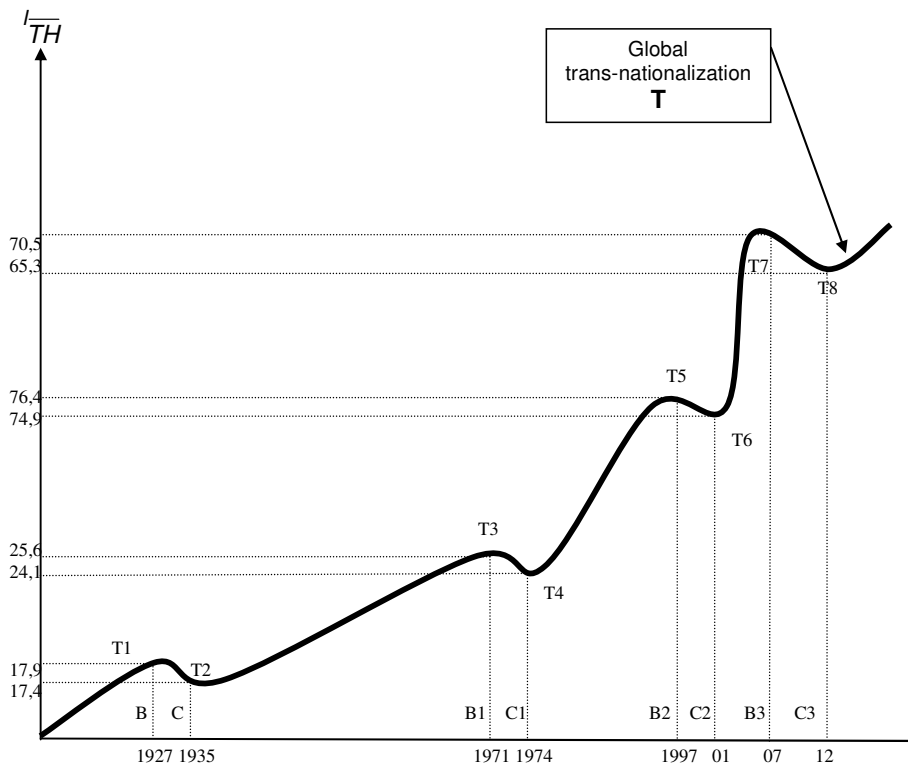
Table 14.

## Dynamics of financial globalization index by years

Year $j = [1; m]$	$\overline{I_{\phi r K p}}$	$\overline{I_{\phi r THK}}$	Average statistical index of financial globalization	Increase rate %	
				against previous year	against reference year
2001	65,03	72,66	61,24	–	–
2002	59,62	64,84	58,17	–5,01	–5,01
2003	67,66	69,55	62,93	8,18	7,77
2004	66,73	68,76	65,74	4,47	4,59
2005	72,05	69,70	69,24	5,32	5,72
2006	74,12	76,08	68,05	–1,72	–1,94
2007	60,54	62,82	56,68	–16,71	–18,57
2008	58,23	61,47	57,88	2,12	1,96
2009	58,50	54,23	53,00	–8,43	–7,97

Figure 3

## Dynamics of global trans-nationalization average statistical index



The latter while projecting on the abscissa axis, coincide with the initial stages of global crises (1930-s, early 70-s, and late 90-s of the 20<sup>th</sup> century, likewise with current global financial crisis, started in the middle of 2007).

Construction of certain graphs demonstrating trans-nationalization process by certain groups of countries (fig. 4) showed that in the developing countries who have always been leaders of trans-nationalization with average statistical index of trans-nationalization strongly tended to grow, its volume grew by four times for about one hundred years, and made over 40 % as average indicator in the group. It is worth noting, that in the given group of countries the volume of average statistical trans-nationalization index includes a significant deterring factor which is manifested in the processes of corporate merges and absorptions. The matter is, that alongside with absorption of rather weaker corporation, mother TNC gets much lower activity indicators as against its own, and that as a result of mathematic adding makes conservative trans-nationalization index against positive indicator of dynamics and perspectives of development.

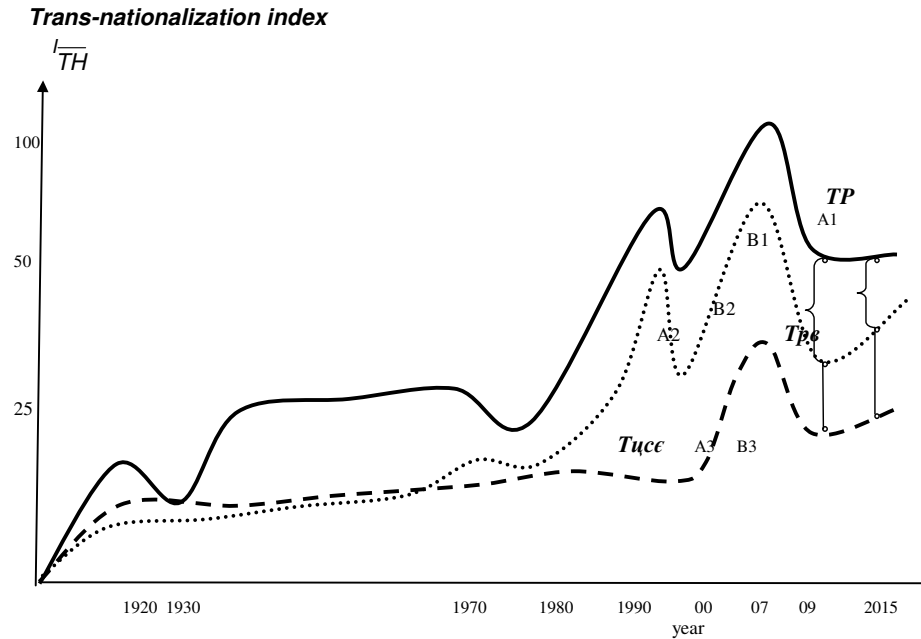
Referring to TNCs of CEE countries, the development of their activity should be evaluated specifically from the middle of the 90-s of the 20<sup>th</sup> century, when in the post-soviet environment the private capital and business activity came into their golden age as a result of certain political changes. Moreover, the rates of trans-nationalization transformations here are speeded up to such an extent that in some TNCs in this region (Lukoil, Gasprom, and so) the trans-nationalization index exceeds the average statistical world level.

The processes of active trans-nationalization in the developing countries started in the 70-s of the last century as a result of liberalization of global economic life. As the graph interpretation of the dynamics of trans-nationalization process visually illustrates (fig. 4), fairly strong trend is observed concerning parallel development of the process with rather stable interval characterizing the rate of breakaway from the group of developed countries (curve  $Tp$ ), and from the developing countries (curve  $Tps$ ).

Nevertheless, apart from prior expectations of analysts, the latest global financial crisis showed that in spite of the fact, that the developing countries suffered most from the crisis, and their breakdown (segment A1A2) is great, in perspective they will gain benefits, and the trans-nationalization development center will move towards those countries who will catch up the developed ones not only nominally, which is demonstrated by the length of segment B1B2 being twice shorter against the segment A1A2, and the lessening of that volume had been achieved for less than ten years.

In particular, it is anticipated that trans-nationalization levels approach till 2014 will be conditioned by economic growth of the developing countries by approximately 60 % at the background of about 12 % of economic growth in the developed countries, that is five times slower.

Figure 4

**Dynamics of trans-nationalization index by groups:**For 25 major TNCs of the developed countries – curve  $Tp$ ;25 major TNCs of the developing countries – curve  $Tpb$ ;25 major TNCs of CEE countries – curve  $Tucə$ 

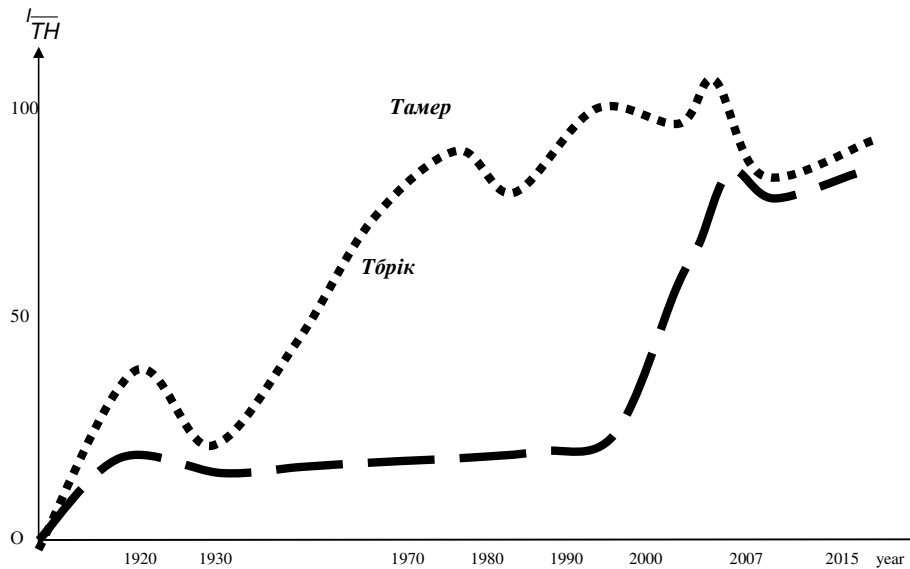
As the  $Tpb$  curve behavior demonstrates, in fact, the Asian countries were the locomotive of global trans-nationalization, China in particular, while the countries of Latin America and East Europe were much weaker since they expected the investment tranches from foreign TNCs.

But the received forecast data and constructed on their base graph (fig. 5) show that beginning from 2010 the distance between the developed and developing countries will drastically decrease due to speeding up of trans-national processes, primarily in the countries of Latin America and East Europe. Thus, from outsiders they will turn into the driving force of global trans-nationalization. It is corroborated by Merrill Lynch analysts who proceeding from financial indicators of Russia and Brazil where GDP growth is expected to be from 5 % to 5.3 % [2, 32, 33], assert about rapid recovery and preparedness to renovation growth of these countries economies.



Figure 5

Dynamics of trans-nationalization index for American TNCs (curve *Tamer*) and TNCs of BRIC countries (curve *T6pik*)



The dynamics of trans-nationalization index development of American and BRIC countries' TNCs is significantly modified because of drastic breakthrough of the companies from the countries like Brazil, India, Russia and China. The given index showed intense growth of TNCs of BRIC countries which on the basis of maximal mobilization of national resource base and effective use of globalization factors of economic development have real perspectives in the near future to become world centers of economic and financial power.

The main driving force of that rapid development of TNCs in BRIC countries was the fact that in late 90-s of the 20<sup>th</sup> century world investors who got disappointed in the companies of «Asian tigers» massively began to invest into economies of CEE countries, India, China, and a number of South American countries, and that speeded up their growth.

Nevertheless, at the moment, American TNCs in spite of weakened capitalization of their companies, still remain the key players on the world arena, which is demonstrated by the indicator of trans-nationalization index.

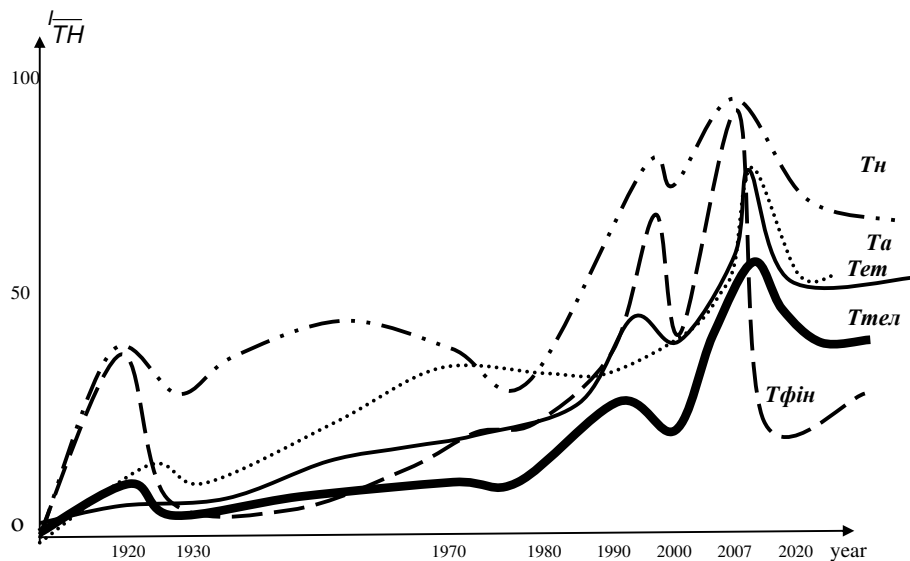
The dynamics of financial TNCs index arises certain interest too. For the last forty years it exceeds not only average statistical values, but also trans-nationalization level of the biggest TNCs of the first group of countries, and in

the periods of crisis shocks (1920–1935, 1970–1975, 1990–2000, 2007 – up to date) their indicator is rapidly falling (fig. 6) which substantiates the peculiarity of financial TNCs development process.

Figure 6

**Dynamics of trans-nationalization index by key industries:**

oil and gas (curve  $T_H$ ), financial (curve  $T_{\phi H}$ ),  
electro-technical (curve  $T_{em}$ ); telecommunication (curve  $T_{\text{тел}}$ ),  
automobile (curve  $T_a$ )



While demonstrating sky rocketing ups at the account of mostly fictitious capital, the TNCs intensely augment capitalization and profitableness on the stages of sustained development of global economy, and mainly their extreme investment activity is conditioned by those facts. Specifically, the lowest index fall in that group of companies is observed during the recession.

The dynamics of trans-nationalization index corroborates the peculiarity of financial branch activity, in particular, that it is very vulnerable and changeable against world-wide situation. Also, the statement is confirmed that it is rather secluded from the real sector of economy. As a result of gradual transition of world community to energy saving technologies, the trans-nationalization process is tended to decrease in oil and gas industry. Nevertheless, that economic sector

still is very powerful. Electro-technique and telecommunication economic industries have similar trend to develop, though the latter manifested it to be more vulnerable against the crisis times.

With reference to trans-nationalization expansion in motor industry, it is described by fairly consistently increasing development from the middle of the 30-s to actual global crisis, which made that economic branch colossally rate losing and expecting for time inexplicit stabilization.

Consequently, application of our developed comprehensive method for the model of quantified evaluation of trans-nationalization process enables to make analytical researches of the dynamics of trans-nationalization development not only on the level of individual TNC, but also on a branch-wise level by certain groups of countries and world economy, as a whole.

### ***6.2. Construction of graph model of total globalization index dynamics and its analytical evaluation***

From the view of the dynamic series of variables limited within the frames of 2001-2009 and necessity to construct the graph interpretation of the total globalization **index** according to the volume of dynamic series in the graphs of trans-nationalization and financial globalization in order to correlate them, we used Box-Jenkins method to extrapolate it to perspective (forecast extrapolation) of up to 2020 and into the past (retrospective extrapolation) from 2001 to 1920 (fig. 7).

### ***6.3. Construction of graph model for financial globalization index***

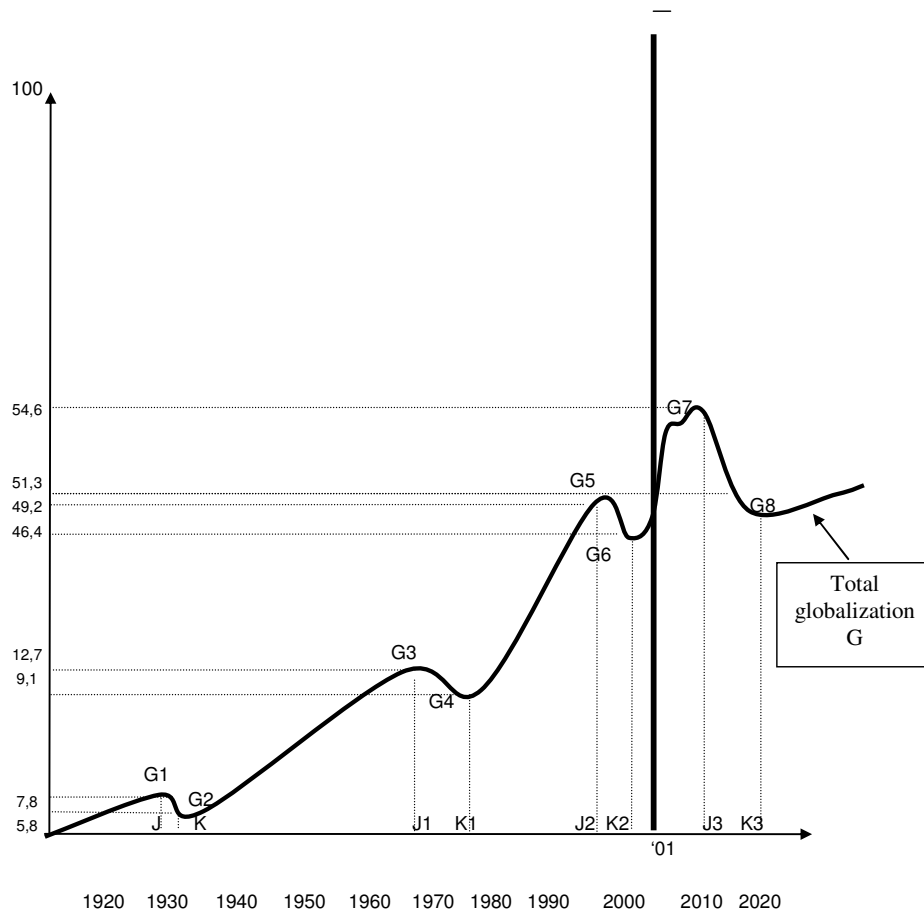
Analysis of the dynamics of average statistical index of total globalization gives all grounds to reveal the segments of its ups and downs.

Thus, the segment of the curve to point G1 is characterized by index growth and in point G1 reaching its maximal value for time period from 1900 to 1927, which could be described as gradual stage of the development of total globalization that had lasted for 27 years.

The graph demonstrates that as a result of crisis phenomena known in American economy as « Great Depression» from 1928 the volume of index began to fall down to point G2. So, we can determine the decrease segment of the curve G1-G2, where point G2 shows the least value of the curve index for the time period from 1927 to 1933, and simultaneously it demonstrates the end of the crisis development in the USA.

Figure 7

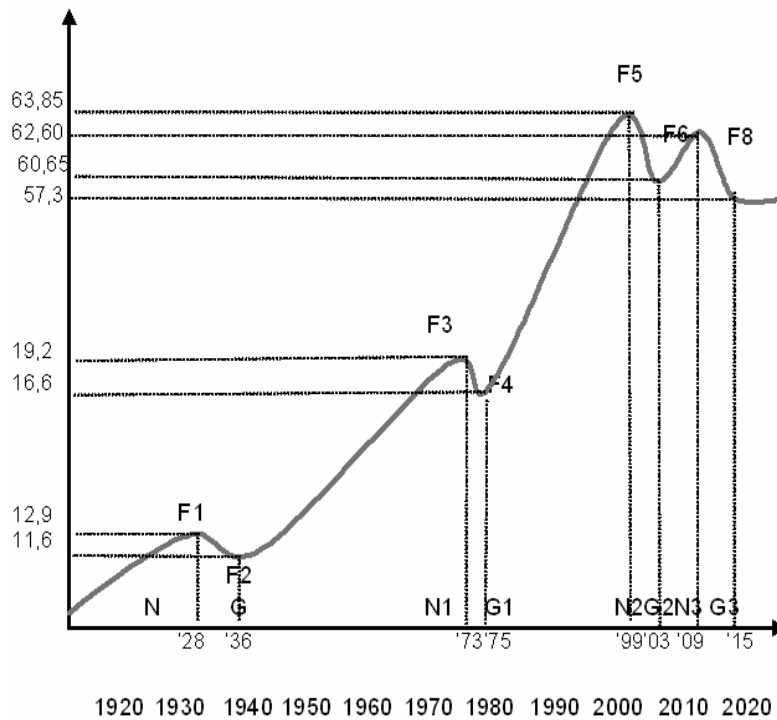
## Average statistical index of total globalization



While researching the period from 1934 to 1970 it is reasonable to imply not only post-crisis economic development of the USA, but also comparatively stable development of world economies (segment G2–G3) that reached its peak in 1969 (point G3). Nevertheless, the following index decrease (segment G3–G4) affords ground for ascertaining, that as a result of the beginning of «energy» crisis the average statistical index of total globalization dropped to point G4, and we can describe the period of its fall from 1970 to 1974.

Figure 8

Average statistical index of financial globalization



As a result of liberalization of world economic life, starting from the middle of 70-s of the 20<sup>th</sup> century, the index demonstrated rapid increase, which allowed us to determine its peak value in 1994 (point G5), and characterize that twenty year period as the most large-scale and universal stage of the globalization processes development in world dimension. Nevertheless, because of currency and credit imbalances occurring in economies of Latin America, the G5–G6 segment shows the index decrease to G6 point, and demonstrates that the value of its decrease made 0.46 in 1998.

Due to introduction of large-scope international borrowings by many countries (and in particular, by the USA) the index showed the growth on G6–G7 segment, and reached extreme maximum in point G7, which manifests the extreme value of the index in time period of 1900–2007.

The actual global financial crisis that started in summer of 2007 cardinally effected the globalization process, which is manifested by the deepest and the

greatest fall of average statistical index of total globalization (G7–G8 segment, and gives ground to ascertain that this trend will last till 2017 (G8 point).

The data analysis shows that every next fall of the curve is described by deeper decrease and speeding up of crisis phenomena in time. Nevertheless, the trend of the globalization process development since 1900 and up to date is positive.

Thus, the global process cyclicity is visualized by the graph which had been constructed on the basis of the developed by the author's computations. The graph enables to detect the periods of temporary drops caused by global crisis phenomena. These wave-like processes can not be regarded negative phenomena for global development since the global processes through deterring the rapid broadening of globalization give impetus to change the poles of growth rates against the crisis. The growth rates of «supraglobal» countries substantially fall (decrease) at the background of speeded up growth of the developing countries.

As a result of that, the dynamics of economic development of polar-opposite group of countries brings about certain levelling of global economic development.

The authors' research conclusions enable to hypothesize on certain correlation among three processes, which required the construction of the three curves in the single system of coordinates (fig. 9).

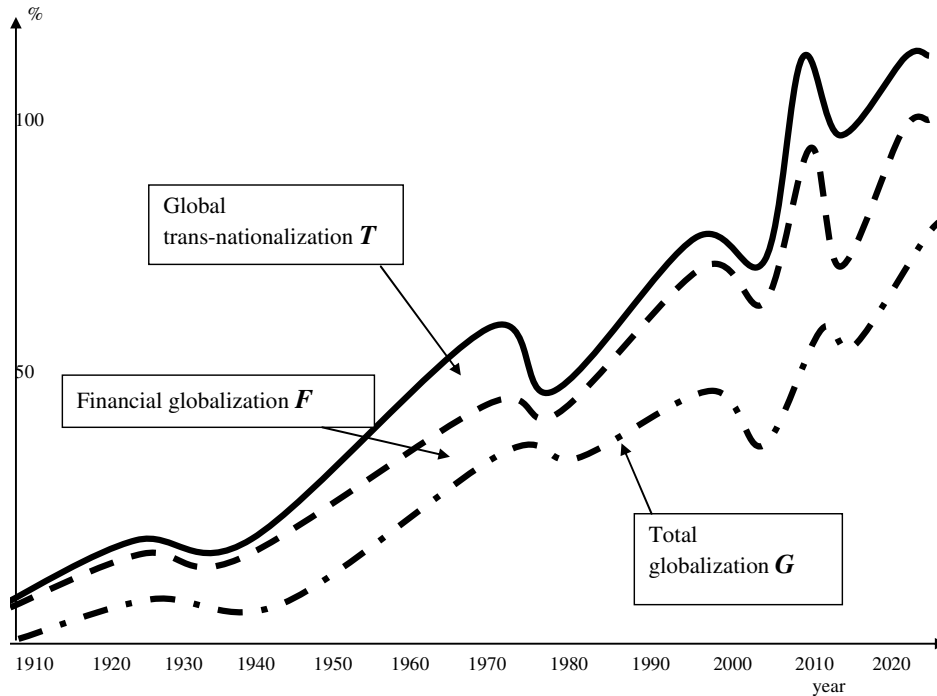
Accentuation on certain graph segments enables to detect TNCs functions in global space of financial markets, it enables to determine perspective guidelines for trans-national capital movement of world corporations and deepening of financial interrelation of the latter with global economic community, as well as it enables to provide scientific background for improvement of effectiveness of foreign economic contacts and relations.

The behaviour of global trans-nationalization index curve exhibits the essential distinction of basically determining function of capital from exclusively resource provisional to full-fledged basis of further TNCs functioning under the influence of internationalization processes and globalization of world economic life. Proceeding from the above, we can ascertain that both financial and corporate strategies of the development of companies have changed.

The graph analysis establishes that the process of financial integration on trans-national level outran the development process of financial globalization, and depicts the double lag of that outrun including spatiotemporal and spatio-criterion one (of business activity).

Figure 9

Double lag in the process of the development of global trans-nationalization, financial globalization and total globalization for 1910–2020



## Conclusions

Urgent need for having the quantified assessment of globalization and trans-nationalization processes for establishing their states and revealing the trends, forecast the probable development, and designing of certain preventive measures, conditioned to create a comprehensive method for development of descriptive models of current indicators, which we identify as index of total globalization and index of financial globalization, as well as seven-stage algorithm for their computation and graph interpretation.

The authors' method for establishing the developed indexes of global trans-nationalization, total globalization and financial globalization is based, first, on comparative principles of theoretical generalization and improvement of key definitions, second, on generalizing the conceptual approaches to forecasting of the state of complicated economic phenomena, like the following: fundamental

(F. Block, B. Graham, D. Dodd, I. Zakarian, H. Kim, S. Cottle, V. Likhovidov, R. Murray, S. Turner, M. Thomsett, M. Haertfelder), technical (Ch. Dow, E. Naiman, V. Tvardovskii, J. Schwager), quantitative (Bachelieu, Graham) and economic-mathematical modeling (R. Frisch); third, on selective approach to the choice and construction of graph interpretation among other options (Box-Jenkins method, Durbin-Watson and Student T- statistics, Akaike and Bayes-Shvarts criteria, Fischer F-statistics, trends, autoregression model, one-step forecast, logarithmation) and includes: 1) algorithm for key indicators formation, developed to evaluate the behavior of the researched processes with determination of the following seven main steps: 2-d and 3-d which are universal (common), while 1-st, 4-th, 5-th, 6-th and 7-th are described by unique form with various contents, 2) variative matrixes of key indicators dynamics based on integration of two dynamic series the values of which ranges within 5 to 100 horizontal elements cascaded after 100 (62) vertical elements on the basis of empiric study of 100 TNCs and 62 world countries for the time interval of 100 years including the prognosticated period till 2020.

The improvement of a respective method for guaranteeing national security on the basis of application of indexes of total globalization, and financial globalization developed by the authors, will enable the comprehensive assessment of the state of economic security and will provide an opportunity to scientifically substantiate the most favorable and secured scenario of integration process for Ukraine.

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