Alexander Dimitrov, Professor, Dr. Ec. Scs.

THE EFFECT OF ECONOMIC AND SOCIAL RESOURCES IN SOME COUNTRIES IN TRANSITION FOR 2000: A STATIC ECONOMETRIC MODEL

This paper presents the utilization of some 31 indicators of the economic and social development of some 45 countries, taken from the World Bank yearly publication World Development Indicators: WDI' 2002, to create the static econometric model EM' 2000, featuring 10 equations, 10 endogenous as well as 21 exogenous variables. An assessment of the endogenous variables of 14 Central and East European countries, including Bulgaria, is made, based on the reduced form of the model (made using the SoritecWin32 software application). Some conclusions are offered as to the effect of using the selected indicators, characterizing the countries' economic and social resources, including a comparative assessment of differences in the state of those countries.

JEL: C5; E6; F1; F4

The practice of econometric modelling based on static data (data on the distribution by company, territorial unit, including countries, etc.) is comparatively rare. It is difficult to organize comparable static data in order to achieve the necessary homogeneity for such modelling. Compared to time series distribution, irrespective of the substantial differences in economic indicators, taken as the model's time variables, the heterogeneity among static variables is considerably greater.

In this particular instance of creating a static econometric model (EM 2000) using aggregate data on individual countries and their characteristics, we are presented with a unique opportunity by the annual publication of the World Bank - World Development Indicators - WDI, which publicly releases economic and social indicators by country, by group of countries and globally. This publication has appeared in full form after 2000 (the most recent appeared in 2003, using 2001 data). Before that a number of indicators have appeared in limited form in the annual reports of the World Bank, but under other titles and not so expanded.

WDI presents a comparatively homogeneous macrostructure of indicators of the countries in the world, grouped in six major sections: (1) World View, (2) People, (3) Environment, (4) Economy, (5) States and Markets and (6) Global Links. There are differences within the various sections, especially in the first section, there are also differences in the number of countries in the main group. That number changes (increases) and in the latest publication (as well as in that for 2002) it is already 152. Nearly 50 countries (territories) are represented by a limited number of indicators which are mainly of informative value and can hardly be accepted and used for the analytical purposes of econometric modelling. The amount (total number) of indicators included in the publication is of the order of several thousand, although for some of them there is no full range of data because of methodological difficulties and/or delays in its provision, and the publication is released without missing data on those countries.

The lack of data on certain indicators by country constitutes a major problem, since assessment in complex econometric models require (at least for the time being) completeness of all indicators on the units under consideration (individual countries). In principle most indicators are, in a sense, homogeneous and interrelated, which in practice means that those missing can be restored analytically, however, that will be "at the expense of" the researcher performing such a procedure. The team of the World Bank uses the appropriate methods for restoring missing data, but in practice it is not possible to fully restore everything that is missing. Depending on the character and the purpose of the research, experts can perform analytical procedures in order to restore missing data on the basis of what they already have, but that is not directly and widely used. The matter is strictly personal, while the approach is differentiated, including the fact that things come down to the contents and size of the models designed, through which the respective results (effects) are sought.

We had a similar problem in this case, and without claiming to have found a permanent solution, we carried out restoration procedures using regression methods and took decisions of compromise, which determined the number of variables, equations and countries. Our desire was above all to keep the presence of Bulgaria, as well as of countries, whose economies have a character and structure similar to ours or have set themselves goals and tasks, analogous to those of Bulgaria. The publication of the indicators for past years can be used for selecting data and restoring the missing items. The number of years is still rather limited, in order for us to use data, distributed simultaneously by country and by year (such opportunity is provided by other publications as, for instance, those of the International Monetary Fund or other international organizations.) The result that we have achieved is not only of methodological and experimental value, but it also has real economic value in view of achieving the analytical purposes of the study.

The composition of the model EM 2000

The composition of the model in terms of the territorial units - countries, included in it, is determined by the choice of variables and the correlations between them. As far as the time period is concerned, in this case we have chosen the year 2000 as it was the last of the XXth century (the values of the 2001 indicators appeared in the WDI'2003, however the latter appeared in April this year and it was practically impossible to process that newer data and include it in the study).

As a rule, the World Bank publishes the data in a book, on CD and in the Internet in Pdf format. The last case is really convenient with respect to achieving speed when obtaining data. The only problem is that the range of data aimed at the general public is rather limited and what is available on the Web is insufficient and lacks the necessary and desired representativeness. The full range is available to a limited number of experts by way of password and embargo conditions about two weeks before the official announcement of the publication and before the official

meeting of the management and the experts of the World Bank with journalists. Such speed and efficiency is not crucial for research purposes, apart from the emphasized preliminary character of the publication and the likelihood of making corrections as well as making it more precise. In this case there was no problem for us to obtain the data free of charge from the Internet.

Some of the issues arising pertain to the timing and quality of acquired data and have to do with the need to convert the data from Pdf format into a format that is required by the respective software applications in order to process it (Acrobat Reader used to read the Pdf files of the World Bank publication comes in different versions which provide different options for text processing). The application is freely available from the Bank as well as from other sources. In practice, to be able to use the familiar, available and necessary software, the data must be entered in ASCII (text) code, which requires a long time for its processing (in our case we did not have a professional program for the automation of that process. What is more, data processing requires special care when none is available for certain indicators and countries. The matter is not only in the models' composition and the selected indicators but is also connected with the necessary additional processing of the data. As far as the software application we have used is concerned - an econometric program - the programming language Soritec in two versions - Sampler for DOS and Win32 version[1] it is necessary to specially supply missing data through the command *missing* for each particular case.

Variables of the EM'2000

The model's variables are chosen in accordance with its composition and purposes. For ease of reference they are given a numerical code, which has the following meaning: the first digit refers to the section number, the second digit/digits - the table number in the respective section, and the rest of the digits - the numbers of the indicators in the respective table. The codes contain additional digits referring to the way the resultant indicators have been made up after the necessary preliminary processing of the data. The variables are divided into endogenous and exogenous, the endogenous fall into target and peripheral and their number determines the model's number of correlations (equations). To the numerical code there has been added the letter symbol of "y" or "x" depending on whether it's an endogenous or exogenous variable respectively. Variables are ordered according to the relations order adopted for the model (Table 1).

[1] The Sampler version of Soritec was presented to me personally for free access and use at the beginning of the 90s, while the Win32 version can be downloaded from the site of Central Michigan University (USA), and in both cases it is meant to be used by the limited number of students (there is a comprehensive list of program users, published in the Internet). For the time being the two versions fully match the minimum requirements for a relatively good individual piece of research (the full professional version of the program, as far as I know, has not yet been bought by anyone in this country). There are also other competitive econometric products used in Bulgaria (about ten altogether) each of which features different capabilities despite the common principles applied in the various cases.

Table 1

1. Endogenous variables

Code	Title	Value for Bulgaria, 2000
1. y4202	Gross Domestic Product (mln USD)	11 995
2. y1104	Gross National Income (bln USD)	12.4
3. y2300	Number of Employed (mlns)	3.52
4. y2204	Labor Force (mlns)	4.2
5. y22002	Life Expectancy at Birth (yrs)	72
6. y4910	Imports (mln USD)	7677
7. y4908	Exports (mln USD)	6957
8. y4912	Gross Domestic Savings (mln USD)	1319
9. y41111	Internal Debt (mln USD)	6333
10. y4210	Services in GDP (mln USD)	6957

Note. The data for Bulgaria is as it appears in the WDI'2002.

2. Exogenous variables

Code	Title	Value for Bulgaria, 2000
11. x41408	GDP Implicit Deflator (%)	102.8
12. x4906	Gross Capital Formation (mln USD)	2039
13. x1108	PPP Gross National Income (bln USD)	45
14. x214024	Adult Illiteracy Rate (pop over 15) (%)	1.5
15. x2612	International Poverty Line (pop below 2 USD) (%)	21.9
16. x2102	Total Population (mlns)	8.2
17. x21802	Malnutrition (%)	13
18. x21504	Health Expenditure per Capita 1990-2000 (USD)	62
19. x41410	Average Consumer Price Index 1990-2000 (%)	117.5
20. x2802	Gini Index (%)	26.4
21. x41412	Average Food Price Index 1990-2000 (%)	123.0
22. x4204	Agriculture Value Added in GDP (mln USD)	1799
23. x41510	Current Account Balance (mln USD)	-701
24. x4206	Industry Value Added (mln USD)	3359
25. x41701	Foreign Debt Group – Average Indebtedness	2
26. x41703	Present Value of Foreign Debt (in % of Exports)	131
27. x41104	Total Expenditure (mln USD)	4282
28. x41106	Overall Budget Deficit (mln USD)	-132
29. x490810	Foreign Trade Balance (mln USD)	-720
30. x41102	Current Revenue (mln USD)	4150
31. x41702	Present Value of Foreign Debt (mln USD)	10 168

Note. The data for Bulgaria is as it appears in the WDI'2002.

The number of countries which had values for all 31 indicators was 45, including Bulgaria, the countries of Central and Eastern Europe, the Baltic States, Russia and Turkey or a total of 14 countries in the group - almost 1/3 of the total number of countries under study. If the number of variables had been changed, it would have been possible to increase the number of countries. It would have provided the opportunity to obtain a more relevant assessment statistically, along with that it would have been possible to group the countries by income per capita and to assess the model's parameters for each group. From the 45 countries in the group, 14 feature the lowest income, 19 (including Bulgaria) - middle income and 12 - the highest. The 45 countries along with the values of the respective endogenous and exogenous variables are given on Table 2.

Table 2

Indicators[2] of 45 countries for 2000

1. Endogenous Variables

№	Country	WDI No	Income Group	1	2	3	4	5	6	7	8	9	10
				Y4202	Y1104	Y2300	Y2204	Y22002	Y4910	Y4908	Y4912	Y41111	Y4210
1	India	59	1	456990	454.8	243.33	450.8	63	77688	63979	95968	244033	219355
2	Pakistan	104	1	61638	61	48.65	51.7	63	11711	9862	7397	48756	31435
3	Uganda	139	1	6170	6.7	5.8	10.9	42	1604	617	185	3233	2406
4	Nepal	96	1	5497	5.6	10.58	10.7	59	1759	1319	880	3524	2089
5	Kenya	70	1	10357	10.6	8.26	15.5	47	3729	2693	414	7157	6318
6	Cameroon	22	1	8879	8.6	3.24	6.1	50	2397	2752	1776	9287	3196
7	Lesotho	78	1	899	1.2	0.42	0.8	44	791	252	-180	610	351
8	Moldova	90	1	1286	1.4	1.96	2.2	68	990	643	-64	1001	669
9	Kyrgyz Republic	74	1	1304	1.3	1.11	2.1	67	717	561	52	1730	456
10	Burundi	20	1	689	0.7	1.96	3.7	42	165	62	-41	1267	214
11	Papua New Guinea	106	1	3818	3.6	1.33	2.5	59	1604	1718	802	2352	1145
12	Bangladesh	10	1	47106	47.9	37.08	69.2	61	8950	6595	8479	18890	24024
13	Ukraine	140	1	31791	34.6	22.11	25.1	68	18121	19393	7312	2988	15260
14	Indonesia	60	1	153255	119.9	95.59	101.8	66	47509	59769	39846	68658	55172
15	Peru	108	2	53466	53.4	8.92	9.7	69	9624	8555	9624	22883	34753
16	Sri Lanka	125	2	16305	16.4	7.85	8.5	73	8316	6522	2772	15506	8642
17	Dominican Republic	38	2	19669	17.8	2	3.7	67	7671	5901	2754	4071	10818
18	Tunisia	136	2	19462	20.1	2.06	3.8	72	9342	8563	4671	11852	11483
19	Bulgaria	18	2	11995	12.4	3.52	4.2	72	7677	6957	1319	6333	6957
20	Lithuania	81	2	11314	10.8	1.69	1.9	73	5883	5091	1584	2489	6675
21	Latvia	76	2	7150	6.9	1.19	1.3	70	3861	3289	1359	937	5077
22	Morocco	92	2	33345	33.9	8.97	11.5	67	12338	10337	6002	24242	18006

[2] For some countries the indicators have been given values by the author on the basis of selected models.

23	Bolivia	14	2	8281	8.2	1.84	3.4	63	2070	1491	911	4646	5217
24	Salvador	41	2	13211	12.6	2.5	2.7	70	5681	3699	264	3858	7927
25	Jamaica	66	2	7403	6.9	1.18	1.4	75	4072	3257	1184	6744	4664
26	Belarus	11	2	29950	28.7	5.19	5.3	68	20666	20366	6290	6050	14077
27	Albania	2	2	3752	3.8	1.39	1.7	74	1501	713	-113	1741	863
28	Jordan	68	2	8340	8.4	1.3	1.5	72	5755	3503	-500	8398	6088
29	Colombia	29	2	81283	85.3	14.78	18.5	72	16257	17882	11380	24222	45518
30	Kazakhstan	69	2	18230	18.8	6.3	7.3	65	8568	10756	4558	4849	8750
31	Philippines	109	2	74733	78.8	28.68	31.9	69	37367	41850	17936	44391	39608
32	Thailand	133	2	122166	121.6	35.92	36.8	69	72078	81851	37871	25411	61083
33	Russia	114	2	251106	241	68.84	77.7	65	62777	115509	95420	256379	135597
34	Mexico	89	3	574512	497	39.59	40.4	73	189589	178099	120648	147075	390668
35	Poland	110	3	157739	161.8	16.58	19.9	73	53631	42590	31548	68459	94643
36	Turkey	137	3	199937	202.1	28.7	31.3	70	61980	47985	33989	106966	117963
37	Czech Republic	36	3	50777	53.9	5.29	5.8	75	38083	36052	13202	6550	27927
38	Hungary	58	3	45633	47.2	4.49	4.8	71	30574	28749	11865	27608	27380
39	Chile	26	3	70545	69.8	5.59	6.2	76	21869	22574	17636	10582	39505
40	Slovakia	120	3	19121	20	2.43	3	73	14532	14150	5354	5507	12429
41	Costa Rica	32	3	15851	14.5	1.41	1.5	77	7291	7608	3012	5754	9352
42	South Africa	123	3	125887	129.2	13.04	17	48	32731	36507	22660	61811	83085
43	Estonia	43	3	4969	4.9	0.68	0.8	71	4373	4174	1043	234	3329
44	Mauritius	88	3	4381	4.4	0.27	0.5	72	2935	2804	964	1415	2716
45	Rep. of Korea	72	3	457219	421.1	23.21	24.2	73	192032	205749	141738	47551	237754

2. Exogenous Variables 11 to 20

№	**Country**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
		X41408	**X4906**	**X1108**	**X214024**	**X2612**	**X2102**	**X21802**	**X21504**	**X41410**	**X2802**
1	India	8	109678	2375	43.5	86.2	015.9	21	20	9.1	37.8
2	Pakistan	10.2	9862	257	57.5	84.7	138.1	20	18	9.7	31.2
3	Uganda	12.4	1111	27	32.5	70.5	22.2	30	18	10.5	37.4
4	Nepal	8.2	1319	32	58	82.5	23	28	11	8.6	36.7
5	Kenya	13.9	1346	30	17.5	62.3	30.1	43	31	15.1	44.9
6	Cameroon	5.1	1421	24	24.5	64.4	14.9	19	31	6.5	47.7
7	Lesotho	9.9	360	5	17	65.7	2	29	32	9.8	56
8	Moldova	120.2	283	10	1	38.4	4.3	11	25	18.9	40.6
9	Kyrgyz Republic	110.2	209	13	23.5	67.8	4.9	17	11	23.1	34.6
10	Burundi	12.3	62	4	52	57.9	6.8	68	5	16.1	42.5
11	Papua New Guinea	7.9	687	11	36	60	5.1	29	25	9.3	50.9
12	Bangladesh	4	10834	209	59	77.8	131.1	38	12	5.5	33.6
13	Ukraine	271.3	6040	183	0.5	31	49.5	5	28	200.4	29
14	Indonesia	15.5	27586	596	13	55.3	210.4	6	8	13.7	31.7
15	Peru	26.8	10693	120	10	41.4	25.7	18	141	27.3	46.2
16	Sri Lanka	9.1	4565	67	8.5	45.4	19.4	25	29	9.9	34.4
17	Dominican Republic	9.4	4721	48	16	16	8.4	28	95	8.7	47.4
18	Tunisia	4.5	5255	58	29	10	9.6	7	108	4.4	41.7
19	Bulgaria	102.8	2039	45	1.5	21.9	8.2	13	62	117.5	26.4

20	Lithuania	75.2	2376	26	0.5	7.8	3.7	8	183	32.6	32.4
21	Latvia	49.2	1931	17	0	8.3	2.4	4	166	29.2	32.4
22	Morocco	2.8	8003	99	51	7.5	28.7	5	49	3.8	39.5
23	Bolivia	8.5	1491	20	14.5	34.3	8.3	23	69	8.7	44.7
24	Salvador	7.4	2246	28	21	44.5	6.3	11	143	8.5	52.2
25	Jamaica	24.1	1999	9	13	25.2	2.6	10	157	23.5	37.9
26	Belarus	355.1	6889	76	0.5	2	10	17	85	336.7	21.7
27	Albania	39.2	713	12	15.5	28.2	3.4	3	36	27.8	36.8
28	Jordan	3.2	1668	19	10.5	7.4	4.9	5	139	3.5	36.4
29	Colombia	21.1	9754	256	8	36	42.3	13	227	20.6	57.1
30	Kazakhstan	204.7	2552	82	15.1	15.3	14.9	5	62	67.8	35.4
31	Philippines	8.4	13452	319	5	42.2	75.6	21	37	8.2	46.2
32	Thailand	4.2	28098	384	4.5	28.2	60.7	21	112	4.9	41.4
33	Russia	162	42688	1165	0.5	25.1	145.6	6	133	99.1	48.7
34	Mexico	18.9	132138	861	8.5	37.7	98	5	236	19.4	53.1
35	Poland	23.4	42590	348	0	2	38.7	9	248	25.3	31.6
36	Turkey	76.3	47985	459	15	18	65.3	10	153	79.9	41.5
37	Czech Republic	11.5	15233	142	7.1	2	10.3	6	380	7.8	25.4
38	Hungary	19.3	14146	120	1	7.3	10	4	318	20.3	24.4
39	Chile	7.3	16225	138	4	8.7	15.2	4	289	8.9	56.7
40	Slovakia	10.6	5736	60	4.5	2	5.4	4	285	8.4	19.5
41	Costa Rica	17.2	2695	30	4	26	3.8	6	257	15.6	45.9
42	South Africa	9.6	18883	392	14.5	35.8	42.8	9	230	8.7	59.3
43	Estonia	53.1	1292	13	3.5	5.2	1.4	6	243	21.6	37.6
44	Mauritius	5.9	1139	12	15.5	8.6	1.2	6	120	6.9	31.8
45	Rep. of Korea	5	132594	818	2.5	2	47.3	6	470	5.1	31.6

2. Exogenous Variables 21 to 31

№	**Country**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**
		X41412	**X4204**	**X41510**	**X4206**	**X41701**	**X41703**	**X41104**	**X41106**	**X490810**	**X41102**	**X41702**
1	India	9.2	114248	-2915	123387	1	91	72661	-18280	-13710	54382	72768
2	Pakistan	10.1	16026	-2208	14177	3	249	13129	-3390	-1849	9739	27450
3	Uganda	13.4	2591	-860	1172	2	146	1024	-333	-987	691	1072
4	Nepal	9.8	2199	-293	1209	1	102	880	-319	-440	561	1512
5	Kenya	15.2	2071	-238	1968	2	168	2693	-21	-1036	2672	4876
6	Cameroon	3.3	3907	-153	1776	3	228	1412	9	355	1421	6450
7	Lesotho	13	153	-151	396	1	95	447	-50	-539	396	540
8	Moldova	64.4	360	-121	257	2	140	382	-75	-347	307	1176
9	Kyrgyz Republic	70.7	509	-77	339	3	237	257	-51	-156	206	1495
10	Burundi	6.7	351	-49	124	3	1118	180	-56	-103	123	672
11	Papua New Guinea	8.9	993	-8	1680	2	97	1031	-309	115	722	2160
12	Bangladesh	4.3	11777	2	11305	1	111	5982	-1602	-2355	4381	9580
13	Ukraine	203.9	4451	1481	12081	1	58	8266	-858	1272	7407	12802
14	Indonesia	17.1	26053	7986	72030	3	182	30804	-3372	12260	27433	113905
15	Peru	24.9	4277	-1628	14436	3	283	10479	-1657	-1069	8822	29370
16	Sri Lanka	10.4	3261	-1042	4402	1	91	3946	-1060	-1794	2886	7216

17	Dominican Republic	11.7	2164	-1026	6687	1	40	3344	-138	-1770	3206	4094
18	Tunisia	4.4	2335	-821	5644	2	112	6150	-545	-778	5605	11457
19	Bulgaria	123	1799	-701	3359	2	131	4282	-132	-720	4150	10168
20	Lithuania	55.6	905	-675	3734	1	90	3519	-588	-792	2930	4644
21	Latvia	25	286	-494	1788	1	94	2531	-293	-572	2238	3174
22	Morocco	4.8	4668	-475	10670	1	124	10837	-967	-2001	9870	16611
23	Bolivia	8.5	1822	-464	1242	2	162	1913	-530	-580	1383	2788
24	Salvador	9.8	1321	-418	3963	1	68	2153	-251	-1982	1902	3654
25	Jamaica	5.3	444	-275	2295	2	95	2895	-503	-814	2391	4278
26	Belarus	373.3	4493	-162	11082	1	10	9255	-659	-300	8596	861
27	Albania	31.2	1914	-156	976	1	36	1118	-394	-788	724	494
28	Jordan	3.9	167	59	2085	3	130	2627	-400	-2252	2227	7728
29	Colombia	18.3	11380	306	25198	2	185	15525	-5283	1626	10242	35826
30	Kazakhstan	246	1641	1074	7839	1	61	2753	-1185	2188	1568	7332
31	Philippines	7.5	11957	9081	23167	2	103	14722	-2840	4484	11883	50432
32	Thailand	5.9	12217	9369	48866	2	89	30664	-11117	9773	19547	77824
33	Russia	143.3	17577	41846	97931	2	128	55243	-2260	52732	52983	149420
34	Mexico	19.3	22980	-18157	160863	1	81	89049	-9767	-11490	79283	139160
35	Poland	21.9	6310	-9997	56786	1	118	55524	-4259	-11042	51265	59866
36	Turkey	83.4	31990	-9819	49984	2	196	76176	-25192	-13996	50984	115197
37	Czech Republic	11.4	2031	-2236	20819	1	57	18026	-1219	-2031	16807	23177
38	Hungary	19.5	2738	-1494	15515	2	85	19805	-2282	-1825	17523	29736
39	Chile	8.3	7760	-991	23985	2	147	16860	-1058	705	15802	35598
40	Slovakia	8.8	765	-694	5928	1	63	7113	-76	-382	7037	9600
41	Costa Rica	14	1427	-649	4914	1	56	3408	-238	317	3170	4495
42	South Africa	10	3777	-469	39025	1	61	38521	-3021	3777	35500	24548
43	Estonia	48.6	298	-315	1342	2	62	1769	-239	-199	1530	3234
44	Mauritius	6.7	263	-33	1402	2	88	1047	-118	-131	929	2376
45	Rep. of Korea	5.3	22861	11405	196604	1	61	79556	11888	13717	91444	117908

Equations (functions) of EM'2000

The model's equations are linear. The contents of the equations is as follows:

Production function, showing the formation of the Gross Domestic Product (in mln USD) as a function of the number of employed, the GDP deflator, imports, gross capital formation and gross domestic savings:

(1) y4202 = f (y2300, x41408, y4910, x4906, y4912);

Function of the Gross National Income, showing the formation of the income (in bln USD) as a function of the GDP and the gross national income, shown as the purchasing power of parity (PPP):

(2) y1104 = f (y4202, x1108);

Function of the employed, showing the formation of the number of employed (in mlns) as a function of the labor force, of the percentage of illiterate population over 15 years of age (both men and women) and the international poverty line of the population as a percentage of the total number (living on under 2 dollars per person per day):

(3) y2300 = f (y2204, x214024, x2612);

Function of the labor force, showing the formation of the mass of the labor force (in mlns) as a function of the total population, the life expectancy, the international poverty line as a percentage of the total number (living on under 2 dollars per person per day) and the share of the population that is undernourished:

(4) y2204 = f (x2102, y22002, x2612, x21802);

Function of the life expectancy at birth (in years) determined by the gross national income, health expenditure per capita, the share of the population that is undernourished, the international poverty line as a percentage of the total number (living on under 2 dollars per person per day), the average consumer price index, the Gini index and the average food price index:

(5) y22002 = f (y1104, x21504, x21802, x2612, x41410, x2802, x41412);

Function of import, showing the formation of the import (in mln USD) as a function of the volume of export, the agriculture value, gross capital formation and the current account balance:

(6) y4910 = f (y4908, x4204, x4906, x41510);

Function of export, showing its formation (in mln USD) as a function of the industry value added, the services volume in GDP, the group that the country is in according to its foreign debt and present value of foreign debt (in % of the volume of export):

(7) y4908 = f (x4206, y4210, x41701, x41703);

Function of gross domestic savings, showing its formation (in mln USD) as a function of the amount of the internal debt, total expenditure and overall budget deficit:

(8) y4912 = f (y41111, x41104, x41106);

Function of the internal debt, showing its formation (in mln USD) from the gross national income, the foreign trade balance, the current revenue and the present value of foreign debt:

(9) y41111 = f (y1104, x490810, x41102, x41702);

Balance equation of the formation of services, showing their formation in the GDP (in mln USD) as the difference between the volume of GDP and value added of industry and agriculture:

(10) y4210 = y4202 – x4206 – x4204.

The equation aggregate, representing the complex model IM'2000 can be presented in the following matrix form:

$$\mathbf{BY+\Gamma X=0,}$$

where **B** and **Γ** are matrices of the parameters of the model (the parameters are denoted in double-digit code showing the number of the row and the column where the parameters of the matrix are (the symbols 0 and 1 are figures), while **Y** and **X** are vectors of the endogenous and the exogenous variables.

The variables, the parameters and the equations are presented by matrix form in the following way:

Table 3

Var.	1	2	3	4	5	6	7	8	9	10
Eqn	**y4202**	**y1104**	**Y2300**	**y2204**	**y22002**	**Y4910**	**y4908**	**y4912**	**Y41111**	**y4210**
1	-1	0	13	0	0	16	0	18	0	0
2	21	-1	0	0	0	0	0	0	0	0
3	0	0	-1	34	0	0	0	0	0	0
4	0	0	0	-1	45	0	0	0	0	0
5	0	52	0	0	-1	0	0	0	0	0
6	0	0	0	0	0	-1	67	0	0	0
7	0	0	0	0	0	0	-1	0	0	710
8	0	0	0	0	0	0	0	-1	89	0
9	0	92	0	0	0	0	0	0	-1	0
10	1	0	0	0	0	0	0	0	0	-1

Matrix **B**

Matrix **B** is a squared matrix of simultaneous type, since there are non-zero parameters on the main diagonal and there is also at least one non-zero parameter above and below it.

Here is matrix **Г**:

Table 4

Var.	11	12	13	14	15	16	17	18	19	20
Eqn	**x41408**	**X4906**	**X1108**	**x214024**	**x2612**	**x2102**	**x21802**	**x21504**	**x41410**	**x2802**
1	111	112	0	0	0	0	0	0	0	0
2	0	0	213	0	0	0	0	0	0	0
3	0	0	0	314	315	0	0	0	0	0
4	0	0	0	0	415	416	417	0	0	0
5	0	0	0	0	515	0	517	518	519	520
6	0	612	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	0

Matrix **Г1**

21	22	23	24	25	26	27	28	29	30	31
x41412	**X4204**	**x41510**	**X4206**	**x41701**	**X41703**	**x41104**	**x41106**	**x490810**	**x41102**	**x41702**
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0
521	0	0	0	0	0	0	0	0	0	0
0	622	623	0	0	0	0	0	0	0	0
0	0	0	724	725	726	0	0	0	0	0
0	0	0	0	0	0	827	828	0	0	0
0	0	0	0	0	0	0	0	929	930	931
0	-1	0	-1	0	0	0	0	0	0	0
Matrix **Г2**										

There are no special requirements towards matrix **Г** except that the two matrices - **B** and **Г** should characterize the identification of each equation with the exception of the balance equations and the definition equations, such as the tenth. If all nine are identifiable, then the model itself is identifiable and we could aim for its reduced form. The identification condition of the first nine equations is true for each one of them.[3] The reduced form is achieved by finding the product of **B**'s reverse matrix with matrix **Г**:

$$\mathbf{Y = -B^{-1}ГX}$$

In this case the matrix product $\mathbf{-B^{-1}Г}$ is denoted by the so-called **П**-matrix, which forms the reduced form of the model; the real use of that form is that it alone expresses each of the endogenous variables **Y** through all exogenous variables **X**. Thus the final solution reflects not only the positive but also the negative feedback among variables.

The EM'2000 solution: Parameter evaluation

The parameter evaluation program was made for the SoritecWin32 software application, using the procedure and modules of the two-stage least squares (TWOSLS) method. The program, including the respective matrix conversions, is as follows:

[3] The condition sine qua non for the identification of each equation is that there exist at least one non-zero determinant of the "No of equations minus one" series (the ninth series in our case), which is made up of parameters preceding variables not belonging to the current equation. In cases when the number of exogenous variables is sufficient and matrix **Г** is of relatively low filling rate, that condition is almost automatically met (as in this case).

EM'2000 parameter evaluation program

```
read ('statuse.sal')
symbols (full)
print *
exogenous x1108 x2102 x214024 x21504 x21802 x2612 x2802 x41102 x41104 x41106 x41408
x41410 x41412 x41510 x41701 x41702 x41703 x4204 x4206
x4906 x490810
twosls(origin) y4202 y2300 y4910 y4912 x41408 x4906
twosls(origin) y1104 y4202 x1108
twosls(origin) y2300 y2204 x214024 x2612
twosls(origin) y2204 y22002 x2612 x2102 x21802
twosls(origin) y22002 y1104 x2612 x21802 x21504 x41410 x2802 x41412
twosls(origin) y4910 y4908 x4906 x4204 x41510
twosls(origin) y4908 y4210 x4206 x41701 x41703
twosls(origin) y4912 y41111 x41104 x41106
twosls(origin) y41111 y1104 x490810 x41102 x41702
matrix beta(10 10) -1 0 400.328 0 0 .481755 0 .622982 0 0 …
                        .854770e-03 -1 0 0 0 0 0 0 0 0 ...
                        0 0 -1 .560334 0 0 0 0 0 0 …
                        0 0 0 -1 .128142e-01 0 0 0 0 0 …
                        0 -.296644e-01 0 0 -1 0 0 0 0 0 ...
                        0 0 0 0 0 –1 .942387 0 0 0 …
                        0 0 0 0 0 0 -1 0 0 -.741022e-02 …
                        0 0 0 0 0 0 0 0 -1 .179637 0 ...
                        0 521.421 0 0 0 0 0 0 -1 0 …
                        1 0 0 0 0 0 0 0 0 –1
print beta
binv=inv(beta)
print binv
emat=binv*beta
print emat
matrix gama(10 21) 16.0716 2.50369 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 ...
                        0 0 .270730e-01 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 ...
                        0 0 0 -.127647 .143379 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 ...
                        0 0 0 0 -.303221e-01 .447611 .575854e-01 0 0 0 0 …
                                    0 0 0 0 0 0 0 0 0 0 ...
                        0 0 0 0 .293949 0 -.192848 .123042 .718874e-01 …
                                    .989296 .633035e-01 0 0 0 0 0 0 0 0 0 0 ...
                        0 .316129e-01 0 0 0 0 0 0 0 0 0 0 …
                                    .923132e-01 -1.08162 0 0 0 0 0 0 0 0 ...
                        0 0 0 0 0 0 0 0 0 0 0 0 0 0 .992285 …
                                    1862.83 –11.2784 0 0 0 0 0 ...
                        0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1.12779 2.42183 0 0 0 ...
                        0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1.16597 –1.68825 .548953 ...
                        0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 –1 0 –1 0 0 0 0 0 0 0
print gama
pi=(-1)*binv*gama
print pi
```

The solution results and the main evaluation for each equation (based on the data in Table 2) are as follows:

Econometric Model EM'2000

Full version of the model: 45 countries, 10 equations, 10 endogenous and 21 exogenous variables

Exogenous variables:

^CONST X1108 X2102 X214024 X21504 X21802 X2612 X2802 X41102 X41104 X41106 X41408 X41410 X41412 X41510 X41701 X41702 X41703 X4204 X4206 X4906 X490810

Equation 1:

Twosls(origin) y4202 y2300 y4910 y4912 x41408 x4906
TWOSLS : dependent variable is **Y4202**
Using 1-45

Variable	Coefficient	Std Err	T-stat	Signf
Y2300	400.328	124.123	3.22525	.003
Y4910	.481755	.340324	1.41558	.165
Y4912	.622982	.345425	1.80352	.079
X41408	16.0716	35.3640	.454461	.652
X4906	2.50369	.471234	5.31304	.000

Equation Summary

No. of Observations = 45
R^2 = .9860 (adj) = .9842
F (5, 40) = 562.115
Significance = .000000

Equation 2:

Twosls(origin) y1104 y4202 x1108
TWOSLS : dependent variable is **Y1104**
Using 1-45

Variable	Coefficient	Std Err	T-stat	Signf
Y4202	.854770E-03	.152733E-04	55.9648	.000
X1108	.270730E-01	.478947E-02	5.65262	.000

Equation Summary

No. of Observations = 45
R^2 = .9973 (adj) = .9972
F (2, 43) = 8053.70
Significance = .000000

Equation 3:

Twosls(origin) y2300 y2204 x214024 x2612
TWOSLS : dependent variable is **Y2300**
Using 1-45

Variable	Coefficient	Std Err	T-stat	Signf
Y2204	.560334	.200623E-01	27.9297	.000
X214024	-.127647	.991557E-01	-1.28733	.205
X2612	.143379	.581815E-01	2.46434	.018

Equation Summary
No. of Observations = 45
R^2 = .9642 (adj) = .9617
F (3, 42) = 377.225
Significance = .000000

Equation 4:

Twosls(origin) y2204 y22002 x2612 x2102 x21802
TWOSLS : dependent variable is **Y2204**
Using 1-45

Variable	Coefficient	Std Err	T-stat	Signf
Y22002	.128142E-01	.124382E-01	1.03023	.309
X2612	-.303221E-01	.304869E-01	-.994596	.326
X2102	.447611	.407690E-02	109.792	.000
X21802	.575854E-01	.564693E-01	1.01976	.314

Equation Summary
No. of Observations = 45
R^2 = .9976 (adj) = .9974
F (4, 41) = 4295.65
Significance = .000000

Equation 5:

Twosls(origin) y22002 y1104 x2612 x21802 x21504 x41410 x2802 x41412
TWOSLS : dependent variable is **Y22002**
Using 1-45

Variable	Coefficient	Std Err	T-stat	Signf
Y1104	-.296644E-01	.242334E-01	-1.22411	.228
X2612	.293949	.157149	1.87051	.069
X21802	-.192848	.261282	-.738085	.465
X21504	.123042	.301673E-01	4.07864	.001
X41410	.718874E-01	.111387	.645386	.523
X2802	.989296	.196047	5.04623	.000
X41412	.633035E-01	.905927E-01	.698770	.489

Equation Summary
No. of Observations = 45
R^2 = .9483 (adj) = .9388
F (7, 38) = 99.5311
Significance = .000000

Equation 6:

Twosls(origin) y4910 y4908 x4906 x4204 x41510
TWOSLS : dependent variable is **Y4910**
Using 1-45

Variable	Coefficient	Std Err	T-stat	Signf
Y4908	.942387	.352949E-01	26.7003	.000
X4906	.316129E-01	.601675E-01	.525416	.602
X4204	.923132E-01	.376408E-01	2.45248	.019
X41510	-1.08162	.669806E-01	-16.1482	.000

Equation Summary
No. of Observations = 45

R^2 = .9986 (adj) = .9984
F (4, 41) = 7067.30
Significance = .000000

Equation 7:

Twosls(origin) y4908 y4210 x4206 x41701 x41703
TWOSLS : dependent variable is **Y4908**
Using 1-45

Variable	Coefficient	Std Err	T-stat	Signf
Y4210	-.741022E-02	.742605E-01	-.997868E-01	.921
X4206	.992285	.130050	7.63004	.000
X41701	1862.83	1673.71	1.11299	.272
X41703	-11.2784	13.9155	-.810491	.422

Equation Summary
No. of Observations = 45
R^2 = .9418 (adj) = .9361
F (4, 41) = 165.817
Significance = .000000

Equation 8:

Twosls(origin) y4912 y41111 x41104 x41106
TWOSLS : dependent variable is **Y4912**
Using 1-45

Variable	Coefficient	Std Err	T-stat	Signf
Y41111	.179637	.433259E-01	4.14618	.001
X41104	1.12779	.927344E-01	12.1615	.000
X41106	2.42183	.321582	7.53100	.000

Equation Summary
No. of Observations = 45
R^2 = .9396 (adj) = .9352
F (3, 42) = 217.628
Significance = .000000

Equation 9:

Twosls(origin) y41111 y1104 x490810 x41102 x41702
TWOSLS : dependent variable is **Y41111**
Using 1-45

Variable	Coefficient	Std Err	T-stat	Signf
Y1104	521.421	119.837	4.35109	.000
X490810	1.16597	.567020	2.05632	.046
X41102	-1.68825	.715280	-2.36027	.023
X41702	.548953	.265307	2.06912	.045

Equation Summary
No. of Observations = 45
R^2 = .8078 (adj) = .7891
F (4, 41) = 43.0922
Significance = .000000

Equation 10:

Balance equation - the parameters are not evaluated, they are known!

A general characteristic of the evaluations of equations is the high coefficient of determination (in a number of cases when such evaluations are present, its value is too low or insignificant, even with the TWOSLS operator values are negative and/or substantially over 1, which can be explained by the obvious adoption of the zero hypothesis, while with the REGRESS operator such values are never observed). The values of the F-statistic (test) and the t-test are respectively high, the level of significance of the chosen factor variables and the variable aggregate as a whole is high with a very small likelihood of error provided the given parameter values are correct.

Comparative results of the model's solution

Matrix **П** is of particular interest to us.

Table 5

Matrix **П** (transposed)

№	Vari-ables	1	2	3	4	5	6	7	8	9	10
		Y4202	Y1104	Y2300	Y2204	Y22002	Y4910	Y4908	Y4912	Y41111	Y4210
1	**X41408**	16,8543	1,44E-02	-3,07E-06	-5,48E-06	-4,27E-04	-0,1177	-0,12489	1,34941	7,51189	16,8543
2	**X4906**	2,6416	2,26E-03	-4,81E-07	-8,58E-07	-6,70E-05	1,32E-02	-1,96E-02	0,211495	1,17735	2,6416
3	**X1108**	1,6543	2,85E-02	-6,07E-06	-1,08E-05	-8,45E-04	-1,16E-02	-1,23E-02	2,66828	14,8537	1,6543
4	**X214024**	-53,5894	-4,58E-02	-0,12764	1,74E-05	1,36E-03	0,374231	0,397109	-4,29055	-23,8845	-53,5894
5	**X2612**	53,9471	4,61E-02	0,128489	-2,66E-02	0,292581	-0,37673	-0,39976	4,31919	24,044	53,9471
6	**X2102**	105,297	9,00E-02	0,250792	0,447577	-2,67E-03	-0,73532	-0,78027	8,43043	46,9304	105,297
7	**X21802**	12,9652	1,11E-02	3,09E-02	5,51E-02	-0,19318	-9,05E-02	-9,61E-02	1,03804	5,77852	12,9652
8	**X21504**	0,370903	3,17E-04	8,83E-04	1,58E-03	0,123033	-2,59E-03	-2,75E-03	2,97E-02	0,16531	0,370903
9	**X41410**	0,2167	1,85E-04	5,16E-04	9,21E-04	7,19E-02	-1,51E-03	-1,61E-03	1,73E-02	9,66E-02	0,2167
10	**X2802**	2,98217	2,55E-03	7,10E-03	1,27E-02	0,98922	-2,08E-02	-2,21E-02	0,238763	1,32914	2,98217
11	**X41412**	0,190825	1,63E-04	4,54E-04	8,11E-04	6,33E-02	-1,33E-03	-1,41E-03	1,53E-02	8,50E-02	0,190825
12	**X4204**	5,02E-02	4,29E-05	-9,13E-09	-1,63E-08	-1,27E-06	9,89E-02	7,04E-03	4,02E-03	2,24E-02	-0,94983
13	**X41510**	-0,54645	-4,67E-04	9,95E-08	1,78E-07	1,39E-05	-1,0778	4,05E-03	-4,38E-02	-0,24355	-0,54645
14	**X4206**	0,475966	4,07E-04	-8,67E-08	-1,55E-07	-1,21E-05	0,938776	0,996168	3,81E-02	0,212135	-0,52403
15	**X41701**	886,913	0,758107	-1,61E-04	-2,88E-04	-2,25E-02	1749,31	1856,26	71,0092	395,293	886,913
16	**X41703**	-5,36977	-4,59E-03	9,78E-07	1,74E-06	1,36E-04	-10,5911	-11,2386	-0,42992	-2,39328	-5,36977
17	**X41104**	0,736811	6,30E-04	-1,34E-07	-2,39E-07	-1,87E-05	-5,15E-03	-5,46E-03	1,18678	0,328393	0,736811
18	**X41106**	1,58224	1,35E-03	-2,88E-07	-5,14E-07	-4,01E-05	-1,10E-02	-1,17E-02	2,54851	0,705195	1,58224
19	**X490810**	0,136839	1,17E-04	-2,49E-08	-4,45E-08	-3,47E-06	-9,56E-04	-1,01E-03	0,220407	1,22696	0,136839
20	**X41102**	-0,19814	-1,69E-04	3,61E-08	6,44E-08	5,02E-06	1,38E-03	1,47E-03	-0,31914	-1,77656	-0,19814
21	**X41702**	6,44E-02	5,51E-05	-1,17E-08	-2,09E-08	-1,63E-06	-4,50E-04	-4,77E-04	0,10377	0,577667	6,44E-02

What is characteristic of it is its full filling rate, despite the fact that not all variables take part in all equations - in this case we have made use of the feedback principle in matrix calculations (the so-called multiplication effect). On the basis of the matrix there can be made conclusions concerning the behaviour of the endogenous variables as a result of the values of the exogenous ones, using the obtained π_{ij}-coefficients.

The matrix coefficients can be taken as average, formed from the 45 countries, and, on that basis, if we substitute the values of the exogenous variables of particular countries, we could obtain the values of the endogenous variables which can then be compared to those given for the country. The program analogue in this case is very close to that of projecting models using time variables. Such evaluations are made for 14 countries, and we have shown here the program for only one of them - Bulgaria (the following script is a continuation of the script given above).

Program for evaluating the endogenous variables by country on the basis of matrix Π and the exogenous variables of the respective country

```
Bulgaria
Use 19
Matrix exog(21 1) x41408 x4906 x1108 x214024 x2612 x2102 x21802 x21504 ...
x41410 x2802 x41412 x4204 x41510 x4206 x41701 x41703 x41104 x41106 ...
x490810 x41102 x41702
endog=pi*exog
print endog
endogtr=tr(endog)
print endogtr
unmake endogtr y4202 y1104 y2300 y2204 y22002 y4910 y4908 ...
y4912 y41111 y4210
print y???? y?????
```

Note: The program is extended to cover the rest of the countries simply by changing the serial number in the present use (for Bulgaria it is 19).

The results for the 10 endogenous variables for the 14 countries, compared to their actual values taken as a benchmark, are given in Table 6:

Table 6

Actual and calculated values (EM'2000) of the endogenous variables for 14 countries for 2000

Endogenous variables	GDP	GNI	Employed	Labor force	Life span	Import	Export	Gr. Cap.	Internal debt	Serv-s in GDP
Country	y4202	y1104	y2300	y2204	y22002	y4910	y4908	y4912	y41111	y4210
8. Moldova Actual	1286	1.4	1.96	2.2	68	990	643	-64	1001	669
Calculated	6909	6.2	6.57	2.1	58	2392	2355	778	2943	6292
Calcualated over actual ratio	5.4	4.4	3.4	1.0	0.8	2.4	3.7	-12.1	2.9	9.4
13. Ukraine Actual	31791	34.6	22.11	25.1	68	18121	19393	7312	2988	15260
Calculated	37936	37.4	16.91	22.4	66	11287	13038	10028	15497	21404
Calcualated over actual ratio	1.2	1.1	0.8	0.9	1.0	0.6	0.7	1.4	5.2	1.4
19. Bulgaria Actual	11995	12.4	3.52	4.2	72	7677	6957	1319	6333	6957
Calculated	15300	14.3	5.44	4.4	53	6178	5506	5442	5190	10142
Calcualated over actual ratio	1.3	1.2	1.5	1.1	0.7	0.8	0.8	4.1	0.8	1.5
20. Lithuania Actual	11314	10.8	1.69	1.9	73	5883	5091	1584	2489	6675
Calculated	12524	11.4	2.55	2.7	61	5124	4495	3017	2628	7885
Calcualated over actual ratio	1.1	1.1	1.5	1.4	0.8	0.9	0.9	1.9	1.1	1.2
21. Latvia Actual	7150	6.9	1.19	1.3	70	3861	3289	1359	937	5077
Calculated	9481	8.6	2.19	1.8	58	2998	2522	2462	1763	7407
Calcualated over actual ratio	1.3	1.2	1.8	1.4	0.8	0.8	0.8	1.8	1.9	1.5
26. Belarus Actual	29950	28.7	5.19	5.3	68	20666	20366	6290	6050	14077
Calculated	36413	33.2	3.79	6.4	76	12674	12592	9365	2913	20838
Calcualated over actual ratio	1.2	1.2	0.7	1.2	1.1	0.6	0.6	1.5	0.5	1.5
27. Albania Actual	3752	3.8	1.39	1.7	74	1501	713	-113	1741	863
Calculated	5107	4.7	2.91	1.5	52	2638	2409	410	576	2217
Calcualated over actual ratio	1.4	1.2	2.1	0.9	0.7	1.8	3.4	-3.6	0.3	2.6
33. Russia Actual	251106	241.0	68.84	77.7	65	62777	115509	95420	256379	135597
Calculated	203587	205.6	40.40	65.8	81	50823	98805	85795	161243	88079
Calcualated over actual ratio	0.8	0.9	0.6	0.8	1.2	0.8	0.9	0.9	0.6	0.6
35. Poland Actual	157739	161.8	16.58	19.9	73	53631	42590	31548	68459	94643
Calculated	177393	161.1	10.67	18.5	59	65547	56033	55434	17416	114297
Calcualated over actual ratio	1.1	1.0	0.6	0.9	0.8	1.2	1.3	1.8	0.3	1.2
36. Turkey Actual	199937	202.1	28.70	31.3	70	61980	47985	33989	106966	117963
Calculated	179344	165.7	17.56	30.1	69	62579	50392	33389	47257	97370
Calcualated over actual ratio	0.9	0.8	0.6	1.0	1.0	1.0	1.1	1.0	0.4	0.8
37. Czech Republic Actual	50777	53.9	5.29	5.8	75	38083	36052	13202	6550	27927
Calculated	62831	57.6	2.63	5.8	71	23426	21582	19531	11988	39981
Calcualated over actual ratio	1.2	1.1	0.5	1.0	0.9	0.6	0.6	1.5	1.8	1.4
38. Hungary Actual	45633	47.2	4.49	4.8	71	30574	28749	11865	27608	27380
Calculated	58368	53.1	3.90	5.3	66	19152	17865	19023	12321	40115
Calcualated over actual ratio	1.3	1.1	0.9	1.1	0.9	0.6	0.6	1.6	0.4	1.5
40. Slovakia Actual	19121	20.0	2.43	3.0	73	14532	14150	5354	5507	12429
Calculated	24165	22.3	1.55	3.3	55	7510	6905	8657	4562	17472
Calcualated over actual ratio	1.3	1.1	0.6	1.1	0.7	0.5	0.5	1.6	0.8	1.4
43. Estonia Actual	4969	4.9	0.68	0.8	71	4373	4174	1043	234	3329
Calculated	7934	7.1	1.27	1.7	72	4472	4311	1898	2680	6294
Calcualated over actual ratio	1.6	1.5	1.9	2.2	1.0	1.0	1.0	1.8	11.5	1.9

From the results on the endogenous variables of the countries there can be made the following conclusions, if we assume that the calculated

values of the model can be viewed as the result of using the ones arrived at through the external varying conditions for the functioning of the economies of the respective countries:

1. With the exception of the two big countries of Russia and Turkey, with all the rest the GDP achieved is lower than the one calculated by the model, in other words there exist unused reserves for achieving the same result. In practice that means the available resources of the countries represented through the exogenous variables, suggest the possibility of achieving a higher volume of the product in comparison with that realized in the year in question - 2000. The case of Moldova is particularly striking - the coefficient is 5.4. It is comparatively much smaller in Estonia – 1.6, Albania - 1.4, while with Bulgaria along with Latvia, Hungary and Slovakia it is 1.3. Actually this means up to 1/3 unused capacity at the creation of the product. Almost analogous is the situation with the GNI, however Poland already features a coefficient of 1.0, while Bulgaria along with Latvia, Belarus and Albania –1.2. This confirms, and even reinforces the conclusion about the inefficient use of our social and economic resources, a situation analogous to the economies of the countries in question which are at a comparatively lower level of development.

2. With respect to the number of employed Moldova also stands out with a high coefficient – 3.4, which allows us to make the conclusion concerning the insufficient utilization and involvement of the workforce in the form of employed individuals. Albania and Estonia feature coefficients of approximately 2, while Bulgaria, Lithuania and Latvia also belong in the group featuring high unemployment and unusability of labour resources. With the rest of the countries that coefficient is below 1: Czech Republic - 0.5, Russia, Poland and Turkey - 0.6. The formation of the workforce follows the trend/tendency of the employed, although that indicator is based on other more objective principles.

3. The conduct of the life expectancy at birth indicator is also interesting. Bulgaria, Albania and Slovakia's coefficients are 0.7, which means insufficient level of the resources of life expectancy and it is very likely that other factors, unaccounted for here, have had significant influence over it, including momentum and quality of life. Values of approximately one and above are characteristic of Ukraine, Belarus, Russia, Turkey and Estonia.

4. The coefficients which are considerably above 1 are typical of the export and import of Moldova, Albania and to a certain extent of Poland, while those below 1 - typical of Slovakia, Hungary, Czech Republic, Belarus, Ukraine, Latvia, Bulgaria, Russia and Lithuania (in ascending order from 0.5 to 0.9). This suggests insufficient use of the foreign economic factor concerning the economic development of the last group of 9 countries.

5. Characteristic of Bulgaria is the high coefficient of gross capitalization (4.1), which suggests its low real level in comparison with the capabilities, determined by available resources. As far as Moldova and Albania are concerned,

the coefficients are not only high, but also negative. For all the rest of the countries (except Russia, whose value is 0.9) the values are a little over 1 - up to 1.9. The conclusion which can be made about those countries, although not sufficiently precise, is that the gross capitalization in their economies is formed comparatively rationally.

6. The state of the internal debt features values which are lower than the actual ones: Albania - 0.3, Poland - 0.3, Hungary - 0.4, Turkey - 0.4. This also holds true for Belarus, Russia and Bulgaria, while with Estonia, Moldova, Latvia and the Czech Republic the values of the coefficients are respectively higher than 1, but they are decreasing - from 11.5 to 1.8.

7. The state of the services in the GDP is at a coefficient of 9.4 in Moldova, 2.6 in Albania, 1.5 in Bulgaria, Hungary, Latvia and Belarus. Below 1 is only that in Russia and Turkey. This means that in almost all countries the services issue has not been solved yet and they have not reached their optimum level, coordinated with the available social and economic resources in the countries under study.

The relation among the endogenous variables with respect to the correspondence between the calculated and the actual values, measured by the coefficients given, can generally be expressed by the correlational matrix, made by allotting the data for the 14 countries (see Table 7).

Table 7

Correlational matrix of the coefficients for the endogenous variables

Variables	Y4202	Y1104	Y2300	Y2204	Y22002	Y4910	Y4908	Y4912	Y41111	Y4210
Y4202	1,000	,997	,804	-,658E-02	-,233	,779	,717	-,903	,177	,993
Y1104	,997	1,000	,810	,220E-01	-,193	,771	,703	-,894	,202	,989
Y2300	,804	,810	1,000	,280	-,395	,812	,777	-,749	,303	,824
Y2204	-,658E-02	,220E-01	,280	1,000	,399E-01	-,112	-,203	,210	,756	-,526E-01
Y22002	-,233	-,193	-,395	,399E-01	1,000	-,312	-,338	,163	,226	-,258
Y4910	,779	,771	,812	-,112	-,312	1,000	,970	-,889	,403E-01	,826
Y4908	,717	,703	,777	-,203	-,338	,970	1,000	-,889	-,242E-01	,783
Y4912	-,903	-,894	-,749	,210	,163	-,889	-,889	1,000	-,202E-01	-,937
Y41111	,177	,202	,303	,756	,226	,403E-01	-,242E-01	-,202E-01	1,000	,137
Y4210	,993	,989	,824	-,526E-01	-,258	,826	,783	-,937	,137	1,000

Of the 90 pairs of correlational coefficients, half of which are symmetrical, that is, equal, there are 45 left. Twenty-two (half of them) have comparatively high values - over 0.75 to 0.99; six of them are negative, that is, they refer to the presence of high feedback level between the respective variable pairs.

The high coefficients are observed among the variables for the GDP and GNI, among them and the employed, among them, including the employed, and the import, export, the gross domestic savings and value of the services in GDP.

Negative is the relation of the gross domestic savings with the GDP, GNI, the employed, the import, export and services in the GDP. Hence we can draw the conclusion about the presence of expected relations and relations drawn theoretically among the variables, with the exception of the role of the gross domestic savings, which does not appear as an acceleration factor of the principal variables of growth of the economies of the countries under study, but the other way round. Therefore, for the year 2000 as well, those countries did not rely on the use of internal resources (the measurement of the gross domestic savings) for the acceleration of economic development. The disregard of (disuse of) internal resources was ascertained by Hernando de Soto with regard to the developing countries and the former socialist countries.[4]

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The present static model EM'2000 offers a comparatively good basis for analysis, although in a sense it is somewhat limited. The search for greater capabilities is faced with the contradiction concerning the reduction of the indicators and the restriction of the analytical abilities of the model, thus achieving a greater number of countries covered and respectively achieving groups in order to provide differentiated economic assessments and vice versa.

The eventual successful way out of the controversy may be sought in the creation of a system of models, made up in accordance with various principles and the search for a more general and informal relation among them. So far this issue has not met the desired response, something which would otherwise help find solutions to the whole lot of problems that are extremely difficult to solve.

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[4] *De Soto, H*. The Mystery of Capital (why Capitalism Triumphs in the West and Fails Everywhere Else). L., NY, BANTAM PRESS, 2000.