ACTA UNIVERSITATIS AGRICULTURAE ET SILVICULTURAE MENDELIANAE BRUNENSIS

Volume LIX 29 Number 2, 2011

ASSESSING THE GDP STRUCTURE IN GLOBAL COMPARISON

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Received: December 17, 2010

Abstract

PALÁT, M., KUNC, A.: *Assessing the GDP structure in global comparison.* Acta univ. agric. et silvic. Mendel. Brun., 2011, LIX, No. 2, pp. 213–220

The paper deals with identifying relationships between the household consumption and the GDP on the selected sample of countries of the world. It provides an analysis of the GDP structure and its development and, on the basis of available statistic data, carries out evaluation of the development of the GDP structure from the point of view of the expenditure method of its estimating in the selected sample of the world countries. In this respect, the validity of a hypothesis is also verified that countries with higher GDP per capita reach the lower proportion of consumption in the total GDP than countries with a lower GDP per capita, namely at the global comparison on the more heterogeneous sample of countries than analyses published so far.

gross domestic product, household consumption, regression analysis, global comparison

GDP is ranked among macroaggregates. Thus, as every aggregate, also GDP includes a number of other partial components (economic quantities). All these components create an integrated system with their elements and relationships. Available literature includes a number of hypotheses dealing with the development and structure of GDP, which can be verified by research. The more detailed description of the system function and the closer approximation of the fundamental elements and relationships the more consistent the fulfilment of the principle of this research resulting in the knowledge of the present behaviour and the possible future development of the system.

METHODS AND RESOURCES

The aim of our paper is, on the basis of available statistical data, to evaluate the development of the GDP structure in the selected sample of the world countries. In this connection, the validity of a hypothesis will be verified that countries with a higher GDP per capita reach the lower proportion of consumption in the total GDP than countries with a lower GDP per capita. One of methods how to obtain the resulting value of the GDP is to carry out the sum of the household consumption, government expenditures, gross investments and net exports. In following paragraphs, an analysis will be carried out how particular components participate in the GDP, what (to what extent) is their development in the course of time including an effort to involve other characteristics, which will become evident in data of the reference sample of countries. The reference sample represents 35 countries of the world, which are divided into six following groups:

1. Very developed countries
   - Japan, USA, Switzerland, Denmark, United Kingdom, Canada, Germany, France, Australia, Luxembourg.
2. Countries of the former eastern bloc
   - Slovenia, Czech Republic, Estonia, Hungary, Poland.
3. Countries of the Near East
   - United Arab Emirates, Syria, Yemen.
4. Countries of eastern Asia
   - Hong Kong, South Korea, Malaysia, Thailand, China.
5. Latin American countries
   - Argentina, Mexico, Brazil, Peru, Ecuador, Bolivia.

6. African countries
   - Tunisia, Egypt, Cameroon, Kenya, Mozambique, Madagascar.

Each group contains the most important economies of the region together with smaller ones, rich or poor (with exception of the group of very developed countries). The selection has been made quite subjectively after a thorough study of data from particular countries where some common features and deviations from the "typical" GDP structure were searched. The number of countries in each of the groups is conditioned by the number of countries with available data in the on-line Nationmaster (2010) database within a necessary time horizon. For some groups, suitable data were available for more countries. In this case, countries with the longest time series of data necessary to carry out the analysis were selected.

A starting point of the paper was the study of domestic and foreign specialized literature sources. Hayes (2006), Chatterjee (2010) and Heim (2010) dealt with problems of aggregate consumption spending and consumption functions. For example, Arlt (2001) or Mandel and Tomšík (2003) dealt with the analysis of consumption functions under conditions of the Czech Republic. Kraft (2008) was engaged in problems aimed at the evaluation of interrelationships in changes of the GDP, consumption and investments. Testing the truth of the selected hypothesis, which is the objective of this paper, can be carried out using methods of regression and correlation analysis. The use of statistical methods was described by Mason and Lind (1990). The factual data processing comes from the methodology published by Hindls *et al.* (2003) and Seger *et al.* (1998). The main graphical data presentation tool for examining the dependence between two variables is a point diagram, where we mark particular cases as points in a reference frame with coordinates, which are the values of particular dependent and independent variables. Statistical software Unistat 5.11 for Windows and Microsoft Excel has been used for the calculation of following results.

RESULTS AND DISCUSSION

In following sections, an analysis is carried out how particular components participate in the size of the GDP and what is their time development at the reference sample representing 35 countries of the world, which are divided into six various groups (very developed countries, countries of the former eastern bloc, countries of the Near East, countries of eastern Asia, Latin American countries and African countries).

Tab. I presents the mean percent proportion of consumption in the GDP of selected countries for the given time period. Tab. I shows that within the GDP, the consumption of households occupies the most important place from its components and but exceptions, the proportion of consumption does not decrease below 50%. Extreme values 108% (or 104%) in Mozambique result from a fact that it refers to an extremely poor country where it is possible to suppose that the size of the state consumption and investments will have a very small proportion. On the contrary, the role of imports will show an important position. This import effects negatively on the GDP size. Thus, in the total sum of proportions of particular components, we can approach a logical value of 100%.

On the other hand, the lowest proportion of the consumption as for the considered group of countries is reached by United Arab Emirates where the main factor causing this fact is the geographical position of the country in the Persian Gulf rich in oil deposits. Thanks to the production of this raw material the proportion of exports reaches higher values at the expense of other components and thus also of the household consumption.

Tab. II presents information on the proportion of gross investments in the GDP of selected countries for the given time period. Based on values given in Tab. II for the first group of countries (very developed countries), we can note that the rate of investments decreases in the course of time being close to the value of 20% in 2005. Only Japan and the USA are exceptions. A similar tendency can be also noted at Hong Kong, which also considerably exceeds the mean of the examined sample of countries by its GDP per capita.

Generally, we can resume that in developed countries where it is possible to suppose the higher availability of capital, the fall of the proportion of gross investments occurs, which can be attributed to the effect of decreasing limiting yield from the invested capital. On the contrary, the higher proportion of gross investments can be noted at the group of counties of eastern Asia. However, this finding corresponds to actual development when "Asian tigers" became from the mentioned countries, i.e. countries with the high rate of growth of the GDP. Thus, because investments are a stimulus for the economic growth this trend in the development of investments could be supposed.

If we focus on countries of South America, there is an evident considerably unstable development of the proportion of investments in the GDP. For example, we can note a considerable slump in the proportion of investments in Bolivia and Brazil at the turn of the 70s and 80s. In both countries, an economic decline occurred in this period resulting in certain dependences between the development of economics and the proportion of investments in the GDP. The same tendency occurred also in case of some south-eastern Asian countries in 1997 when this region was affected by a financial and currency crisis. Thus, we can resume that in the period of economic fall, investments decrease even faster than the GDP. Thus, we can assign a considerably pro-cyclic behaviour to investments.

Generally, the change of investments is more marked than the change of the GDP alone. In case of the poorest countries of Africa we can note the

I: *Proportion of the household consumption in the GDP percentage in the selected sample of the world countries*

	Luxembourg	Japan	USA	Switzerland	Denmark	UK	Canada	Germany	France	Australia	Slovenia	Czech Rep.	Estonia	Hungary	Poland	UAE	Syria	Yemen
2001–2005	42	57	71	61	48	67	56	59	57	60	56	53	58	69	64	58	64	65
1996–2000	43	57	68	61	50	65	56	59	56	59	59	53	57	65	63	41	67	69
1991–1995	45	56	68	61	51	64	57	59	57	60	57	47	55	73	63	39	71	84
1986–1990	50	55	68	61	52	63	57	59	58	59	53	48	51	70		40	75	75
1981–1985	58	56	67	63	53	60	56	59	58	61	53	48	53	70			63	75
1976–1980	57	56	66	64	56	58	59	59	59	61	53	48		72			72	75
1971–1975	52	56	66	61	55	59	58	57	58	61	53	48		76			71	75
1966–1970	50	58	64	61	58	58	58	57	58	59	53	48		79				75
1960–1965	49	61	63	60	58	59	59	57		59	53	48						75

	Hong Kong	South Korea	Malaysia	Thailand	China	Argentina	Mexico	Brazil	Peru	Ecuador	Bolivia	Tunisia	Egypt	Cameroon	Kenya	Mozambique	Madagascar
2001–2005	56	52	44	57	43	67	70	58	71	67	75	62	75	71	77	66	93
1996–2000	62	55	43	56	48	70	67	63	72	63	75	61	77	68	77	84	85
1991– 1995	63	58	47	57	52	71	70	58	74	63	77	62	81	65	71	94	84
1986–1990	59	58	47	60	55		68	52	76	64	80	64	78	64	72	104	83
1981–1985	61	61	53	64	58		67	59	74	68	73	66	80	60	68	108	93
1976–1980	59	62		69		63	70	53	76	66	71	62	85	69	73		
1971–1975	60	68		72		67	74	52	79	67	73	61		73			
1966–1970	58	68		77		67	75	51	82	72	78			73			
1960–1965	51	73		82		67	78			67							

Source: Our calculations based on Nationmaster data (2010)
Note: UAE = United Arab Emirates, UK = United Kingdom

low proportion of investments within the GDP. This phenomenon can be attributed to the unstable politico-economical environment in countries under consideration. Thus, these countries become less attractive for potential investors.

Values of government expenditures represent another analysed component of the GDP. At the absolute majority of countries from the examined group, these values indicate certain stability in the proportion of this component within the GDP, see Tab. III. Thus, a certain percentage change of the GDP corresponds to the same change of government expenditures. No marked changes in the development of government expenditures occurred even at "Asian tigers" in the period of the financial crisis in 1997. It follows that government expenditures show a certain stabilization function within the GDP.

If we evaluate the size of government expenditures from the aspect of the wealth and development of particular countries we can find that there is no exact dependence between an economic level and the proportion of government expenditures. For example, Luxemburg, which reaches a quadruple of the GDP average per capita from the examined countries, shows government expenditures roughly at the same level as Yemen, which reaches only 4% of the average. It is, however, necessary to mention that in case of Luxemburg, it refers to a very specific country and a more detailed comparison would require considering its other economic characteristics.

Data given in Tab. IV serve for the analysis of exports and imports as last components of GDP. Data in Tab. IV correspond to a theoretical hypothesis that more developed countries will reach positive values of net exports whereas countries at the second end of the scale will dominate rather in imports.

Thus, in accordance with this condition, African countries reach higher negative values of net exports while the most developed countries show well-balanced or slightly prevailing exports.

Tab. IV shows that fast developing countries of southern and south-eastern Asia reach one of the highest values of net exports over the last years. At some countries of this region, such as Hong Kong, Malaysia or Thailand, exports reach values close to the level of GDP or even exceed the GDP. These countries are considerably orientated to exports and exports show a key role in the growth of eco-

II: *The size of expenditures for gross investments in the GDP percentage in the selected sample of the world countries*

	Luxembourg	Japan	USA	Switzerland	Denmark	UK	Canada	Germany	France	Australia	Slovenia	Czech Rep.	Estonia	Hungary	Poland	UAE	Syria	Yemen
GDP per capita [%]*	400	299	286	266	242	206	192	183	180	177	88	51	45	44	40	176	9	4
2001–2005	22	24	19	22	21	17	20	19	20	26	26	30	31	25	20	20	22	22
1996–2000	22	26	19	23	20	17	19	21	18	23	24	29	26	25	23	22	18	23
1991–1995	21	28	15	23	16	15	18	22	18	21	17	25	24	17	15	23	21	17
1986–1990	22	29	15	24	18	16	20	21	19	22	16	25	35	17		22	25	13
1981–1985	19	26	15	21	15	14	18	20	17	22	16	25	34	18			40	13
1976–1980	20	28	15	20	19	15	18	22	19	22	16	25		23			44	13
1971–1975	25	30	15	24	22	16	18	24	21	23	16	25		21			38	13
1966–1970	24	27	14	25	22	17	17	26	21	27	16	25		18				13
1960–1965	31	21	14	27	23	18	19	26		29	16	25						13

	Hong Kong	South Korea	Malaysia	Thailand	China	Argentina	Mexico	Brazil	Peru	Ecuador	Bolivia	Tunisia	Egypt	Cameroon	Kenya	Mozambique	Madagascar
GDP per capita [%]*	**229**	**101**	**34**	**19**	**11**	**62**	**47**	**28**	**18**	**12**	**8**	**18**	**12**	**6**	**3**	**2**	**2**
2001–2005	25	30	24	25	37	14	21	21	19	28	15	25	18	20	15	29	19
1996–2000	29	33	32	30	35	18	21	22	23	23	20	26	19	17	15	27	13
1991–1995	27	37	38	44	31	17	19	21	20	26	15	28	15	19	13	20	10
1986–1990	24	31	25	34	27		17	24	17	28	12	24	23	23	15	18	13
1981–1985	26	26	27	29	26		20	23	18	32	10	35	34	30	17	14	11
1976–1980	28	25		31		23	23	33	17	39	16	35	34	23	21		
1971–1975	25	17		30		21	22	33	18	34	17	34		19			
1966–1970	26	15		30		20	22	30	13	32	14			20			
1960–1965	38	6		19		20	20			32							

Source: Our calculations based on Nationmaster data (2010), * 100% = mean of the examined sample

nomics. Thanks to the marked proportion of exports in the GDP, negative deviations in the demand of foreign countries for domestic goods could cause a marked decline of the whole economics. It would be of interest to trace how the decline became evident in the course of the last global economic recession. Although it does not result from Tab. IV, in the course of processing starting data it was found that the considerable growth of foreign trade occurred at all monitored countries during the examined period. While in 1960, exports represented on average 20% GDP, in 2004, it reached already 53%. It points to the ever-increasing importance of the international market in the field of goods and services. In this part of our paper we can verify the applicability of the following hypothesis: "Countries with higher GDP per capita reach the smaller proportion of consumption in the total GDP than countries with lower GDP per capita". Kraft (2008) proved this hypothesis at a group of EU countries. Our aim is to extend or disprove applicability of this hypothesis in a global comparison at a more heterogeneous sample of countries. Our sample will represent 140 countries. For 140 observations, critical values of the index of correlation amount to 0.163 (95% confidence interval) and 0.218 (99% confidence interval). Our calculated value of the index of correlation of linear dependence amounts to 0.44018, which indicates that it refers to a statistically highly significant dependence. However, it is not possible to deduce the intensity of dependence only from the high significance. Because the index of correlation is nearer to zero than to one, it refers to weak linear dependence, which is of negative (indirect) character (see Fig. 1). Another indicator informing on the quality of the selected regression function is the index of determination. The determination index is the second power of the index of correlation. In our case, it amounts to 0.1938. Based on this value, we can state that the selected regression function accounts for only 19% of the total variance and remaining 71% is a so called residuum, i.e. other effects. According to low values of the correlation and determination indexes, the examined dependence is not as unam-

III: *The size of government expenditures in the GDP percentage in the selected sample of countries of the world*

	Luxembourg	Japan	USA	Switzerland	Denmark	UK	Canada	Germany	France	Australia	Slovenia	Czech Rep.	Estonia	Hungary	Poland	UAE	Syria	Yemen
2001–2005	16	18	15	12	26	19	19	19	23	18	19	22	19	10	19	13	13	17
1996–2000	16	16	15	12	25	19	20	19	24	18	20	21	22	11	19	15	11	14
1991–1995	16	15	17	12	26	21	23	19	25	19	21	24	20	12	22	15	13	18
1986–1990	16	15	19	11	26	21	23	21	24	19	19	25	13	10		15	15	18
1981–1985	17	15	19	10	28	24	24	21	24	19	19	25	13	9			21	18
1976–1980	17	15	19	10	26	25	24	21	23	18	19	25		9			20	18
1971–1975	16	14	20	10	24	24	24	20	22	17	19	25		10			20	18
1966–1970	17	15	24	10	22	24	23	19	23	17	19	25		12				18
1960–1965	16	19	24	9	20	24	22	19		16	19	25						18

	Hong Kong	South Korea	Malaysia	Thailand	China	Argentina	Mexico	Brazil	Peru	Ecuador	Bolivia	Tunisia	Egypt	Cameroon	Kenya	Mozambique	Madagascar
2001–2005	9	12	13	11	16	14	11	19	10	9	15	16	11	10	15	10	8
1996–2000	10	13	11	11	15	13	12	19	10	10	14	16	12	9	16	9	7
1991–1995	10	13	12	10	17	14	13	22	10	11	15	16	12	9	13	11	8
1986–1990	9	14	13	12	15		13	24	10	14	16	17	14	9	11	10	9
1981–1985	11	16	14	15	16		12	18	11	17	20	17	15	7	11	11	9
1976–1980	10	17		14		12	11	19	10	18	19	16	15	7	12		
1971–1975	10	19		12		11	11	21	10	12	17	15		8			
1966–1970	11	22		11		12	9	23	9	10	15			8			
1960–1965	10	24		10		14	9			11							

Source: Our calculations based on Nationmaster data (2010)

biguous as in an analysis carried out by Kraft (2008, p. 418) for the group of countries of EU. Fig. 1 shows dependence between the size of GDP per capita and the percentage proportion of the household consumption in the GDP. According to Fig. 1, it is also evident that in case of a separate evaluation of the dependence for countries with GDP per capita up to USD10 000 and above USD10 000, we would come also to different results. Thus, this fact can become the subject of other examination.

Thus, we can conclude that, in this broad global comparison, consumption shows the highest proportion in the GDP. The share of consumption in GDP decreases only exceptionally below 50%. Moreover, it appeared that in African countries, the proportion of consumption ranged between 70 and 80%. This finding corresponds to another result, which has proved a hypothesis that countries with higher GDP per capita reach the lower proportion of consumption in the total GDP than countries with lower GDP per capita. The hypothesis is based on a condition that households in economically more developed countries with higher incomes need not spend such a high percentage from their incomes as households from less economically developed countries. Thus, it refers to taking a decreasing trend to consumption into account. Thus, the hypothesis claims that countries with lower GDP per capita will have higher consumption in GDP than countries with the higher GDP per capita. Confirming the hypothesis we come to an agreement with theoretical findings on the behaviour of a trend to consumption. However, it is necessary to notice that although the hypothesis was specified as highly significant relationships between the share of consumption and the size of GDP per capita appear to be weaker. This weak dependence (low values of the correlation coefficient) shows that there are many cases, which do not correspond with the given hypothesis. These deviations can be caused by a fact that a trend to consumption is dependent also on other factors such as tradition, buying habits, etc. These factors can show marked effects in some countries, which explain these deviations from the hypothesis.

Moreover, the development of the proportion of gross investments in GDP was analysed in the paper. Considerably pro-cyclic behaviour of investments was demonstrated by means of statistic data. Par-

IV: *The proportion of net exports in the GDP percentage in the selected sample of the world countries*

	Luxembourg	Japan	USA	Switzerland	Denmark	UK	Canada	Germany	France	Australia	Slovenia	Czech Rep.	Estonia	Hungary	Poland	UAE	Syria	Yemen
2005–01	21	2	–5	5	5	–4	5	4	0	–4	–2	–5	–8	–4	–2	9	2	–3
2000–96	19	1	–2	5	5	–1	5	0	2	–1	–3	–3	–5	–1	–6	23	4	–6
1995–91	18	1	–1	5	6	0	2	–1	0	0	5	4	0	–2	0	23	–5	–20
1990–86	11	1	–2	4	3	0	1	0	–1	–1	12	1	1	4		23	–16	–5
1985–81	6	3	–1	6	4	2	2	0	0	–2	12	1	0	3			–24	–5
1980–76	5	1	–1	5	–1	3	–1	–2	–1	–1	12	1		–4			–36	–5
1975–71	7	–1	–1	5	–1	1	0	–2	–2	–1	12	1		–7			–29	–5
1970–66	9	–1	–1	5	–2	0	2	–2	–2	–3	12	1		–9				–5
1965–60	4	–1	–1	4	–1	0	1	–2		–4	12	1						–5

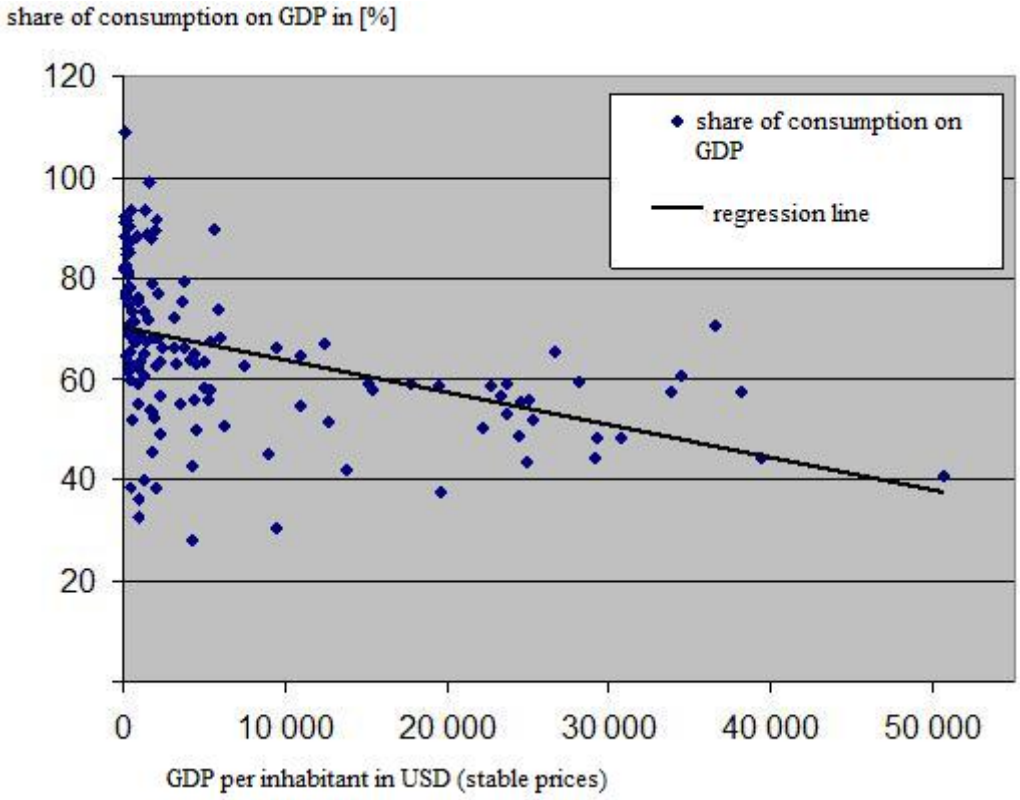
	Hong Kong	South Korea	Malaysia	Thailand	China	Argentina	Mexico	Brazil	Peru	Ecuador	Bolivia	Tunisia	Egypt	Cameroon	Kenya	Mozambique	Madagascar
2005–01	10	6	19	7	5	4	–2	3	0	–3	–5	–3	–4	0	–7	–6	–19
2000–96	0	–1	15	3	2	–1	1	–3	–5	4	–10	–2	–8	6	–8	–20	–5
1995–91	0	–8	3	–11	1	–1	–2	0	–5	0	–7	–6	–8	7	3	–26	–2
1990–86	7	–3	15	–6	2		2	1	–2	–6	–8	–6	–15	4	3	–32	–5
1985–81	3	–3	6	–9	0		1	0	–2	–16	–3	–19	–30	3	3	–32	–13
1980–76	3	–5		–13		2	–4	–5	–3	–23	–6	–13	–34	0	–6		
1975–71	5	–4		–13		0	–6	–6	–7	–13	–6	–11		–1			
1970–66	5	–5		–19		0	–6	–4	–4	–14	–7			0			
1965–60	1	–3		–12		–1	–6			–10							

Source: Our calculations based on Nationmaster data (2010)

ticularly in the stage of the construction of an economic cycle the higher slump of investments was noted than the slump of the GDP alone. In line with expectations, it was found that countries, which noted fast economic growth in the examined period, reached the high proportion of investments within GDP (about 30%). In African countries, where the increasing proportion of investments could be expected on the ground of low capital availability, this trend did not occur. It can be explained by the persisting uncertain politico-economic environment. Investments at this group of countries create roughly about 15% GDP.

At government expenditures, relatively constant percentage proportion was noted within GDP. It means that their development corresponds with the development of GDP. A relationship between the size of government expenditures and the economic level of the countries was not noted. Generally, government expenditures range between 25 and 30% GDP.

A last component, which was analysed, was the behaviour of net exports. The development of the export proportion occurred according to theoretical expectations in all examined aspects. At the poorest countries, which at most export goods of low added value (mineral raw materials) higher values were proved of imports over exports. On the other hand, at more developed countries, the balance of foreign trade was equal or in favour of exports. The highest values of net exports (10% GDP) were noted again at fast developing countries (south-eastern Asia), which proved the importance of foreign trade for economic growth. As for the problem of net exports, it was also referred to their increasing effects on the formation of the final GDP. This increasing effect resulted from a fact that from the average value of 20% GDP the exports exceeded a limit of 50% GDP over the last 45 years.



1: *Dependence between the size of GDP per capita and the percentage share in the household consumption in GDP*
Source: Our calculations on the basis of data from Nationmaster (2010)
Note: For the calculation, values were used of examined quantities from 140 countries of the world from the year 2004.

SUMMARY

The aim of the paper is to evaluate the GDP structure in the selected sample of countries of the world on the basis of available statistical data. In this connection, the truth was verified of a hypothesis that countries with higher GDP per capita reached the lower proportion of consumption in the total GDP than countries with lower GDP per capita. A reference sample represents 35 countries of the world, which are divided into six groups (very developed countries, countries of the former eastern bloc, countries of the Near East, countries of eastern Asia, Latin American countries, African countries). In this global comparison, consumption shows the highest share in GDP of all its examined components. The proportion of consumption in GDP decreases only exceptionally below 50%. In addition to this, it appeared that at African countries, the proportion of household consumption ranged between 70 and 80%. This finding corresponds with other results corroborating the hypothesis. This hypothesis is based on an assumption that households in economically developed countries with higher incomes need not spend such a large percentage of their incomes as households in economically less developed countries. Thus, it concerns a problem to take into account the decreasing tendency to consumption. On this account the hypothesis claims that countries with lower GDP per capita reach the higher proportion of consumption in the total GDP than countries with higher GDP per capita. Confirming the hypothesis we come to an agreement with theoretical findings on the behaviour of a trend to consumption. From the aspect of the share development of gross investments in GDP statistical data demonstrated considerable pro-cyclic behaviour of investments. Particularly in the stage of the economic cycle contraction the higher slump of investments was noted than the slump of the GDP alone. In line with expectations, it was found that countries, which noted fast economic growth in the examined period, reached the high proportion of investments within GDP (about 30%). In African countries, where the increasing proportion of investments could be expected on the ground of

low capital availability, this trend did not occur. It can be explained by the persisting uncertain politico-economic environment. Investments at this group of countries reach roughly about 15% GDP. At government expenditures, their steady percentage proportion in GDP was noted. It means that that their development corresponds with the development of GDP. A relationship between the size of government expenditures and the economic level of the countries was not found. Generally, government expenditures range between 25 and 30% GDP. A last component, which was analysed within the first group of results, was the behaviour of net exports. Development of the exports share showed behaviour according to theoretical expectations in all examined aspects. At the poorest countries, which at most export goods of low added value (mineral raw materials) higher values were proved of imports over exports. On the other hand, at more developed countries, the balance of foreign trade was equal or in favour of exports. The highest values of net exports (10% GDP) were noted again at fast developing countries (south-eastern Asia), which proved the importance of foreign trade for economic growth.

Acknowledgement

The paper was prepared thanks to the support from MSM 6215648904 "Česká ekonomika v procesech integrace a globalizace a vývoj agrárního sektoru a sektoru služeb v nových podmínkách evropského integrovaného trhu".

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