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ECONOMIC DYNAMICS OF THE COUNTRIES OF THE WORLD IN THE YEARS 1992-2010: INHOMOGENEITY OF GROWTH[1]

1. Formulation of the problem

In the modern world the notion of economic growth is one of the most widely employed; it is of great interest not solely for economist. The R. Solow model is generally acknowledged as the fundamental model of economic growth, in line with which growth is tied to the adjustment of potential GDP. Such adjustment can take place following an expansion of the resource base of economy (extensive growth) or an increase of factor productivity. On the basis of Solow model the "golden rule" of capital accumulation was formulated. The "golden rule" allows to calculate the optimal capital growth rate, which ensures that in the presence of multiple trajectories of sustainable growth the economy takes on the trajectory maintaining the maximum level of per capita consumption. Yet, if such stimuli of economic growth are narrowed down to sustain a certain level of capital accumulation, then, with a proximate level of productive factors availability and similar technologies, development trajectories of a country are likely to converge in the long term (reciprocal flow of production factors is in progress) and eventually become identical in the level of development. This assumption underlies the concept of convergence of economic growth trajectories.

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In fact the state of things over the last two decades (1992-2010), which are relevant both for practical purposes and for verification of the existing theoretical concept, appears largely different. Shocks, crises, transition processes (especially in Russia) leave no chances for "pure theory" to produce the desired effect. This time span includes an extremely painful period for the Russian economic history.

Needless to say, that the effect of convergence of countries by their development level ought to be of continuous character. In this study we suggest, that a period of ten-twenty years be regarded as a "step". To offer a credible picture of growth dynamics we employ the index of GDP in terms of purchasing power parity (PPP) per capita in the prices of 2005. The validity of the theory is confirmed by empiric data; simultaneously, there arises a logical question as to which particular test is the fittest to verify actual existence of convergence. Attempts at such a verification were made, e.g., by Lanton Pritchet, who carried out a juxtaposition of the per capita GDP dynamics covering 111 countries. He used the index of GDP on PPP basis in the prices of 1985 and reviewed the time span from 1960 to 1985 or 1992 (the period vary for different countries). This fact is of great significance, as the above period covers only several years following China's high growth rates (late 1980-s). Pritchet divided countries into developing and industrial ones. As a criterion for categorizing a country as industrial he used its membership in OECD, while other countries were referred to developing (i.e., they were not divided into clusters by their development level). Omitting the technique of study, let us mention, that at that time his analysis showed the following: the variation of growth rates among the developing countries is more significant than in industrial countries; growth rates in industrial countries is sustainably higher, than in developing countries. Median growth rate in industrial countries reaches 2,86%, which exceeds almost two time as much as median growth rates in developing countries— 1,51%. The range of in-country growth rates is wide in different periods of time. The average absolute value of growth rate shift among the developing countries is 3.4 percentage points, while for all sampled countries it equals 2.0 percentage points.

The calculations of the International Monetary Fund (IMF) demonstrated the hardships on the way to improving the level of development in the XX-th century, when several wars, revolutions, disruptions of empires and severe economic crises obstructed the effect of market convergence factors [1]. There were notable changes in this situation over later periods. W. Easterly [2] speculates on the following stylized facts:

1. Economic growth rates are sizably affected by other factors apart from capital formation. Namely these factors contribute to the difference in the levels and rates of per capita GDP growth across countries. They are referred to as "total factor productivity".

2. The inter-country difference of the level of per capita GDP increases with time. Divergence between groups of countries is observed. Though poor countries are not becoming poorer, rich countries are getting richer much faster, that poor countries.

3. Capital formation rates manifest much more sustainable dynamics, than GDP growth rates.

4. All production factors are directed to the same regions of the world (which disagrees with some assumptions made by R. Sollow) resulting in more concentrated economic activities.

5. Domestic policies affect growth in the long term. Proceeding from the growth of total productivity factor, national policy, which fosters the efficiency of capital and labor application and affect the endogenous technological level, may promote an increase of productivity and thus accelerate economic growth in the long term.

In his analysis Easterly reviewed 64 countries, covering the period of 1980-1992. Those countries were divided into 10 groups according to the rates of per capita GDP growth. Econometric analysis showed, that inter-country disparities of the actual per capita GDP growth rates on 90% are determined by the disparities in growth rates of the total factor productivity, i.e., factors, other than capital. Similar results were obtained by *Klenow* and *Rodriguez-Clare* [3], who reviewed a selection of 98 countries, covering the period of 1960-1995: the difference in total factor productivity growth rates accounts for 90% of the difference in output growth rates calculated for one employee.

Using the same empiric material (and covering the same period) researchers have revealed new tendencies in the dynamics of economic growth observed in separate groups of countries. Thus, we can distinguish three key tendencies of global economy development in scope of inter-country converging trajectory [4]:

1. Over the last years, growth rates of developing economies on the basis of per capita calculation have been sustainably higher, than those in the developed countries, which is indicative of a structural shift in the global economy. The nascence of the new convergence can be explained by three factors: firstly, growing global interdependency translates into rising direct foreign investments, as well into a possibility of adapting the existing technologies. Secondly, demographical transition, which took place in many developing countries, facilitated the formation of a more capital-intensive economy and acceleration of per capita economic growth rates. Thirdly, developing countries achieved an increase of the share of income further used as investments. The latter not only enhance labor productivity by means of using additional capital, but can also improve total factor productivity, which, as it was mentioned above, accounts for the greater part of inter-country disparities of economic growth rates (according to empiric study).

2. Regardless of the difference between long-term growth rates in developed and developing countries, a cyclical interdependency does not vanish. We distinguish three main channels of interdependency between countries. The first one is trading and commerce, as their intensification brings about the shocks of external demand, which, in their turn, produce a powerful effect of economic growth of a particular country. We regard financial markets and investors' expectations and behavior as the second and third channel, respectively. It should be mentioned, that this experience did not include the events of the period of 2008-2013, which was marked by a crisis followed by a lengthy revival.

3. Despite common convergence of average income, in most countries the income gap between the rich and the poor is growing. Later (in the 1990-s) this phenomenon was less obvious, since rapid growth in China, India and a number of other countries changed the situation.

It should be noted, that even first-class research works failed to identify the clear tendency for convergence in the period before 1992. Thus, a study into the question of existence or non-existence of convergence leads to conflicting results. An important matter is defining the period within which the effect of convergence can be observed using actual data and materials (to identify it not just as a tendency, elicited from equations).

The authors attempted at testing the presence of economic growth convergence between countries within the period of 1992-2010. We pose three simple questions: 1) did "neighbors" converge in terms of their level of development in the period of 18 years; 2) does convergence take place on a broader scale – between the countries of the world; 3) which trajectory did the Russian economy take in the given period amongst 150 countries of the world.

The overall picture of the countries' going up and down the cluster ladder is clearing up, because, among other things, we use simple averages encompassing 150 countries, and not aggregated indices calculated for continents and groups. In our opinion, these findings should be appreciated in shaping the idea of modern development and of what "stylized" facts must underlie the theorems of global economy.

2. Statistics and methodology

The analysis covered 150 countries (table 1). The choice was largely determined by the availability of statistic data covering the reviewed period. The selection was closely approximated to the general totality – the list does not include a number of poorest countries and several oil-exporting countries with incomplete statistic data. The share of the consolidated GDP of the reviewed 150 countries total 97% for the period of 2010.

The choice of the period of 1992-2010 can be attributed to the fact, that it is difficult to analyze the implications of convergence in longer periods, marked by the above mentioned shocks. In a favorable environment it is easier to distinguish the influence of convergence from other factors, since, should it exist, it is likely to be most vividly manifested in such periods. The reviewed period falls within the third stationary period, as they were categorized in the study "The theory of growth under the strokes of crises" [6]. In these years the collapse of the socialistic system had already taken place, while the latest years were marked by the Great Recession. As applied to post-soviet countries and Central and Easter Europe, our calculations were largely influenced by a severe transition crisis of the 1990-s. Soaring oil prices in the period of 2003-2010 must have contributed to the growth of oil-exporters, which affected their position in

our clusters[2], but we did not review the implications of this factor individually.

1992 г.			**2010** г.		
Cluster 1	Poland (7 748)	***Cluster** 6*	***Cluster 1***	Belorussia (12 494)	***Cluster** 6*
UAE (68 798)	Chile (7 696)	Sri Lanka (2 125)	Luxembourg (68 742)	Botswana (12 462)	Guyana (3 078)
Luxemburg (45 976)	Serbia (7 564)	Papua New Guinea (2 005)	Macao (57 123)	Mexico (12 441)	India (3 073)
Norway (34 180)	Estonia (7 532)	Mongolia (1 964)	Singapore (51 966)	Mauritius (12 286)	Vietnam (2 875)
Switzerland (32 347)	Malaysia (7 473)	Kirghizia (1 947)	Norway (46 908)	Panama (12 206)	Moldavia (2 790)
USA (32 015)	Republic of South Africa (7 411)	Yemen (1 888)	UAE (42 351)	The Caribeans (11 491)	Uzbekistan (2 786)
Germany (27 313)	Macedonia (7 376)	Tadzhikistan (1 877)	USA (42 297)	Bulgaria (11 490)	Nicaragua (2 613)
Japan (27 067)	Dominica (7 325)	Bhutan (1 838)	Hong-Kong (41 713)	Dominica (11 003)	Solomon Islands (2 431)
Singapore (27 036)	Botswana (7 251)	Cameroon (1 835)	Switzerland (37 583)	Venezuela (10 973)	Pakistan (2 411)
The Netherlands (26 956)	Brazil (7 018)	Nicaragua (1 801)	The Netherlands (36 996)	Romania (10 921)	Yemen (2 380)
Austria (26 362)	Panama (6 900)	Guyana (1 790)	***Cluster** 2*	Kazakstan (10 916)	Laos (2 288)
Hong-Kong (26 133)	Costa Rica (6 650)	Cote d'Ivoire (1 784)	Ireland (35 988)	Costa Rica (10 377)	Papua New Guinea (2 217)
Denmark (26 128)	Ukraine (6 635)	Pakistan (1 738)	Austria (35 379)	Brazil (10 056)	Mauritania (2 203)
Canada (25 929)	Mauritius (6 630)	Mauritania (1 731)	Canada (35 223)	Serbia (9 598)	Nigeria (2 152)
Belgium (25 746)	Bulgaria (6 525)	Uzbekistan1 692)	Australia (34 411)	UAE (9 477)	Cameroon (2 058)
Bahamas (25 728)	Romania (6 347)	Armenia (1 551)	Sweden (33 771)	Macedonia (9 192)	Sudan (2 023)
Cluster 2	Columbia (6 304)	Nigeria (1 455)	Germany (33 414)	Azerbaijan (8 913)	Kirghizia (2 008)
France (24 697)	Jamaica (6 255)	Senegal (1 446)	Belgium (32 808)	Tunisia (8 566)	Tadzhikistan (1 940)
Macao (24 546)	Latvia (6 ПО)	Republic of Cape Verde (1 426)	Iceland (32 781)	Peru (8 555)	***Cluster 7***
Italy (24 264)	Algeria (5 951)	Kenya (1 339)	England (32 474)	Columbia (8 479)	Myanma (1 749)
Iceland (24 120)	Kazakstan	China (1 338)	Denmark (32 235)	Dominican Republic (8 387)	Senegal (1 736)
Sweden (23 698)	Belorussia (5 731)	***Cluster 7***	Finland (31 493)	Thailand (7 673)	Cote d'Ivoire (1 704)
Australia 23 314)	Ecuador (5 531)	India (1 238)	Japan (30 573)	Albania (7 658)	Bangladesh (1 488)
England (22 020)	***Cluster 5***	Guinea-Bissau (1 232)	France (29 640)	Algeria (7 564)	Kenya (1 481)
Finland (20 763)	Belize (4 916)	The Comoros (1 182)	Bahamas (28 476)	Turkmenia (7 422)	Ghana (1 475)
Saudi Arabia (20 691)	Tunisia (4 838)	Zambia (1 165)	Italy (27 137)	***Cluster* 5**	Lesotho (1 437)
Spain (20 340)	Thailand (4 524)	Dahomey (1 137)	Korea (27 027)	Ecuador (7 201)	Dahomey (1 424)

Cyprus (18 919)	Namibia (4 324)	Gambia (1 120)	Israel (26 023)	China (6 816)	Tanzania (1 286)
Israel (18 485)	Dominica (4 ПО)	Vietnam (1 005)	Cyprus (25 937)	Ukraine (6 029)	Gambia (1 265)
Greece (17 618)	Paraguay (4 034)	Laos (976)	Slovenia (25 048)	Belize (5 983)	Chad (1229)
Portugal (17 091)	Salvador (3 967)	Lesotho (945)	Greece (24 206)	Salvador (5 981)	Uganda (1 141)
Cluster 3	Swaziland (3 887)	Ghana (937)	Trinidad and Tobago (23 088)	Namibia (5 808)	Burkina Faso (1 127)
Malta (14 949)	Azerbaijan (3 543)	Madagascar (926)	Malta (22 761)	Angola (5 549)	Nepal (1075)
Check Republic (14 411)	Congo (3 541)	Chad (904)	Check Republic (22 575)	Egypt (5 544)	Guinea-Bissau (1 064)
Gabon (14 403)	Fiji (3 469)	Togo (838)	***Cluster 3***	Swaziland (5 339)	Rwanda (1044)
Slovenia (14 183)	Guatemala (3 457)	Tanzania (826)	Portugal (21 660)	Jordan (5 157)	the Comoros (983)
Korea (12 944)	Syria (3 428)	Ruanda (826)	Saudi Arabia (20 374)	Armenia (4 901)	Guinea (978)
Hungary (11 210)	Jordan (3 378)	Guinea (814)	Slovakia (20 164)	Butan (4 780)	Mali (955)
Trinidad and Tobago (10 766)	Egypt (3 292)	Bangladesh (774)	Poland (17 352)	Syria (4 741)	Ethiopia (934)
Venezuela (10 652)	Turkmenia (3 197)	Nepal (748)	Hunagry (16 958)	Paraguay (4 648)	Togo (895)
Mexico (10 393)	Bolivia (3 140)	CAR (726)	Estonia (16 561)	Sri-Lanka (4 555)	Madagascar (869)
Russia (10 219)	Angola (2 843)	Burkina Faso (705)	Chroatia (16 128)	Georgia (4 552)	Mozambique (845)
Slovakia (10 103)	Honduras (2 744)	Mali (700)	Lithuania (15 534)	Bolivia (4 350)	Malawi (791)
Cluster 4	Moldova (2 720)	Niger (631)	***Cluster 4***	Guatemala (4 292)	Sierra Leone (742)
Chroatia (9 973)	Morocco (2 659)	Sierra-Leone (584)	Argentina (14 363)	Morocco (4 227)	CAR (708)
Lithuania (9 278)	Solomon Islands (2 641)	Uganda (574)	Russia (14 183)	Fiji (4 178)	Niger (653)
Argentina (9 155)	Georgia (2 629)	Malawi (556)	Chile (13 596)	Indonesia (3 880)	Liberia (376)
Turkey (8 269)	Albania (2 573)	Burundi (500)	Gabon (13 504)	Congo (3 808)	Burundi (366)
Uruguay (8 044)	The Philippines (2 426)	Congo (477)	Malaysia (13 214)	Mongolia (3 620)	Congo (311)
The Caribbean (7 923)	Indonesia (2 270)	Ethiopia (432)	Latvia (12 948)	The Philippines (3 560)	
Lebanon (7 802)		Mozambique (377)	Uruguay (12 655)	Honduras (3 519)	
		Myanmar (363)	Lebanon (12 621)	Cabo Verde (3 476)	
		Liberia (284)	Turkey (12 547)		

Note: The table gives the values of GDP on PPP basis in dollars, as of 2005
Source: compiled by the authors using the World Bank database World Development Indicators (WDI) [5].

[2] In this article the term “cluster” stands for a single-factor group with unequal intervals (editor’s note).

The selected 150 countries were arranged in the ascending order according to their per capita GDP on PPP basis (in the prices of 2005) as of 1992, further on they were divided into seven clusters [3]. The obtained clusters were analyzed in terms of the average per capita GDP of a cluster, the spread of this value inside and across clusters (variation index was employed as a measure of spread).

Table 2. **Borders of clusters in 1992 (in int. dollars) and the number of constituent countries**

Cluster No	Borders of clusters as of 1992	Number of countries in the cluster
1	Over 25 000	15
2	From 15001 to 25000	15
3	From 10001 to 15000	11
4	From 5001 to 10 000	30
5	From 2251 to 5000	27
6	From 1251 to 2250	20
7	Under 1250	32

Source: compiled by the authors using the World Bank database World Development Indicators (WDI) [5].

Over the period of 1992-2000 world economy grew by 16% per capita, and by another 25,2% in 2010 (which totals 45% over the entire reviewed period). The borders of clusters for the years 2000 and 2010 shift proportionally to growth rates of the per capita GDP on PPP basis, in the prices of 2005 (by multiplying all borders by 1.45). Thus, both the composition of the clusters and their borders change for each of the three points. In shaping the clusters we attempt to distinguish the convergence factor from a simple increase of the average per capita GDP (table 3).

Table 3. **Borders of clusters (in int. dollars) and the number of constituent countries**

Cluster, No	1992			2000			2010		
	Borders		Number of countries	Borders		Number of countries	Borders		Number of countries
	Lower	Upper		Lower	Upper		Lower	Upper	
1	25001	-	15	29012	-	19	36 305	-	9
2	15001	25000	15	17407	29010	14	21 784	36 304	24
3	10001	15000	11	11605	17406	8	14 523	21 782	8
4	5001	10000	30	5803	11604	28	7 262	14 522	34
5	2251	5000	27	2612	5802	27	3 269	7 261	27
6	1251	2250	20	1452	2611	22	1 817	3 267	17
7	0	1250	32	0	1451	32	-	1 815	31

Source: compiled by the authors using the World Bank database World Development Indicators (WDI) [5].

The presented analysis is targeted at looking into the question of presence of sigma-convergence (marking a transitional reduction of the spread of the countries' development level) between and inside country groups. The reviewed period of time of 1992-2010 is relatively short, simultaneously, in a number of selected countries this period was marked by a severe crisis.

3. Cluster analysis

Clusters play a significant role in our analysis, since they enable us to look at global growth broken down into country groups, which means maintaining an individual approach to analysis (without aggregating continents and other). Developed countries have notably increased their GDP level (with relatively an insignificant growth in percentage points) and reached the average level of 40 thousand dollars of PPP (according to IMF calculations). This is a remarkable threshold for countries with developed market democracy. Rising deviation in the other six clusters is indicative of the inhomogeneity of growth existing in countries with a similar entry level in 1992. The of growth becomes evident – further on we can look analyze the correlation of the existing situation with savings ratios, factor productivity, and, eventually, institutional factors, which have sustained high savings ratios and productivity growth for over two decades.

In our test, if countries grow much faster (or more slowly) than the global economy, they shift to other clusters. In this case vast transitions across clusters are obvious (table 4). As of 2010, three lower clusters embrace two thirds of the population, 75 countries and over a quarter of GDP, since China and India shifted to upper clusters but remained in the frames of this part of the world: fast growth does occur, but there are no miracles in economy. Cluster 4 (with the limits of 7,26-14,52 thousand dollars) grew by all parameters, but there remains a drastic gap between the former and clusters 3 and, the more so, cluster 2. Clusters 3 and 4 are of the greatest interest for us (they encompass the greater part of countries with transition economy, and Russia).

Table 4. *The results of ranking the composition of clusters and border shifts in 2010*

Cluster No	Number of countries in the cluster		Coefficient of variation of per capita GDP on PPP basis inside a cluster, %		Average value of of per capita GDP on PPP basis inside a cluster, international dollars		Share of the global population, %		Share in the global GDP in the prices of 2005, on PPP basis	
	1992	2010	1992	2010	1992	2010	1992	2010	1992	2010
1	15	9	36,3	21,9	31 848	47 298	10,1	5,2	44,1	22,4
2	15	24	12,6	14,7	21 303	29 559	5,3	9,1	17,6	28,2
3	11	8	16,1	12,7	12 203	18 092	6,1	1,5	9,7	2,8
4	30	34	14,7	19,3	7 212	10 889	10,6	14,5	11,3	16,4
5	27	27	22	21,7	3 442	4 940	9,6	28,7	4,3	17,7
6	20	17	13,3	15,4	1 728	2 431	27,9	26,1	5,8	7,6
7	32	31	34	35,8	801	1 082	26,6	10,8	4,1	1,3

Source: compiled by the authors using the World Bank database World Development Indicators (WDI) [5].

Transition crisis was acute, but the countries of Central and Eastern Europe managed to swiftly overcome it – before 2000. The year 1992 did not see the lowest point of this crisis in the majority of post-soviet countries. Thus, the severe Russian crisis (minus 43% of GDP) in the 1990-s is mainly "hidden" inside the period and manifests itself in the loss of the level of development, which Russia did not manage to achieve by 2010. Naturally, over the period of 2010-s the countries of the former USSR mostly recovered from the transition crisis and in some degree improved their standing in the global scale. Specifically, by 2000 Russia first moved from cluster 3 (1992) to the middle of cluster 4, and later on ascending to its top over the period of 2000-s. We realize, that there was no significant investment upturn in the post reform period, but the effect of growing oil prices shifted growth in the center of the scale and

[3] The borders of clusters in the year 1993 were defined on the principle of maximum distances between relatively dense groups. In other words, the density of countries along the scale increases towards the middle of clusters, rather than their borders.

sustain upward movement of the Russian economy. In practice, the country is close to returning to cluster 3 in the coming years. Currently, this cluster is mainly composed of Central and Eastern European countries with transition economies (see table 1).

A key role in this analysis is played by the 1,45-fold increase of cluster limits in line with the global growth of per capita GDP on PPP basis. Naturally, the share of two upper clusters in the global GDP declined by approximately 10 percentage points for the benefit of cluster 3, to which China moved. 48 countries, one third of the reviewed selection, remain in the lower two, truly poor clusters. There was a certain increase of the number of countries in two upper clusters; however, their share of the world population declined. Yet, here it is important to mention a redistribution of the number of countries and the share of GDP across clusters 1 and 2 – cluster 1 has shrunk to 22,4% of GDP and 9 countries, which survived the XXI-century growth race.[4] This is a new pattern, with clusters shrinking at the extremes of the scale of countries, ranked by their per capita GDP.

Inter-cluster shifts entailed changes in the ranking – the homogeneity of countries inside clusters. There was a sharp slump of variation in the majority of clusters. Correspondingly, it is conceivable, that in clusters from the 2-nd to the 6-ths variation is also relatively small. Let us mark here, that in 2010 the gaps between arithmetic average values of per capita GDP across clusters suggest larger incremental disparities. In practice, the proportion between average level of adjacent clusters (for clusters from the 7-th to the 3-d) is 2:1. Each group of countries sets its own development objectives. Doubling per capita GDP in real terms is an objective of at least two decades, if not a generation. This gives us more credible parameters of the future world, rather than just real GDP growth rates of aggregated groups (OECD, BRICS, UN and other). Determining the nature and paces of development depend primarily on the national socio-economic problems. Simultaneously, this is also a matter adapting socio-political institutes to ensure sustainable growth.

At the same time the disparities between clusters are growing, the scale is stretching. The 7-th cluster hosts 31 countries with an average per capita GDP of 1082 dollars (compared to 801 in 1992). The average proportion of per capita GDP of the 1-st and the 7-th clusters grew from 40 to 43.7 times, while regarding absolute values – from 31 to 46.2 thousand dollars the gap even between the 1-st and the 6-th cluster totaled 44.6 thousand dollars. Thus, poor countries are growing as well, but dozens of countries still remain behind, with nine countries having reached the average (non-weighed) GDP of 47.3 thousand dollars (the average value was largely influenced by Norway, see table).

4. The Problem of Convergence

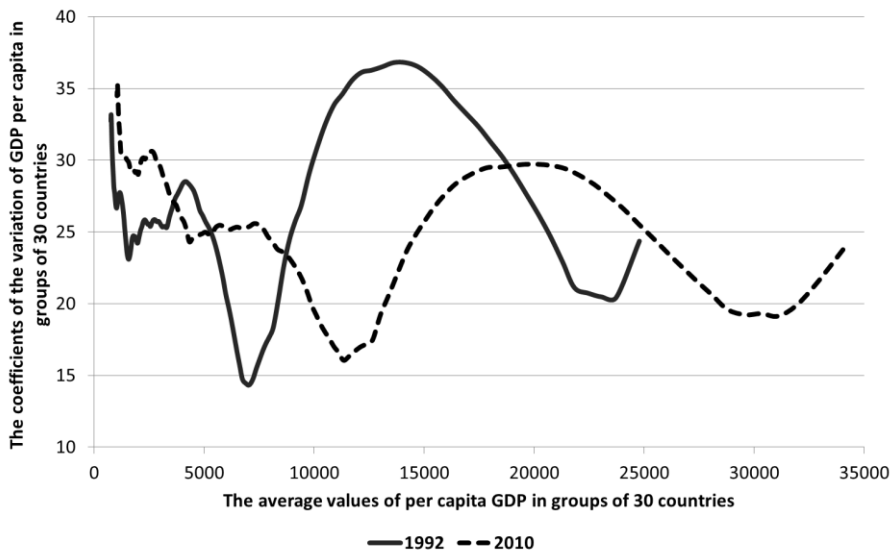
Cluster Analysis is the analysis of separate sets of countries. However, the convergence, if any, should first of all be observed among neighboring countries (based on the ranges of per capita GDP). The variations within the clusters as well as among them give a certain insight into the range of values. However, it is more interesting to observe the "sliding variation", which shows the range of per capita GDP based on PPP in a fixed size group within each year. Such sliding variations were reviewed for the years 1992 and 2010[5].

To calculate sliding variation we worked with a fixed size group of 30 countries (chosen according to the sizes of the most numerous clusters). On average it equals the size of one or two clusters, which is enough to attempt to detect convergence. At a shorter interval (10-15 countries) the deviation among neighboring countries would be less significant (and slightly closer to the sizes of numerically smaller clusters). Yet, we assume that the notion of convergence is wider than that among several neighboring countries. It is obvious that at an interval of 30 countries we slightly "even the variation", which is mostly important when the calculation of another variation doesn't involve the cluster itself, but large parts of adjacent clusters (i.e. several heterogeneously formed objects).

The graphs presented in the picture reflect the obtained results for a selection of 150 countries for the years 1992 and 2010: the position of each point is defined by the value of variation in a group of 30 countries and the average per capita GDP on the basis of PPP for the same group. Each following point reflects the value of the stated factors for the first group of countries which is changing at a certain interval. At the same time the average value of GDP per capita in a group of 30 countries is in reality very close to the median of each group. In order to interpret it we chose the abscissa coordinate, which equaled the absolute values of per capita GDP based on PPP of the 15th country in each group of 30 countries, on condition that the countries are ranked according to the indicator value.

In 1992 China was the median for the 104th group made up of 30 countries with the level of per capita GDP based on PPP of 1338 dollars, while in 2010 it became the median for the 64th group made up of 30 countries with the level of per capita GDP based on PPP of 6816 dollars. Russia in 1992 was the median for the 26th group, while in 2000 it turned to be the median for the 40th group, but by 2010 it rose to the median of the 29th group.

The applied approach shows the degree to which the neighboring countries (in sliding groups of 30) are scattered at the rate of an average variation (the average variation coefficient of 30). We can analyze the data along the graph arranged according to the increase of per capita GDP in 1992 and 2010, as well as among themselves.



The Difference in the Degrees of Development of 150 World Countries in 1992 and 2010.

NB: The 150 countries under consideration were ranged according to the increasing level of GDP per capita. The ordinates of points in both graphs are the coefficients of the variation of GDP per capita in groups of 30 adjacent countries for the corresponding year (the vertical scale). Altogether there are 121 points in each graph. It is the sliding coefficient of variation at an interval of one country (for 30 countries). The abscissas of the graph points are the average values of per capita GDP in the same arranged groups of 30 countries, whose composition wasn't changed, at the same interval of one country (the horizontal scale).

Source: the authors used the World Development Indicators (WDI) data base of the World Bank [5].

The first graph of the average variation (1992) revealed the following: the minimal variation is observed around $7000, and the maximal variation is observed in the range of $12000-17000, which later increased to $20000-25000 on average. These findings give a better idea of deviation than the cluster analysis, where countries were organized in comparatively small groups.

The same test for 2010 gives even a better view of this problem. For less developed and most developed countries there's a considerable increase in deviation, which reflects uneven growth at the extremes of the scale. While arranging the line of 150 countries according to the value of GDP per capita in

[4] Let us specify, that in clusters of the year 1992 countries were ranked at an interval, since their shifts to other clusters stemmed from inhomogeneous shifts inside clusters.

[5] Calculations were made for the selections of 150 and 133 countries. No sizable difference was found, the coefficient of correlation of the drawn up ranges came up to 0.82, and curves are similar.

2010 we can observe a visible decrease in the rate of sliding deviation within the range of $12000-30000.

Generally it shows that the development of countries with similar initial conditions is uneven. They may not only migrate to other clusters, but may also reposition themselves along the scale (which is neglected in the cluster analysis). 18 years later the countries significantly changed their positions along the scale. These data mainly allow us to state the fact that the current median countries (a different set of countries) are closer to each other than the median countries 18 years ago.

The problem is whether it can serve evidence of the convergence of countries. We assume it possible that there is a certain tendency of convergence among middle-developed and developed countries. To clarify the situation we would like to point out that in 1992 it was not necessarily neighboring countries which converged. On the contrary, the diversity in the structure of assets and quality of institutions, as we can see, fosters considerable diversity in the growth rate at an interval of several years or even a generation (18 years in terms of the same regime). Our analysis shows a tendency to convergence, but the conditions of development are changing. During the next period there may be an increase in development of other countries and a further decrease in deviation. The reason why this approach is important for more general problems of development is that within the range of $12000-30000 countries are evidently prone to a dangerous period of instability in their history; they might become economically, socially and politically closer.

For least and most developed countries (in both poles) the situation is vaguer. We could sooner say that the period under consideration is characterized by the stratification "on top" and "at the bottom" of the stairs according to the levels of GDP per capita. The world became more diverse, but the reasons for such development are more complicated.

Even within the stated range there was no significant decrease in deviation during two decades. The problems of growth in less developed countries are widely debated, but they are beyond the framework of our analysis. The next article considers the factors which could be relevant for the most developed countries (clusters 1-2).

5. "Cultural Codes" and the Growth of the Leading Countries in 1992-2010.

Cultural factors are considered by some researchers to foster modernization of countries alongside with economic factors. In our opinion, their role is really significant, especially for those sectors of countries, which form the basis for social and cultural institutions. A. Maddison [7] divided countries into two groups according to high (A) and low (B) developmental trajectories. He considered the following countries to have the high developmental trajectory: the countries of Western Europe, the USA, Canada, Australia, New Zealand and Europe. Despite evident technical difficulties of the statistical analysis, we think it important and interesting to see how cultural factors unite a part of countries on the basis of institutions and how they influence the processes of convergence of developmental levels.

We believe that cultural factors of the institutional development do not necessarily have the same impact on the countries which got to trajectory A (further on – "A-countries "), i.e. countries with stable development over a long period of time (stable development in this case is accumulation of tangible and cultural assets, and income growth). Consequently, we don't aim at confirming the obligatory predominance of the A-countries in development momentum if there are all necessary institutions. We assume that the fixed institutional predominance of trajectory A countries should be observed within the relative group of countries. This advantage should have had a certain impact in the 1990s, which created favorable conditions for development, as well as in more intensive, though far more turbulent conditions of the 2000s.

The "Cultural Factors of Modernization" report [8] presents the results of calculations based on statistical tables by Angus Maddison which include the data on the per capita income of countries since the beginning of the XX century. It reveals the direct relations between the quantitative social and economic indicators of the economic development of society of a certain country and the dynamics of its fundamental values. Approaching the stable trajectory of economic development is accompanied by an increasing trust of citizens towards authority, increasing status of self-expression and self-realization values, increasing responsibility for one's own fate. The more wide-spread these values are in the society, the more stable the trajectory of economic development is. And vice versa, the less the elite works with the value system of the society, the fewer chances there are for the transition of the economy to trajectory A. The report presents the following three groups of countries which were defined on the basis of the undertaken analysis:

1) countries which got to the modernization trajectory of development (trajectory A) already at the beginning of the XX century (Australia, Austria, Belgium, Denmark, Canada, Finland, France, Germany, England, Ireland, Italy, the Netherlands, Norway, Sweden, Switzerland, the USA);
2) countries which came to trajectory A in the second half of the XX century (Hong Kong, Japan, South Korea)
3) countries which haven't so far reached trajectory A and which still follow the developmental pattern of the "lower" trajectory B.

The selection of 150 countries which is considered in the present article includes all the listed modernized countries (present in trajectory A) except Taiwan. The framework of our test enables us to follow how this set of countries transfers from one cluster to another in the period of 1992-2000. The boundaries of clusters, defined for the year 1990, change due to the growth of the world GDP. Basically this test is aimed to verify the supposition that usually (if not always) the "A-countries" grow faster than the rest of the world or other trajectory B countries. Literature (A. Maddison in particular) does not present any generally accepted division into groups, but for the purposes of our research we use the group which is mentioned in the "Culture" project [8]. Even though it might be incomplete, it surely includes the majority of the "A-countries " and definitely only the countries of this group. So our objective is to form a control group out of the countries which are the closest in terms of their development. The database of "the whole world" cannot be considered reliable for comparison as there is a group of rapidly growing countries with a low initial level. In this analysis we use two sub-periods: 1992-2000 and 2000-2010. Basically we would like to get an answer to simple questions.

Hypotheses on the problem:

1) there is "the eternal predominance" of trajectory A countries, which continue their rapid advancement as opposed to the world countries and the control group (defined below), and which converge;
2) 4 countries (Hong Kong, Japan, Singapore, South Korea) are approaching them;
3) The control group is catching up with them due to some factors;
4) The countries of the control group also converge as they grow at the comparable level.

Below we present the division of the "A-countries" group into clusters (per capita GDP on the basis of PPP in international dollars of 2005). In 1992 12 out of 20 "A-countries" were in cluster 1 (Norway, Switzerland, the USA, Germany, Japan, Singapore, the Netherlands, Austria, Hong Kong, Denmark, Canada, Belgium), 7 countries were in cluster 2 (France, Italy, Sweden, Australia, Great Britain, Finland, Ireland), 1 country was in cluster 3 (South Korea).

In the year 2000 cluster 1 had 15 countries (Norway, the USA, Singapore, Switzerland, the Netherlands, Ireland, Canada, Austria, Denmark, Belgium, Germany, Hong Kong, Australia, Sweden, Great Britain), cluster 2 had 5 countries (Japan, France, Italy, Finland, South Korea).

There happened considerable changes during the first quite successful decade of the XXI century. In 2010 there remained only 6 countries in cluster 1 (Singapore, Norway, the USA, Hong Kong, Switzerland, the Netherlands), and there were 14 countries in cluster 2 (Ireland, Austria, Canada, Australia, Sweden, Germany, Belgium, Great Britain, Denmark, Finland, Japan, France, Italy, South Korea).

Some countries demonstrated rapid upward movement across or inside clusters over the reviewed period (Ireland, Australia, South Korea), but some countries have lost this position. Others remained in the 1-st cluster throughout the entire period under review (Singapore, Norway, the USA, Hong-Kong, Switzerland, the Netherlands). Arguably, the latter are of greater interest for our study due to the specificity of their cultural codes, as only Norway had the benefit of imposing high oil and gas prices.

A comparison of growth rates of the average per capita GDP on PPP basis for 20 countries with A-trajectory and countries of the world (table 5) reveals, that growth in the group of countries with A-

Table 5. **Average GDP growth of "A-countries" against global growth and the control group**

Growth of average per capita GDP on PPP basis, %	Year 2000 to 1992	Year 2010 to 2000
For sixteen countries	23,7	12,8
Control group	21,7	20,8
All countries of the world	16	25,1

Source: compiled by the authors using the World Bank database World Development Indicators

trajectory was largely inhibited in the environment of the growing global average value. We are not questioning the fact, that over the last decade a number of countries took on the A-trajectory – mainly, they are Asian countries, which had long been under direct American control. The question is how closely this related to cultural codes of the European civilization. Before a definite moment American military presence reduced military outlay and administration costs; it also provided "support" of the liberal regime. This can not be treated as a "credible experiment" of shifting to the A-trajectory. Singapore made a huge leap in the 55 years, when it was under the leadership of the Lee Kuan Yew. However, the notion of cultural codes is not obvious, as this is the only country in the reviewed selection, which can be referred to democracy, by to "hybrid regimes" (5.88 points in the 10-point scale in the year 2012) [9]. We deem it important to compare the development of sixteen countries without Japan, Singapore, Hong-Kong and South Korea) which took on the A-trajectory in the beginning of the XX-th century with other countries, given an equitable level of development.

Table 6 contains average values and variation of GDP for a group of 16 countries (A-trajectory countries exclusive of 4 Asian countries). To compare the dynamics of the group of 16 A-trajectory countries, a control group was selected. It includes 15 countries which are in immediate proximity to the reviewed group by their per capita GDP on PPP basis, as of the year 1992. The control group is composed of countries, which rank highest according to their per capita GDP as of 1992 and belong to the European civilization, to shut out the factor of "alien codes". It comprises Iceland, Spain, Cyprus, Israel, Greece, Portugal, Malta, Check Republic, Gabon, Slovenia, Hungary, Mexico, Slovakia, Croatia, Argentina.

Table 6. **The dynamics of GDP values for different groups of countries**

Indicators	1992	2000	2010	2010/1992
For 16 countries Average value of per capita GDP on PPP basis, thous. dollars	25 920	32 072	34 860	1,34
Variation of per capita GDP on PPP basis	15,9	13,8	13,5	-
For the control group Average value of per capita GDP on PPP basis, thous. dollars	15 024	18 279	22 075	1,47
Variation of per capita GDP on PPP basis	29,3	31,6	26,1	-
For the group of 4 countries Average value of per capita GDP on PPP basis, thous. dollars	23 295	28 791	37 820	1,62
Variation of per capita GDP on PPP basis	29,7	27,5	29,9	-
Reference: Variation of GDP across 20 countries	18,5	16,6	17,7	-

Source: compiled by the authors using the World Bank database World Development Indicators (WDI) [5].

Thus, the average value of per capita GDP on PPP basis in the control group is initially lower than in 16 countries of the A-trajectory. The group of A-countries grew more slowly; the spread inside both groups had narrowed by 2010, though not so significantly, as to qualify it a reverse of the trend. Let us also make a more detailed comparison of the 16 countries and the control group according to their average per capita GDP on PPP basis (see table 5).

The obtained values of variation of per capita GDP on PPP basis give evidence that this value is declining in the group of 16 countries, while no such trend is observed in the control group. However, the above values do not suggest the superiority of "A-countries". To test the second hypothesis we calculated the average value and variation of GDP on PPP basis for 4 Asian countries and for the 16 countries, as well as variation in both groups (table 6). The value of variation inside groups demonstrates, that the period of 1992-2000 was marked by a considerable mutual approximation of the groups, with the "group of four" outrunning the main group in the average per capita GDP namely in the second sub-period. At the same time, there were no significant changes to the general gap.

The control group grew faster than "A-countries" (but more slowly, then the world in general) and acquired greater homogeneity, nonetheless, regarding homogeneity, it did not catch up with "A-countries". More importantly, the control group came short of average growth rates, but notably outperformed "A-countries" namely in the period of 2000-2010.

Previous analysis showed lower convergence on the extremes of the scale of 150 countries over the reviewed period. Nonetheless, the deterioration of the first cluster in the first decade of the XXI century is rather an unexpected fact. The countries, which shifted from cluster 1 (as of 2000) to cluster 2 in 2010 are: Ireland, Canada, Austria, Denmark, Belgium, Germany, Australia, Switzerland, The countries which remained in cluster 1 in 2010 are Singapore, Norway, the USA, Hong-Kong, Switzerland, the Netherlands. It is obvious, that with but few exceptions (the Netherlands remained in cluster 1, while Canada left it), almost all "A-countries", which have lost their position in the first cluster are EU countries. Moreover, this does not apply to the USA which had been over almost the entire period, and suffered an acute crisis at the end of it. Since the slowdown only affected a number of the countries, which is evident from cluster analysis described above, we still can not discuss the reasons for the "slowdown of growth past the threshold of 40 thousand dollars" – a more detailed study is necessary. One remark needs to be made: in the EU similar slow-downs has recurred starting from the mid 1970-s. This phenomenon is described in a work of Morice Alle, a Nobal laureate in economy [9]. The slow-down under review took place in the XXI century and coincided with the introduction of Euro and the ensuing expansion of the EU. Both dramatic steps were made chiefly to promote growth. However, heavy-weight European economy, which stretched from 15 to 27 countries, boosted growth far not in every country.

Conclusion

Summing up the results of our analysis, the following conclusions can be made: 1) "A-countries" ranked slightly lower than the control group and the rest of the world by their growth rates; 2) a small group of countries takes on the A-trajectory with the above mentioned exceptions; 3) arguably, among macroeconomic parameters of the control group countries we can distinguish growth factors, which allowed the group to verge towards "A-countries" – most likely, a more detailed analysis will show, that this is a higher rate of saving; finally, 4) as expected, the control group remains highly inhomogeneous, its approximation by the level of per capita GDP is in progress, but at rather a slow pace.

The carried out analysis points out a tremendous progress in global development within the period of 1992-2010. Many countries advanced sizably in their development, especially in clusters 4-6. The analysis allows to speak, though with care, about the trend of convergence in the range of 12-30 thousand dollars of per capita GDP on PPP basis. At the same time over these years the scale "stretched" and world become more inhomogeneous on the extremes of the scale ranked according to per capita GDP. The impairment of growth of A-trajectory countries in the XXI century, as compared to the control group and the rest of the world, poses additional questions and proposes a more complex analysis, which is necessary to get grasp the character of development of the most advanced countries of the world in the XXI century.

The conducted research needs to be complimented by more general remarks. In the first place, there is no simple evident answer to the question of annealing of global development level – the situation is

more complex. Certain effects of approximation in the center of the scale of countries (covering 18 years) are paralleled by growing diversity, especially on the extremes. Finally, (as food for thought), there remains the problem of overstepping perhaps the most baffling barrier: to the medium level (nominally, from the 5-th to the 4-th cluster) and from the medium level of development (nominally, from the 4-th cluster to 3-rd cluster and above) to sustainable developed market democracy. The realities of rapid growth in a relatively favorable period of global development in 1992-2010 demonstrate what overwhelming difficulties we need to overcome on the way to socio-economic development. In this context Russia remains in the difficult 4-th cluster – the trap of the medium development level.

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