Relative social inequality in the world: Rigidity against the economic growth, 1992–2016

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Abstract

The study of economic growth and social inequality goes back to the works of S. Kuznets, A. Atkinson, P. Krugman, J. Stiglitz, T. Piketti, and B. Milanovic. Statistical analysis of social inequalities for a large set of countries, divided into seven clusters, was conducted for the period 2000–2016. The share of incomes of the 10th decile was used as a measure of inequality. The hypothesis of the positive impact of economic growth on the reduction of social inequality was tested. Stylized facts on an array of 106 countries for the period under review indicate a high degree of stability of the level of inequality in most groups, especially in the most developed countries, and in particular in the Anglo-Saxon ones. The distribution of key socioeconomic and even political indicators for clusters shows their strong relationship with the structure of cluster inequality. This makes it possible to significantly deepen the analysis, in particular the one concerning the stages of world development.

Keywords: inequality, economic growth, clusters, income distribution
JEL classification: A14, B10, D11, D33, F02.

1. Introduction

A great amount of theoretical and statistical research is devoted to analyzing social inequality, which remains a major challenge for most countries, both developed and developing. The question of social inequality's impact on many aspects of economic activity and social life has been discussed by many academic researchers. The fact that this problem was first highlighted through Marxism seems to have long been an obstacle in the way of research, since the results of studies have often been used in political discourse. A few simple questions

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can be formulated regarding social inequality: its measurement and significance; origin; long-term and current trends; what it affects; how it is affected by economic growth and social policy; finally, whether it can be reduced and whether we should try to do it. We are going to focus mainly on the key question: does economic growth reduce inequality? To this end, we will consider important aspects of the problem: measuring inequality; actual trends observed over the past twenty-five years; and the connection between inequality and other socioeconomic indicators.

2. Theories and approaches to social inequality

In our previous article, devoted to trends in inequality between countries, we used cluster analysis (174 countries divided into seven clusters[1] based on data from 1992 to 2016) to show that the distance between the average and weighted average GDP (PPP) per capita is increasing, in particular between developed countries (Grigoryev and Pavlyushina, 2018a). Since the 18th century, economic scientists have been studying the subjects of wealth accumulation, income growth, the distribution of accumulated capital and the emergence of inequality. However, throughout the entir-e history of research, economists and social scientists have focused on three main questions: is inequality really high, does it decline over time, and does it hinder economic growth? The third question gained especial relevance following the Great Recession of 2008 and 2009, and the answer is not as straightforward as at first it may seem.

The question of social inequality became especially fascinating during the time of the Industrial Revolution, the emergence of the classical political economy, and the publication of the Communist Manifesto, in which Karl Marx demonstrated that he realized the importance of the middle class but predicted the disappearance of the "old" one (which was true) and did not foresee the emergence of a new, much more numerous one (Marx and Engels, 2002 [1848]). Two prominent 19th century economists — David Ricardo and Karl Marx — studied the principles of wealth distribution and concluded that, over time, wealth will be concentrated in the hands of a single class: land owners according to Ricardo and capitalists according to Marx.

During the 20th century, economists continued to study the distribution of income and wealth. The traditional formulation of the question regarding the relationship between economic growth and inequality was elaborated upon in Kuznets (1955). He divides countries into two groups (developed and underdeveloped) and postulates a hypothesis that, for countries in the early stages of economic development, income inequality tends to rise at first but then declines as the economy develops (the idea underlies the main conclusion of Kuznets's paper, i.e. building the Kuznets curve), which is illustrated in Table 1. According to Kuznets (1955), the reasons for higher inequality in developing countries are as follows: due to the low average income in a country, considerable savings are only possible for people with high income, which leads to even greater stratification; income inequality also results from low GDP (and, consequently, per capita income) growth rates within the country.

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[1] The first cluster is the richest one, the seventh — the poorest.

Table 1

Shares of household income by quintile in India, Sri Lanka, the United States, and the United Kingdom, 1950[a] and 2016[a] (%).

Country	1950[b]			2016[c]		
	Total of 1st, 2nd, and 3rd quintiles	4th quintile	5th quintile	Total of 1st, 2nd, and 3rd quintiles	4th quintile	5th quintile
India	28	17	55	35.5	20.6	44.0
Sri Lanka	30	20	50	32.4	20.5	47.0
United States	34	22	44	30.8	22.7	46.4
United Kingdom	36	19	45	36.5	23.0	40.6

[a] Or last year available.

[b] However, we recognize that in the early 1950s the data could differ from today's data in terms of collection and processing methods.

[c] The sum of quintile shares may vary slightly from 100% due to rounding.

Sources: Kuznets (1955); World Bank data.

Table 1 shows that, for example, the share of the 5th (the wealthiest[2]) quintile of household income in the United States increased from 44.0% to 46.4% between 1950 and 2016. According to Kuznets, in India and Sri Lanka, the starting level of social inequality reflected the situation in the countries at the time they were liberated from colonial dependence (not in "developing countries"), and it further dropped from 55.0% to 44.0% and from 50.0% to 47.0%, respectively.

In the 40 years preceding the publication of Kuznets's paper, the world had lived through two world wars, the Great Depression, and several revolutions (including the October Revolution in Russia). Therefore, Kuznets could not have observed long periods of growth except during the post-war years from 1947 through 1955, but with two crises in the United States.

Kuznets's applied analysis was characterized by the limited statistics and facts on which he relied in discussing inequality. His hypothesis was largely based on the trends in inequality in the United States between 1913 and 1948. Therefore, he did not observe long periods of growth under any normal conditions. Paradoxically, his optimism with respect to reducing social inequality as a result of economic growth reflected the specific aspects of war and crisis periods. Of course, now we know much more about global social processes, as noted in Atkinson (1975), and Atkinson and Piketty (2007). This is the main reason for the criticism of his conclusions (see, e.g., Merkulova, 2010).

In his works, Kuznets noted very high inequality in the Anglo-Saxon countries, but took into account the capabilities of economic tools that could drive higher social inequality. The level of post-colonial inequality in India and Sri Lanka was exceptionally high in the early 1950s and resembled the situation in present South Africa. It should be noted that, in 65 years, the 4th and 5th quintiles retained great advantage in the U.S. and the UK, but in the two aforementioned developing countries the share of the 5th quintile decreased considerably, while the 4th one increased slightly.

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[2] Kuznets regards the 5th quintile as the poorest and the 1st as the wealthiest. However, modern science uses the reverse approach. For the sake of convenience, Kuznets's data are presented in this article according to the modern convention.

Over more than 40 years ago, Anthony Atkinson, one of the most renowned researchers of inequality issues, showed in his works that today's biggest problem was not that the rich were getting richer, but that the problem of poverty still remained unresolved (Atkinson, 1975). Overall economic growth does not result in significant improvement for the lower-income population groups, while fast-paced changes in the economy leave increasingly more people below the threshold of high wealth. The economist stressed that the problem can be solved not by raising taxes for the rich (including luxury taxes) but through an overall resolution of structural problems — in terms of technology, social stability, the distribution of capital, and taxation. Atkinson argued for active steps to fight inequality and rejected the common assertion that globalization itself would solve all the problems, while the necessary measures were extremely expensive (Atkinson, 2015). The Nobel Prize winners Paul Krugman and Joseph Stiglitz touched upon the inequality problem in their papers. Krugman (2008) does not deny the increase in inequality, but stresses: there are no reasons to claim that income and capital are distributed unfairly. He notes that "inequality probably played an important role in creating our economic mess, and has played a crucial role in our failure to clean it up" (Krugman, 2013). Krugman also accentuates the heightened inequality following the Great Recession, which is leading to higher household debt and hindering economic growth.

In turn, Stiglitz wrote that inequality was usually associated with more frequent up and down cycles, which make the economy more vulnerable and unstable. Of course, the income gap between the poorest and the richest did not cause the 1920s crisis directly, although it was not a mere coincidence that the last time inequality was so high was just before the Great Depression (Stiglitz, 2013). The Nobel Prize winner noted that inequality had reached a stage where it stopped being effective and had turned into a serious hindrance to development (Stiglitz, 2012).

Milanovic (2012) suggests another method for analyzing inequality based on location rather than on class. The author also raises the question as to whether citizenship can be regarded as rent or punishment if the inequality problem is approached from a global, rather than a national, perspective. Lakner and Milanovic (2013) demonstrated on a figure known as "elephant chart" that from 1988 to 2008 developing countries produced a more stable middle class due to increasing household income in the middle of the distribution, while in developed countries the higher strata got further from the middle due to a sharp rise in their incomes. It is noteworthy that a significant part of the "elephant's body" — if scrutinized under a magnifying lens — consists largely of China's new middle class. Milanovic (2016) put forward an interesting assumption that instead of "Kuznets curve," economists should look for "Kuznets waves." However, this assumption has not found statistical proof so far.

Speaking of inequality, one cannot help mentioning Piketty's "Capital in the twenty-first century" (Piketty, 2014), which has been discussed extensively by the academic community and is even regarded as a book that divides all studies on inequality into "before" and "after" its publication. The study is based to a certain extent on the works of Ricardo and Marx. The author carried out an enormous amount of statistical work, analyzing a great quantity of data. He concluded that if the rate of return on capital considerably exceeds the economic growth rate (which becomes more likely, although not necessarily certain, during bouts

of low growth rates) over a long period of time, the risk of deviations in wealth distribution increases substantially. This effectively means that returns on capital (according to Piketty, capital *is* wealth) exceed GDP growth in the long run and, accordingly, the persistent rise in wealth inequality will lead to higher economic instability. When returns on capital exceed income and output growth, inequality increases at higher rates. According to the author, in this case capitalism must be controlled by the state, e.g. by changing taxation, introducing grant systems and guaranteed employment, and regulating wages.

Critical reviews of Piketty's book focus mostly on the insufficient understanding of the sources of statistical data and calculations, or on searching for processes neglected by the author. For example, The Financial Times economics editor C. Giles compared later data from household surveys with earlier data from tax assessments, and concluded that inequality was declining because the latter data were lower than the values for previous periods. However, this conclusion seems to be incorrect, as using two different sources of data on inequality (tax returns and household surveys) should allow for adjustments, because the figures on income differences obtained from tax returns are higher than those obtained from household surveys (Krugman, 2014). The reason for this is that poor population groups pay few taxes, if any at all. Moreover, no income survey seems to actually be possible in super-rich population groups.

Many critics of Piketty's work note that in his calculations, he did not take into account fixed assets depreciation, which reduces a company's equity. This happens to be incorrect, as there is an adjustment for depreciation in his calculations. Rognlie (2015) published a paper where he conducted an econometric analysis based on the data used in Piketty's book and came to the conclusion that the author had failed to fully take into consideration the depreciation of fixed assets, after all. This does not affect the findings of the paper, but does call for certain adjustments: specifically, a more accurate calculation of depreciation shows that the growth rate for returns on capital (and, accordingly, of inequality) is falling; capital growth is largely attributable to increased real estate prices due to the limited supply of land and residential space (Rognlie, 2015). In any case, the publication of "Capital in the twenty-first century" revitalized the discussion of social inequality in a new format and, in a sense, established a "new normal" in studying the differences in household incomes.

Pomeranz (2009) and Koot (2013) justified the economic "division" between Asia and Europe as far back as during the Middle Ages, which resulted in Asia's economic backwardness and today's inequality there. The following papers made a significant contribution to the study of inequality: Barro (2000), Kaldor (1955), Aghion et al. (1999).

Notably, the topic of social inequality also aroused extensive discussion among Russian economists. They include Dzhomo and Popov (2016), Mau (2012), Klinov (2017), Radaev and Shkaratan (1996), Grigoryev (2013, 2016), and others. Kapeliushnikov (2017) wrote that "inequality is a pseudo-problem from a normative standpoint (in the sense that it is never a problem in and of itself). Of course, it may be a symptom of some other serious problems, but this is a completely different story. And because a disease is not treated by just removing the symptoms, reducing income differences must not be a goal in itself: society's efforts should be directed at resolving deeper problems that may underlie and cause those dif-

ferences." We believe that the reasons for inequality and its trends are important in and of itself. Whereas his question regarding the effect of inequality on various socioeconomic processes requires a separate solution in a broader socioeconomic context, as does the question of the advisability and methods for fighting it.

According to our previous analysis, income inequality did not decline globally during an active economic growth period (1990–2011), i.e. global economic growth did not change the key parameter: the share of the 10th decile of the population in the incomes of developed and certain developing countries (Grigoryev and Salmina, 2013). The nature of social inequality in the world is determined by historic factors, which a number of countries managed to overcome by intensive development (China and South Korea) based on institutions that were adequate for the existing economic structure. Absolute poverty has begun to decrease according to the "modest" criteria of the World Bank. However, its scale is still great and keeps growing in countries that have not completed a second demographic transition. Judging by contemporary discourse, relative poverty creates sharp social contrasts.

The combination of decreasing inequality and growing poverty during a recession is a complex phenomenon. High social inequality in moderately developed countries hinders the development of the consumer market and holds back domestic demand. Highly developed countries demonstrate signs of a weakening middle class (classes), and the aforementioned literature discusses the growing share of total income by the 10th decile and top-1% of the wealthiest people in the United States, other leading countries, and in the world. Notably, these calculations and debates concur with the statement that global inequality is decreasing between people over the world but remains quite high — at around 57% or 58% on the Gini index. We believe that the concept of diminishing global inequality (mostly due to the success of China and India) is an interesting one, inspiring certain (quite vague) hope for humanity. This approach enables us to discuss the nature of humanity's development in the context of the UN's Millennium Development Goals and Sustainable Development Goals. However, this concept has at least one flaw: it is inapplicable to any decision-making by the world's economies on socioeconomic problems. The level of development of global civic society is still very low, while the interests of social strata and politicians (and especially the elites) are still very far apart.

3. Rigidity of social inequality from 2000 to 2016: stylized facts

The theoretical discussion regarding the scale and trend in social inequality produces a complex world picture that needs to be described at the level of stylized facts, lest research efforts be scattered due to inconsistencies between periods, different country groups, and methods. Various indicators are used to measure social inequality, the main ones being: the Gini index; the share of income earned by a certain portion of the population; R/P 10% ratio; the Atkinson index;[3] the share of income and wealth by the top-1% of the wealthiest people in a country or in the world.

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[3] It reflects the equivalent level of income corresponding to the level of evenly distributed income at which the society would be at the same level of wealth as the given uneven distribution.

The most common and frequently used indicator for analyzing social inequality (including non-economic studies) is the Gini index. However, it has a number of serious drawbacks: most importantly, it fails to adequately reflect inequality at the ends of the distribution and remains unchanged if increases in the shares of income earned by the poorest and the wealthiest parts of the population are equal (Alvaredo et al., 2018). Moreover, we believe that a researcher (unless it is a detailed study in a country for a practical purpose) is not usually interested in the details of income distribution in the 2nd to 9th deciles. Therefore, decreases in the Gini index registered in some cases should still be verified in terms of the correlation between the richest groups and the rest of the society. The calculations in our paper will be based on the distribution of income between the wealthiest and all the other quintiles and deciles.

The hypothesis that we consider in this section is simple: if, during the period of significant growth in the world economy from 2000 to 2016, patterns and factors had been in operation that led to lower social inequality globally or in large groups of countries (in terms of a given indicator), then they would have been reflected in a reduction in the 10th decile's share of total income. Recalculating income in a single unit of measurement (in international dollars — Int\$, based on PPP) enables income level to be compared — GDP (PPP) per capita — across various countries and clusters. It is important that "cluster centers" based on the level of GDP (PPP) per capita (the average in countries or weighted average) vary by an amount that, in this case, is 1.7–2.0 times. A two-fold gap (e.g., in China) can be overcome in 10 years, provided that the advantage in growth rates is 7.2 p.p. Actual rates of convergence will be determined by the rates of economic growth and population growth. The main parameters, however, are the duration and sustainability of high growth rates.

According to our assumptions, when institutions are built within a country (Acemoglu et al., 2005), one type of inequality arises including taxes and social systems, vertical elevators, tolerance to poverty, and a mindset of success or stability throughout the life cycle. We can see lower inequality in European countries resulting from the spread of Christianity and the effect of the socialist experiment and the struggle against it (taxes and social protection for the population) in Europe during the 20th century (Barbara, 2012; Hoffman et al., 2002). In fact, once having emerged, social inequality has proven to be surprisingly resistant to economic growth.

For the entire period from 2000 to 2016, we had access to comparable data from 92 countries (Table 2). This enables a more detailed analysis of social inequality trends in two eight-year periods: 2000 to 2008 and 2009 to 2016. For illustrative purposes, we divided the 92 countries into four groups:

- those with GDP (PPP) per capita below Int\$10,000 in 2016. There are 36 countries in the group, which belong to the fifth through the seventh clusters;
- developing, where GDP (PPP) per capita was between Int\$10,000 and Int\$25,000 in 2016. The group consists of 28 countries belonging to the third and fourth clusters;
- those with GDP (PPP) per capita over Int\$25,000 in 2016. There are 24 countries in the group, which belong to the first and second clusters. These are mostly the developed countries of continental Europe;
- four Anglo-Saxon countries from the first cluster — the United Kingdom, Australia, Canada, and the United States — are highlighted.

We will now examine the trends in the shares of deciles and quintiles over the two periods. In the four Anglo-Saxon countries (on average), the fluctuation in the shares of income is insignificant and appears to be negligible. Accordingly, considerable economic growth was absorbed in proportion to these shares, and produced an amazing result by 2016: the imputed GDP (PPP) per capita (Grigoryev and Salmina, 2013) for the 10th decile reached Int\$121,600, which is 9 times that of the 10th decile in countries with per capita income below Int\$10,000. This was caused by the sharp increase in wages, in addition to the increased returns on capital (Atkinson and Piketty, 2007). The extremes of global inequality based on the decile measure are impressive: the gap between the rich (10th) decile of Anglo-Saxons and the poorest (1st) decile of the poorest countries was 101-fold in 2016 (174-fold in 2000 and 119-fold in 2008). As we show below, this can hardly be considered a reduction in inequality. In our opinion, it is a more accurate measure of global social inequality than, for example, the concentration of income in the hands of the top-1% of the richest people.

Over 16 years, in developed countries with per capita incomes exceeding Int\$25,000, the share of income in the 10th decile decreased by 0.7 p.p., while that of the 5th quintile dropped by 0.5 p.p. and the share of incomes earned by quintiles 2 to 4 slightly increased. In the Anglo-Saxon group, inequality is appreciably higher than in developed countries: from the 3rd quintile on, affluent Anglo-Saxon groups are ahead of the rest of the developed countries both in terms of the share of income and, especially, the size of imputed income. The gap between the 10th Anglo-Saxon decile and the 10th wealthy country decile (over Int\$25,000 per capita) in 2000, 2008, and 2016 was Int\$22,500, Int\$22,600, and Int\$25,500 per capita, respectively; the gap with the 10th decile for countries with per capita income between Int\$10,000 and Int\$25,000 was Int\$70,000, Int\$72,100, and Int\$71,800, respectively.

In moderately developed (Int\$10,000 to Int\$25,000 per capita) and less developed countries (below Int\$10,000), the trend is more complex: the share of the 5th quintile decreased in both country groups by roughly 2.5 p.p. over 16 years. These shares are distributed in small "portions" in the share of income earned by the 1st to the 4th quintiles, which inspires certain optimism (Table 2). Of course, the cluster data are arithmetic means and largely reflect trends rather than details. The decrease in the share of the 5th quintile relative to that of the 1st one between 2000 and 2016 is especially noticeable in Kazakhstan, Ecuador, Argentina, and Belarus, which may result in an apparent downward trend in inequality in transition economies in certain groups.

Notably, the share of the 5th quintile in developed countries is lower than in developing countries, giving certain grounds for Kuznets's hopes to reduce inequality. However, it is extremely important to stress the difference between relative and linear shifts, as in the cluster analysis of national growth rates in our previous article (Grigoryev and Pavlyushina, 2018a). On the whole, we would like to note that both the actual social status and its perception by national populations are measured not by correlating the hard-to-estimate (for citizens) shares, but by easily perceiving the distance between strata based on their own financial opportunities. Overcoming absolute poverty in the leading countries of the world and the progress in China and India are enormous achievements for millions of households today. Various threshold values corresponding to the improvement in

Table 2
Average share of income (%) and imputed GDP (PPP) per capita (thousand Int$ per capita) by country groups (92 countries), 2000, 2008, and 2016.

Country group by GDP (PPP) per capita (thousand Int$ per capita)	Share of income			Imputed GDP (PPP) per capita		
	2000	2008	2016	2000	2008	2016
1st decile						
Below 10	2.3	2.5	2.6	0.6	1.0	1.2
Developing countries (10 to 25)	2.2	2.4	2.5	2.1	3.4	4.0
Over 25	3.2	3.1	3.0	10.7	12.4	12.4
Anglo-Saxon countries	2.5	2.5	2.5	9.2	10.5	10.7
2nd decile						
Below 10	3.5	3.8	3.9	1.0	1.5	1.8
Developing countries (10 to 25)	3.5	3.7	3.9	3.5	5.4	6.3
Over 25	4.9	4.9	4.8	16.3	19.3	19.4
Anglo-Saxon countries	4.2	4.2	4.1	15.8	17.6	18.2
1st quintile						
Below 10	5.8	6.3	6.5	0.8	1.2	1.5
Developing countries (10 to 25)	5.7	6.0	6.4	2.8	4.4	5.1
Over 25	8.0	8.0	7.8	13.5	15.9	15.9
Anglo-Saxon countries	6.7	6.7	6.6	12.5	14.0	14.5
2nd quintile						
Below 10	9.8	10.4	10.7	1.4	2.0	2.4
Developing countries (10 to 25)	10.0	10.3	10.8	5.0	7.5	8.7
Over 25	12.9	13.0	13.0	21.4	25.5	26.0
Anglo-Saxon countries	11.8	11.7	11.6	22.2	24.8	25.8
3rd quintile						
Below 10	14.0	14.6	14.9	2.0	2.8	3.3
Developing countries (10 to 25)	14.4	14.7	15.1	7.3	10.7	12.2
Over 25	16.9	17.0	17.2	27.9	33.2	34.2
Anglo-Saxon countries	16.4	16.2	16.3	31.0	34.5	36.2
4th quintile						
Below 10	20.6	21.1	21.3	3.0	4.1	4.8
Developing countries (10 to 25)	21.2	21.3	21.5	10.8	15.4	17.3
Over 25	22.3	22.4	22.7	36.6	43.7	44.9
Anglo-Saxon countries	22.6	22.6	22.9	42.9	48.3	51.1
5th quintile						
Below 10	49.8	47.5	46.6	7.2	9.1	10.3
Developing countries (10 to 25)	48.8	47.7	46.3	24.8	33.8	36.9
Over 25	39.9	39.7	39.4	64.9	76.6	77.4
Anglo-Saxon countries	42.7	42.9	42.6	81.4	92.3	95.7
9th decile						
Below 10	15.4	15.4	15.4	4.5	5.9	6.8
Developing countries (10 to 25)	15.7	15.6	15.6	16.0	22.4	25.0
Over 25	14.7	14.8	14.9	48.1	57.3	58.7
Anglo-Saxon countries	15.4	15.4	15.6	58.6	66.1	69.7
10th decile						
Below 10	34.4	32.1	31.2	10.0	12.3	13.7
Developing countries (10 to 25)	33.1	32.1	30.8	34.2	46.5	49.8
Over 25	25.2	24.9	24.5	81.7	96.0	96.1
Anglo-Saxon countries	27.2	27.5	27.1	104.2	118.6	121.6

Source: Authors' calculations based on World Bank data.

social status (owning a house, education) can be identified. However, the growing gap in the standard of living from the wealthiest groups (e.g., 10th decile) can be estimated either objectively or subjectively.

A certain reduction in relative inequality (the shares of the 10th decile and 5th quintile) during economic growth is accompanied by a growing distance between the incomes (imputed GDP (PPP) per capita) of the wealthiest and the "other wealthy," middle, and poor groups of the global society. The distance

between the 10th decile and the 2nd quintile increased significantly in 2000 and 2016 (see Table 2):

- in the first group: from Int\$8600 to Int\$11,300 per capita;
- in the second group: from Int\$29,200 to Int\$40,100 per capita;
- in the third group: from Int\$60,300 to Int\$70,100 per capita;
- in the four Anglo-Saxon countries: from Int\$82,000 to Int\$95,800 per capita.

It is safe to say that there have been certain shifts in the shares and gaps across years, deciles, and country groups, but the "linear" gap between the rich and the poor grew considerably over the first 16 years of the 21st century. Certain shifts can be seen in the degree of inequality in developing and moderately developed countries during long-term periods of economic growth. We may have to re-think our understanding of the correlation between the economic growth trend and the nature of social institutions at different levels of development within the context of the inequality problem.

To verify our hypothesis, we conducted an econometric analysis on data from 92 countries (Table 3). It should be noted that we had to divide them into two groups due to the huge gaps in the level of development: countries below Int\$14,000 ($N = 20$) per capita and over Int\$14,000 ($N = 72$) per capita.

The interpretation of the results is quite simple. Relative inequality (Y_2), measured as the gap between GDP (PPP) per capita in the 10th decile and the 2nd quintile, i.e., in fact, between the wealthiest groups and a portion of the lower middle class, appears to have been stable and nearly unchanged between 2000 and 2016. Moreover, no additional variables have produced any significant coef-

Table 3
Econometric analysis results.

Function	GDP (PPP) per capita	Const	X_2	X_3	X_4	DW	Qu. correlations, adjusted
Y_1	Below	−1.859	0.610	2.844		1.716	0.608
t-stat	\$14,000	−0.987	2.168	5.582			
Y_1	Over	−2.710	2.843	0.294	0.934	1.524	0.902
t-stat	\$14,000	−0.631	3.500	1.483	8.653		

Function	GDP (PPP) per capita	Const	X_5			DW	Qu. correlations, adjusted
Y_2	Below	2.667	0.344			2.004	0.538
t-stat	\$14,000	4.641	4.812				
Y_2	Over	1.100	0.633			2.017	0.635
t-stat	\$14,000	2.862	11.161				

Dependent variables:

Y_1 equals (Imputed GDP (PPP) per capita in the 10th decile – Imputed GDP (PPP) per capita in the 2nd quintile);

Y_2 equals (Imputed GDP (PPP) per capita in the 10th decile – Imputed GDP (PPP) per capita in the 2nd quintile)/ (Imputed GDP (PPP) per capita in the 2nd quintile, thousand Int\$, 2016).

Independents:

X_1 equals the share of 2000 income in the 10th decile;

X_2 equals the average GDP growth rate from 2000 to 2016;

X_3 equals GDP (PPP) per capita, thousand Int\$, 2000;

X_4 equals (Share of 2000 income in the 10th decile – Share of 2000 income in the 2nd quintile);

X_5 equals (Share of 2000 income in the 10th decile – Share of 2000 income in the 2nd quintile)/ (Share of 2000 income in the 2nd quintile).

ficients. For the similar indicator (Y_1), but in absolute terms of the gap between 2000 and 2016, the significant indicators were the initial GDP per capita in 2000 and the GDP dynamics over the period, but only for countries with GDP per capita over Int\$14,000. In actuality, all of the above equations confirm the central hypothesis that relative inequality was rigid while absolute inequality increased gradually along with economic growth within the range under review: between the rich and the disillusioned "yellow vests."

For Y_2 (the relative gap between the 10th decile and the 2nd quintile in 2016), we did not find a significant correlation with GDP growth factors or the initial indicators of inequality in either group, i.e. the lagging indicator of the function as of 2000 completely dominates the calculations.

This, in fact, means that a stable relative gap between the upper class (the 10th decile may include both the upper and the upper middle class) and the lower middle class (the 2nd quintile in developed countries) leads to a wider absolute gap over time. In less developed countries, this correlates with other factors. In this respect, econometrics doesn't produce new results as much as it confirms the quite easily observable "inertial departure" of the wealthiest social group from the relatively poor but quite massive stratum, i.e. the lower middle class.

From the perspective of interdisciplinary studies, the above parameters of the income structure and trend for groups enable a more accurate estimate of the status of civic society in the countries under review. The analysis shows that, in most countries, social inequality arises as a result of various historical processes and remains constant afterwards. There is an example of this in Russia, where inequality increased sharply during the rapid privatization program between 1993 and 1996 (Novokmet et al., 2017). Similar developments have just occurred in China (Jain-Chandra et al., 2018). Undoubtedly, vertical social elevators (especially in Anglo-Saxon countries) enable some individuals (for example, in receiving higher education, or getting into show business or sports) to reach a whole new level of income, but no considerable shift in equality happens on a nation-wide scale. The imperfections of a market economy, specific aspects of a society's social structure (e.g., castes in India until recently), inefficient education and labor markets entrench inequality within a country to a large extent.

Fig. 1 shows a pattern that seems to be connected with the Great Divergence (the European Economic Miracle of the Middle Ages), colonialism, the transformation of post-socialist countries, and differences between the Anglo-Saxon and continental European market economies. The share of income in the 10th decile varies within a wide range, to approximately Int\$25,000 per capita (or to the point where the country enters the 2nd cluster). Then, the share of the 10th decile begins to drop slightly, and the variability decreases when entering a relatively narrow range. Anglo-Saxon countries are, on average, above and "to the right" of the large group of developed countries (over Int\$25,000 per capita). In fact, we can see another manifestation of the differences between the two market economy models and their social institutions (taxes, vertical mobility) in the context of social inequality. This is important, in particular, for understanding the development paths of the post-reform Russian economy and for reconciling social mobility and paternalism. However, we see no decrease in inequality in developed countries between 1992 and 2016.
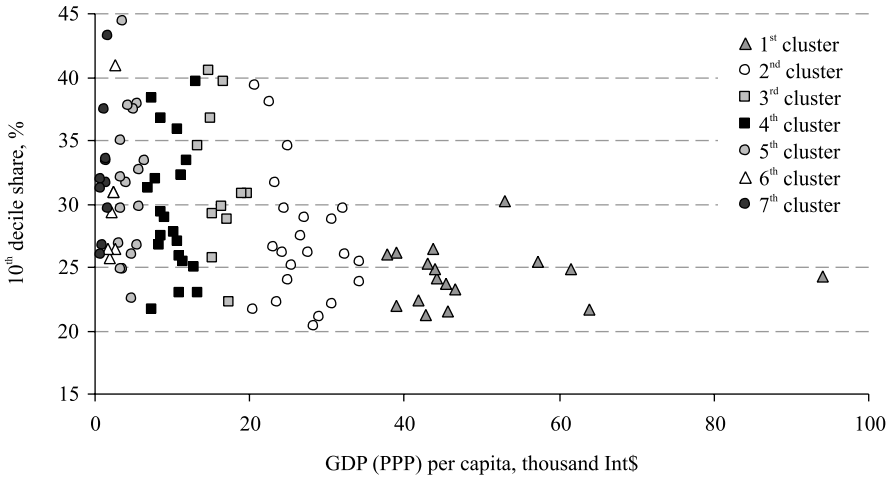
Fig. 1. Share of the 10th decile, GDP (PPP) per capita, 106 countries, 2016.
Source: Authors' calculation based on World Bank data.
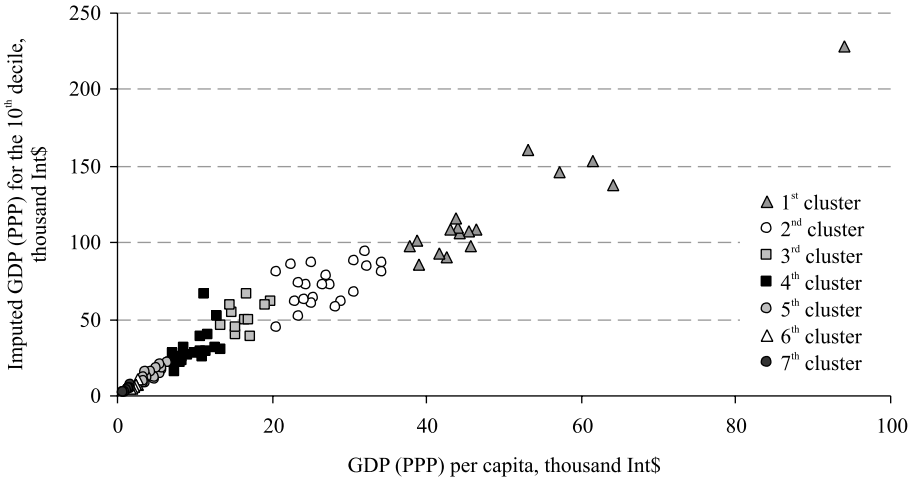

Fig. 2. Imputed GDP (PPP) for the 10th decile and GDP (PPP) per capita, 106 countries, 2016.
Source: Authors' calculation based on World Bank data.

Social inequality in the world for a particular year can be illustrated by comparing the incomes of their citizens belonging to the 10th deciles (Fig. 2). Naturally, the higher the GDP per capita in a country, the higher the per capita income of the 10th decile for its "members." This comparison is, philosophically, the opposite of the estimates of inequality on a global scale. It is, rather, a concise presentation of the gap between a country's residents on average and those in the 10th decile. We believe this picture to be a vivid presentation of the size of the gap. Approaches to analyzing inequality based on the Gini index and various standards and ratios are a traditionally vital element of academic science. The growing gap between the rich and the rest of the population in countries is reflected in the standards of living, protection from unemployment, and other effects of the business cycle, as well as in the social contrasts with the middle and poor strata of a society.

The separation of the per capita income of the 10th decile becomes stronger after a country exceeds Int$15,000 per capita. The 10th decile's exceptionally high share in Luxembourg could be viewed as exotic, but one cannot deny the breakaway of the wealthy from the rest of the population in terms of income at the early stages of development and the entrenchment of these advantages in the course of economic growth within a country. Above, we have demonstrated the lack of perceptible relative shifts in the 10th decile's share of income from 2000 to 2016. Here, however, we can see the absolute gaps widening, whereas there are no signs of declining inequality as GDP increases, rather quite the opposite.

4. Characteristics of inequality in key country groups

We will conduct a more detailed analysis of the level and nature of social inequality in key countries and identify its driving forces in later papers. Here, we will dwell on the most interesting groups. In this section, we consider the trends and some specific features of inequality in the European Union, former socialist countries and the BRICS states in recent decades, as they represent important practical cases.

4.1. European Union

When reviewing the process of convergence, one cannot help mentioning the generally successful (at least for some countries) integration process of the Central and Eastern European countries into the EU. The correlation in growth rates between the "old 15" and the "new 13" is divided into two stages. From 2000 to 2008, growth rates in the new EU member countries (future members before 2004) far exceeded the growth rates of the EU's core (Table 4). In our opinion, this was caused by the synergy of three factors. First, in the early 2000s, these countries overcame the transformational crisis and struck a growth trajectory driven by the fundamental factors of the market economy. Second, the opening of the markets and joining the EU played a substantial role in accelerating their development. Third, there was significant financial support from the EU: investment for development equalization (AC, 2017b; 2017c).

The weighted average GDP (PPP) for the EU-13 countries was 55.2% and 63.5% for the similar EU-15 indicator in 2008 and 2016, respectively. From 1980 to 1990, the EU average GDP (PPP) per capita increased from Int$25,400 (9 members) to Int$30,000 (12 members).

In 2000, the GDP (PPP) per capita in the EU-15 reached Int$35,300, varying from slightly below Int$26,000 in Greece and Portugal to Int$41,200 in Denmark and Int$41,900 in the Netherlands (the highest value is in Luxembourg—Int$82,100 per capita). Economic growth was intensive during the 2000s, while the weighted average GDP (PPP) per capita in the "old" EU member countries increased from Int$35,300 to Int$39,300. As a result, by 2008 (before the recession), the situation had changed and Ireland, Germany, Finland, and Sweden joined the group of leaders in the EU-15.

GDP (PPP) per capita in the "new" (13 future members) EU member countries was Int$14,700 on average in 2000, but by 2008 it had increased to Int$21,700, or from 41.6% to 55.2% of the EU-15 average. It was a significant success for

Table 4
Population (million), GDP (PPP) per capita (thousand Int\$), share of income in the 10th decile (%), 2000–2016.

Country	Population		GDP (PPP) per capita			Share of the 10th decile		
	2000	2016	2000	2008	2016	2000	2008	2016
EU-15								
Luxembourg	0.4	0.6	82.1	95.7	98.0	23.7	25.8	24.3
Ireland	3.8	4.7	38.8	46.1	64.2	n/a	n/a	24.9
Netherlands	15.9	17.0	41.9	47.4	47.5	23.7	23.7	23.3
Sweden	8.9	10.0	36.9	43.4	46.1	21.1	21.5	21.5
Germany	81.5	82.5	37.6	42.2	44.9	25.2	24.6	24.9
Denmark	5.3	5.7	41.2	44.7	44.7	20.6	21.0	23.7
Austria	8.0	8.7	38.9	44.3	44.3	23.8	24.1	24.1
Belgium	10.2	11.3	37.0	41.5	41.7	25.1	22.7	22.4
France	58.9	64.6	36.0	38.8	39.3	24.5	26.7	26.0
United Kingdom	58.9	65.6	33.3	38.1	39.3	27.8	26.4	26.2
Finland	5.2	5.5	34.6	42.3	39.2	23.2	23.0	22.0
Italy	56.9	60.7	36.1	37.3	34.1	26.3	25.5	25.5
Spain	40.6	46.4	30.3	34.6	33.7	24.9	25.6	26.0
Portugal	10.3	10.3	25.8	27.4	26.8	30.8	28.9	27.4
Greece	10.8	10.8	25.6	32.9	24.9	25.5	26.0	26.1
EU-13								
Bulgaria	8.2	7.1	9.4	16.2	18.9	n/a	n/a	28.8
Malta	0.4	0.4	25.4	29.3	37.0			
Cyprus	0.7	0.8	31.4	37.8	32.4			28.8
Czech Republic	10.3	10.6	21.0	29.2	31.1	22.7	22.9	22.1
Slovenia	2.0	2.0	22.7	31.2	29.9	20.6	20.1	21.1
Slovakia	5.4	5.4	15.5	25.3	29.1	22.1	21.4	20.3
Lithuania	3.5	2.9	12.1	23.5	27.8	27.9	27.6	28.9
Estonia	1.4	1.3	15.3	25.3	27.5			
Poland	38.3	38.0	14.7	20.2	25.7	26.1	26.7	25.2
Hungary	10.2	9.8	17.9	23.7	25.5	24.2	22.1	24.0
Latvia	2.4	2.0	11.2	21.4	23.8	28.5	27.7	26.6
Croatia	4.4	4.2	15.7	21.7	21.3	n/a	n/a	n/a
Romania	22.4	19.8	10.1	18.2	20.7	23.3	23.2	21.6

Sources: IMF and World Bank data.

Cyprus, Slovenia, Czech Republic, and the Baltic states, which can be partly associated with the integration effects. At the same time, the rapid growth by a number of EU-13 countries was natural to a large extent, resulting from the decade-long transformation of economic institutions. Thus, the joining of the "new" members undoubtedly increased the dispersion of GDP (PPP) per capita values across the EU, as the development level of new members was much lower. However, due to the economic growth before and after 2004, the gap between the EU-15 and EU-13 countries decreased slightly.

The general favorable trend towards equalized development levels and high growth rates in many EU countries was disrupted by the crisis in 2008 and 2009. It was relatively easily surpassed by Poland, which is beginning to lead in terms of growth rates among the "new" members. The Czech Republic, Slovakia, and Slovenia are retaining their positions. However, the overall increase in GDP per capita was not very high during the eight years, and the group reached a new mark of Int\$25,100 per capita. However, this was enough to increase the relative indicator value to 63.5% of that for the group of developed countries.

The reason is that for the better developed group of "old" members, the situation proved to be more complex than in less-developed countries during and after the crisis in 2008 and 2009. In Spain, the depression lingered for five years (AC, 2017a). In a number of countries (including Italy, Spain and Greece), GDP (PPP) per capita was lower in 2016 than in 2008. As a result, during the eight years, the weighted average GDP (PPP) per capita in the EU-15 grew from Int\$39,300 to just Int\$39,500.

We can state that the European economies (many of them, at least) demonstrated a certain reduction in relative inequality between 2000 and 2016, in terms of the 10th decile's share of income (Table 2), though it may partly reflect the economic adversities during this period (inequality usually declines during a crisis in the business cycle). The severity of the crisis in 2008 and 2009, and the subsequent deceleration in growth explain much of the concern expressed by European elites towards difficulties of domestic development, the acuteness of the problems in government finance and national debt, as well as the need to resolve the crisis in the southern countries. The anticipated Brexit should also be considered against the background of the overall picture. In any case, in terms of GDP per capita, the UK caught up with France by 2016, but fell even further behind Germany.

The European country group represents the "EU cluster" in terms of the huge integration efforts, investments, and multiple steps in various areas aimed at strengthening the EU's Acquis Communautaire. In terms of inequality, the majority of these countries, except for the UK and Portugal, are rather an example of its lower level, while the 10th decile's share fluctuates insignificantly.

4.2. Former socialist countries

The inequality data for socialist countries in 1992 are difficult to estimate, as a vast majority of these countries underwent dramatic changes during that year. One noteworthy development was the crisis in the post-Soviet states, accompanied by growing inequality both across the entire group and within individual countries, particularly as noted by Milanovic (1998). This created the potential for significant economic growth (including the "recovery" one) in the former "socialist camp" during the 2000s and the explosive growth in inequality during the transition to private property and a market economy; however, in reality, inequality did not change significantly in those countries. Based on the statistics we have obtained, the average share of the 10th decile within the group of socialist countries was 27.0% in 1992, which dropped to 25.5% in 2000. However, this is attributable to the extremely high inequality in Kyrgyzstan in 1992 (the share of the 10th decile was 40.3%). Without it, the average share of income in the 10th decile for the former socialist economies was 25.6% in 1992, and 25.9% in 2000.

The data for the period from 2000 to 2016 reflect a decrease in the share of income in the 10th decile for almost every country. It decreased most dramatically in Moldova (from 28.5% to 22.5%) and Kazakhstan (from 26.7% to 22.3%) and grew in Russia (from 27.6% to 29.7%). Inequality in financial income in Russia emerged during the 1990s and has not changed much since then. The distribution of shares of income by quintile has barely changed since 1999, as has its structure in general (Grigoryev and Pavlyushina, 2017).

4.3. BRICS countries

The BRICS group consists of economies with substantial differences in the level of development and the economic growth models. China, while being comparable in population with India, produces almost 2.5 times as much per GDP (PPP) (Int\$23.2 trillion and Int\$9.5 trillion, respectively, in 2017). The dispersion of GDP (PPP) per capita in current prices within BRICS was 3.9 times in 2017. The corresponding values for China, Brazil, and South Africa are close: Int\$16,700, Int\$15,600, and Int\$13,500 per capita, respectively. Russia's figure is almost twice as high (Int\$27,800 per capita), whereas India's is twice as low (Int\$7,200 per capita). At the same time, South Africa demonstrates the highest social inequality (the country is not presented in the charts due to the specific nature of gathering statistical data), while being in the middle of the distribution. In 2017, the share of income in the wealthiest (10th) decile was 50.5% in South Africa, 40.4% in Brazil, 31.4% in China, 29.8% in India, and 29.7% in Russia.

It is also noteworthy that in the BRICS countries, the goal of reducing social inequality is set at the political level. For example, Russian Prime Minister Dmitry Medvedev (2016) pointed out that it had not caused great anxiety during vibrant and sustainable growth conditions, but was now becoming a source of economic and political volatility. According to the South African government, the main factors holding back development today are: unemployment, inequality, poverty, and the lack of necessary infrastructure, including for faster industrial development.

At the 18th Congress of the Chinese Communist Party in 2012, Li Keqiang, Premier of the State Council, identified the promotion of social justice as one of the development priorities. Poverty declined considerably in China after 2008, but inequality increased because incomes of urban households grew faster than those of rural households. On the whole, the significant increase in well-being in China coincided with a level of inequality which is high for a socialist country, but relatively low in comparison with other developing countries. Future inequality is currently the subject of analysis and discussion, since reducing it could facilitate a re-focusing of growth on the domestic market. The market boom (between 1980 and 2015) was accompanied by a giant leap in development; a new standard of living was achieved but a new type of social inequality emerged as well as 10th decile incomes distanced themselves from the rest of the population, which was reported in an IMF study (Jain-Chandra et al., 2018). The authors of the study were skeptical with respect to similar improvement opportunities in the future. It should be noted that China's national statistics on inequality point to different incomes not only between strata but also between professions (under a planned economy and mixed ownership).

5. Social indicators in clusters

The cluster analysis of social statistics with respect to 106 countries is fairly reliable (especially in the richest four clusters). Earlier (Grigoryev and Pavlyushina, 2018a), we showed that the structure of employment and energy consumption had a strong correlation with the level of development. We will show that a greater set of socioeconomic and even sociopolitical indicators (though not all) corresponds to the level of development and inequality described cluster-wise (Table 5).

Table 5

Proportion of personal consumption and share of income in 10th decile, 2016[a] (%).

Cluster No.	Cluster limits, thousand Int$ per capita		Durable goods	Non-durable goods	Services	Recreation and leisure	On durable goods for culture and recreation	Share of 10th decile
	bottom	top						
1	35.1	–	14.4	25.8	52.4	8.5	0.35	24.3
2	21.1	35.1	8.9	40.4	43.5	6.4	0.09	27.2
3	14.0	21.1	10.0	43.8	39.2	4.8	0.11	31.7
4	7.0	14.0	7.8	46.8	39.6	3.3	0.04	29.5
5	3.2	7.0	7.6	54.8	31.6	1.5	0.05	31.4
6	1.8	3.2	8.2	57.8	27.1	1.5	0.04	30.1
7	–	1.8	4.8	62.8	28.3	1.0	0.02	32.5
United States			8.8	17.8	66.6	9.2	0.46	30.2
Germany			11.2	27.3	52.3	8.7	0.26	24.9
Brazil			10.2	39.3	43.0	4.2	0.04	40.5
India			3.3	41.2	47.2	0.9	0.02	29.8
China			7.3	34.7	48.5	5.5	0.08	31.8
Russia			12.1	49.1	31.8	4.9	0.02	29.7

[a] Or last year available.

Source: Authors' calculation based on World Bank and Euromonitor data.

A high proportion of food in personal consumer expenses effectively acts as a "substitute" for the poverty indicator. The higher the proportion, the further the country is from wealth, intellectual development in terms of a "post-industrial society" or the free development of a person in the Marxist vernacular. The important factors are increased amounts of free time and opportunities for recreation, leisure, and the use of special recreational products. The hierarchy of the clusters is very conspicuous: 8.5% of spending in the first cluster (with the highest income for the 10th decile in Fig. 2) and 9.2% on recreation and leisure in the United States, with a rapid decrease in the share downward across the clusters. In the fifth cluster, it falls to 1.5% in the arithmetic mean (and is only 0.9% in India).

Looking back at the problem of inequality and the level of development, we note that developed countries (first and second clusters) with their high absolute inequality, still have lower shares of income in the 10th decile, except for the Anglo-Saxon countries. However, no sustainable trend towards lower inequality in developed countries can be observed in the period under review. A slight decrease in some countries is concurrent with an increase in others.

Democracy indices and the proportion of the population with internet access fall into a clear cluster hierarchy (Table 6). It should be noted, however, that excluding a number of oil exporters in the first cluster from the mean based on the democracy index produces a more accurate picture: inequality as a share of income in the 10th decile is gradually declining along the upward scale, but the distance from the poor is growing at the same time.

Social parameters provide a clear picture of differences across clusters. The first thing to mention is the rigid order across clusters in declining birthrates, increasing life expectancy and the proportion of people with higher education as well-being increases. Inequality may be a crucial element in the system of formal and informal institutions that characterize a society's development at a certain income level.

Table 6

Average values for R&D spending, the democracy index, proportion of population with internet access, proportion of population older than 25 years with tertiary education, life expectancy at birth, and the birthrate, 2016.

Cluster No.	R&D spending	Proportion of population with internet access, %	Democracy index	Proportion of the population older than 25 years with tertiary education, %	Life expectancy at birth, years	Birthrate (per 1,000 of population)
1	2.1	88.0	7.9[a]	32.1	81.1	11.4
2	1.3	70.2	6.8	25.8	76.8	13.0
3	0.7	56.8	5.6	18.8	73.2	16.5
4	0.4	48.3	5.7	20.4	72.3	18.5
5	0.3	30.6	4.5	32.7[b]	67.7	26.6
6	0.1	17.3	4.5	2.1	67.5	32.5
7	0.3	10.6	3.8	–	59.1	37.3
United States	2.8	76.0	8.0	42.3	78.7	12.4
Germany	2.9	89.6	8.6	25.4	81.1	9.3
Brazil	–	60.9	6.9	–		14.2
India	0.6	29.5	7.2	–		19.0
China	2.1	53.2	3.1	–		12.0
Russia	1.1	73.0	–	–	70.9	12.9

[a] Excluding Arab countries. [b] Specific case of Turkey.
Sources: Authors' calculation based on World Bank and IMF data.

Catch-up development in terms of the cluster approach implies a comprehensive transition of the entire institutional system to a higher level together with a two-fold increase in per capita income on average (characteristic gap between clusters). Each country has its own specific features here, but the common trends and parameters are still significant: to overcome the two-fold gap between clusters in GDP per capita, a country needs to grow with a greater advantage in growth rates over other countries, and not without adjustment for population growth.

6. Conclusion

What conclusions can be drawn from analyzing the distribution of a large group of economic and sociopolitical indicators across clusters? First of all, we have noted the stability of the incumbent system during the twenty-five years under review. We can see the general rigidity of inequality, specifically in its Anglo-Saxon and continental models. Moreover, we observe a crisis of relative inequality. Therefore, we believe that the institutions and factors driving the redistribution of income (labor market efficiency, social status, progressive taxes, inheritance tax, etc.) will fail to overcome the "deceleration" underlying the institutions of the modern economy and society. This provides sufficient grounds for improving the theory, rather than for seeking simple income redistribution methods, as the latter does not solve the actual inequality problem.

Of course, the rapid development of China, South Korea and India has pushed population masses upwards along the social ladder, but failed to remove the differences between the countries and the differences between deciles within the countries. In the context of the picture representing inequality and its rigidi-

ty across all clusters, the social situation in the world becomes different from that imagined recently: much less grounds for optimism for divergence across the globe. This, in particular, follows from the trends observed in the 21st century. Undoubtedly, any country through extraordinary effort seems to be able to move upwards across the clusters and reduce internal inequality, but a massive shift is hardly possible. In our future papers, we also intend to identify the specific features of the labor market and how they impact social inequality, and to address the problem of inequality in wealth.

We are confident that these conclusions are stable: they can be regarded as stylized facts based on which the theory has to be improved. However, conclusions with respect to the breakdown of the distribution of economic and sociopolitical indicators can be interpreted either from a soft or from a hard perspective. The soft perspective means that we correctly identified the limits of the clusters as the tool of analysis and discovered substantial differences between them, which go far beyond "development levels" in terms of GDP (PPP) per capita. At least, we can state that each cluster corresponds to its own set of parameters for all (most) indicators.

In the course of development, it is not enough to just double GDP per capita to move up a cluster. It is important to change the social system so that social indicators are congruent to a measure between each other and with GDP per capita. Strictly speaking, this specifies the requirements for sustainable development in the context of changing this level. However, in using this approach, we will not risk regarding these clusters as a separate type of society. Perhaps only with respect to the first cluster (with the exception of a number of countries due to the great deviation in their sociopolitical indicators) can it be stated with confidence that it has a number of indicators characterizing the transition to post-industrial development. It should be noted that this approach sets higher and often quantifiable criteria in formulating national development strategies.

Potentially, this set of cluster indicators and characteristics can be interpreted more rigidly, something on which we do not insist. In this case, these clusters will represent qualitatively different types of economies and societies. Then, the transitions between them can be called "qualitative leaps" in the Marxist terminology. We are not suggesting cluster names in the language of social development, particularly because we can see no ideal, especially for the inequality indicator. Nevertheless, we believe there may be people willing to do it.

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