SCIENTIFIC AND TECHNOLOGICAL LANDSCAPE OF THE MULTIPOLAR WORLD

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To interpret the complex processes occurring in the global multipolar world, analysts often make references to the statements and decisions made by leaders of superpowers, and attempt to uncover the obvious or not so obvious intentions of global actors, with consideration of their civilizational peculiarities. Currently, there is a certain focus on information issues, although it seems the original meaning of this term is often forgotten (in Latin: *informare* – to shape, teach, think, imagine) and much attention is paid to activities of hackers, bloggers, as well as the "likes" and "fakes" in social media. At the same time what appears to be often ignored, is that patterns of modern developments significantly depend on the level of awareness (in terms of knowledge) of both the decision-making persons/organizations and those who present such information. Moreover, the quality and volume of knowledge resources determine the place and role of one or another country or community in the modern world order. To substantiate this approach, this article examines the connection between the scientific/technological potential of various communities and their geo-economic characteristics.

The following integrative indicators were used for this purpose:

- Gross domestic product (GDP) based on purchasing power parity (PPP) of the examined country or group of countries (GDPppp).
- Research and development (R&D) expenditures, also based on purchasing power parity (R&Dppp), as well as the percentage of R&Dppp in relation to GDPppp[1].

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[1] Hereinafter the "ppp" will be skipped for brevity.

This last indicator describes generally the R&D policies in the country, since it is something planned beforehand during one or another strategy for R&D development. The most accessible and comprehensive source for the mentioned indicators is the *R&D Magazine,* which among other things provides a list and indicators for R&D expenditures in 40 leading countries for the period of 2012-2016 [1, 2]. According to these sources, it had been expected that in 2016 total $1.9 trillion or 1.74% of the overall global GDP, was to be spent on R&D. The share of the USA is the largest - more than the quarter of the total global R&D expenditures (26.4%, $514 billion, *see Figure 1*). China's share is over one-fifth of total (20.3%, $396 billion). The third country is Japan (8.6%, $167 billion), followed by Germany (5.6%, $109 billion), and South Korea (4.0%, $77 billion). The list of these top five countries remains unaltered since 2012.

Characteristically, out of these five countries China, Japan and South Korea represent Eastern Asia, while Continental Europe is represented only by Germany. In addition to these countries, the top 10 includes India, France, Russia and the UK, with Brazil being the last one and the only Latin American country. In 2016 the aggregate share of these ten countries in global R&D expenditures comprised 78.5%. In terms of percentage of R&D expenditures in relation to GDP, the global leader in 2016 was South Korea (over 4.0%), closely followed by Israel (3.93%, which topped the list till 2014), then Finland, Sweden and Japan.

Let us consider countries grouped based on linguistic and cultural attributes ("Worlds of World") for which interesting patterns can be observed. We consider the following six "Worlds":

1. "World of Hieroglyphs": China, Japan, South Korea, Taiwan and Singapore (all these countries are among top 40 of *R&D Magazine* list);
2. "Anglo-Saxon World": USA, UK, Canada, Australia and New Zealand (the latter is not among the top 40);
3. "Continental Europe": Germany, France, Italy, Spain, Portugal, Austria. Belgium, the Netherlands, Switzerland, Sweden, Finland and Norway (all these countries are among top 40);

4. "Slavic World": Russia, Poland and Czech Republic, as well as the following countries that are not among the top 40 in 2016: Ukraine, Slovenia, Belarus, Serbia and Montenegro;
5. "World of Crescent": a segment of Islamic world, including Turkey, Iran, Qatar, Malaysia, Pakistan, Saudi Arabia, Indonesia, Egypt and Bangladesh (all these countries are among top 40);
6. *BRICS* countries group: Brazil, Russia, India, China and South Africa.

Figure 1

World top 10 countries by R&D expenditure (pie chart).
Top 5 countries for R&D expenditure relative to GDP (bottom bar chart). 2016.

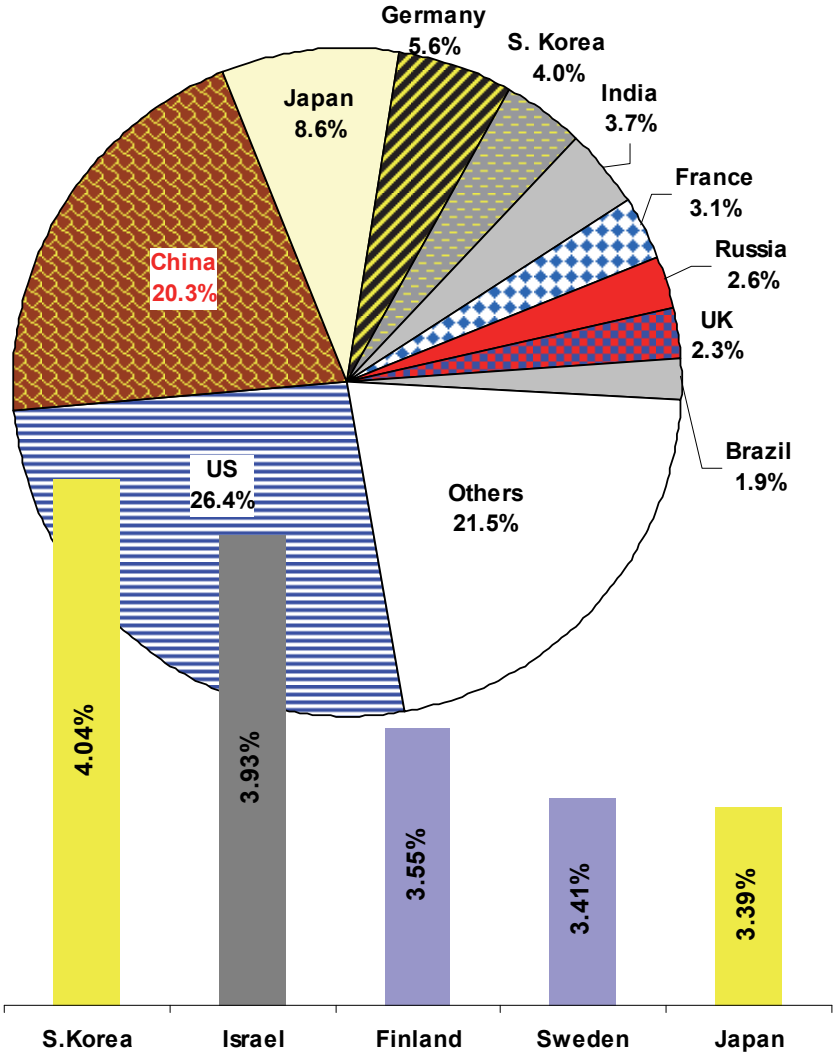


Table 1 summarizes the data for these "Worlds" on their total territory, population and GDP, as well as R&D expenditures expressed in $ billions ($ bln) and as average percentage of their group GDP. As seen in the table, the “World of Hieroglyphs” overtakes the other groups (obviously, with exception of *BRICS*) not only by population, but also by total GDP, surpassing the “Anglo-Saxon world” by $4 bln. There is prevalence also in R&D expenditures, but it is not significant: $678 against $619 bln. However, the “World of Hieroglyphs” spends 2.87% of its group GDP on R&D, whereas the “Anglo-Saxon world” 1.98%: Naturally, if this trend continues, the difference in R&D spending will increase in favor of the “World of Hieroglyphs”.

Table 1. Totals (and average for R&D as % of GDP)	Territory, million km²	Population, million	GDP, $ bln	*R&D*, $ bln	R&D as % of GDP
World of Hieroglyphs	10.1	1,580	28 414	678.3	2.87%
Anglo-Saxon World	28.1	451	24 084	618.7	1.98%
BRICS	39.7	3,087	35 606	562.7	1.30%
Continental Europe	3.3	337	13 831	311.2	2.38%
Slavic World	18.6	261	5 758	76.6	1.15%
World of Crescent	8.9	957	9 948	71.7	0.90%

As it follows from the data of the Table 1, the “Anglo-Saxon World” surpasses the “Slavic World” 1.5 times by territory, 4 times by overall GDP and 8 times by R&D expenditures. The “World of Hieroglyphs” tops the “Slavic World” 5 times by overall GDP, 9 times by R&D expenditures and 2.5 times by R&D expenditures percentage relative to the GDP. There is also a significant prevalence of “Continental Europe” over the “Slavic World”, including 1.3 times in population, 2.4 times in overall group GDP, 4 times in R&D expenditure and 2.1 times in R&D expenditures as percentage of the GDP. In terms of this last indicator “Continental Europe” fares 0.4% better than the “Anglo-Saxon World” and is outdone only by the “World of Hieroglyphs”. Although the “Slavic World” prevails by 0.25% over the “World of Crescent” in this indicator, the R&D expenditures of these groups are about the same, with $77 and $72 bln, respectively. As a comparison, South Korea alone spent

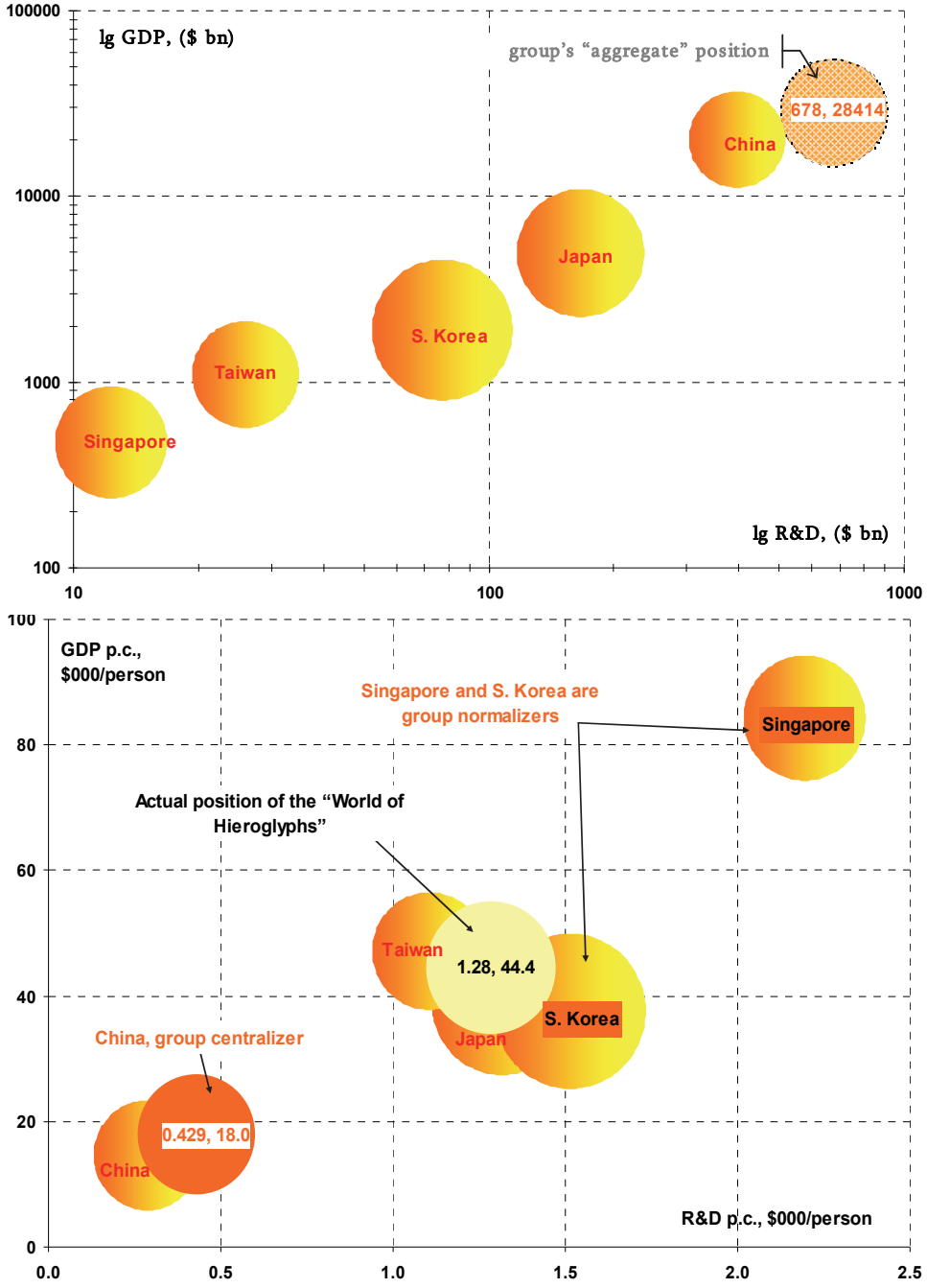
$77.14 bln on R&D in 2016. It has to be mentioned that the overall GDP of "Slavic World" is 1.7 times smaller than that of the "World of Crescent", and has a 4 times smaller population.

It is easy to notice that every examined group has a clear leader in terms of economy and demography. For example, in the "World of Hieroglyphs" it is China, with 95% of the group territory, 87% of overall population, 70% of GDP and 58% of total R&D spending. In the "Anglo-Saxon World" the USA is the leader: although its territory is just 35% of the group, but the population comprises 72%, GDP is 77% and R&D expenditure is 83% of the total. Germany's territory constitutes only 11% of the "Continental Europe", with 24% of its population, 27% of GDP and 35%. Russia has 92% of the "Slavic World" group territory, 55% of population, 59% of group GDP and 67% of overall R&D expenditures. In the "World of Crescent", although Turkey occupies just 9% of the overall territory and 8% of population, its R&D expenditures (about $14 bln) are significantly higher than those of the other group countries, while the GDP ($1.62 trillion) is second to Saudi Arabia (about $1.71 trillion). These countries are the conditional "centers of gravity" in their respective groups in terms of GDP and R&D. Loosely following the terminology of the mathematical group theory, we will call them *"centralizers"* of the group. Let us consider "World of Hieroglyphs" as an example.

The Figure 2 (top) shows the configuration of the "World of Hieroglyphs" group of countries in R&D expenditures (X-axis) and GDP (Y-axis) plane, in log scale (chosen to enable demonstration in a single graph, as the values differ significantly). As it can be seen, the countries are located approximately on a single line, with China at the uppermost right end (GDP of $20 trillion, R&D expenditures of $514 bln). The diameters of country marker correspond to the given country's R&D expenditures as % from the GDP in 2016. For example, South Korea's marker has the largest diameter with a value of 4.04% (see above, Figure 1). If one would choose to present the whole "World of Hieroglyphs" by a single, hypothetical country (group representation), there are three different ways to do it.

Figure 2

Absolute (top) and specific (bottom) indicators of the "World of Hieroglyphs" in 2016



First, all GDPs and all R&D expenditures of the group countries can be summed up and attributed to this hypothetical country. In this case its marker on our graph will have coordinates of $27.4 trillion (GDP) and $678.3 bln (R&D), with the diameter of marker determined by the ratio of these aggregated values (2.39%). In our figure this hypothetical country would be positioned higher and to the right of China (see "Group's aggregate position", Fig. 2) However, such additive representation of the "World of Hieroglyphs" in our subject matter is insufficient at least, and actually wrong. Such additive approach implies a powerful unification, which would be true only for a single, unified country. For a *group* of countries it implies close linguistic, historical, cultural, geopolitical and geo-economic consolidation, something that the modern "World of Hieroglyphs" obviously lacks. Suffice to mention the geopolitical controversies between modern China and Taiwan (or Russia and Ukraine, in the case of "Slavic World"). Such a close consolidation currently can be attributed only to the "Anglo-Saxon World". These issues, as well as "dialectics" between *centralizer* and *normalizer* countries of the group (see below), will be touched upon in our next article.

The absolute values of GDP and R&D expenditures, as well as population and territory data, though very important *per se* for assessing the might of a country (or group of countries), are not sufficient in our case. For adequate group representation, specific indicators are necessary: GDP and R&D expenditures per capita (p.c.). Using such indicators may substantially modify the configuration of the examined groups. For instance, the bottom part of Figure 2 shows specific GDP/R&D expenditures diagram (normal scale can be used in this case). As with the previous case, the diameters of markers correspond to R&D expenditures as percentage of the GDP. As seen, the group configuration has changed considerably. The uppermost right end is now occupied by Singapore with its exceptional specific indicators: $84.3 thousand of GDP p.c. and $2.2 thousand of R&D expenditures p.c. (2.6%). As we will see later, on the global scale these values are second only to Qatar ("World of Crescent"). The "World of Hieroglyphs" group *centralizer* - China, is now in the lowermost left corner with $14.6 thousand GDP p.c. (about six times smaller than Singapore) and R&D expenditures of $0.29 thousand p.c. (about eight times lower than Singapore in 2016).

Now, with this new configuration, if the whole "World of Hieroglyphs" were to be depicted by a single hypothetical country this time on specific GDP and R&D expenditures plane, it could be done in two ways. First, the logic of the previous, additive, approach can be followed again to find out the aggregated coordinates (now - in specific, p.c. dimension) of such hypothetical country: $18.0 thousand GDP p.c. and $0.429 thousand R&D expenditures p.c. Such hypothetical country would be positioned close to China, somewhat higher and to the right (see Figure 2, bottom). This is understandable, because in this second approach we still consider China as the group *centralizer* and its economic and demographic indicators are determinant for the group representation. However, in the scientific/technological and information coordinates the adequate representation of the "World of Hieroglyphs" necessarily requires considering the peculiarities of R&D specific indicators of all countries.

Thus, presenting the group adequately should involve *averaging* the countries' specific indicators, but not just *adding* them up. With this third approach, the single hypothetical country representing the "World of Hieroglyphs" will have coordinates of $44.4 thousand GDP p.c. and $1.28 thousand R&D expenditures p.c., with marker diameter of 2.89% (see Figure 2, bottom). Figuratively speaking, this hypothetic country would be the "scientific/ technological center of gravity" of the "World of Hieroglyphs". Characteristically, Singapore and South Korea are positioned far away to the right of this "scientific/technological center of gravity", which reflects their determining role in "scientific/technological presentation" of the group. Such countries, located upwards *and* to the right from "scientific/technological center of gravity", would be hereinafter referred to as *normalizer* countries of the group.

For example, unlike Singapore and South Korea, Taiwan is positioned higher than the "scientific/technological center of gravity", but not to the right of it. This means Taiwan's prevalence over the center is due to its specific GDP, but not specific R&D expenditures, and hence, it is not a group *normalizer*. Obviously, China is the *centralizer* for the "World of Hieroglyphs", but not its *normalizer*. Using this method the following two figures illustrate group configurations on p.c. GDP–R&D expenditures plane for the rest of the "Worlds of World" in consideration.

Figure 3

Top: "Anglo-Saxon world", Bottom: "Slavic world" and BRICS group of countries

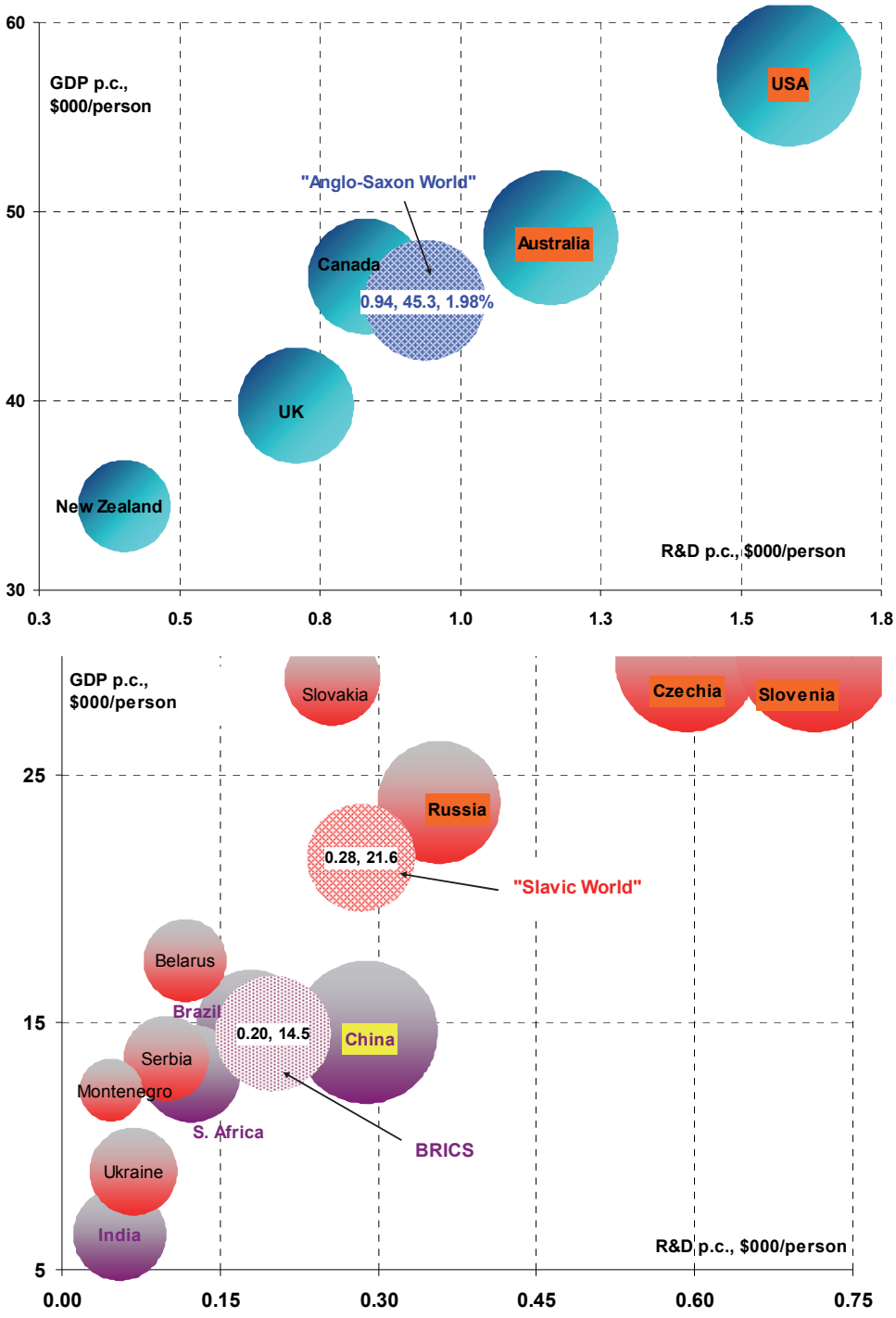


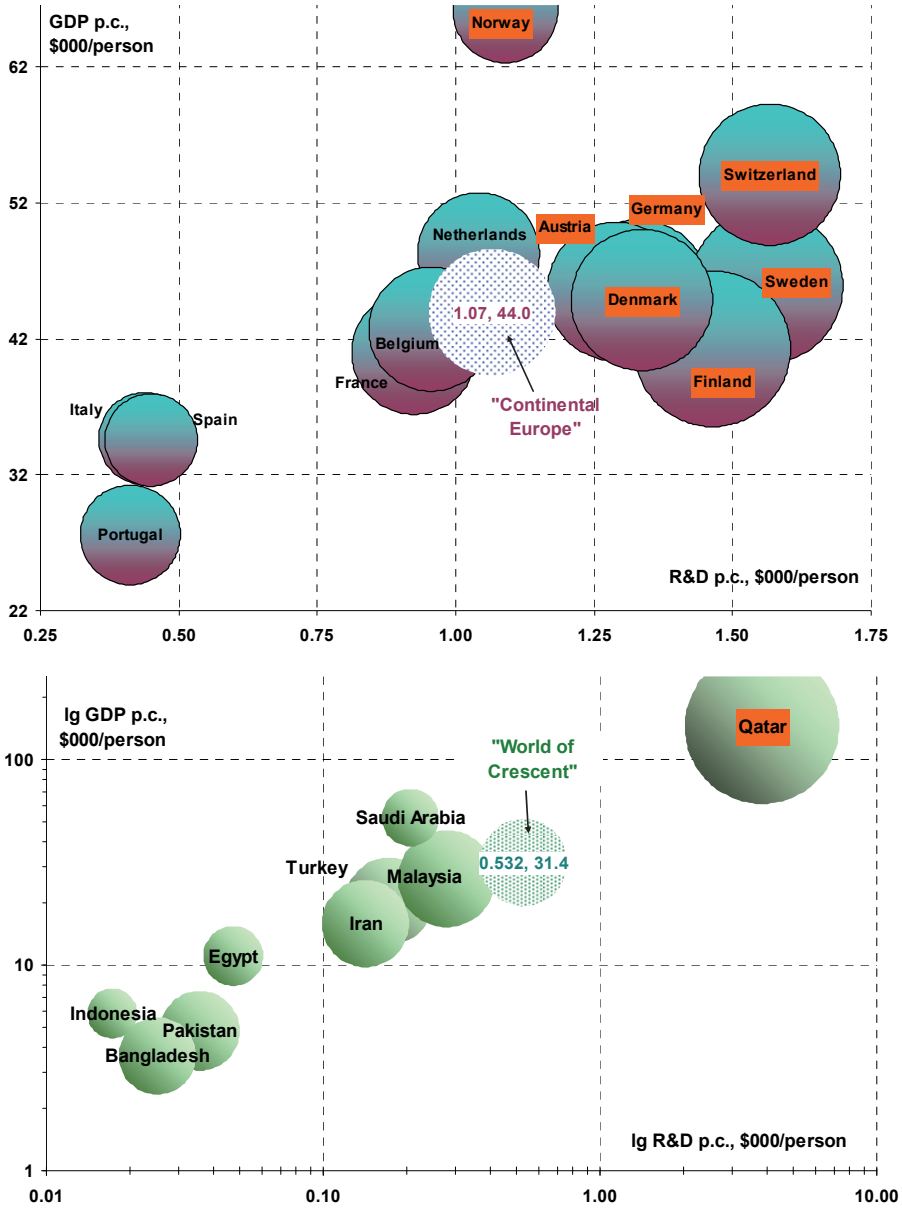
Figure 3 top part shows the configuration of the "Anglo-Saxon World". The "scientific/technological center of gravity" is at $45.3 thousand of p.c. GDP and $0.94 thousand of p.c. R&D expenditures, with marker diameter of 1.98%. The group *normalizers* are the USA and Australia, as they fall to the right (and above) the "center of gravity". The USA is also the group's *centralizer*. The bottom part of Figure 3 illustrates "Slavic World" and *BRICS* country groups. As seen, Russia, Czech Republic and Slovenia are the *normalizers* of the "Slavic World", since they are positioned to the right of the "scientific/technological center of gravity" (p.c. GDP of $21.6 thousand, p.c. R&D expenditure of $0.28 thousand and diameter of 1.31%). Thus, Russia is both the *normalizer* and *centralizer* for the "Slavic World". Interestingly, if Russia (and China) is viewed within *BRICS*, then the hypothetical representative country of *BRICS* (with its p.c. GDP of $14.5 thousand, p.c. R&D expenditure of $0.20 thousand and diameter of 1.38%) will be positioned to the left and below of not only Russia and China, but also of "Slavic World". Hence Russia is the *normalizer* of not only "Slavic World", but also for *BRICS* group. At the same time "Slavic World" significantly outperforms *BRICS* in terms of science/technology.

The "Continental Europe" group is shown in Figure 4, top. The "scientific/technological center of gravity" coordinates for this group are $44.4 thousand p.c. GDP and $1.07 thousand p.c. R&D expenditures, with marker diameter of 2.43%. The group *normalizers* are Germany, Scandinavian countries (Sweden, Norway and Finland), Denmark and Austria. Germany is also the group's *centralizer*. The bottom part of Figure 4 shows the "World of Crescent". As seen, it is clearly divided into three subgroups: "underdogs" (Indonesia, Bangladesh, Pakistan and Egypt), middle (Iran, Turkey, Malaysia and Saudi Arabia) and an absolute scientific/technology leader of the group Qatar, with world record-breaking p.c. indicators of $3.86 thousand R&D expenditure, $143.1 thousand p.c. GDP (2.7%). The spread in the group is so wide that again logarithmic scale has to be used. The "scientific/technological center of gravity" of the "World of Crescent" is at $0.532 thousand of specific R&D expenditure and $31.4 of specific GPD, with marker diameter of 1.7%. As already mentioned, the group's *centralizer* is Turkey, but it

is not the *normalizer*, since its position is to the left and below of the center. Obviously the group *normalizer* is Qatar.

Figure 4

Top: "Continental Europe", Bottom: "World of Crescent" (2016)



Now, we are equipped with a method to illustrate the overall scientific-technological landscape of the World in general. The positions of all six groups are depicted together in Figure 5. "World of Hieroglyphs" is the leader here with R&D p.c. expenditure of $1.28 thousand (2.89% of GDP). It is followed by "Continental Europe" and "Anglo-Saxon world" that spend $0.9-1.1 thousand on R&D p.c. "World of crescent" is next, at almost half the rate of the leaders, but "chasing" them. "Slavic world" and *BRICS* are at the tail, with less than $300 of p.c. R&D expenditure.

Figure 5

Positions of the examined groups in the world's scientific and technological landscape, 2016.

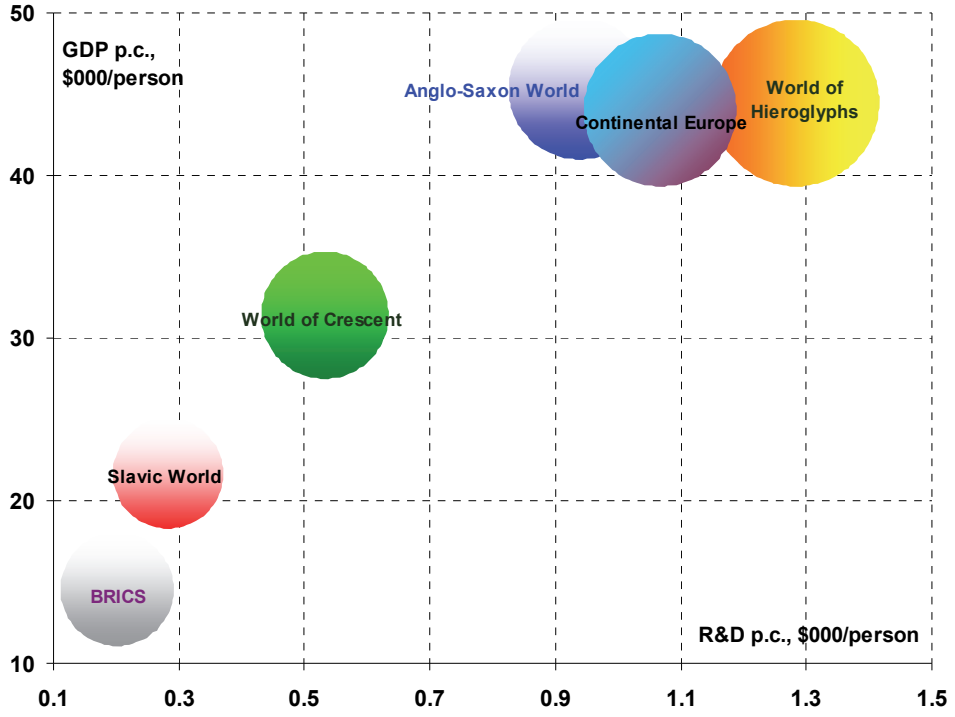


Figure 5 shows only a static picture for 2016. To uncover the trends, the picture has to be examined in dynamic pattern. For this purpose, an analysis of 40 leading countries in R&D was conducted for 2012-2016 [1, 2]. Separately, forecasts for 2014 were also compared with actual R&D spending. Generally, in the past five years R&D expenditures have grown significantly. This

growth is especially noticeable in four of the five *centralizer* countries: the USA, China, Germany and Qatar. In 2012 the top 40 countries list ended with R&D expenditures of $2.0 bln (Indonesia), with their total amounting at $1.48 trillion, which was 37.63% of overall global R&D expenditures. In 2014 the floor of top 40 was already $3.86 bln (Portugal), while their total spending comprised $1.75 trillion, which was 96.84% of overall global R&D expenditures for the year. Finally, in 2016 the top 40 lower boundary was $4.27 bln (Bangladesh), with their total amounting at $1.89 trillion, which was 96.87% of overall global R&D expenditures. In terms of the R&D spending growth, the advancement of "World of crescent" is particularly noticeable.

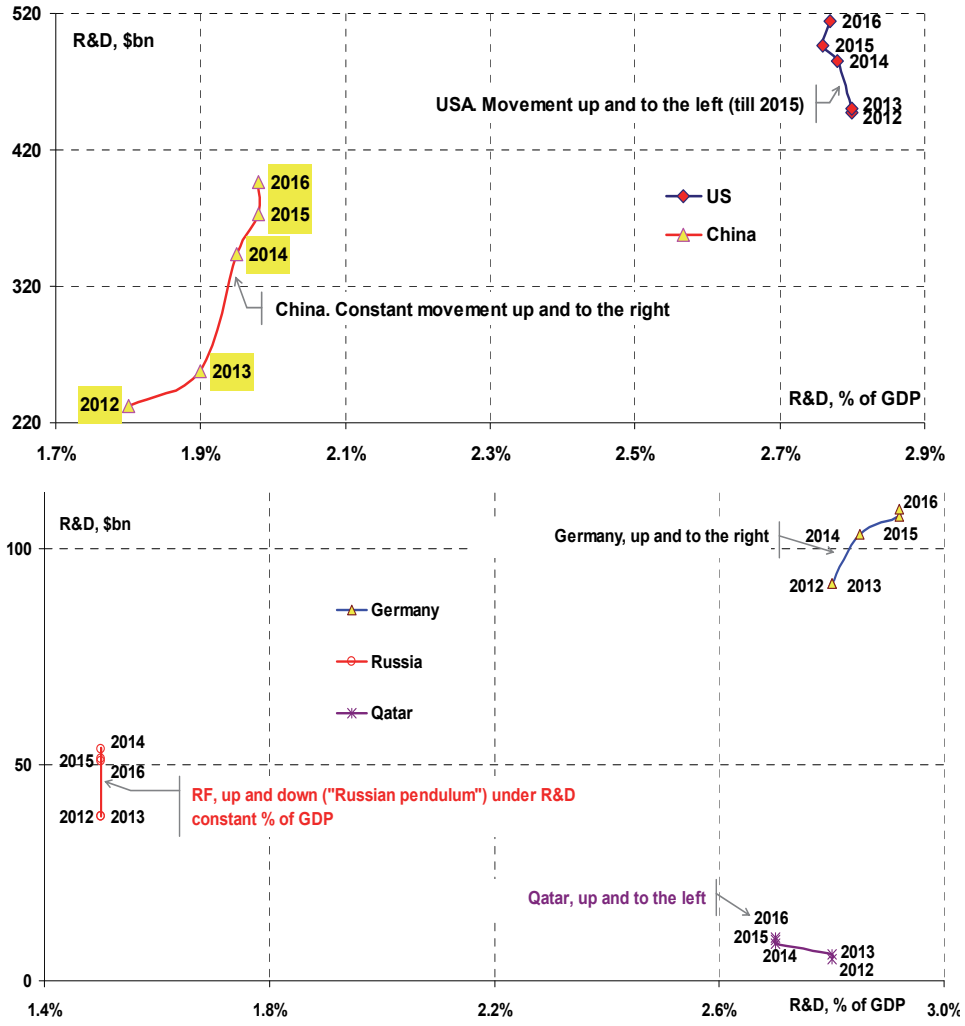
A comparative analysis indicates that actual 2014 R&D expenditures were underestimated in the forecast done in 2013 for more than half of the countries: 23 out of 40. The most underestimated country is China, where the actual R&D spending exceeded the forecast by $60 bln. China is followed by the USA (underestimation of $20 bln), India (underestimation of $18 bln), Russia ($14 bln), Germany ($11 bln) and France ($6 bln). Interestingly, every Muslim country that ever made to top 40 during the last five years was underestimated in the forecast, including Qatar ($2.7 bln), Indonesia ($2.6 bln), Turkey ($2.3 bln), Pakistan ($2.3 bln), Saudi Arabia ($2.2 bln), Iran and Malaysia [1, 2].

Moreover, Ireland and Ukraine that were among top 40 in 2013, were replaced by two Muslim countries in 2014 – Egypt and Bangladesh. Consequently, while in 2012 the share of Muslim countries in the top 40 was 18%, in 2016 it reached 23%. One may only guess what would be real picture if the "Arab spring" would have not terminated scientific/technological development in such countries as Iraq, Libya and Syria. Or what would happen if the geopolitical and civilizational processes initiated in 2013 would not cause scientific/technological potential of Ukraine to plummet and the country would stay among the top 40?

Using the available data it is possible to draw the "scientific/ technological trajectory" of the countries in 2012-2016 in the dimensions of R&D expenditure – R&D percentage in GDP, which allows uncovering the peculiarities of the R&D strategy in these countries. The top part of the Figure 6 shows these trajectories for the USA and China, while the bottom part of

Figure 6

R&D Trajectory of the USA and China (top), and Germany, Russia and Qatar (bottom)



the Figure 6 illustrates those for Germany, Russia and Qatar. As seen, the "scientific/technological trajectory" of China assertively moves upwards and to the right, reflecting the growth of R&D expenditures both in absolute value and in percentage to GDP. This trajectory can be interpreted as consistent implementation of R&D development strategy in China. The R&D expenditures grew from $232 bln in 2012 to $396.3 bln in 2016. There is a noticeable leap in 2013-2014 when the R&D spending increased by almost $86 bln. In 2016

first time ever the growth was only in absolute value (by $23 bln), while their percentage to GDP remained the same (1.98%).

The character of "scientific/technological trajectory" for the US is somewhat different. In the examined period it does move upward, but not to the right. This can be interpreted as a result of a conservative strategy for R&D development. Indeed, the US R&D expenditures grew from $447 bln in 2012 to $514 bln in 2016. A significant advancement is observed for 2013-2014, when the expenditures increased by $35 bln. However, in 2013 R&D expenditures comprised 2.80% of GDP, while in 2014 they dropped to 2.78%. In 2016 it is the first when R&D spending grew both in absolute value (by $17 bln) and percentage to GDP (by 0.01%).

The "scientific/technological trajectory" of Germany has the same pattern as that of China, i.e. moving up and to the right. Actual R&D expenditures of Germany passed beyond $100 bln (2.85% of GDP) in 2014, while in forecast done in 2013 they were expected to be $92 bln. Russia's trajectory is completely different. In the past five years R&D expenditures remained at the same 1.5% of the GDP.

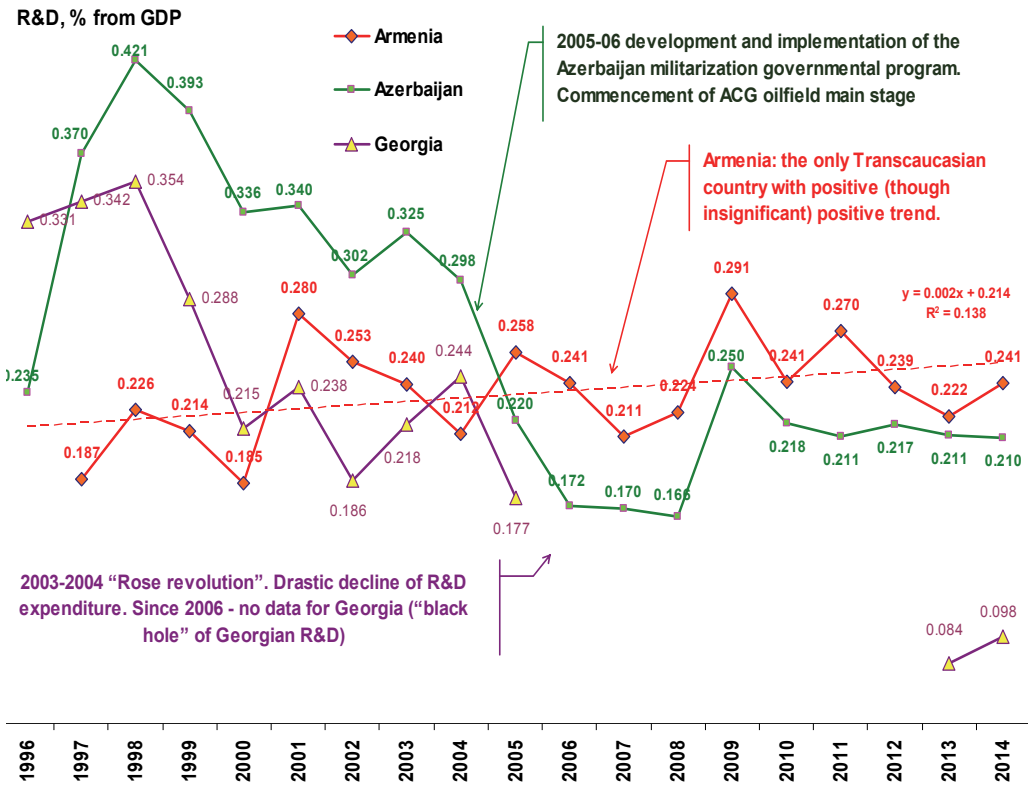
Their absolute value increased from $38 bln in 2012 to $53.52 bln in 2014, but then declined to $51.49 bln in 2015 and $50.95 bln in 2016. Perhaps, this pattern is a consequence of "leftover funding" strategy for R&D development in the last five years. Finally, Qatar's trajectory moves upward and to the left (see Figure 6, bottom). Absolute values of R&D expenditure grew from $5.0 billion in 2012 to $9.95 bln in 2016, with its percentage to GDP falling from 2.8% (2012-2013) to 2.7% in 2014-2015.

The situation in South Caucasus countries was also reviewed using data from the World Bank (WB). Based on these data the chart of R&D expenditures in 1997-2014 as percentage of the GDP for the three countries is shown in Figure 7. A common property for all three countries in this chart is the miniscule volume of the R&D expenditures. For Azerbaijan, it has to be noted that the commencement of the main stage of oil reserves exploitation in 2005-06 had no effect on R&D expenditure percentage relative to GDP. Moreover, it significantly decreased from 0.3% in 2004 to 0.16% in 2006-2008. A growth was observed only starting from 2008, up to about 0.22% in 2009-2014. In ad-

dition, the R&D expenditure decline in Azerbaijan coincides with development and adoption of the government program for militarization, while the growth follows after the Georgian August 2008 adventurism (see [3]). As for Georgia, a dramatic decline in allocation of funding to R&D is observed (from 0.24% in 2004 to 0.098% in 2014), which can be interpreted as a result of "Rose revolution" and "external governance" of the country. Remarkably, the WB database lacks any data on R&D for Georgia for the period of 2006-2012. It can be supposed that the reason for this "black hole" is the same as the mentioned above.

Figure 7

R&D Expenditures in the three Trans-Caucasian Countries (as percentage of GDP)



According to the WB data, Armenia is the only Transcaucasian country with positive trend line of R&D in 1997-2014, although its angle is miniscule +0.12% (see Figure 7). Starting from 2005, Armenia's indicator of R&D expenditure percentage relative to GDP surpassed those of its neighbors. Still, the

R&D spending remains untenably low, and unfortunately, to the date there is no strategy in Armenia to improve the situation (more information about this can be found in [4-7]).

In the complicated situation of the "Second Cold War" in a multipolar world, this shortcoming will inevitably have its effects. This concerns not only Armenia, but also its strategic ally Russia. The origins of such situation should be searched in the logic of liberal revolution in 1991.

At the beginning of *perestroika*, despite its numerous deficiencies, the Soviet society was quite close to the "information society" as defined by Daniel Bell. Unsurprisingly, it was the segment of society with most knowledge resources that became a "revolutionary class", *de facto* implemented the revolution and overthrew the degraded party establishment. However, the lack of knowledge served Soviet intelligentsia a dirty trick, since due to closed system of mono-ideology they were lagging far behind their Western colleagues in humanities sciences, had little idea about Western political culture and geopolitical realities, and hence, about the upshots of the revolutionary transformations they undertook.

While their western partners did everything by rules established beforehand. Following the letter and spirit of information wars they embedded so-called "dead-end ideas" social, economic and ideological areas. A special attention was paid to scientific/technological matters. For example, in some of the post-Soviet countries a special operation was carried out with a general objective to "prompt" the scientific institutions to conduct non-productive research. Grant policies were another tool, which induced the researchers to do "imitation" of work and/or solve non-topical problems. Interestingly enough, this program was called *Spoilt Weapon*, and most likely such programs are still implemented [8, 9]. Consequently, the society which was pretty close to the status of an "information society", rather quickly turned into a *"de-industrialized"* one [10].

It is well known that after the collapse of the USSR, almost all post-Soviet countries had huge losses, especially in science and technology. Several thousand R&D institutions were closed, and academic institutions went through bankruptcy or degradation. For example, in 1990s the corridors of the

renowned Institute of Chemical Physics in Moscow were used as space to sell Chinese underwear, while the Laser Technology Institute of Armenia produced corn curls. As a result, hundreds of thousands of highly qualified professional emigrated from the former USSR countries. It is pertinent to note that after the Bolshevik revolution in Russia, in 1918-1919 (when civil war was ongoing and devastation and starving reigned in the country) 33 scientific institutions were established, while in 1927 their number reached 90. Later on, in 1975, there were over one million people involved in science and R&D in the USSR, which comprised 25% of all scientists around the world. As already mentioned, things are not well in Armenia, too. For example, in the Third Republic the number of scientists and engineers declined eightfold compared to the Second Republic.

There is no guarantee that "bad scenarios" are in the past and ruled out, especially bearing in mind the internal political conflicts in the "Slavic World". The current realities are the result of ignoring the importance of scientific and information policies. The main opponents of Slavs, the "English-speaking" nations continue to remain a good example of a quite unified commonwealth, as described by W. Churchill. Meanwhile, not only the "Anglo-Saxon World", but other "Worlds of World" may pose geopolitical challenges.

It has to be mentioned that there is some advancement observed in Russia's science/technology area. For instance, in 2011-2016, some 1213 new large enterprises were opened[1], while in the past three years 10 sizable scientific research institutions were established within the structure of Armed Forces[2]. There is an impression that the Russian society recovers its status of "industrial" and strives to become an "information" society. A growth in joint Russian-Armenian developments is observed in military-industrial complex, though hard to compare to the times when there were 200 organizations in Armenia involved in servicing the aviation and space industry and even submarine building.

April, 2017

[1] http://rusrand.ru/goodnews/obzor-novyh-proizvodstv-dekabr-2016-g.

[2] https://rueconomics.ru/236324-shoigu-rasskazal-ob-otkrytii-novyh-voennyh-nii.

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