

Security indices of some contemporary polesPavel Stoynov
pavel_todorov_stoynov@yahoo.com**Abstract:**

New realities take place at the beginning of XXI century in the international relations. The world changes to multipolar and new relations appear between the old and the new powers – global or regional.

The article is continuation of the work done by Stoynov (2022) and presents contemporary poles and some their characteristics based on indices.

Keywords: multipolarity, poles, international relations, geopolitics, geoeconomics.

Introduction

At the beginning of XXI century the world is transformed to multipolar and new relations appear between the old and the newly formed centers of power which we call in this article “poles”.

In Stoynov (2022), the definition and the types of the poles were presented and it was mentioned that China is an absolute pole, USA, EU and India are strong poles, Russia is a pole and Japan and Brasil are weak poles.

Also, in Stoynov (2022), Germany, UK, France, Italy, Pakistan, Mexico, Ethiopia, Egypt, Iran, Saudi Arabia, Canada and Australia were qualified as regional powers.

When only real economic power is used for defining of global economic poles, the classification changes as follows: absolute poles are China and India, strong poles are USA, EU and Russia and weak poles are Japan, Indonesia and Brasil Stoynov (2022) .

When using real economic power to define economic poles, to the group of regional powers we should add Turkey and Nigeria Stoynov (2022).

In this article which is a continuation of Stoynov (2022), we

Security indices

An Economic Security Index (ESI) is defined as a combination of the following indicators: GDP, GDP PPP, GDP growth, population, territory, degree of openness and debts.

The main index of economic security is calculated according to the formula:

$$I_{ESI} = \frac{P_R + P_N}{2 * 10^{12}} (1 + g) + \frac{N}{10^8} + \frac{A}{10^6} - \frac{(E + I)}{10^{12}} - \frac{D}{10^{12}},$$

where P_R is the real GDP (PPP), P_N is the nominal GDP, g is the growth of the economy in percents, N is the population, A is the territory, in square kilometers, E is the export, measured in currency, I is the import, also in currency units, D is the total debt, measured in currency, such as the dollar.

The sub-indices here are: production and growth index $I_P = \frac{P_R + P_N}{2 * 10^{12}} (1 + g)$, population index

$I_N = \frac{N}{10^8}$, territory and resource index $I_A = \frac{A}{10^6}$, degree of openness of the economy defined as

$O = \frac{(E + I)}{10^{12}}$, the degree of indebtedness of the economy $I_D = \frac{D}{10^{12}}$.

The production and growth index is an indicator of the economic strength and competitiveness of a country. A country is more protected from economic risks, the larger its economy. This index includes growth as the main economic value.

The population index is related to the provision of the economy with labor resources. It can be supplemented with a study of the age structure of the population, the share of the labor force and employment.

The territory index is related to the provision of the economy with natural resources. Its study can be supplemented by a study of the geographical position, the access to the seas, the size of the territorial waters and the exclusive economic zones in the adjacent seas and oceans, the natural resources on the territory and the density of the population living on this territory.

The Economic Openness Index is a measure of how dependent a national economy is on the economies of other countries for its functioning. The presumption is that during serious international crises and confrontation, a country's dependence on imported goods and services and on markets for the realization of its own production abroad can create serious difficulties for the economic system in the event of a disruption in supply and distribution chains.

It is this vulnerability of economies that is exploited in the imposition of economic sanctions and other forms of economic confrontation. By stopping or limiting the inflows and outflows of goods and services to a country, the enemy disrupts the economy and weakens the country's economic potential.

Therefore, the openness of the economy is considered a weakness of the economy during wars and conflicts and is taken with a minus sign when determining the economic security index.

The indebtedness index is also taken with a minus sign because it presents debts as a potential weakness for the economy.

The first three summands in the formula for the index of economic security form the index of domestic economic strength:

$$I_{EPI} = \frac{P_R + P_N}{2 * 10^{12}} (1 + g) + \frac{N}{10^8} + \frac{A}{10^6}.$$

It follows that the index of economic strength is equal to the index of economic security, adjusted so as not to take into account the degree of openness and the degree of indebtedness.

The measurement of the relevant indicators is usually done by the national statistical institutes of the respective countries or by various international organizations.

The Political Security Index (PSI) of the country is based on the indicators: number of armed forces, production of the military-industrial complex, population, territory, import of armaments.

The main index of political security is calculated according to the formula:

$$I_{PSI} = \frac{P_R + P_N}{2 * 10^{12}} (1 + g) + \frac{N}{10^8} + \frac{A}{10^6} + \frac{M}{10^6} + \frac{H}{10^3} + \frac{1}{2} \left(\frac{S_1}{10^6} + \frac{S_2}{10^2} \right) + \frac{C}{10^3},$$

where M is the number of armed forces, including regular army, reserves and paramilitary units, H is the number of nuclear warheads, S_1 is the total tonnage of warships, S_2 is the total number of warships, C is the total number of military aircraft in the military of the respective. The subindex

$$I_{PMPI} = \frac{M}{10^6} + \frac{H}{10^3} + \frac{1}{2} \left(\frac{S_1}{10^6} + \frac{S_2}{10^2} \right) + \frac{C}{10^3}$$

here is called the index of military-political power and is denoted by I_{PMPI} .

Several sub-indices are included within the military-political power index as follows: military staff index

$$I_M = \frac{M}{10^6}, \text{ nuclear forces index } I_H = \frac{H}{10^3}, \text{ navy index } I_S = \frac{1}{2} \left(\frac{S_1}{10^6} + \frac{S_2}{10^2} \right) \text{ and air force index}$$

$$I_C = \frac{C}{10^3}.$$

Security indices of China

As an example, we can define the two main indices for China.

The product and growth index for 2021 is

$$I_P = \frac{P_R + P_N}{2 * 10^{12}} (1 + g) = \frac{15801910980000 + 27312548290000}{1000000000000} * 1.081 =$$

$$= \frac{43,1}{2} * 1,081 \approx 23,455 \approx 23,5.$$

for 2021 is

The population index

$$I_N = \frac{N}{10^8} = \frac{1425887337}{100000000} = 14,2588 \approx 14,3.$$

The territory and resources index is:

$$I_A = \frac{A}{10^6} = 9,5907 \approx 9,6.$$

The degree of openness of Chinese economy for 2020 is

$$O = \frac{(E + I)}{10^{12}} = \frac{265000000000 + 1550000000000}{1000000000000} = 4,2,$$

The indebtedness of China for 2020 is

$$I_D = \frac{D}{10^{12}} = \frac{2750000000000}{1000000000000} = 2,75.$$

So, for the index of economic security (ESI) of China for 2020-2021 we have the estimate

$$\begin{aligned} I_{ESI} &= \frac{P_R + P_N}{2 * 10^{12}} (1 + g) + \frac{N}{10^8} + \frac{A}{10^6} - \frac{(E + I)}{10^{12}} - \frac{D}{10^{12}} = \\ &= 23,5 + 14,3 + 9,6 - 4,2 - 2,75 = 47,4 - 6,95 = 40,45. \end{aligned}$$

The index of political security is

$$\begin{aligned} I_{PSI} &= \frac{P_R + P_N}{2 * 10^{12}} (1 + g) + \frac{M}{10^6} + \frac{N}{10^8} + \frac{A}{10^6} + \\ &+ \frac{H}{10^3} + \frac{1}{2} \left(\frac{S_1}{10^6} + \frac{S_2}{10^2} \right) + \frac{C}{10^3} = \\ &= 23,5 + 14,3 + 9,6 + \frac{2500000}{1000000} + 0,35 + \\ &+ \frac{1}{2} \left(\frac{708886}{1000000} + \frac{777}{100} \right) + \frac{1991}{1000} = \\ &= 47,4 + 2,5 + 0,35 + 4,3 + 2 \approx 56,6. \end{aligned}$$

Security indices of USA

As a next example we define the security indices for USA.

The index of productivity and growth for 2021 is

$$\begin{aligned} I_P &= \frac{P_R + P_N}{2 * 10^{12}} (1 + g) = \\ &= \frac{23000000000000 + 22996100000000}{1000000000000} 1,057 = \\ &= \frac{46}{2} * 1,057 \approx 23,455 \approx 24,3. \end{aligned}$$

The population index of USA for 2021 is

$$I_N = \frac{N}{10^8} = \frac{338289857}{100000000} = 3,3828 \approx 3,4.$$

The index of territory and resources of USA is:

$$I_A = \frac{A}{10^6} = 9,8266 \approx 9,8.$$

The degree of openness of the economy of USA for 2021 is

$$O = \frac{(E + I)}{10^{12}} = \frac{207700000000 + 2834000000000}{1000000000000} \approx 4,9,$$

The external indebtedness of USA for 2021 is

$$I_D = \frac{D}{10^{12}} = \frac{23930437000000}{1000000000000} \approx 23,9.$$

So, for the index of economic security (ESI) of USA for 2020-2021 we have the estimate

$$I_{ESI} = \frac{P_R + P_N}{2 * 10^{12}} (1 + g) + \frac{N}{10^8} + \frac{A}{10^6} - \frac{(E + I)}{10^{12}} - \frac{D}{10^{12}} =$$

$$= 24,3 + 3,4 + 9,8 - 4,9 - 23,9 = 37,5 - 28,8 = 8,7.$$

At first sight this index is somehow surprising about the USA, the world economy leader. The main reason for its small value is the huge debt of USA. Officially, the external debt of USA is over 31 trillion dollars in October 2022. The main objection of the experts against this so small value is that USA never could be forced to return their debts. As they are the hegemon, they can annulate its debt at any time and there is no power which could enforce them not to do this. But as the USA is the only country which could behave in this way at the international scene, in order to apply unified approach to all countries, we take the indebtedness into account.

The index of the political security of USA is

$$I_{PSI} = \frac{P_R + P_N}{2 * 10^{12}} (1 + g) + \frac{M}{10^6} + \frac{N}{10^8} + \frac{A}{10^6} +$$

$$+ \frac{H}{10^3} + \frac{1}{2} \left(\frac{S_1}{10^6} + \frac{S_2}{10^2} \right) + \frac{C}{10^3} =$$

$$= 24,3 + 3,4 + 9,8 + \frac{1400000}{1000000} + 5,6 +$$

$$+ \frac{1}{2} \left(\frac{3415893}{10^6} + \frac{490}{10^2} \right) + \frac{5217}{10^3} = 53,9.$$

Security indices of Russia

As a next example, we consider the indices for Russia.

The productivity and growth index for 2021 is

$$I_P = \frac{P_R + P_N}{2 * 10^{12}} (1 + g) =$$

$$= \frac{1480000000000 + 41336084000000}{2 * 1000000000000} 1,047 =$$

$$= \frac{5,61}{2} * 1,047 \approx 2,924 \approx 2,9.$$

The population index for 2021 is

$$I_N = \frac{N}{10^8} = \frac{144000000}{100000000} = 1,44 \approx 1,5.$$

The index of territory and resources is:

$$I_A = \frac{A}{10^6} = 17,098 \approx 17,1.$$

The degree of openness of economy of Russia for 2021 is

$$O = \frac{(E + I)}{10^{12}} = \frac{547741272400 + 247161000000}{1000000000000} \approx 7,9,$$

The external indebtedness of Russia for 2021 is

$$I_D = \frac{D}{10^{12}} = \frac{410280000000}{1000000000000} \approx 0,41.$$

So, for the index of economic security (ESI) of Russia for 2020-2021 we have the estimate

$$I_{ESI} = \frac{P_R + P_N}{2 * 10^{12}} (1 + g) + \frac{N}{10^8} + \frac{A}{10^6} - \frac{(E + I)}{10^{12}} - \frac{D}{10^{12}} =$$

$$= 2,9 + 1,5 + 17,1 - 7,9 - 0,41 = 37,5 - 28,8 = 13,19.$$

The index of political security (PSI) of Russia is

$$\begin{aligned}
 I_{PSI} &= \frac{P_R + P_N}{2 * 10^{12}} (1 + g) + \frac{M}{10^6} + \frac{N}{10^8} + \frac{A}{10^6} + \\
 &+ \frac{H}{10^3} + \frac{1}{2} \left(\frac{S_1}{10^6} + \frac{S_2}{10^2} \right) + \frac{C}{10^3} = \\
 &= 2,9 + 1,5 + 17,1 + \frac{1014000}{1000000} + 6,3 + \\
 &+ \frac{1}{2} \left(\frac{845739}{10^6} + \frac{603}{10^2} \right) + 3,9 = \\
 &= 21,5 + 1 + 6,3 + 0,7 + 3,9 = 33,4.
 \end{aligned}$$

Security indices of India

As a next example we consider the two indices – ESI and PSI - for The index of productivity and growth for 2021 is

$$\begin{aligned}
 I_P &= \frac{P_R + P_N}{2 * 10^{12}} (1 + g) = \\
 &= \frac{1022000000000 + 3170000000000}{2 * 1000000000000} * 1,089 = \\
 &= \frac{13,39}{2} * 1,089 \approx 7,290855 \approx 7,3.
 \end{aligned}$$

The population index of India for 2021 is

$$I_N = \frac{N}{10^8} \approx \frac{1380000000}{100000000} \approx 13,8.$$

The index of territory and resources is

$$I_A = \frac{A}{10^6} = 3,287263 \approx 3,3.$$

The degree of openness of the Indian economy for 2021 is

$$O = \frac{(E + I)}{10^{12}} = \frac{335440000000 + 495830000000}{1000000000000} \approx 0,8,$$

The external indebtedness of India for 2021 is

$$I_D = \frac{D}{10^{12}} = \frac{620700000000}{1000000000000} \approx 0,62.$$

So, for the index of economic security of India for 2020-2021 we obtain the estimate

$$\begin{aligned}
 I_{ESI} &= \frac{P_R + P_N}{2 * 10^{12}} (1 + g) + \frac{N}{10^8} + \frac{A}{10^6} - \frac{(E + I)}{10^{12}} - \frac{D}{10^{12}} = \\
 &= 7,3 + 13,8 + 3,3 - 0,8 - 0,62 = 24,4 - 1,42 = 22,98.
 \end{aligned}$$

The index of political security (PSI) is

$$\begin{aligned}
 I_{PSI} &= \frac{P_R + P_N}{2 * 10^{12}} (1 + g) + \frac{M}{10^6} + \frac{N}{10^8} + \frac{A}{10^6} + \\
 &+ \frac{H}{10^3} + \frac{1}{2} \left(\frac{S_1}{10^6} + \frac{S_2}{10^2} \right) + \frac{C}{10^3} = \\
 &= 7,3 + 13,8 + 3,3 + \frac{1455550}{1000000} + \frac{156}{1000} + \\
 &+ \frac{1}{2} \left(\frac{317725}{10^6} + \frac{285}{10^2} \right) + \frac{1715}{1000} = \\
 &= 24,4 + 1,46 + 0,15 + 1,61 + 1,7 = 29,32.
 \end{aligned}$$

Comparing security indexes of the main poles in 2021-2022

The comparison between the indexes of economic security (ESI) and political security (PSI) of the main poles are presented in Table 1.

Table 1. Comparing security indexes of the main poles in 2021-2022

Pole	ESI	PSI
China	40,45	56,6
USA	8,7	53,9
Russia	13,19	33,4
India	22,98	29,32

As expected, the absolute poles in real economic terms – China and India – considerably outperform the strong poles USA and Russia, but still China is about twice stronger economically than India.

As of political strength, there is still parity between the absolute pole China and the strong pole USA. This discrepancy could involve turbulency in international relations in case USA decides not to give up its political leadership to China. Also, the strong pole in real terms Russia still is politically stronger than the absolute pole India and still has potential to resists to pressure for the other strong pole, USA, which could lead to turbulency in international relations in case Russia decides not to give up its leadership in Europe to USA.

Conclusion

The indexes considered here are firstly introduced in Stoynov(). These indexes enable:

1. To obtain a security snapshot for a country.
2. To dynamically track security changes for certain periods.
3. To make an analytical-structural quantitative analysis of the economic and military-political risks at the state and international level.
4. To quantitatively analyze the strategies and results of actions during crises and conflicts in the economic and military-political spheres at the state and interstate level.

References

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