

Measuring a State's Power: Comparative Analysis of Multi and Double-Variable Evaluation

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Abstract

Measuring a state's power has already been a concern for scholars of International Relations. Because of the features of political science, it is quite challenging to create a formula that will precisely calculate the power of a state. Therefore, some authors prefer to weigh the capacity of a country via control over other actors or events and outcomes. Nevertheless, control over resources still remains a primary method to quantify and reveal a state's capability via numbers. However, the ways of calculation as well as results may be significantly different. The aim of this article is to compare the results of multi-variable and double-variable evaluations. The multi-variable analysis is based on the Composite Index of National Capability and Kenneth Waltz's guideline. The double-variable calculation is based on Economic and Military capabilities, respectively.

Keywords: Power, Measurement, Capabilities.

Introduction

One of the most crucial questions in International Relations is what makes some states more powerful than others (Beckley, *The Power of Nations*, 2018). Before answering the most important question, it is noteworthy to mention that the superficial similarity among states is that they are the same functionally. However, countries differ in many ways, such as means, resources, capacity, and competence (Waltz, 1979, p. 97). In simple term, these are called capabilities. Therefore, the unequal distribution of capabilities makes some countries more powerful than others. Perhaps, this is a simple answer to the salient question; however, it is still vague to measure precisely how stronger a country is, compare with another.

For decades scholars have been trying to figure out the most sophisticated method for power measurement. The reason lies in the feature of social science. Unlike natural science, there is no

standard formula where $F=m*a$. Thus, we face disagreement on understating the concept of power as well as on measurement methods. Some Scholars prefer to use qualitative variables for better evaluation (Singer et al., 1972). Other scientists consider that power not only consists of concrete variables like territory, population, and natural resources but intangible features also matter, like political competence (Waltz, 1979), diplomatic skills, institutional arrangement or ideology (Nye, *The Future of Power*, 2011). Some authors go beyond and mention that the main focus has to be directed toward the ideational/cultural part of the power and not the tangible one (Wendt, 1999, pp. 96-97).

The primary aim of the article is to follow the Realist pattern and use the classic formula for capability measurement – Composite Index of National Capabilities and contrast it with Waltz's guideline. In the final phase of the investigation, the results will be compared with economic and military capabilities – respectively and together.

Literature Review

After the birth of the world political map, power became an indispensable feature of every state. Power resembles love, and it is simple to experience rather than describe or evaluate it (Nye, 1990). Generally, there are three approaches to power measurement: 1) Control over resources; 2) Control over actors; 3) Control over events and outcomes (Hart, 1976). According to certain scholars, control over actors (Dahl, 1957) and control over events and outcomes (Hart, 1976) are better for precise measurement. Perhaps the second and third approaches seem impressive; they might not be instrumental and wrongly define reality. For example, the United States was unable to defeat North Vietnam in a Vietnam war. The US was powerless to control actors, events and outcomes. USSR's war in Afghanistan is the same illustration. However, it would be unwise to conclude that the United States was weaker than North Vietnam or that the Soviet Union was frail compared with Afghanistan. The failures suppose that even mighty states could not handle the specific situation. And despite defeats, the US and the USSR still were great powers because of control over resources. And this approach has been generally acknowledged since the 1960s (Singer & Small, 1966).

Even nowadays, measuring power is essential for International Relations. Quantification of capabilities makes states' ranking easier. Defining a top country or countries helps to figure out the type of system, whether it is unipolar, bipolar or multipolar. Further, the international system

model hints at great powers' interactions (Keersmaecker, 2017, p. 4) and general outcomes (Waltz, 1979, p. 210) and makes predictions simple. Without quantitative data, it is hard to determine how much state A's power exceeds state B's. Thus, quantitative options and guidelines are significant for better explanations and descriptions.

Since the birth of political science and IR theories, many scholars have been trying to introduce sophisticated methods for measuring national capabilities. At the beginning of the 1970s, David J. Singer, Stuart Bremer, and John Stuckey introduced the national capability data set consisting of six variables. These variables are the components of the well-known CINC – Composite Index of National Capabilities. The index consists of three dimensional six indicators. The dimensions are population, industry and military strength. Each includes dyads: 1) population and urban population; 2) iron and steel production and coal consumption; 3) military personnel and military expenditure. According to the formula, the country-world ratio of each indicator is calculated respectively. Then all six are summed and divided by the number of the total amount of indicators – six (Singer et al., 1972). In this index, one salient parameter is missing – the size of a territory. At the end of the 1970s, Kenneth Waltz proposed different variables for state power measurement: Territory and population; resource endowment; economic capability; political stability and competence; military strength (Waltz, 1979, p. 131). The suggestion had political as well as theoretical reasoning.

At the beginning of the 1970s, when US and China's cold relationship started melting. The first direct communication was in 1971 when Henry Kissinger secretly visited Beijing (Kissinger, 1994, p. 727). Almost a year later, in 1972, Nixon personally visited the Great Helmsman. The Shanghai Communique emerged from the meeting where Sino-American sides acknowledged sovereignty, territorial integrity and peaceful coexistence (Rich, 2003, pp. 450-451). This event inspired some scholars who stated that the world was becoming tripolar (Healy & Stein, 1973). Others even mentioned the theory of tripolarity (Nogee & Spanier, 1977).

Waltz argued that whether a state is a great power depends not on acknowledgement by other great powers but on capabilities. However, he mentioned that determining the number of top players in international politics is simple or as challenging as finding the most prominent companies in the oligopolistic market, and common sense can help with it (Waltz, 1979, pp. 130-131). We can

assume that the author suggests quantitative and qualitative approaches for exploring top-ranking states. This exciting proposition will be intensely scrutinized in the methodology part.

While in the 1960s and 1970s, scholars were obsessed with several different indicators for capability measurement, at the end of the 20th and beginning of the 21st century, authors concentrated only on two variables – economic capability and military assets (Kennedy, 1987) (Tellis et al., 2000). A country's wealth, referred to as latent power, is the foundation for military strength (Mearsheimer, 2001, p. 55). However, it doesn't mean that a wealthy state is a militarily powerful actor. It depends on a policy of a country whether it prefers "guns or butter" (Monteiro, 2014, p. 16). On the other hand, it is quite alarming for great power when a potential challenger's irreversible economic growth is accompanied by expanding military assets.

After the 2008 world financial crisis, authors argued that the unipolar moment was over, and new great power – China - was rising (Allison, 2017) (Zakaria, 2011). There was a case when a scholar mentioned bipolarity because of China's economic progress (Xuetong, 2011). Despite the zeitgeist of decline, work suggests that the US power is unrivalled and Beijing will need too much time to catch up with Washington (Beckley, 2018).

Regardless of contrasting ideas and works, one thing remains the same. The "Control over resources" approach remains essential. However, the superficial differences in measurement between the old 1970s and 2000s are apparent. The main question is how contrasting the results of distinctive evaluations will be.

Research Question, Hypothesis and Methodology

The primary research question can be formulated as Does a double-variable measurement of a state's power give the same result as a multi-variable measure? The answer as a central hypothesis is Yes. Before defining measurement methodology, it is essential to explain how the comparative analysis will be conducted.

For example, if we select five random states, these countries can be put in a particular order, alphabetically or according to their capabilities. The latter hierarchy is the most important for the research. A specific type of hierarchical "ladder" will be created by using CINC. The primary task of the work is to demonstrate what kind of hierarchy is given by Waltz's guideline and compare it with CINC results. Later the same comparison will be utilized, but in this case, CINC and Waltz's

guideline will be compared with economic and military capability. This comparison resembles the "method of agreement." Despite the different features, the primary mission is to find more similarities as the possible reason for the variable (Evera, 1997, pp. 23-24).

According to the central hypothesis, the similarity lies in hierarchical "ladders", and the rankings will be the same. However, the results may be completely different or almost identical. The latter two words propose slightly different outcomes with no more than one step switch up or down. For description, it is better to use a hypothetical table. Let's imagine there are five states: A, B, C, D and E. Capabilities, according to CINC, are: A=0.5; B=0.4; C=0.3; D=0.2 and E=0.1. The results of Waltz's guideline are A=0.7; B=0.55; C=0.51; D=0.4, and E=0.21. In this case, the general effect will be identical. Even though numerical data differ, the rankings of the states are the same (Table 1). There is a probability that the outcomes of diverse evaluations will be different.

Table 1 Hypothetical Comparison	
Country/CINC	Country/WG¹
A=0.5	A=0.7
B=0.4	B=0.55
C=0.3	C=0.51
D=0.2	D=0.4
E=0.1	E=0.21

Table 2 Hypothetical Comparison	
Country/CINC	Country/WG
A=0.5	B=0.67
B=0.4	A=0.65
C=0.3	C=0.41
D=0.2	E=0.3
E=0.1	D=0.2

If countries switch hierarchical (Table 2) places, this may be almost identical. In the case of getting this type of result, the hypothesis is neither confirmed nor declined. The hypothesis will be rejected if the outcomes are contrasting (Table 3).

In the beginning, the comparison will be two-fold, CINC vs WG. Further, it will be three and four-fold compared with economic and military capabilities. Before conducting evaluations and

¹ Waltz's Guideline

comparative analysis, salient questions must be answered: 1) How to quantify Waltz's Guideline? 2) How to measure economic and military capabilities? 3) What countries have to be selected for comparison?

As Kenneth Waltz admitted, state ranking rests on the size of the following parameters: Territory

Table 3	
Hypothetical Comparison	
Country/CINC	Country/WG²
A=0.5	B=0.8
B=0.4	D=0.45
C=0.3	A=0.31
D=0.2	E=0.14
E=0.1	C=0.01

and population, economic capability, resource endowment, military strength, political stability and competence (Waltz, 1979). Measurement of territory and population is pretty simple. There are precise units, such as square kilometers and people. In terms of economic capability and resource endowment calculation, simplicity is gone. Probably in the 1970s, it was essential to distinct economic performance and resource endowment. However, it may be assumed that it is not so important nowadays. The resources utilized by a state are part of the state's economy. And

Gross domestic product- GDP is the most popular variable for weighting economy. The authors who emphasize China's rise have at least one standard. They use GDP to determine economic strength (Subramanian, 2011) (Allison, 2017) (Rachman, 2017). Even though Michael Beckley considers GDP as a less precise variable gross domestic product is part of the 'rough proxy' he uses for measurement. Thus, resources are included in the economy, and the parameter of the economy is GDP.

Military expenditure, armed forces and organization, weapons, and platforms are salient in determining conventional might (Lowy Institute, 2023). Calculating and comparing strength via diverse types of guns, fighting gadgets or systems is hard. However, military spending is the most straightforward proxy, along with the size of personnel that can be used for defining the potential of fighting power.

Finally, to turn Waltz's guideline into a formula, it is necessary to quantify political stability and competence. Both depend on the politicians' level of education and skills. To simplify the riddle,

² Waltz's Guideline

assuming that competence and stability derive from knowledge is convenient. Therefore, according to the assumption, higher wisdom, higher competence, and higher competence, higher is stability. Perhaps the most useful proxy for this part is the annual amount of scientific works in the field of political science. The conclusive image of the formula will resemble CINC: the average of the sum of each variable's world ratio -

$$\frac{\text{State's Territory} + \text{State's Population} + \text{State's GDP} + \text{State's ME}^3 + \text{State's MP}^4 + \text{State's C\&S}^5}{\text{World's Territory} + \text{World's Population} + \text{World's GDP} + \text{World ME} + \text{World's MP} + \text{World's C\&S}}$$

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In the first phase of comparison, the results and state rankings of CINC will be compared with WG. The next step is to make a threefold comparison: CINC vs WG vs Economic capability. Waltz's guideline includes economic capability, precisely the ratio of a state's GDP to the world's GDP. It might be unfair to compare the multi-variable formula with a simple ratio that is included in the formula. Changing the measurement method of separate economic potential is essential to eliminate the slightest similarity or coincidence.

GDP is a useful proxy to measure a state's wealth, success or failure (Karabell, 2014). However, it is not so precise in terms of efficiency. According to the World Bank, the GDP of Bangladesh was 416.26 billion USD in 2021 (World Bank, GDP (current US\$) - Bangladesh, 2023). Luxemburg had 85.51 billion USD (World Bank, 2023). It seems clear that Bangladesh's economy is almost five times bigger than Luxemburg's. Conversely, Luxemburg has a better productivity level, and in proportion, its efficiency with 650 364 people (CIA, 2023) is higher than Bangladesh with a 165 650 475 population (CIA, The World Factbook - Bangladesh, 2023). The simplest way to demonstrate it is via GDP per capita. In 2021 GDP per capita of Luxemburg was 107 792\$, while Bangladesh had only 1684 USD (World Bank, 2023). One of the latest studies tried to measure states' power by combining these two variables. Using Bairochs suggestion, Michael Beckley created a primitive proxy by multiplying GDP by GDP per capita. The aim was to expose the significance of net resources (Beckley, 2018, p. 18). This approach has at least two issues: 1) the proxy doesn't demonstrate net resources. If net means deduction of cost, the formula should have the subtraction sign "-". The actual image of Beckly's evaluation is $\frac{GDP^2}{Population}$. 2) The second

³ Military Expenditure

⁴ Military Personnel

⁵ Competence & Stability

issue is that the formula gives big numbers, and the variable doesn't demonstrate anything in an absolute or relative manner. The mission of this study is not to sophisticate the evaluation of net resources but to describe economic capability in relative terms.

The ordinary recipe for the calculation of relative economic capability can be exhibited via arithmetic mean and demonstrated as the following: $\frac{\frac{State's\ GDP}{World\ GDP} + \frac{State's\ GDP\ per\ capita}{World\ GDP\ per\ capita}}{2}$. The problem

with the calculation is the feature of specific states with higher GDP per capita than the world GDP per capita. In the evaluation, the sum of $\frac{State's\ GDP}{World\ GDP}$ with $\frac{State's\ GDP\ per\ capita}{World\ GDP\ per\ capita}$ will not change much unless the plus sign is modified by multiplying one. In this case, it will be better to transform the

arithmetic mean into a geometric one. Thus, instead of using $\frac{\frac{State's\ GDP}{World\ GDP} + \frac{State's\ GDP\ per\ capita}{World\ GDP\ per\ capita}}{2}$ the precise mathematical solution is $\sqrt{\frac{State's\ GDP}{World\ GDP} * \frac{State's\ GDP\ per\ capita}{World\ GDP\ per\ capita}}$. This suggestion can be called the GMEC - geometric mean of economic capability.

The same approach will be used for the calculation of military capability. The two main variables are military expenditure and military expenditure per military. The latter may seem provocative, but it is helpful for better measurement.

It is noteworthy that military expenditure per capita is one of the most common parameters to measure how much a state spends on security. This variable demonstrates how much a share of the total military cost per person is. Even though the parameter exhibits an average amount of money "paid" by an average citizen for security, it doesn't statistically demonstrate how much is "spent" on each soldier. Therefore, changing military expenditure per capita with military expenditure per military will fill the gap and hint roughly how much is "invested" in a soldier. And a ratio of a state's military cost per military with world military expenditure per military will demonstrate how much the state spends on each soldier, more or less than the world average.

Finally, the geometric mean of military capability - GMMC can be demonstrated as following:

$\sqrt{\frac{State's\ military\ expenditure}{World\ military\ expenditure} * \frac{State's\ military\ expenditure\ per\ military}{World\ military\ expenditure\ per\ military}}$. But what countries should be selected for comparison? Instead of calculating the capabilities of all states worldwide, it is simple,

clever and effortless to follow a structural realist pattern and choose the most vital countries. This is the case when common sense can give us the correct answer without measurement.

As Waltz argued, the world's political outcome depends on the interaction of big rather than small players in the global political arena. And finding the salient states is as straightforward or complicated as discovering major firms and enterprises in an oligopolistic market (Waltz, 1979, pp. 72, 131). Instead of searching the salient in the UN security council or top ranks of the OECD members, simply G8+5 provides an attractive solution.

The reason for not selecting G7 states is that there are not presented such significant actors as China, India and even the Russian Federation. The reason why Russia was kicked out from the G “club” was political and had no connection with capabilities. Additionally, not representing the most significant economies of Asia and the world in the study hardly gives a reliable outcome. Therefore, the selected states will be members of G8+5.

The comparative analysis will have three phases. The first one will demonstrate the similarity/difference between CINC and WG. The second phase will include a comparison of the results of GMEC with the previous two calculations – CINC and WG. The third one will cover previous comparisons with GMMC.

It can be argued that mathematically, the comparison is incorrect. CINC and WG are calculated according to the average mean of a state’s six different indicators of state-to-world ratio. However, GMEC and GMMC are calculated via geometric mean, with only dyadic variables. Nevertheless, the last two methods will demonstrate if the calculation using six variables gives the exact result as the estimation via a couple of variables.

According to the hypothesis, the results of each calculation will create precisely the same ranking of the G5+8 States. The hypothesis is neither proven nor refuted if the hierarchical pattern is slightly different. In case of a completely different outcome proposition will be wrong.

Comparison of CINC with Waltz’s Guideline

The data of the composite index of national capability can be found on the website of the correlates of war project. The only issue is the latest data which covers 2016 only. Thus, the calculation and

evaluations were based on some old info. For comparison, the last 5 years, 2012-2016, were selected to determine how the capabilities changed during that time.

According to the latest data, the hierarchy of G8+5 countries' ranking is demonstrated in Table 4. According to CINC data, the top state is China, and the United States holds the second. During the five years, the ranking of the states is almost the same. The difference appeared in 2012, 2013, and 2014 when the United Kingdom and Mexico switched places.

Country/CINC 2012		Country/CINC 2013		Country/CINC 2014		Country/CINC 2015		Country/CINC 2016	
China	0.220	China	0.228	China	0.228	China	0.231	China	0.230
USA	0.138	USA	0.132	USA	0.129	USA	0.133	USA	0.133
India	0.080	India	0.081	India	0.083	India	0.085	India	0.086
Russia	0.039	Russia	0.039	Russia	0.039	Russia	0.036	Russia	0.036
Japan	0.035	Japan	0.035	Japan	0.033	Japan	0.032	Japan	0.032
Brazil	0.025	Brazil	0.024	Brazil	0.024	Brazil	0.023	Brazil	0.023
Germany	0.017	Germany	0.017	Germany	0.016	Germany	0.016	Germany	0.016
UK	0.015	Mexico	0.014	UK	0.014	Mexico	0.014	Mexico	0.014
Mexico	0.015	UK	0.014	Mexico	0.014	UK	0.014	UK	0.013
France	0.014	France	0.014	France	0.013	France	0.013	France	0.013
Italy	0.012	Italy	0.011	Italy	0.011	Italy	0.011	Italy	0.011
Canada	0.009	Canada	0.008	Canada	0.008	Canada	0.008	Canada	0.008
South Africa	0.006	South Africa	0.006	South Africa	0.006	South Africa	0.006	South Africa	0.006

Nevertheless, CINC results are the primary model for comparing other calculations, and it is not significant how the ranking changes within the CINC results in different years.

The primary question is if the WG results are the same (in terms of ranking) as the outcome of the CINC evaluation.

As Table 4.1 demonstrates, the results of WG are entirely different than CINC-based ranking. The first significant difference is the positions of the US and China. According to CINC results, China is the leader. Conversely, the WG results demonstrate that the United States is the top country. The difference is significant in terms of other states' hierarchy comparisons. One of the most interesting cases is the position of the United Kingdom. In CINC order, it has the 8th and 9th place; meanwhile, in the WG ranking, it is in second place. Such fascinating change completely rejects the hypothesis, and this single example is enough to conclude that the hypothesis is wrong.

Ranking	State/CINC 2012		State/WG 2012		State/CINC 2013		State/WG 2013	
1	China	0.220	USA	0.181	China	0.228	USA	0.175
2	USA	0.138	UK	0.124	USA	0.132	UK	0.124
3	India	0.080	China	0.097	India	0.081	China	0.102
4	Russia	0.039	India	0.068	Russia	0.039	India	0.068
5	Japan	0.035	Russia	0.044	Japan	0.035	Russia	0.044
6	Brazil	0.025	Brazil	0.028	Brazil	0.024	Brazil	0.028
7	Germany	0.017	Canada	0.025	Germany	0.017	Canada	0.025
8	UK	0.015	Japan	0.025	Mexico	0.014	Japan	0.022
9	Mexico	0.015	Germany	0.022	UK	0.014	Germany	0.022
10	France	0.014	France	0.020	France	0.014	France	0.021
11	Italy	0.012	Italy	0.015	Italy	0.011	Italy	0.014
12	Canada	0.009	Mexico	0.011	Canada	0.008	Mexico	0.011
13	South Africa	0.006	South Africa	0.006	South Africa	0.006	South Africa	0.007

The difference is evident in observing other states as well. Japan declined from 5th place to 8th and Canada jumped from 12th to 7th place. Almost the same pattern was repeated in 2014, 2015 and 2016. As Tables 4.2 and 4.3 show difference is continued. However, there are the

Ranking	State/CINC 2014		State/WG 2014		State/CINC 2015		State/WG 2015	
1	China	0.229	USA	0.171	China	0.231	USA	0.170
2	USA	0.129	UK	0.122	USA	0.133	UK	0.121
3	India	0.084	China	0.104	India	0.085	China	0.107
4	Russia	0.039	India	0.070	Russia	0.037	India	0.070
5	Japan	0.034	Russia	0.046	Japan	0.033	Russia	0.049
6	Brazil	0.024	Brazil	0.028	Brazil	0.024	Brazil	0.027
7	Germany	0.017	Canada	0.025	Germany	0.017	Canada	0.025
8	UK	0.015	Japan	0.024	Mexico	0.015	Japan	0.023
9	Mexico	0.015	Germany	0.022	UK	0.014	Germany	0.022
10	France	0.014	France	0.020	France	0.013	France	0.020
11	Italy	0.011	Italy	0.015	Italy	0.011	Italy	0.015
12	Canada	0.009	Mexico	0.012	Canada	0.009	Mexico	0.011
13	South Africa	0.007	South Africa	0.007	South Africa	0.007	South Africa	0.007

⁶ Calculation of Waltz's Guideline (WG) was based on data acquired from Scimago Journal Rank; World Bank; CIA Factbook and SIPRI

actors that have the same ranking in WG and CINC-based hierarchy. Brazil, France and Italy maintain the same positions during the five years in both evaluations. Meanwhile, there is the actor that slightly changes position from 4th to 5th place – Russia.

The reason why China's status is declined in WG lies in a proxy of political competence. According to Scimago Journal Rank, China is the second country after the United States

Ranking	State/CINC 2016		State/WG 2016	
1	China	0.231	USA	0.168
2	USA	0.133	UK	0.120
3	India	0.087	China	0.108
4	Russia	0.036	India	0.072
5	Japan	0.033	Russia	0.051
6	Brazil	0.023	Brazil	0.027
7	Germany	0.017	Canada	0.024
8	Mexico	0.015	Germany	0.024
9	UK	0.013	Japan	0.022
10	France	0.013	France	0.020
11	Italy	0.011	Italy	0.014
12	Canada	0.008	Mexico	0.011
13	South Africa	0.007	South Africa	0.007

regarding all subject category documents (Scimago Journal Ranking, 2023).

However, the ranking of China is pretty low in terms of documents released in the field of political science. In terms of amount, in 2016, China was the 12th state to release political science and international relations documents. Countries like Italy, Canada, Spain, Netherlands had higher positions (Scimago Journal Ranking, 2023).

Nevertheless, it has to be mentioned that progress in this particular field continues,

and in 2022, China was in 6th place (Scimago Journal Ranking, 2023). Because of the constant changes, if the Chinese progressive pattern continues, it will be necessary to conduct the same type of comparison later and contrast CINC results with WG measures and new outcomes with the old ones as well.

The GMEC Results and Comparative Analysis

The results of the GMEC were as intriguing and surprising as the WG outcomes. As Table 5 shows, there is a significant change in the ranking hierarchy of the G8+5 states.

Table 5⁷ CINC and GMEC Comparison

⁷ Calculation of Gemotric Mean of Economic Capability (GMEC) was based on data acquired from World Bank

Ranking	State/CINC 2012		State/GMEC 2012		State/CINC 2013		State/GMEC 2013	
1	China	0.220	USA	1.027	China	0.228	USA	1.038
2	USA	0.139	Japan	0.621	USA	0.133	Japan	0.506
3	India	0.081	Germany	0.440	India	0.081	Germany	0.455
4	Russia	0.040	UK	0.380	Russia	0.039	UK	0.381
5	Japan	0.035	France	0.370	Japan	0.035	France	0.379
6	Brazil	0.025	Canada	0.347	Brazil	0.025	Canada	0.342
7	Germany	0.018	Italy	0.303	Germany	0.017	Italy	0.302
8	UK	0.015	China	0.259	Mexico	0.015	China	0.284
9	Mexico	0.015	Russia	0.207	UK	0.015	Russia	0.210
10	France	0.014	Brazil	0.195	France	0.014	Brazil	0.191
11	Italy	0.013	Mexico	0.125	Italy	0.012	Mexico	0.129
12	Canada	0.009	South Africa	0.066	Canada	0.009	South Africa	0.060
13	South Africa	0.007	India	0.057	South Africa	0.007	India	0.057

In 2012 and 2013, two powerful Asian economies, China and India, stepped down from 1st to 8th and 3rd to 13th places. Meanwhile, Japan advanced and took 2nd place based on GMEC calculation.

Table 5.1 CINC and GMEC Comparison								
Ranking	State/CINC 2014		State/GMEC 2014		State/CINC 2015		State/GMEC 2015	
1	China	0.220	USA	1.055	China	0.228	USA	1.164
2	USA	0.139	Japan	0.466	USA	0.133	Japan	0.451
3	India	0.081	Germany	0.464	India	0.081	Germany	0.426
4	Russia	0.040	UK	0.410	Russia	0.039	UK	0.416
5	Japan	0.035	France	0.377	Japan	0.035	France	0.342
6	Brazil	0.025	Canada	0.326	Brazil	0.025	China	0.341
7	Germany	0.018	China	0.304	Germany	0.017	Canada	0.299
8	UK	0.015	Italy	0.297	Mexico	0.015	Italy	0.270
9	Mexico	0.015	Brazil	0.185	UK	0.015	Brazil	0.144
10	France	0.014	Russia	0.183	France	0.014	Russia	0.129
11	Italy	0.013	Mexico	0.130	Italy	0.012	Mexico	0.122
12	Canada	0.009	India	0.061	Canada	0.009	India	0.066
13	South Africa	0.007	South Africa	0.055	South Africa	0.007	South Africa	0.053

In the case of China, the radical difference shrunk slowly in 2014, 2015 (Table 5.1) and 2016 (Table 5.2). The exciting part of GMEC is that even if the comparison is conducted with the WG outcomes according to tables 4, 4.1 and 4.2, the gap among results is pretty significant. The

calculation based on Waltz's guideline puts China and India in 3rd and 4th places. Thus, there is no similarity between the rankings of WG and the GMEC, as well as with CINC and GMEC.

Ranking	State/CINC 2016		State/GMEC 2016	
1	China	0.231	USA	1.178
2	USA	0.133	Japan	0.502
3	India	0.087	Germany	0.433
4	Russia	0.036	UK	0.377
5	Japan	0.033	France	0.343
6	Brazil	0.023	China	0.341
7	Germany	0.017	Canada	0.288
8	Mexico	0.015	Italy	0.273
9	UK	0.013	Brazil	0.142
10	France	0.013	Russia	0.120
11	Italy	0.011	Mexico	0.111
12	Canada	0.008	India	0.071
13	South Africa	0.007	South Africa	0.049

If, in the previous case, the reason for contrast was the proxy of political competence, in this one, GDP per capita is the indicator we have to blame. The geometric mean of the state-to-world GDP and GDP per capita ratio demonstrated that despite the colossal power of specific Asian actors, their economic and social performance is still not as sophisticated as in particular countries. The indicators such as population and energy consumption play a significant role, and these indicators are one of the main determinants of why China and India are in the top 3 and top 5 lists in the

CINC and WG outcomes. However, a massive population sometimes means less GDP per capita, which creates the case when a general socioeconomic image of one of the most prominent economies becomes less significant than other great powers.

The GMMC Results and Comparative Analysis

The results of GMMC were surprising as well. As in previous cases, in this comparison, the hierarchy of the states is pretty different compared with CINC results. The US is on top. China in 2012 had 4th rank and later became the third. India had a substantial step-down and, from third place, moved to tenth. However, there are some coincidences. As Table 6 demonstrates, in 2013, China became the 3rd in the ranking. Even though it is two-step down compared with CINC, it has the same position in the WG results. In fact, the top three countries are the same in the GMMC and the WG results from 2013 to 2016.

Ranking	State/CINC 2012		State/GMMC 2012		State/CINC 2013		State/GMMC 2013	
1	China	0.220	USA	1.99	China	0.228	USA	1.87
2	USA	0.139	UK	0.46	USA	0.133	UK	0.45
3	India	0.081	Germany	0.30	India	0.081	China	0.30
4	Russia	0.040	China	0.28	Russia	0.039	Germany	0.29
5	Japan	0.035	Japan	0.26	Japan	0.035	Japan	0.26
6	Brazil	0.025	France	0.25	Brazil	0.025	France	0.25
7	Germany	0.018	Canada	0.21	Germany	0.017	Canada	0.19
8	UK	0.015	Russia	0.15	Mexico	0.015	Russia	0.16
9	Mexico	0.015	Italy	0.14	UK	0.015	Italy	0.13
10	France	0.014	India	0.09	France	0.014	India	0.09
11	Italy	0.013	Brazil	0.07	Italy	0.012	Brazil	0.07
12	Canada	0.009	South Africa	0.04	Canada	0.009	South Africa	0.04
13	South Africa	0.007	Mexico	0.03	South Africa	0.007	Mexico	0.03

There is a significant difference between GMEC and GMMC too. Intriguingly, China has a lower rank in GMEC (Table 5, 5.1, 5.2); however, in terms of the geometric mean of military capability, the position is higher, and progress is evident through the years.

Ranking	State/CINC 2014		State/GMMC 2014		State/CINC 2015		State/GMMC 2015	
1	China	0.220	USA	1.81	China	0.228	USA	1.79
2	USA	0.139	UK	0.46	USA	0.133	UK	0.44
3	India	0.081	China	0.33	India	0.081	China	0.36
4	Russia	0.040	Germany	0.30	Russia	0.039	Germany	0.30
5	Japan	0.035	Japan	0.26	Japan	0.035	France	0.27
6	Brazil	0.025	France	0.26	Brazil	0.025	Japan	0.27
7	Germany	0.018	Canada	0.19	Germany	0.017	Canada	0.23
8	UK	0.015	Russia	0.17	Mexico	0.015	Russia	0.17
9	Mexico	0.015	Italy	0.12	UK	0.015	Italy	0.12
10	France	0.014	India	0.10	France	0.014	India	0.10
11	Italy	0.013	Brazil	0.07	Italy	0.012	Brazil	0.07
12	Canada	0.009	South Africa	0.04	Canada	0.009	South Africa	0.04
13	South Africa	0.007	Mexico	0.03	South Africa	0.007	Mexico	0.03

⁸ Calculation of Gemotric Mean of Military Capability (GMMC) was based on data acquired from SIPRI

In the list of G8+5, there are only four countries with more than a million military personnel. The two states out of the four, China and India, have more than two million militaries. Despite the large army of China, Beijing's overall score in GMMC is pretty higher. The reason lies in Military expenses that are so huge that it balances the amount of military personnel and military expenditure per military personnel becomes a higher number. This is the significant difference between China and India.

Table 6.2
CINC and GMMC Comparison

Ranking	State/CINC 2016		State/GMMC 2016	
1	China	0.231	USA	1.78
2	USA	0.133	UK	0.44
3	India	0.087	China	0.39
4	Russia	0.036	Germany	0.31
5	Japan	0.033	France	0.28
6	Brazil	0.023	Japan	0.26
7	Germany	0.017	Canada	0.23
8	Mexico	0.015	Russia	0.18
9	UK	0.013	Italy	0.13
10	France	0.013	India	0.11
11	Italy	0.011	Brazil	0.07
12	Canada	0.008	South Africa	0.04
13	South Africa	0.007	Mexico	0.03

A significant feature of China can be demonstrated by comparing GMEC and GMMC. In the former's ranking, China slowly developed ranking from 8th place to 6th. Progress is evident, however, in the GMMC ranking, China has the higher position. This fact can be explained in two ways: 1) The position in the geometric mean of economic capability is lower because of a vast population. 2) The higher place in the hierarchy of geometric mean of military capability is derived from the second largest military expenditure.

Finally, a general but exciting fact in the GMMC ranking is that in 2012, 2013 and 2014, three were nuclear powers among the top five states. In 2015, the ranking was changed, and France replaced Japan. The same pattern was continued in 2016, and four actors out of five were nuclear states.

Conclusion

It has been clear that the hypothesis in all comparisons turned out to be wrong. But does it mean that the formulas were inaccurate? Hardly the answer could be yes. Despite no coincidence among the different calculations, the research was not done in vain. There is little but an exciting pattern. In all rankings except the CINC, the top state is the United States. And even in exception, the US

holds the second place. This fact can be a pretty solid argument for the primacist⁹ scholars who still advocate the unchallengeable power of the United States.

However, another striking pattern exists from the perspective of measuring power via control over resources. Even though China has a lower ranking than the US in WG, GMEC and GMMC, it still is a progressive power, and in most cases, development is irreversible.

One actor that hasn't been mentioned revealed an exciting position between the first and the third ranks. It is the United Kingdom. Although its position differs in CINC and GMEC in evaluations in WG and GMMC, the UK has the second rank. This fact may hint that the United Kingdom shouldn't be underestimated from a particular perspective.

Finally, the work can be criticized because the initial hypothesis was rejected. Nevertheless, research revealed interesting results that can be interpreted in infinite ways. When Thomas Edison failed in numerous times to refine a light bulb, he mentioned that he didn't fail ten thousand times but found ten thousand ways that didn't work. In this case, I would say that this article didn't fail but demonstrated three methods of measuring states' power with mostly contrasting outcomes.

⁹ Author Nuno P. Monteiro, in his Book "Theory of Unipolar Politics", describes two types of scholars: 1) Declinists and 2) Primacists. The former group includes the ones who argue that the power of the United States is declining or has already declined. Thus, there is no Unipolarity anymore. The latter argue that despite changes in world politics, the US is still the unrivalled superpower and has no peer competitor (Monteiro, 2014).

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