Quality of Life, Balance of Power, and Nuclear Weapons

A Statesman's and Citizen's Statistical Yearbook 2019

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Качество жизни, баланс держав и ядерное оружие

Статистический ежегодник 2019-го года для государственных деятелей и граждан

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Quality of Life, Balance of Power, and Nuclear Weapons: A Statesman's and Citizen's Statistical Yearbook 2019, by Alexander V. Avakov.

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What is New?

Что нового?

This year, the number of countries with data about GDP and GDP per capita is increased to 262. The number of countries with data about population remains 296. The additional new country with data about GDP and GDP per capita is Rotuma Island.

Also, this year I added seven environmental indicators to the "Quality of Life" section:
- Population density,
- Forest cover,
- Freshwater resources per capita,
- Emissions of carbon dioxide per capita,
- Emissions of carbon dioxide per sq km,
- People using at least basic drinking water services,
- People using improved sanitation facilities,

new indexes:
- Environmental quality-of-life index,
- Economico-political-environmental quality-of-life-index,

and one new indicator to the "Balance of Power" section:
- Area.

Generally, I include into my list of countries independent states and dependent territories which have at least some population. The list of dependent territories is taken from different year editions of the CIA *World Factbook* and from English and Russian Wikipedia. The list of independent states is trickier. Some of the states, which I included into this category (like frozen conflict states of the former U.S.S.R. and Northern Cyprus), are recognized only by a handful of states. In the extreme, Donetsk People's Republic, Luhansk People's Republic, and Somaliland are not recognized by anybody. The standard used is the sovereignty doctrine, which does not require international recognition, but requires the existence of separate governments and control over their territories (see, for example: https://en.wikipedia.org/wiki/List_of_sovereign_states). I happen to think that some of the potential addressees of this book, like members of the U.S. Congress, may be interested in exactly the hard-to-find data about the economic potential of this kind of states.

Introduction

Введение

This statistical annual presents fundamental data in two sections: (1) Quality of Life, (2) Balance of Powers.

The advantage of this yearbook is that it contains data generally not available elsewhere. Sections 1 and 2 give statistics for GDP for 262 countries and for population for 296 countries. By comparison, the World Bank *World Development Indicators Online* and Encyclopedia Britannica *Book of the Year* provide statistical data for a maximum of about 180-187 countries. The actual number of countries in World Bank statistical tables is even smaller. The IMF *World Economic Outlook Database* has data for 189 countries, but the data which can be used in this yearbook is only that about GDP per capita. The United Nations *National Accounts Main Aggregates Database* gives GDP per capita at market exchange rates for 194 countries. The CIA *World Factbook* gives data for GDP per capita at market exchange rates for 191 countries, for GDP per capita at PPP for 198 countries, and other statistics of interest to us for about 230 countries, but that data is limited by scope and is imprecise. Other statistical publications are in even less satisfactory. I managed to increase the number of countries tallied by writing proprietary software utilizing statistical regressions, selecting data which, first of all, is important and, second, is relatively reliable, offering high correlation coefficients for these regressions.

Section 1 concentrates on data that reflect the quality of life. First, I focused on major economic and demographic indicators. In addition to data about the quality of life as measured strictly in economic terms, I sought to produce a methodologically rigorous estimate of a human rights index. The latter measures civil and political rights as well as socioeconomic rights. I also computed an integrated economico-political quality-of-life index.

To describe quality of life I selected five economic indicators:
- GDP per capita at market exchange rates,
- Electricity consumption per capita,
- Infant mortality,
- Life expectancy,
- GDP per capita at purchasing power parities,

and five political indicators:
- Societal integration index,
- Freedom of the press index,
- Civil and political rights index,
- Human development index,
- GINI coefficient of income inequality.

The initial task in front of me was to try to estimate missing data among these indicators. These indicators are not accidental and are very important for the description of the economic and political life of a society. A priori, it was not clear whether I would be able to build meaningful regressions. The thought that economy and politics of a society are related are not something new — it is enough to refer to the writings of Marx about the relationship between the economic basis and superstructure. It was interesting to test these verbal speculations using modern international statistics.

And indeed, my regressions, which used these ten variables, typically showed a multiple correlation coefficient among themselves in the ranges:

2017 data	0.86 to 0.98

2016 data	0.86 to 0.98
2015 data	0.87 to 0.98
2014 data	0.87 to 0.98
2013 data	0.86 to 0.98

The exception was GINI coefficient of income inequality, which showed the multiple correlation of about:

2017 data	0.48
2016 data	0.54
2015 data	0.56
2014 data	0.55
2013 data	0.56

This demonstrates that most important indicators of economic and political life are very tightly correlated.[1] The multiple correlation for GINI coefficient is with a minus sign, which means that there is a tendency to decrease inequality with a higher level of economic development. The relatively low multiple correlation for GINI coefficient shows, that though inequality is related to economic basis and general indicators of political life, the inequality also depends on other factors, not included into the current model. In short, the degree of inequality is more culturally specific than other indicators.

Three indicators did not have missing values: the societal integration index, the freedom of the press index, and the civil and political rights index. So, I did not have to compute regressions for them, but I did as a matter of curiosity. The societal integration index had the multiple correlation coefficient with all other indicators:

2017 data	0.43
2016 data	0.47
2015 data	0.49
2014 data	0.38
2013 data	0.39

The freedom of the press index had the coefficient:

2017 data	0.83
2016 data	0.81
2015 data	0.81
2014 data	0.79
2013 data	0.75

The civil and political rights index had the coefficient:

2017 data	0.90
2016 data	0.87
2015 data	0.88
2014 data	0.84
2013 data	0.81

If we try to measure multiple correlations of these three indicators specifically with economic basis, the results would be as follows: the societal integration index showed the multiple correlation with the basis:

2017 data	0.39

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[1] I calculated these correlations in 1988, 1992, and then every year since 1994. Some aspects of my methodology have been evolving over the years. But within the periods of relative stability of the methodology the correlations also have been relatively stable, to the second digit of the correlation coefficients.

2016 data	0.38
2015 data	0.38
2014 data	0.35
2013 data	0.35

While not a fantastically high multiple correlation, this is acceptable for sociological research; it would indicate a moderate tendency to proceed to a more multi-party pluralism with economic advancement. The freedom of the press index had multiple correlation with a basis of:

2017 data	0.59
2016 data	0.57
2015 data	0.58
2014 data	0.61
2013 data	0.59

Which would tell us that freedom of the press is correlated with economic development. And the civil and political rights index was correlated with the economic basis by:

2017 data	0.77
2016 data	0.74
2015 data	0.74
2014 data	0.71
2013 data	0.70

Which would say that human rights (the way they are usually understood) are highly correlated with developed economic basis.

The overall (canonical) correlation between the economic basis (five variables) and the political superstructure (five variables), which tries take into account unobserved latent variables, is:

2017 data	0.986
2016 data	0.985
2015 data	0.986
2014 data	0.984
2013 data	0.983

If weighted by population (to minimize the effect of accidental factors in smaller countries), the canonical correlation is:

2017 data	0.9901
2016 data	0.9904
2015 data	0.9911
2014 data	0.9914
2013 data	0.9915

Under closer scrutiny, it appears that such high canonical correlation is primarily caused by the human development index (which reflects income, education, and health care), which has a multiple correlation with the basis of:

2017 data	0.979
2016 data	0.979
2015 data	0.980
2014 data	0.979
2013 data	0.979

An indicator with such high multiple correlation with the basis should itself be considered part of the basis. If we then reclassify the human development index as part of the economic basis, the canonical

correlation between the economic basis (six variables) and the political superstructure (four variables) would be:

2017 data	0.797
2016 data	0.753
2015 data	0.747
2014 data	0.684
2013 data	0.704

If weighted by population, the canonical correlation would be:

2017 data	0.766
2016 data	0.801
2015 data	0.789
2014 data	0.748
2013 data	0.817

(It can be argued that the reclassification of the indicator representing education and health care as part of the basis does not correctly represent causal relationships, that the high multiple correlation between the human development index and the indicators of the economic basis is a mere statistical association reflecting the change in societal attitudes over the last one hundred years. To that it can be answered, that in today's world education and health care are part of the group of basic factors which determine the character of a society.)

It is necessary to underscore that the human development index is still part of the five political indicators used for computation of the generalized human rights index. This is because the socio-economic component is very important for the modern definition of human rights, as it is outlined in the Universal Declaration of Human Rights. The multiple correlation coefficient between the economic basis (the five economic variables) and the generalized human rights index (the principal component 1 of the five political indicators) is:

2017 data	0.80
2016 data	0.77
2015 data	0.77
2014 data	0.77
2013 data	0.79

Starting from this year's yearbook, in addition to the quality-of-life indicators of the classical basis-superstructure model, we tried to measure those indicators in relation with environment. This has become possible thanks to newly available environmental data.

To describe environmental quality of life I selected seven indicators:
- Population density,
- Forest as percent of land area,
- Renewable freshwater per capita,
- Emissions of carbon dioxide per capita
- Emissions of carbon dioxide per square kilometer,
- People using at least basic water services as percent of population,
- People using improved sanitation facilities as percent of population.

As with the classical basis-superstructure model, I tried to estimate missing data among these environmental indicators. My regressions, which used the newly assembled 17 variables, showed a multiple correlation coefficient among the environmental variables in the range from 0.71 to 0.94 for 2017 data. This demonstrates that most important environmental indicators are very tightly correlated with other variables.

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Three environmental indicators did not have missing values: the population density, the forest cover, and the emissions of carbon dioxide per sq km. So, I did not have to compute regressions for them, but again I did as a matter of curiosity. The population density had the multiple correlation coefficient with all other indicators of 0.65; the forest cover had the coefficient of 0.40; the emissions of carbon dioxide per sq km had the coefficient of 0.79.

The overall (canonical) correlation between the economic basis (six variables) and the environment (seven variables), which tries take into account unobserved latent variables, is 0.960. If weighted by population (to minimize the effect of accidental factors in smaller countries), the canonical correlation is 0.9868. In other words, economic development correlates with good environment; causation can be argued in both directions.

The overall (canonical) correlation between the political superstructure (four variables) and the environment (seven variables), which tries take into account unobserved latent variables, is 0.696. If weighted by population (to minimize the effect of accidental factors in smaller countries), the canonical correlation is 0.7978. Here, some more detailed analysis may be required.

The highest correlation between any of the environment variables and the first canonical variable of the political superstructure is with the people using at least basic drinking water services, 0.6511. The second is with the people using improved sanitation facilities, 0.5151; and the third is with the emissions of carbon dioxide per capita, -0.5140.

The highest correlation between any of the political superstructure variables and the first canonical variable of the environment is with the civil and political rights index, 0.6727. The second is with the freedom of the press index, 0.4749; and the third is with the GINI coefficient of income inequality, 0.3146.

It looks logical that political rights and good modern governance can help with general improvement in environment. What is less obvious, is that the freshwater per capita is correlated with the civil and political rights index (0.1826). The regression for the definition of missing values of freshwater per capita includes as a meaningful variable the societal integration index with the positive regression coefficient. It seems that it is not that the lack of political rights or underdeveloped parliamentarism which cause water scarcity; after all that is the correlation. On the contrary, water scarcity, typical of the Middle East and North Africa, has some causation on the government water irrigation and water control. That in turn increases the role of the government in countries of this region and gives birth to the oriental despotias. The corresponding reduction in political rights is to be expected.

In Section 2, the book deals with major indicators of balance of power. In addition to data about each country's economic power, military personnel and military expenditures, it includes data about nuclear delivery systems and provides the number of nuclear warheads of all nuclear powers. This is based on information from reputable sources. Among others, it includes estimates of the Israeli nuclear arsenal which usually do not appear in the press. I give a rough account of countries possessing, pursuing or capable of acquiring other weapons of mass destruction. I also give information about stockpiles of highly-enriched uranium and separated plutonium. Chances are that if American public were more familiar with these statistics, some Middle East foreign policy failures might have been avoided.

It should also be underscored that many official estimates, for example, of the Russian and Chinese military expenditures distributed by U.S. and British intelligence communities are methodologically flawed. Such estimates claim to give a picture of the military expenditures of the countries of the world at market exchange rates; at the same time, they apparently cite the figures of the Russian and Chinese military expense figures at purchasing power parities, thus inflating these numbers

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in comparison to other countries. There are also other aspects that exaggeration (see section "Appendix: Methodology and Definitions," sub-section "Definition of Military Expenditures"). At a very minimum such deceptive practices of the Anglo-American intelligence services should be counter-balanced by presenting two different tables, showing military expenditure estimates both at market exchange rates and at purchasing power parities. Also, it looks like that, in addition to these methodological flaws, in the 1990s the CIA plainly falsified Russian military expenditure numbers inflating them approximately 5-6 times. Members of the U.S. Congress and others who care about the foundations of power politics in the nuclear age will find facts that speak for themselves in this section.

Sources

Источники

The sources are shown in the form: XX(Source), or XX(Source)W, or XX(Source A/SourceB), where XX is a year, W after (Source) means that data is weighted against the World Bank data for the U.S., and (Source) (or Source A or Source B) is one of the following:

WB	The World Bank (1) (version 2015-04-14)
E	Encyclopedia Britannica
IMF	The International Monetary Fund
UN	United Nations National Accounts Main Aggregates Database
UNDP	United Nations Development Programme
WPP	UN World Population Prospects
OECD	Organization for Economic Co-operation and Development
NBER	National Bureau of Economic Research
WIID	World Income Inequality Database
TRANSMONEE	Transmonee
SA	Statistical Abstract of the United States
ES	Eurostat
CIA	Central Intelligence Agency
GPI	Global Peace Index
FH	Freedom House
HUMANA	Charles Humana
OFFICIAL	Official government statistics website
WIKI	Wikipedia
OTHER	Other Internet source
RWB	Reporters Without Borders
IISS	International Institute for Strategic Studies
JDW	Jane's Defense Weekly
SIPRI	Stockholm International Peace Research Institute
BULL	Bulletin of the Atomic Scientists
REG	Regression
EST	Estimate
PRIN1(EQL)	Principal Component 1 of Economic Quality-of-Life Indicators
PRIN1(PQL)	Principal Component 1 of Political Quality-of-Life Indicators
PRIN1(EPQL)	Principal Component 1 of Economico-Political Quality-of-Life Indicators
POP*GPC	Obtained by multiplication of Population by GDP

	Per Capita at Market Exchange Rates
POP*GPCPPP	Obtained by multiplication of Population by GDP Per Capita at Purchasing Power Parities
YY(Army/LaborForce)	Military Expenditure as percent to GDP in the year YY is estimated as percent of Armed Forces Personnel to Labor Force
YY(Army/Pop*Pop/LaborForce(COUNTRY))	Military Expenditure as percent to GDP in the year YY is estimated as percent of Armed Forces Personnel to the Population multiplied by the ratio of Population to Labor Force of the proxy country COUNTRY
YY(Army/Pop*(Pop/Army*Milgdp)(COUNTRY))	Military Expenditure as percent to GDP in the year YY is estimated as a ratio of Armed Forces personnel to the Population multiplied by the ratio of Population to Armed Forces Personnel of the proxy country COUNTRY multiplied by Military Expenditure as percent to GDP of the proxy country COUNTRY
GDP*MILGDP+MILAID	Obtained by multiplication of GDP at Market Exchange Rates by Percent of Military Expenditures as Share of GDP plus Foreign Military Aid
GDPPPP*MILGDP+MILAID	Obtained by multiplication of GDP at Purchasing Power Parities by Percent of Military Expenditures as Share of GDP plus Foreign Military Aid
XX(CALC(Source)) YY	Calculated using data of the Source of the year XX according to the results of the parliamentary elections to the (chamber with the largest number of deputies of the) parliament of the year YY, where Source can be either CIA or WIKI
XX(CALC(Source))	Calculated using data of the Source of the year XX in the country where there have not been any (recent) parliamentary elections, where Source can be either CIA or WIKI
PROXY(X)	Approximation based on data for country or group of countries X
PROXY(MAX(X,Y))	Approximation based on maximum of data for country or group of countries X and country or group of countries Y
(YY-1(FH)/YY-0(FH))*YY-0(HUMANA)	Approximation based on data from Charles Humana for year YY-0 prorated based on a ratio of data for year YY-1 from Freedom House to data for year YY-0 from Freedom House
POP*GPCPPP	Obtained by multiplication of Population by GDP Per Capita at Purchasing Power Parities

Sources

GDP*MILGDP+MILAID	Obtained by multiplication of GDP at Market Exchange Rates by Percent of Military Expenditures as Share of GDP plus Foreign Military Aid
GDPPPP*MILGDP+MILAID	Obtained by multiplication of GDP at Purchasing Power Parities by Percent of Military Expenditures as Share of GDP plus Foreign Military Aid

Regions

Регионы

AFR	Africa
CPA	Centrally Planned Asia
DME	Developed Market Economies
EEU	Eastern Europe
LAM	Latin America
MEA	Middle East
SAS	South Asia
SEA	South-East Asia and Pacific
USR	Former U.S.S.R.
OECS	Organization of Eastern Caribbean States

Country Abbreviations

Аббревиатуры стран

BIOT	British Indian Ocean Territory
FSAL	French Southern and Antarctic Lands
SGSSI	South Georgia and South Sandwich Islands

Variable Abbreviations

Аббревиатуры переменных

GPC	Gross Domestic Product at Market Exchange Rates Per Capita
ELCONS	Electricity Consumption Per Capita
INFMRT	Infant Mortality
LIFEXP	Life Expectancy
GPCPPP	Gross Domestic Product at Purchasing Power Parities Per Capita
SCINTX	Societal Integration Index
CPRX	Civil and Political Rights Index
FPX	Freedom of the Press Index
HDX	Human Development Index
GINI	Gini Coefficient of Income Inequality
POPDEN	Population Density
FRST	Forest as Percent of Land Area
WATR	Renewable Freshwater Resources Per Capita
CO2PC	Emissions of Carbon Dioxide Per Capita
CO2DEN	Emissions of Carbon Dioxide Per Sq Km
DRNK	People Using At Least Basic Drinking Water Services
SNTN	People Using Improved Sanitation Facilities
EQLX	Economic Quality-of-Life Index
PQLX	Political Quality-of-Life Index
EPQLX	Economico-Political Quality-of-Life Index
ENVQLX	Environmental Quality-of-Life Index
EPENVQLX	Economico-Political-Environmental Quality-of-Life Index
AREA	Area
POP	Population
GDPPPP	Gross Domestic Product at Purchasing Power Parities
GDP	Gross Domestic Product at Market Exchange Rates
ARMY	Armed Forces Personnel
MILGDP	Military Expenditures as Share of GDP
MILXPP	Military Expenditures at Purchasing Power Parities
MILEXP	Military Expenditures at Market Exchange Rates

Variable Abbreviations