

INTERNATIONAL COMPARISONS: ISSUES OF METHODOLOGY AND PRACTICE

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International Comparisons: Issues of Methodology and Practice

The article discusses the methodology and organization of statistical observation of the level of countries' economic development. The theoretical basis of international comparisons is singled out and on its basis the comparative evaluation of inconsistency of theoretical positions and the reasons of differences of GDP growth is carried out. Based on the complexity of the formation of homogeneous data sets in order to obtain correct comparison results, a general scheme for the relationship between the theoretical base of international comparisons and PPP constraints is defined. The possibility of obtaining a single measurement of the indicators of national economies based on the existing sampling errors, measurement uncertainties and classification errors is considered. The emphasis is placed on combining the work using the ICP and CPI with the aim of achieving comparability of data in the territorial and temporal cross-section. Using the basic characteristics of sustainable economic growth, long-term prospects for changing the ranking positions of countries with different levels of income are determined. It is shown that the clarity and unambiguity of the theoretical provisions is the defining condition for the further process of data collection and formation of correct analytical conclusions.

Keywords: international comparisons, System of National Accounts, Purchasing Power Parity, consumer prices, methodology of statistics.

Fig.: 2. **Tbl.:** 2. **Bibl.:** 14.

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Серова І. А. Міжнародні зіставлення:
питання методології та практики

У статті розглянуто питання методології та організації статистичного спостереження рівня економічного розвитку країн. Виокремлено теоретичний базис міжнародних зіставлень і на його основі здійснено порівняльну оцінку неузгодженості теоретичних положень і причин відмінності темпів зростання ВВП. Виходячи зі складності формування однорідних сукупностей даних з метою отримання коректних результатів зіставлення, визначено загальну схему взаємозв'язку теоретичної бази міжнародних зіставлень й обмежень по ППС. Розглянуто можливість отримання єдиного виміру показників національних економік виходячи з наявних помилок вибірки, похибок виміру і помилок класифікації. Зроблено акцент на поєднання робіт за ПМЗ та ІСЦ з метою досягнення зіставлення даних в територіальному розрізі та за часом. Використовуючи базові характеристики стійкого зростання економік, визначено довгострокові перспективи зміни рейтингових позицій країн із різним рівнем доходів. Показано, що чіткість й однозначність теоретичних положень є визначальною умовою подальшого процесу збирання даних і формування коректних аналітичних висновків.

Ключові слова: міжнародні зіставлення, Система національних рахунків, паритет купівельної спроможності валют, споживчі ціни, методологія статистики

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Серова И. А. Международные сопоставления:
вопросы методологии и практики

В статье рассмотрены вопросы методологии и организации статистического наблюдения уровня экономического развития стран. Выделен теоретический базис международных сопоставлений и на его основе осуществлена сравнительная оценка несогласованности теоретических положений и причин отличий темпов роста ВВП. Исходя из сложности формирования однородных совокупностей данных с целью получения корректных результатов сопоставления, определена общая схема взаимосвязи теоретической базы международных сопоставлений и ограничений по ППС. Рассмотрена возможность получения единого измерения показателей национальных экономик исходя из существующих ошибок выборки, погрешности измерения и ошибок классификации. Сделан акцент на совмещении работ по ПМС и ИПЦ с целью достижения сопоставимости данных в территориальном и временном разрезе. Используя базовые характеристики устойчивого роста экономик, определены долгосрочные перспективы изменения рейтинговых позиций стран с различным уровнем дохода. Показано, что четкость и однозначность теоретических положений, является определяющим условием дальнейшего процесса сбора данных и формирования корректных аналитических выводов.

Ключевые слова: международные сопоставления, Система национальных счетов, паритет покупательной способности валют, потребительские цены, методология статистики.

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Introduction. One of the characteristics of effectiveness of modern society is the level of its economic development. The criterion of the development is sustainable growth – the ability of an economy to maintain a certain state over relatively long periods of time. To assess the development effectiveness, comparative analysis based on the key economic indicators is traditionally used. One of such indicators is Gross Domestic Product (GDP).

But, both the periods of sustainable development of the economies of each country, and, particularly, their actual state, differ in a set of defining characteristics and have a different time interval of sustainability. Assessing the state and level of sustainability, conducting their comparative analysis is a rather labor-intensive and complex task that has not been solved yet and requires constant improvement of both the methodology and the tools.

Any scientific research has a theoretical basis. The basis for international comparisons are

- the System of National Accounts (SNA), which, as an international standard for accounting, expresses macroeconomic data in a form suitable for analysis;
- the International Comparison Program (ICP), which allows implementing a global comparison of GDP based on Purchasing Power Parities (PPPs).

Being oriented towards a more comprehensive coverage of economic transactions, the accounting of new objects in an economy included in the SNA 2008 is based on a considerable itemization of accounts, which should contribute to a more complete description of a national economy and improve the comparability of macroeconomic indicators.

The ICP presents development of the international SNA, generally defining the method for statistical study of the relationship between the indicators of the level and dynamics of socio-economic development in countries where the PPP is a technical tool for ensuring the comparison of GDP based on selecting representative products.

The common objective of the SNA and the ICP is to achieve a more accurate description of the level of development of national economies and formulate correct conclusions.

Proceeding from the fact that the correctness of conclusions made depends on the information quality, as well as the correctly selected methods of research, let us consider international comparisons through the prism of basic statistical characteristics.

The methodological basis of statistics is the law of large numbers, which determines the inessentiality of random deviations when working with mass data. But, when making comparative evaluation for countries, there take place differences, first of all, in the consumer goods baskets, on the basis of which PPPs are calculated; purchasing power of the national currency; price level; structure of economies, population. In addition, these differences are related to the technical side of obtaining information, particularly, changes in the composition of objects of observation; methods of collection and primary processing of the initial information, units of measurement.

Thus, working with qualitatively heterogeneous information, both in the content and methods of obtaining, it is necessary to achieve its homogeneity – one of the basic criteria that determine the possibility of working with statistical data.

In the scientific literature much attention is paid to the need to improve the GDP indicator [2] as a basic indicator in international comparisons and in assessing the level of development of a national economy, primarily due to the existing practice of artificial pricing, writing off loans, impossibility of separating in this indicator a new value from its redistribution. The methodological innovations of the SNA [10] and the methodology of statistics [8] need more in-depth explanations regarding the formation of cautionary information that meets modern requirements for assessing the level of socio-economic development of countries. The opinion on excessive mathematization of statistical science is ambiguous [3; 4].

The complexity of the issues under consideration, the need for their comprehensive solution sometimes makes the task of forming homogeneous sets of data, which should have a correct comparison result, impossible from a practical point of view.

Therefore, identifying basic issues in assessing the level of development of countries will provide an opportunity to form a methodological basis for studying the problem of international comparisons.

Conducting international comparisons of parameters-indicators based on PPPs is based on price statistics and national accounts. The general scheme of the relationship between the limitations in the use of the PPP and the theoretical basis of international comparisons is presented in Figure 1.

The adoption of a new version of the international statistical standard – SNA 2008 became an objective necessity [10]. Eliminating previous inconsistencies, increasing the level of consistency of macroeconomic statistics was aimed at obtaining cautionary information based on a more detailed analysis.

Nevertheless, after eliminating some inaccuracies and errors, there revealed other ones. The new version of the SNA has a number of issues that can be summarized as follows:

- if the result of the sale of products is income, then why the elemental structure of the GDP is reflected in the costs;
- if a correct statistical evaluation is manifested in homogeneous sets, why aggregation and disaggregation of heterogeneous indicators is carried out;
- why the services of financial intermediaries can be included in production activities;
- why unclaimed products are included in the volume of GDP;
- why free market and non-market goods and services are considered within production boundaries;
- where the clarity of distinction between military and non-military expenditures;
- what is the sense of overstating GDP, including, for example, arms and research expenditures in gross capital formation.

Thus, assuming the inconsistency of theoretical provisions, an error is made in further data collection, not to mention the conclusions drawn on their basis.

There arise no less issues concerning price statistics. The main one is obtaining high-quality information and achieving its representativeness in planning the monitoring of prices both for calculating the Consumer Price Index (CPI) of the domestic economy and for calculating the prices for goods-representatives when organizing international comparisons.

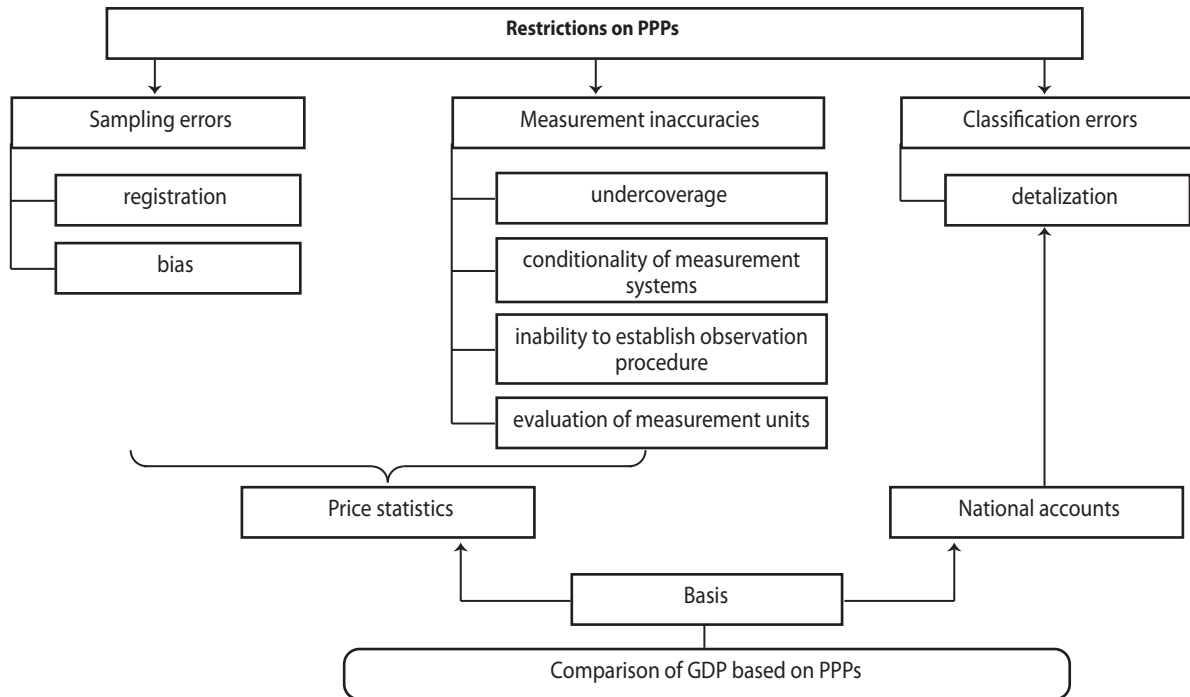


Fig. 1. Scheme of the relationship between the theoretical basis of the international comparisons and restrictions on PPPs

The GDP is a macroeconomic value indicator, but it is formed as the product of quantity by price. Despite the fact that the characteristics of the GDP in terms of goods do not correspond to the basket, the quantity of goods (services), their assortment and price per unit is the information basis for assessing the level of development of the domestic economy and international comparisons.

If the basket is formed for a national economy based on the specifics and the level of development of a particular country, then for international comparisons it is necessary to form a universal basket that maximally satisfies both the quantitative and qualitative characteristics of goods of all countries participating in the comparison. In the first case, the list of goods included in the basket will be wider and can be determined for different objects under observation and territorial divisions within the country. In the second case, it is significantly narrower and is formed mainly on the basis of the property of goods identity, i.e. indirect characteristic of the similarity of goods for different countries.

The received baskets must have a value estimate. Therefore, there arises a problematic issue of determination of prices of goods included in the basket. But, if for the domestic economy the prices for the same goods (services), depending on the territory of their collection, can differ by several times, then for some countries they are not determined at all (there takes place a cost characteristic of the goods (services)).

The general scheme of comparing consumer prices through taking into account the characteristics of products and the process of compliance with international comparisons can have the following form (Fig. 2).

This scheme determines choosing a variant of comparison of consumer prices in different territories for different periods of time based on the formed plan for statistical observation of prices and the possibility of its implementation.

Regardless of the serious analytical differences between the comparison of prices for a certain period of time with the help of the CPI and the comparison of consumer prices and PPPs in different territories, the CPI is considered a more important indicator for any country [9], since it determines the total price change for the period under study. And the consistency of temporal and territorial characteristics in international comparisons is one of the most difficult tasks, even in its mathematical interpretation.

The general requirements for data to be used in international comparisons are

- representativeness of the data on prices for goods included in the basket;
- representativeness of the data on the weight of various categories of goods.

The main difference in the comparison of PPPs in different territories and consumer prices is the impossibility of establishing a procedure for price monitoring. In addition, if the data on prices to calculate the CPI are collected from trade outlets that can be scattered throughout the country and household expenditures are used as the weight, then in international comparisons these data on countries can be unavailable at all.

The process of calculating the weight of an indicator is one of the most difficult in statistical practice. When calculating the CPI, the weight of expenditure is determined on the basis of the standard classification [12].

Classification, as an obligatory instrument of statistical analysis, provides an adequate description of the structure of an economy and aggregation of information. Only implementation of the principles of effective classification makes a subsequent correct processing of data possible. In carrying out international comparisons, both the principle of a single criterion in the formation of groups of the same order and the principle of

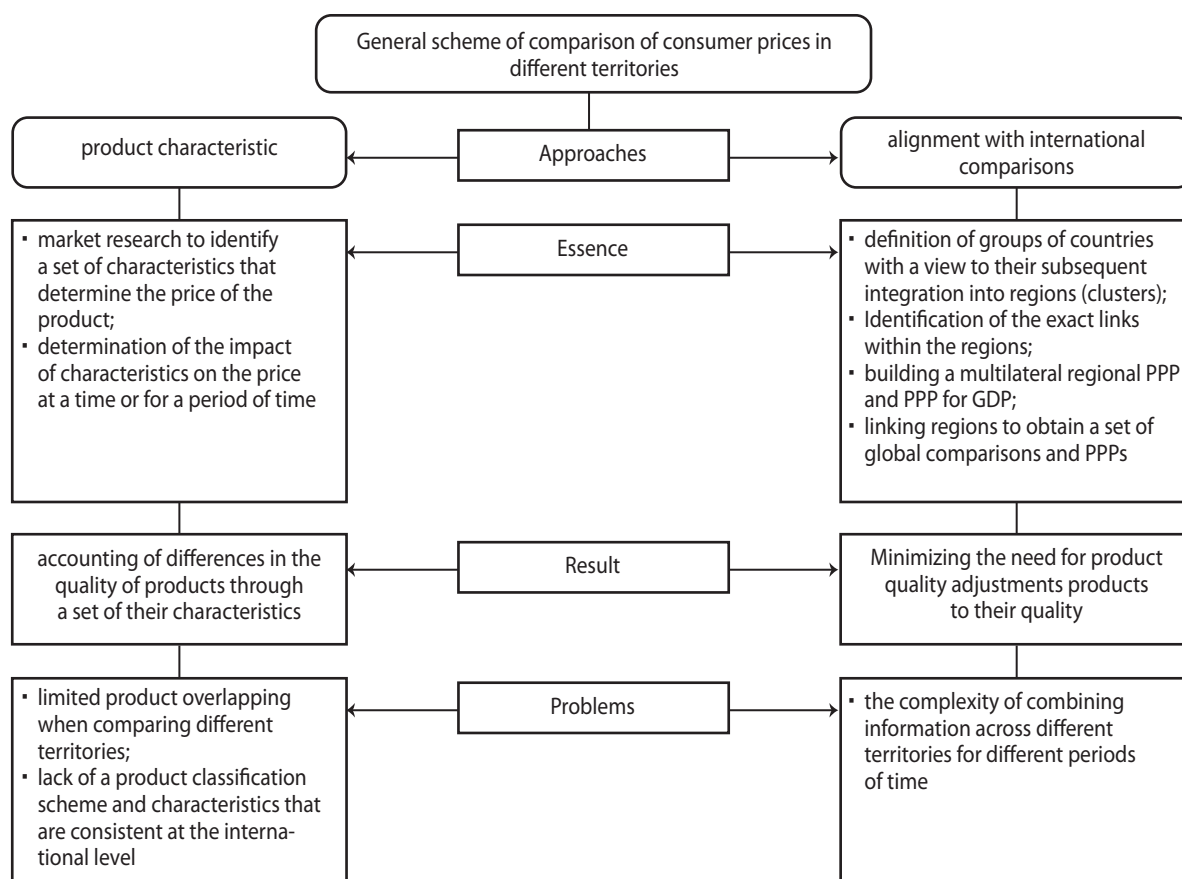


Fig. 2. Scheme of comparison of consumer prices in different territories

completeness of classification for each of its steps are violated. Therefore, considering the SNA 2008 as an international statistical standard for the harmonization of systems of statistical indicators, its excessive detalization should be noted. The attempt to describe in more detail characteristics of products for the purpose of comparison was at the same time a violation of the principle of multi-step classification that determines the limit of classification division, which results in complicating the process of comparison.

The main type of observance of prices for products included in the basket or representative products is sampling. In the formation of sample totalities, it is important to determine a sampling frame with regard to the purpose of the study. One way to specify the composition of the data set and subsequent determination of the sampling frame can be either the interchanging or simultaneous using of continuous and sampling methods of observation.

If a more homogeneous totality is formed in the calculation of the CPI, a sufficient condition for the collection of data will be using the interchanging of rare continuous and periodic sampling observations, which allow determining the composition of features of continuous observation that ensure the organization of sampling and justification of the interchanging periods.

If an unequivocally heterogeneous totality is formed in the calculation of the PPP, this will necessitate a simultaneous using of continuous and sampling observations within a single survey. This organization of observation allows establishing the optimal proportions between specific features that are ob-

served on a continuous basis and the main body of data that are observed on a sampling basis.

One of the main objectives of sampling observation is to obtain an estimate of certain properties of the totality. To limit the estimation error is possible using a sampling plan. The development of a plan is a complex task, but it allows approximating the estimate to the properties of the totality, realizing the possibility of implementing a stratified sampling and increasing the number of households, outlets and goods. At each stage, a stratified sample should be used to increase the accuracy. Disproportionate stratified samples are usually less accurate than proportional samples, so their using is more correct when performing international comparisons of indicators.

Sampling errors, like classification errors, are associated with measurement errors. One of the main problems of measurement is the incompleteness of coverage of the units of a totality, which most often arises in the formation of a non-representative sample. An equally important problem, as discussed above, is the detalization of the data in the SNA, which can only be carried out upon availability of a well-thought-out monitoring plan. To adjust household resources, an important measurement issue is the choice of an equivalence scale, which allows avoiding economies of scale when accounting a joint consumption.

To date, in the international practice of comparisons, it is possible to obtain a unified measurement of the indicators of national economies using the PPP. The complexity of the process of data collection and calculation of the PPP does not allow

to directly estimate the error margin associated with the use of this indicator.

But the PPP allows «... to avoid the situation when the same real GDP volume may look more expensive or cheaper only depending on how much the exchange rate of the national currency strengthens or weakens in accordance with the situation in the foreign exchange market at the time of calculations» [3].

The PPP serves as the cost basis for the exchange rate. But there are deviations between these indicators practically for all countries.

Using the information [14] on the rating position of the 10 leading countries in terms of the parameters-indicators of economic development for 2014 and the forecast for 2030 and 2050, we will monitor the dynamics of GDP at PPP and at the exchange rate (Tbl. 1).

The analysis showed that the average growth rates of GDP at PPP and the exchange rate practically in all countries have a positive trend. The only exception is China, where the indicator in terms of the exchange rate in 2050 is lower than in 2030.

If in terms of the indicator of GDP at PPP in 2030 compared with 2014 such countries as Mexico and Nigeria improved their ranking positions and entered the top ten, France as soon as in 2030, and the United Kingdom in 2050 did not retain their leading positions. Over the entire period of the study, in terms of the GDP indicator at the exchange rate, there is a more substantial reshuffling of the countries where Mexico and Nigeria again in the long term claim to take the leading positions.

It is interesting to note that, despite the time factor, the average GDP growth at the exchange rate is higher than the average GDP growth at PPP in such countries as China, Brazil, Russia, India, Indonesia, Mexico and Nigeria, which confirms the current trends of faster growth of low or middle income countries.

Proceeding from the fact that sustainable growth is determined by such characteristics as average annual GDP growth per capita, length of growth periods and growth volatility, we will represent the change of these indicators by countries (Tbl. 2).

For the entire period of the study, in terms of the GDP per capita at PPPs, almost all countries maintained an outpacing average growth rate compared to the average GDP growth at the exchange rate. The exception was Brazil. In the changing ranking by countries, Indonesia, Mexico and Nigeria have trends similar to those for Brazil.

Using only average indicators to assess the capability to maintain growth over a long period of time will not be correct, since the growth is not sustainable.

Nevertheless, the analysis of Table 2 showed that volatile growth at average rates is higher in countries with an average and even low level of income. Thus, in terms of the GDP per capita at PPPs for the period under study, India has the highest level of volatility – 4.6 times, followed by Indonesia – 3.8 times, and Mexico and Nigeria – about 3 times.

The main reasons for the difference in GDP growth based on the ICP and growth based on the SNA are [1; 5; 9; 10; 13]:

- product specification (the characteristic in the SNA is the place where the product is produced, and in the PPP – the average price for the product);

- list of products (more products are examined in the SNA than in the ICP);
- structure of weights (if there examined more products the prices for which are determined in the SNA than the products the prices for which are determined in the ICP, the structure of weights will be different);
- adjustment to exclude the effect of changes in the quality of products over time (is not used by all countries);
- determination of price dynamics (according to the ICP 2005, the growth rate was to ensure representativeness within each country and comparability between countries; according to ICP 2011 – the importance of a product in a particular country, while according to the SNA, the consistence in time was to be ensured);
- change in the terms of foreign trade (in the SNA does not affect the dynamics of the GDP, and in the ICP – affects directly);
- the specifics of accounting of non-market services (in the SNA, the estimate is based on labor and material costs, and the assumption of similar labor productivity of all the countries involved in the comparison is used to calculate the PPP).

Conclusions. Economic development is a multidimensional concept. The multidimensionality is difficult to measure. It is even more difficult to compare multidimensional and at the same time heterogeneous systems and draw a conclusion about their development level.

The determination of the general vector of the methodology of modern science makes it possible to single out the key points in the relationship of such components of the study as the formation of a theoretical basis, collection of data and their analysis.

In comparing the level of economic development of countries, such key point is the clarity and unambiguity of theoretical provisions that determine the further process of data collection and correctness of analytical conclusions.

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Table 1
Comparative evaluation of average growth rates of GDP at PPP rankings and GDP at MER rankings (based on the data for 2014)*

Rank 2014	GDP at PPP rankings				GDP at MER rankings			
	Country	Projected 2030	Projected 2050	Rank 2014	Country	Projected 2030	Projected 2050	Rank 2014
1	China	1,045	1,067	1	United States	1,049	1,061	
2	United States	1,049	1,062	2	China	1,126	1,091	
3	India	1,113	1,119	3	Japan	1,029	1,035	
4	Japan	1,029	1,035	4	Germany	1,027	1,037	
5	Germany	1,030	1,041	5	France	1,030	1,044(rank 12=↓)	
6	Russia	1,032	1,057	6	United Kingdom	1,040	1,049(rank 11=↓)	
7	Brazil	1,063	1,078	7	Brazil	1,077	1,097	
8	France	1,035(rank 11=↓)	1,054(rank 13=↓)	8	Italy	1,027(rank 12=↓)	1,040(rank 16=↓)	
9	Indonesia	1,100	1,105	9	Russia	1,062	1,089	
10	United Kingdom	1,050	1,06(rank 11=↓)	10	India	1,172	1,183	
	Mexico	1,081(rank 9=↑)	1,09(rank 7=↑)		Mexico	1,105 (rank 10=↑)	1,119(rank 7=↑)	
	Nigeria		1,140(rank 9=↑)		Indonesia		1,160(rank 4=↑)	
					Nigeria		1,174(rank 9=↑)	

↓ – decline in the country's ranking position; ↑ – increase in the country's ranking position * Developed by the author based on [14].

Table 2
Comparative evaluation of GDP per capita (based on PPPs) and GDP per capita (based on MERs)*

Rank 2014	GDP per capita (based on PPPs), \$ths				GDP per capita (based on MERs), \$ths				
	Country	2014	Projected 2030	Projected 2050	Rank 2014	Country	2014	Projected 2030	Projected 2050
1	China	12,580	24,848	44,100	1	United States	53,567	70,185	103,240
2	United States	53,567	70,185	103,240	2	China	7,388	18,350	38,667
3	India	5,675	11,608	26,052	3	Japan	37,613	49,691	73,055
4	Japan	37,755	49,791	73,055	4	Germany	46,268	59,508	87,341
5	Germany	43,858	57,698	87,341	5	France	44,658	52,868	71,122
6	Russia	25,046	36,344	62,657	6	United Kingdom	44,609	56,942	78,544
7	Brazil	15,089	22,429	39,650	7	Brazil	11,019	18,249	36,925
8	France	39,810	49,332	71,122	8	Italy	34,820	43,096	60,268
9	Indonesia	9,988	18,693	37,993	9	Russia	14,476	24,881	54,675
10	United Kingdom	38,140	52,250	78,544	10	India	1,597	4,947	17,245
	Mexico	17,112	27,739	51,338		Mexico	10,348	20,054	45,400
	Nigeria	5,765	9,395	16,680		Indonesia	3,348	9,064	27,202
						Nigeria	3,237	6,429	14,429

* Developed by the author based on [14; 15].

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