

# ELCANO GLOBAL PRESENCE REPORT



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# ELCANO GLOBAL PRESENCE REPORT 2017

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# 9

## Executive summary

---

# 13

## 1. Which countries are really declining and which are effectively emerging?

Iliana Olivié and Manuel Gracia

China hangs on to the 2nd position  
Emerging countries: a blurred category

---

# 19

## 2. A new phase of de-globalisation?

Iliana Olivié and Manuel Gracia

A decreasing foreign policy space  
A re-concentration of external projection  
Drivers of (de)globalisation



**25**

### 3. JRC statistical audit on the Elcano Global Presence Index 2016

Marcos Domínguez-Toreiro, Marcos Álvarez-Díaz and Michaela Saisana

Introduction

Statistical coherence in the Elcano Global Presence Index framework

Data checks

Outlier treatment

Statistical assessment

Qualitative review

Impact of modelling assumptions on the Elcano Global Presence Index results

Uncertainty analysis results

Sensitivity analysis results

Conclusion

---

**45**

### Methodological annex

Brief history of the project

Main elements of the Elcano Global Presence Index

The inclusion of the European Union in Elcano Global Presence Index

---

**55**

### Statistical annex

## LIST OF TABLES AND GRAPHS

<b>Page 11</b>	Table 0	Frequently asked questions about the Elcano Global Presence Index
<b>Page 13</b>	Graph 1.1.	2016 Global presence ranking top 20 (in index value)
<b>Page 15</b>	Table 1.1.	Emerging countries' global presence variations (in index value)
<b>Page 16</b>	Table 1.2.	Emerging countries' global presence variations (in ranking positions)
<b>Page 17</b>	Graph 1.2.	United States and European Union global presence (in index value and %)
<b>Page 20</b>	Graph 2.1.	Global, economic, military and soft presence (in index value, 1990-2016)
<b>Page 21</b>	Graph 2.2.	Distribution of global presence by quintiles (in %, 1990-2016)
<b>Page 22</b>	Graph 2.3.	Global presence by dimensions and two variables (in index value, 1990-2016)
<b>Page 28</b>	Table 3.1.	Pair-wise correlation structure at the dimension level: economic dimension variables
<b>Page 29</b>	Table 3.2.	Pair-wise correlation structure at the dimension level: military dimension variables
<b>Page 29</b>	Table 3.3.	Pair-wise correlation structure at the dimension level: soft dimension variables
<b>Page 30</b>	Table 3.4.	Correlation between the scaled dimensions, the overall Index and the scaling factors
<b>Page 31</b>	Table 3.5.	Correlation between individual indicators, non-scaled dimensions, the overall Index and the non-scaled version of the overall Index
<b>Page 32</b>	Graph 3.1.	GDP values <i>versus</i> Elcano Global Presence Index scores
<b>Page 35</b>	Table 3.6.	Uncertainty analysis for the Elcano Global Presence Index 2016: weights, missing data, aggregation and omission of selected variables

<b>Page 36</b>	Graph 3.2.	Robustness analysis (Elcano Global Presence Index <i>versus</i> median rank, 90% confidence intervals)
<b>Page 36</b>	Table 3.7.	Elcano Global Presence Index ranks, simulated median ranks and simulated 90% intervals
<b>Page 41</b>	Graph 3.3.	Sensitivity analysis: impact of modelling choices, rank based on EM imputation
<b>Page 41</b>	Graph 3.4.	Sensitivity analysis: impact of modelling choices, rank based on geometric average
<b>Page 42</b>	Graph 3.5.	Sensitivity analysis: impact of modelling choices, rank excluding energy
<b>Page 46</b>	Graph A.1.	Structure of Elcano Global Presence Index
<b>Page 49</b>	Table A.1.	Countries listed in the Elcano Global Presence Index
<b>Page 50</b>	Table A.2.	Variables, indicators and sources of the Elcano Global Presence Index
<b>Page 53</b>	Table A.3.	Variables, indicators and sources of the Elcano Global Presence Index calculated for the European Union
<b>Page 54</b>	Table A.4.	Variables, indicators and sources of the Elcano European Presence Index
<b>Page 55</b>	Table B.1.	Elcano Global Presence Index 2016
<b>Page 59</b>	Table B.2.	Global presence position (selected years)
<b>Page 62</b>	Table B.3.	Global presence contribution by dimension (2016, in %)





# Executive summary

## **Decaying countries and emerging economies: blurred categories**

The United States tops the ranking of the 2016 edition of the Elcano Global Presence Index, with an index value of 2,457 points. China is 2nd (therefore hanging on to the position it reached last year and recording 727 points). These two countries are followed by Germany (3rd, 623 points), the United Kingdom (4th, 566 points) and France (5th, 516 points). There are no relevant changes in the top 20 positions with respect to last year's Index.

Unlike in previous editions, traditional powers and emerging countries do not behave as two distinct and homogeneous blocs. On the one hand, a good number of emerging countries that had been increasing their global presence since the 1990s have decreased their external projection last year. In some cases, the losses are linked to a sustained slowdown in the international prices of primary goods and energy products –this is the case of Nigeria, Russia and Saudi Arabia–. There are very few emerging countries gaining global presence and they are concentrated in East Asia. On the other hand, the United States and the European Union record diverging patterns: whereas the United States' quota kept on increasing (after a turning point in 2012), the European Union maintained its decline, thereby narrowing the gap with the United States.

## **The beginning of de-globalisation?**

The foreign policy space (the aggregate value of global presence of all 100 countries included in the Elcano Global Presence Index) has decreased for the first time in our series. To the extent that what we call the foreign policy space can be a reflection of the globalisation process, the latter intensified after the fall of the Berlin Wall, skyrocketed during the 2000s and peaked in 2015. This decrease has been due to a sharp contraction in the economic dimension (-2.6% in only one year) and, more specifically, in energy and primary goods, and despite the comeback of the military dimension (which recorded a 3.1% increase last year) and a far more timid growth of the soft dimension than in previous phases (0.4%).

The decrease in total global presence has gone hand in hand with its re-concentration in the top global players, as revealed by both the behaviour of the Herfindhal-Hirschman Index (HHI), which returned to 2010 levels (with 799 points in 2016), and by the distribution of global presence by quintiles as Q1 (the group of 20 countries with a higher global presence) increased its global presence from 78% of the total external projection of all 100 countries in 2015 to 79% in 2016.

## **The Elcano Global Presence Index, audited**

The Competence Centre on Composite Indicators and Scoreboards (COIN) of the Joint Research Centre (JRC) of the European Commission conducted a statistical audit of the

Elcano Global Presence Index that has led to a series of methodological changes. In order to make each country's performance across the indicators comparable to that of another country, individual indicators are now denominated first by countries' Gross Domestic Product (GDP) or population. These intensive/denominated variables can thus be added up and combined together to obtain the dimension scores. Only at a later stage the dimension scores are scaled-up taking into consideration the relative share of a country in global GDP (the economic dimension) or population (both the military and soft dimensions). Also, the weights of variables and dimensions have been rounded up or down.

This audit suggests that the Elcano Global Presence Index is sufficiently robust and reliable, with a statistically coherent and balanced multi-level structure. The Index ranks are also relatively robust to methodological changes related to the treatment of missing values, weighting, aggregation rule and selection of indicators. The external report also recommends a series of additional refinements that are detailed in chapter 3 of this report.

## Frequently asked questions about the Elcano Global Presence Index

What does the Elcano Global Presence Index measure?	The index measures global presence. By global presence we understand the effective positioning, in absolute terms, of the different countries (products sold, tourists welcomed, victories in international sports competitions...).
Does the Elcano Global Presence Index measure power?	No. A country may have a strong international projection and a weak regional or global influence (or vice-versa). The relationship between presence and power depends on the foreign policy of each country or on the limiting factors of the exercise of influence depending, for instance, on the presence of another regional leader.
Does it reflect the effort of countries attempting to achieve greater internationalisation?	No. This Index measures the results of internationalisation, not its means. For example, a country may have deployed a significant number of troops abroad with a defence expenditure that is relatively smaller than that of another country with a smaller military presence.
Does it measure the openness of countries?	No. The Elcano Global Presence Index considers the external projection of the different countries and not so much the way in which they absorb the external action of other countries in their national territory. That is why the index considers the exports of manufactured goods but disregards the imports. It does not measure world interdependence, though it may help to analyse it.
Is it calculated with objective or subjective data?	Objective. Its purpose is not to ascertain how a country is perceived by certain elites or by the public opinion as a whole. This Index is calculated to determine the effective external projection of the different countries, regardless of their reputation or image.
Does it measure merely the 'quantity' of a country's presence or also its nature?	Both. The Elcano Global Presence Index is composed of three dimensions (economic, military and soft presence), which in turn are composed of variables of a different nature (ranging from energy to development cooperation, to troops deployed or tourism). It is therefore useful in revealing not only how present countries are in the global order, but also the nature of their presence.
How are the variables of the Elcano Global Presence Index selected?	First, presence is reflected in a single direction, what could be deemed its unidirectionality. Secondly, the results of presence are measured and not the means to achieve them. In addition, all the variables have an explicitly external component in the sense that they reflect cross-border presence. Presence is given in absolute and not relative terms; in other words, the indicators are not proportional to the demographic or economic size of the country. Likewise, as for any other index, the best explanatory capacity is sought with the fewest variables or indicators possible. Finally, hard data on presence are taken and not data based on judgments or opinions.

## Frequently asked questions about the Elcano Global Presence Index

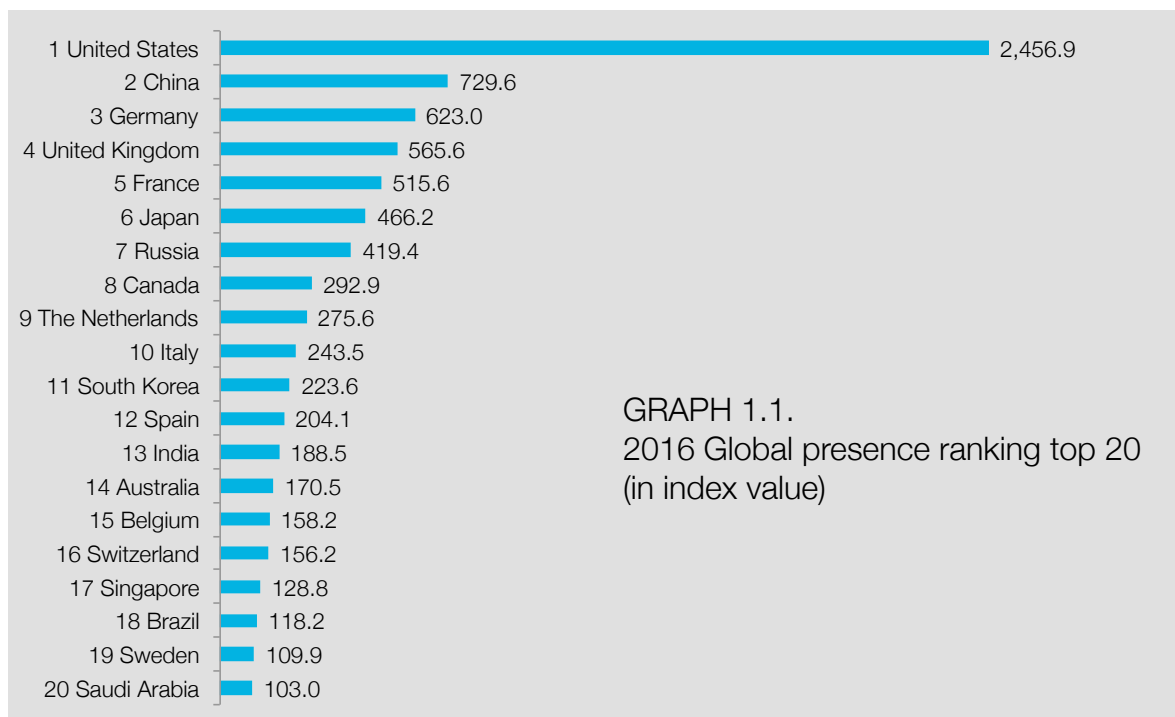
And how are they combined in a synthetic index?	Weights assigned to variables and dimensions are based on experts' criteria. Two surveys were conducted in 2012 and 2015: questionnaires were sent to specialists in international relations and answers were combined to determine the weights of variables and dimensions.
What about missing cases? How are they estimated?	In these cases we have also referred to expert opinion. A total of 2,440 data items have been estimated from 36,475 observations. The number of estimations accounts for 6.7 % of the base.
The Index has been calculated for what years?	For 1990, 1995, 2000, 2005, and 2010-16. Since 2010 the calculation is performed annually.
Why those years?	To reveal the transformations in the world order since the end of the Cold War.
For what countries?	The Elcano Global Presence Index is calculated for 100 countries: the first 92 world economies and the countries not listed in these positions that are nonetheless members of the OECD or the European Union.
Can the presence of different countries be combined to reveal joint presence for a chosen group or region?	Not exactly. The presence of different countries can be combined, showing regional trends of global presence. Moreover, as new editions include an increasing number of countries, for some regions (ie, Latin America or East Asia) the number of countries selected for the Index is high enough to consider the aggregated index value as a fair reflection of the external projection of the whole region. However, it is important to note that, in these cases, the total index value is recording the relative presence of some countries in others of the same group or region (i.e. the global presence index value of Latin America includes the relative presence of Argentina in Brazil). Thus, the adding together of global presences should not be considered a metric of a given region's external projection outside its boundaries.
Can the presence of European countries be combined and can it be assumed that that is the presence of the European Union?	No, for the aforementioned reason. It must be borne in mind that the global presence of the member states is partially reflected in other member states of the Union. In order to apply the index to the European Union, intra-European presence has been deducted. The intra-European presence of the member states is precisely what the Elcano European Presence Index measures.

# 1. Which countries are really declining and which are effectively emerging?

Iliana Olivé & Manuel Gracia

## China hangs on to the 2<sup>nd</sup> position

The United States is the country with the highest global presence, according to the 2016 edition of the Elcano Global Presence Index. With almost 2,457 points in index value, its external projection is more than three times that of China (730 points), which holds the 2nd position. China is closely followed by Germany (3rd, 623 points), the United Kingdom (4th, 566 points) and France (5th, 516 points).



There are a good number of emerging countries (seven, to be specific) spread throughout the top 20 ranking of global presence in this latest edition. Besides China, Russia holds the 7th position while South Korea is 11th, India 13th, Singapore 17th, Brazil 18th and Saudi Arabia occupies the 20th position (Graph 1.1).

Compared with last year's ranking following this same methodology, the changes in the top 20 are moderate: only a few countries switch positions. These are Russia and Japan, Canada and the Netherlands, Switzerland and Belgium, and Sweden and Saudi Arabia.

Moreover, the ranking is very similar to the 2015 ranking following the previous methodology of the Index. After a statistical evaluation conducted by the Joint Research Center, several methodological adjustments were introduced. These have implied a series of changes in the results of the Index (the details of this statistical assessment and the methodological adjustments are documented in chapter 3 of this report). In general terms, the main trends of global presence observed throughout all the editions are maintained. In this respect, this top 20 ranking is similar to that published in last year's report,<sup>1</sup> following the previous methodology: the top four positions are occupied by the same countries and several emerging countries are scattered amongst the first 20 positions.

### **Emerging countries: a blurred category**

Previous editions of this report featured the relative decay of old powers and the subsequent emergence of 'the rest' (in Amsden's<sup>2</sup> terms). Following the end of the Cold War, the trend became stronger as a result of the Great Recession. However, data for 2016 seem to show a turning point that could coincide with different experiences in recovering from the crisis in the North and a potential slowdown in the South.

First, a fair number of emerging countries that had gained an increasing global presence during the 1990s, 2000s and/or 2010s have seen a decline in their external projection over the past year; or alternatively, it has increased at a slower pace. There are countries losing global presence in all developing regions: Angola and Nigeria in Africa; Argentina, Brazil, Colombia and Venezuela in Latin America; Bangladesh, India and Malaysia in East Asia; and Algeria, Iraq, Kuwait, Saudi Arabia and United Arab Emirates in Maghreb and the Middle East (Table 1.1). In some cases, these losses are linked to a continued slowdown in international prices and/or the international demand of primary goods and energy products, something that is affecting emerging economies such as Nigeria, Russia and Saudi Arabia as well as developed countries like Australia, Canada and the Netherlands (which acts as an international trade hub).

Secondly, there are very few emerging countries gaining global presence; and, thirdly, these are concentrated in East Asia (Table 1.1). Only Iran and Turkey gain global presence outside East Asia. The winners in this respect are Indonesia, South Korea, Thailand, Vietnam and, above all, China, with a 40-point increase. One feature shared by four of these five Asian countries (with the exception of Indonesia) is that they are producers and world exporters of manufactured goods. However, other variables also play a role. This is the case, for instance, of investment (China, South Korea and Indonesia) as well as other non-economic variables such as science (China and Indonesia), education (China and Thailand) and tourism (China and Thailand).

<sup>1</sup> Iliana Olivé & Manuel Gracia (2016), *Elcano Global Presence Report 2016*, Elcano Royal Institute.

<sup>2</sup> Alice Amsden (2004), *The Rise of 'the Rest': Challenges to the West from Late-Industrializing Economies*, Oxford University Press.

TABLE 1.1.  
Emerging countries' global presence variations (in index value)

	1990-2000	2000-2010	2010-2012	2012-2015	2015-2016
Algeria	4.8	4.1	3.4	-2.7	-3.9
Angola	2.5	1.9	4.2	-1.5	-4.6
Argentina	-1.4	2.8	4.3	-5.4	-1.8
Bangladesh	9.9	19.3	2.0	-1.7	-0.6
Brazil	-5.9	27.6	29.1	-7.5	-7.3
China	75.7	262.8	100.0	136.6	40.3
Colombia	-3.6	4.8	7.3	6.2	-1.3
India	-8.6	76.7	17.2	22.6	-3.7
Indonesia	7.3	15.7	21.3	-7.2	0.9
Iran	-12.3	6.3	6.0	-7.6	4.0
Iraq	-1.4	-4.6	5.9	2.4	-5.4
South Korea	41.8	51.6	39.5	18.4	0.1
Kuwait	1.7	10.2	6.6	-2.2	-5.4
Malaysia	27.0	16.7	14.4	0.1	-2.0
Nigeria	18.8	13.5	7.4	-11.8	-6.4
Russia	-234.2	-77.9	84.2	-11.0	-40.2
Saudi Arabia	-0.4	19.4	32.0	12.9	-21.5
Thailand	35.3	6.9	14.7	1.9	8.4
Turkey	18.3	5.8	6.7	6.0	3.1
United Arab Emirates	30.4	16.1	12.7	15.2	-0.1
Venezuela	2.9	-2.1	8.2	-1.9	-5.0
Vietnam	-76.2	1.4	4.4	3.5	2.7

In brief, the period of intense gains of global presence by emerging countries could be over or temporarily on hold, with the exception of a small group of East-Asian economies, which happen to be those that had recorded greater increases of external projection. In fact, China and South Korea are the two countries (among the 100 countries assessed) that have recorded the greatest increase in their share of global presence in the 1990-2016 period (5.4% and 1.1%, respectively). Singapore is 3rd, India 5th, Thailand 6th and Malaysia 9th. Therefore, if the trend continues, we might be able to confirm in the medium term a phenomenon that we have identified in previous studies on global presence:<sup>3</sup> a small number of Asian countries taking the lead among emerging countries in global presence. If such proves to be the case, when it comes to global presence 'the rise of the rest' could be limited to the rise of emerging East Asia, with China as the main (but not only) stakeholder.

<sup>3</sup> Mario Esteban (2016), "The New Drivers of Asia's Global Presence", *ARI* nr 9/2016, Elcano Royal Institute, January.

Indeed, as shown in Table 1.2, there are several Asian countries among those that gain the greatest number of positions during the 1990-2016 period (Thailand, Bangladesh, Singapore, Malaysia and China). However, top variations in ranking positions over that period are also recorded by countries in the Maghreb and Middle-East region (United Arab Emirates, Qatar and Oman), in Sub-Saharan Africa (Ethiopia, Ghana, Kenya, South Africa, Nigeria and Tanzania) and even Latin America (Mexico and Panama). This is due to the fact that it is easier to gain positions at the tail-end than at the top of the series since, at the tail-end, gaps between positions can be smaller than 0.5 index value points. For instance, the United States has not varied its position since 1990.

TABLE 1.2.  
Emerging countries' global presence variations (in ranking positions)

	1990-2000	2000-2010	2010-2012	2012-2015	2015-2016	1990-2016
United Arab Emirates	33	2	1	5	-1	40
Ethiopia	-25	23	6	22	2	28
Ghana	21	4	2	-8	2	21
Qatar	-6	16	10	2	-2	20
Thailand	18	-4	3	-1	3	19
Bangladesh	10	8	-1	0	-1	16
Singapore	13	1	1	1	0	16
Kenya	2	-7	7	9	3	14
Malaysia	12	0	4	-1	-1	14
China	1	5	1	2	0	9
South Africa	-1	3	4	2	1	9
Lebanon	8	0	0	-4	4	8
Nigeria	12	1	-1	-1	-3	8
South Korea	4	-1	3	1	0	7
Tanzania	-14	-2	10	12	1	7
Mexico	9	-6	-1	5	-2	5
Oman	-1	-4	5	6	-1	5
Panama	-13	6	2	6	4	5

Despite this change of trend in the external projection of emerging countries, the shares of global presence of major countries or unions, such as the United States and the European Union,<sup>4</sup> have tended to decline, as pointed out in previous reports.<sup>5</sup>

However, since 2012 and particularly since 2015, these two global players seem to have adopted diverging patterns. As for the United States, after a maximum share of 29% in

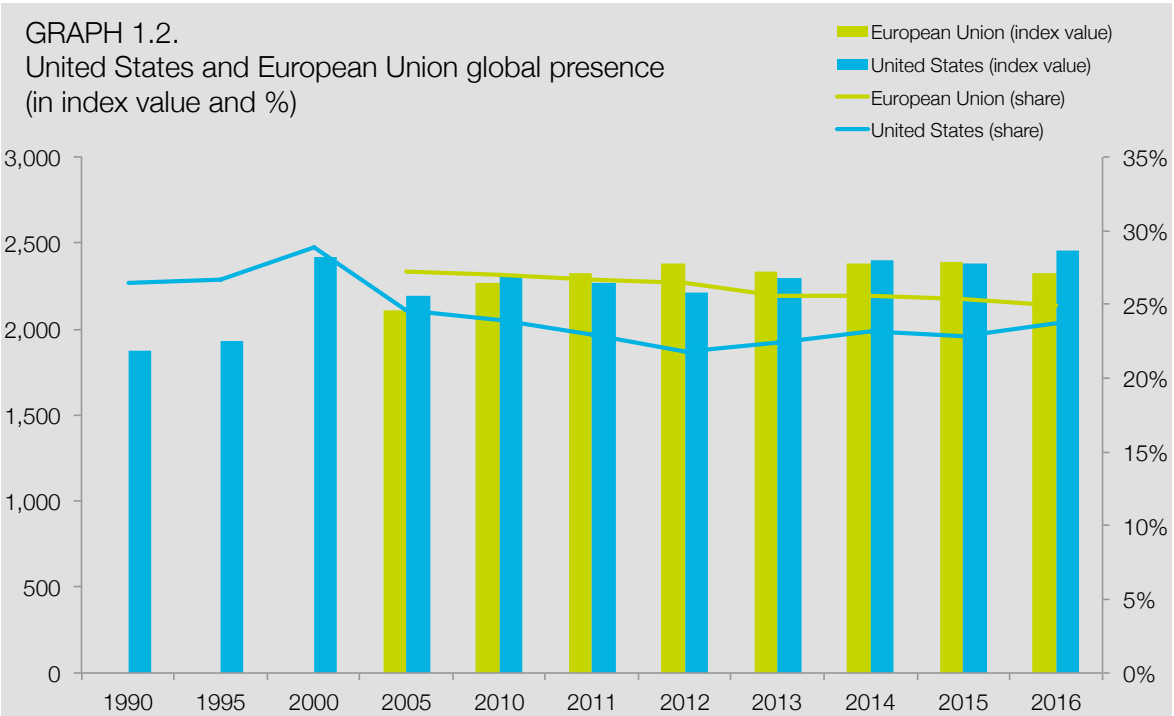
<sup>4</sup> The global presence of the European Union is considered to be the extra-European external projection of all member states. More details can be found in the methodological annex.

<sup>5</sup> Ollivé & Gracia (2016), *op. cit.*



2000, its quota has been steadily decreasing until a minimum of 22% in 2012. Since then, it has mildly regained shares of global presence, a trend that has accelerated over the past year. The country now has 24% of the aggregated global presence of all 100 countries. It should be noted that this trend is not consistent with the new Administration’s discourse on the United States losing ground in the international arena.

The case of the European Union is slightly different. Starting from over 27% in 2005, it has steadily lowered its quota to less than 25% in 2016, thus reducing the gap with the United States (Graph 1.2). Moreover, the decline has occurred despite the fact that the Union has been increasing in size since the beginning of the period. Global presence share in 2005 is calculated for 25 member countries, whereas the figures for 2010 to 2012 include 27 members and records since 2013 refer to 28 member countries.





## 2. A new phase of de-globalisation?

Iliana Olivé & Manuel Gracia

### A decreasing foreign policy space

We define foreign policy space as the aggregate value of the global presence of all 100 countries included in the Elcano Global Presence Index. The lion's share of this policy space is economic (the economic dimension represents almost 55% of the aggregated values of global presence of all countries), then soft (just over 27% of total space) and, lastly, military (slightly under 18%) (Graph 2.1).

As described in previous editions of this report,<sup>6</sup> after a period of rapid globalisation during the 1990s, and particularly the 2000s, earlier this decade, there was a slowdown in the rate of growth of this foreign policy space. New figures, calculated for 100 countries, updated to 2016 and following a slightly different methodology (which is detailed in chapter 3) ratify this trend and even show a contraction during last year. Added global presence has increased by 46% between 1990 and 2016 (from 7,089 points to 10,343, respectively). However, this general trend includes three distinct phases.

In a first phase that started in 1990, following the end of the Cold War, and ended in 2012, aggregate global presence almost doubled, increasing at an annual average rate of nearly 3%. The trend was led by the economic (that grew at an almost 5% annual rate) and soft dimensions (4% annual growth) and despite a contraction in the military dimension, which, in the absence of two antagonic blocs, retrenched from 2,967 points in 1990 to 1,926 in 2012.

Then came a turning point and the beginning of a short second phase, from 2012 to 2015, when the pace of globalisation dramatically decreased to an annual average rate of less than 1%. As in the previous phase, different dimensions contributed to varying extents to this change in trend. The economic dimension followed the average (with a 1% ascent per year) and the military dimension kept the same track as in the first phase, with an even stronger average decrease of over 2% per year. Perhaps surprisingly, during that brief phase the soft dimension took up the torch of globalisation, growing at an over 3% average rate and preventing a stronger slowdown in the rate of growth of the foreign policy space.

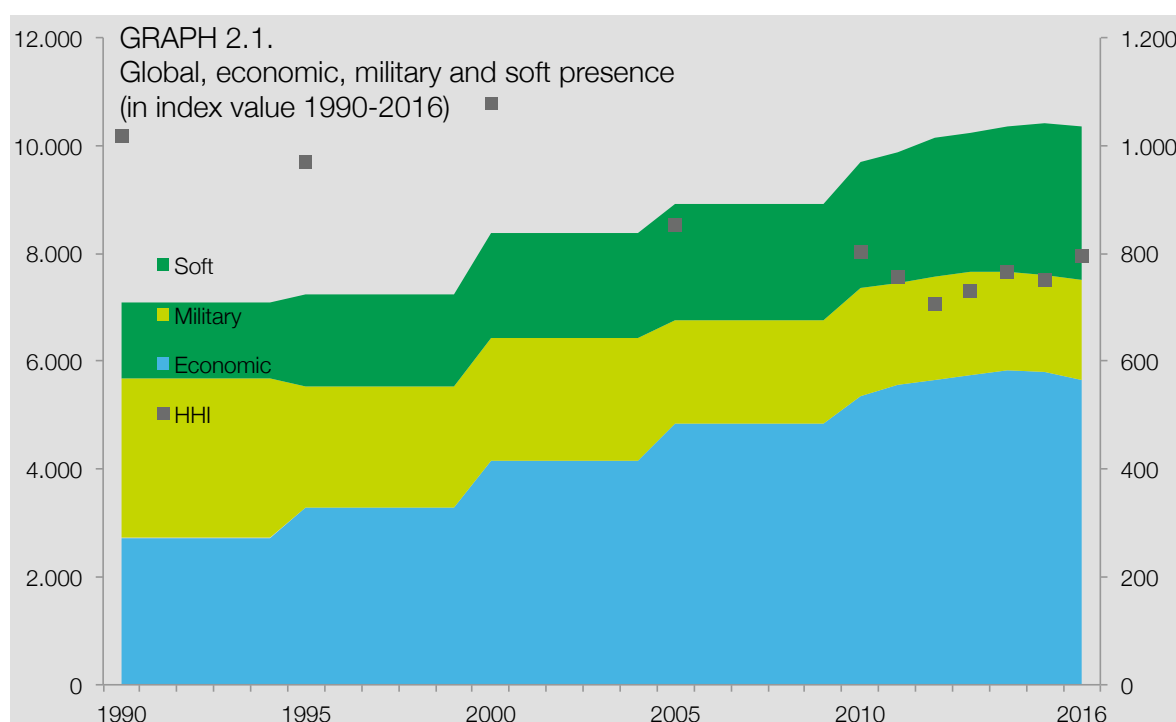
The evolution of the foreign policy space during last year may be signalling a new third phase, starting in 2015, of a period of de-globalisation. The aggregated value of global presence of the 100 countries for which the Index is calculated has decreased for the first time in our series. It has declined by 0.8%, down from 10,425 points to 10,343. This is due

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<sup>6</sup> See, for instance, Iliana Olivé & Manuel Gracia (2016), *Elcano Global Presence Report 2016*, Elcano Royal Institute.

to a strong contraction of the economic dimension (-2.6% in only one year) and despite the comeback of the military dimension (that recorded 3.1% growth during last year) and a much more timid rise in the soft dimension than in previous phases (0.4%).

In short, to the extent that what we call the foreign policy space can be a reflection of the globalisation process, the latter intensified after the fall of the Berlin Wall, skyrocketed during the 2000s and peaked in 2015. During these two and a half decades, the process has become more economic (from 38% to 55% of total global presence in 1990 and 2016, respectively), and softer (from 20% to 27%) and much less military (down from 42% to 18%).



Note: left axis for global presence values and right axis for HHI values.

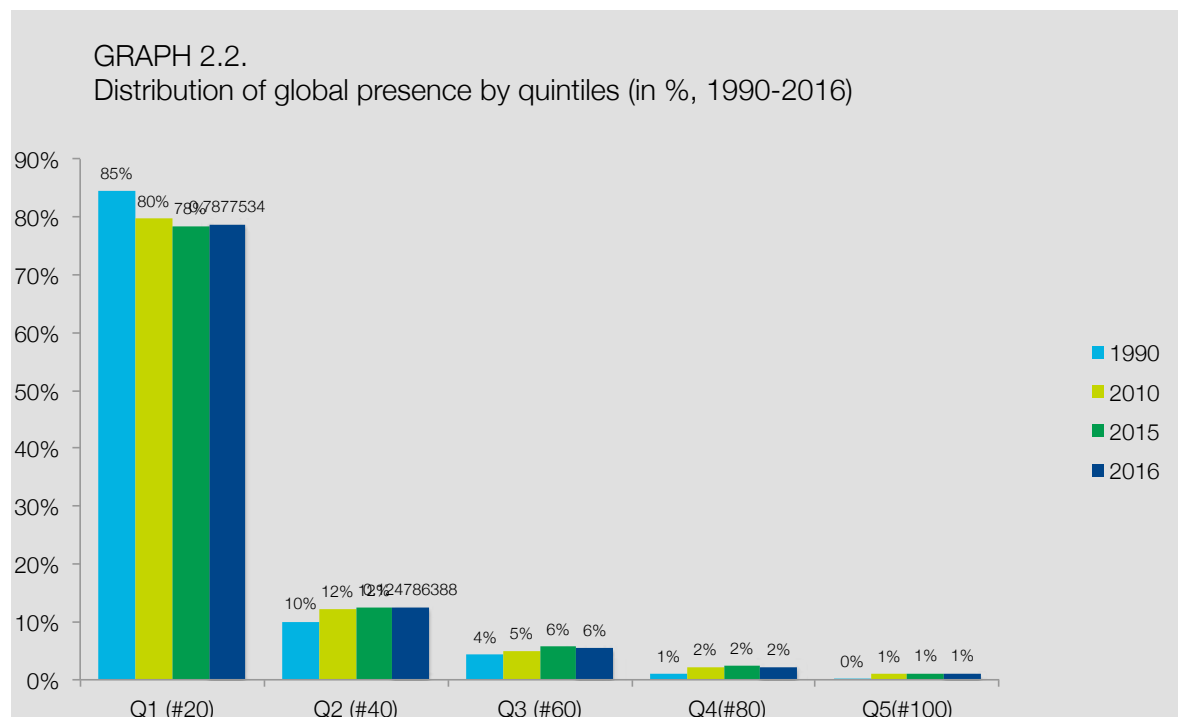
## A re-concentration of external projection

As shown in previous reports, rapid globalisation came hand in hand with a de-concentration of global presence among an increasing number of countries. That is, if aggregate global presence (or what we call the foreign policy space) were to be divided in quotas, those held by big players would have tended to decrease (such as that of the European Union, as explained in the first chapter of this report) while shares of smaller (frequently developing) countries grew during the globalisation process. As also shown in the previous edition of this report, the cooling-off of the globalisation process reversed this trend and resulted in a certain re-concentration of global presence.

Here again, new figures for a wider selection of countries (100), including one more observation (2016), and with a different methodology, confirm this trend. The phenomenon

can be tracked, for instance, with the Herfindhal-Hirschman Index (HHI),<sup>7</sup> which is a measure of concentration. After an erratic behaviour, the HHI decreased dramatically, from a value of 1,016 in 1990 to 707 in 2012. During the second phase, of slower globalisation, between 2012 and 2015, the HHI increased up to 750 points and is now at 799 points, its highest level since 2010 (Graph 2.1).

In order to explore the evolution of global presence, we also calculate the distribution of this aggregated presence by quintiles, assessing the share of global presence projected from five different groups of countries. The first quintile includes the 20 countries with the highest values of global presence (countries listed in this group can vary from one year to another)<sup>8</sup> while quintile 5 contains 20 countries with the lowest levels of external projection.



As shown in Graph 2.2, the top 20 world players currently project almost 80% of global presence while quintile five projects only 1% of it. In line with the results of the HHI, the distribution by quintiles shows a certain de-concentration over the years, as Q1 has lowered its participation from 85% in 1990. This decrease has been distributed across the other four groups of countries: Q2 and Q3 have increased their shares by 2 percentage points each and Q4 and Q5 by 1.

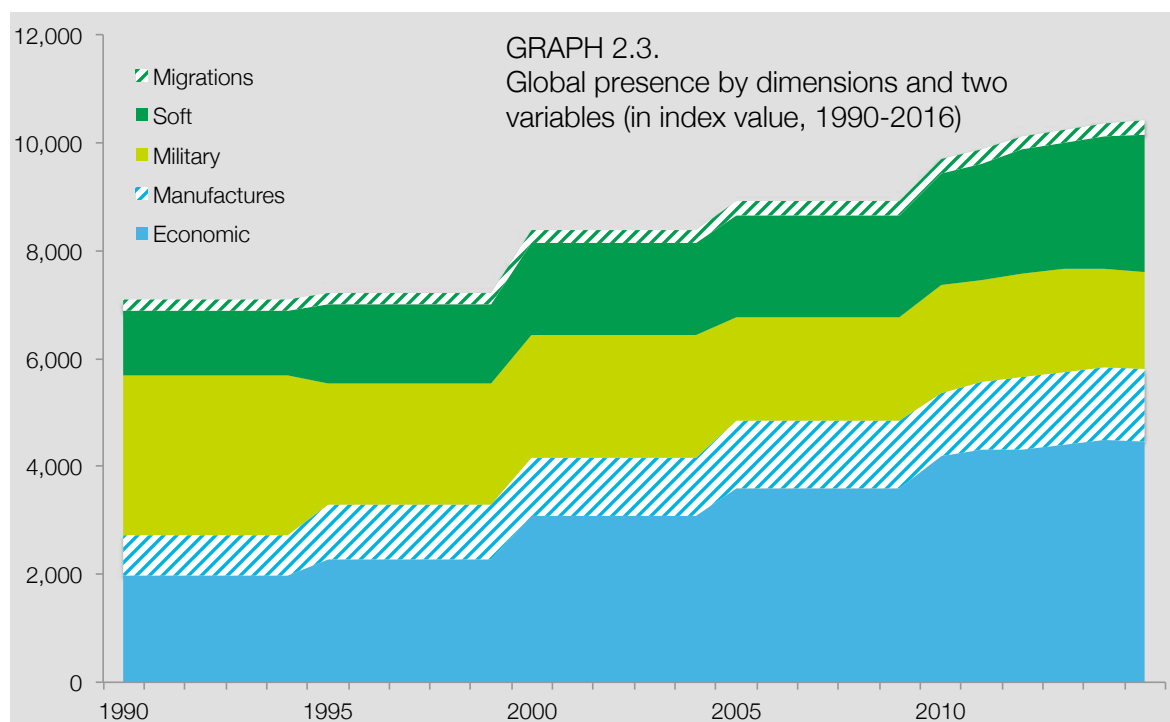
<sup>7</sup> The Herfindhal-Hirschman index (HHI) is a statistical measure of concentration that accounts for the relative size of all firms in a market. It is here applied by squaring and aggregating the share of global presence of all countries (si). It can range from 0 to 10,000. An increase shows concentration.  $HHI = \sum_{i=1}^N s_i^2$

<sup>8</sup> In 1990 these countries were the United States, Russia, the United Kingdom, France, Germany, Japan, Italy, Canada, the Netherlands, Belgium, China, Spain, Australia, Vietnam, India, Brazil, Switzerland, South Korea, Sweden, Saudi Arabia, Denmark, Austria, Greece, Norway and Argentina. In 2016 Vietnam, Denmark, Greece, Norway and Argentina were no longer part of Q1. Instead, Singapore, Ireland, Thailand, Mexico and Malaysia joined the group.

Also in line with the HHI, figures on the distribution by quintiles show a certain re-concentration of global presence coinciding with the decrease of the foreign policy space: over the last year, Q1 has partly recovered its share from 78% in 2015 to 79% in 2016.

## Drivers of (de)globalisation

As mentioned above, during the 1990-2015 period of expansion, there has been a certain reshaping of the foreign policy space that has become much more economic, slightly softer and less military. Within the economic dimension, the main driver of globalisation is the investments variable, whose contribution to the aggregate global presence increases over 11 percentage points, from 10.4% in 1990 to 22% in 2015. Both services and energy contribute to this expansion of the economic dimension but they do so at a much lower scale (2.1 and 2.4 percentage points, respectively, during that same period). Meanwhile, the net contribution of the primary goods variable over the whole period decreases by one percentage point. As for manufactures, a hot topic during both the Brexit and Trump campaigns, its expansion during this period is relatively low, when compared to other variables, as its contribution increases by only 2.2 percentage points, from 10.8% in 1990 to 13% in 2015 (Graph 2.3).



In what seems to be an incipient phase of de-globalisation that started last year, the contribution of the economic dimension to the entire foreign policy space decreased by one percentage point, mainly due to a contraction in the contributions of energy (-1.6 percentage points) and primary goods (-0.4 percentage point).

The decreased relevance of the military dimension in the globalisation process is more or less equally the result of the behaviour of the troops and military capacity variables. These

have developed very much in parallel due to the fact that the latter can be defined as the ability to deploy the former. Troops decreased their contribution by 10 percentage points, from 16.4 in 1990 to 6.4 in 2015, while military capacity recorded a 14.6 percentage-point decrease, from 25.5 to 10.9 over the same period. During this very recent de-globalisation phase, the contribution of the troops variable continued to decrease (-0.2 percentage points) while that of military capacity increased by 0.9 percentage points.

The discrete expansion of the soft dimension was built upon the increased contributions, during the 1990-2015 period, of information (2.9 additional percentage points), science (1.8), culture (1.6), education (1.1), development cooperation (0.7) and tourism (0.4). The variable relating to technology saw its participation in the foreign policy space contract by one percentage point. So did the migrations variable, whose contribution decreased by 0.2 percentage points, from 2.9% in 1990 to 2.7% in 2015 (Graph 2.3). It is interesting to note that this aspect of globalisation, which was also an important part of the message concerning the external risks involved in both the Brexit and Trump campaigns was actually less relevant in the whole globalisation process than it was two decades and a half ago.

Between 2015 and 2016 most soft variables maintained their contribution to the aggregate global presence, with some exceptions that saw a mild increase in their weight: information (0.4 percentage points), and science and education (0.1 percentage points each). Only one variable, development cooperation, experienced a reduction in its importance, by 0.1 percentage points.





# 3. JRC statistical audit on the Elcano Global Presence Index 2016

Marcos Domínguez-Torreiro, Marcos Álvarez-Díaz & Michaela Saisana<sup>9</sup>

## Introduction

The Elcano Global Presence Index offers an annual measurement of the projection in the world of —in the 2016 edition— 100 countries. The global presence as measured by the Index is based on the assessment of each country performance across three different dimensions: economic (flows of energy, flows of primary goods, flows of manufactures, etc.); military (troops deployed and military equipment); and soft (migration, tourism, sports, culture, etc.).

The philosophy behind the development of the 2016 edition of the Index is that, in order to make each country's performance across the indicators included in the framework comparable to that of another country, individual indicators need to be computed firstly as intensive variables<sup>10</sup> (i.e. denominated by Gross Domestic Product (GDP) or population). These intensive/denominated variables can thus be added up and combined together to obtain the dimension scores. Only at a later stage the dimension scores should be scaled-up taking into consideration the relative share of a country in global GDP (the economic dimension) or population (both the military and soft dimensions). These scaling coefficients are calculated as the ratio between GDP (or population) of the country and the average GDP (or population) of all the countries considered in the 2016 edition of the Index. This final scaling-up step is deemed necessary by the Index developers to fulfil the goal pursued by the Elcano Global Presence Index, i.e. to grasp the global projection of individual countries.

As reported by the development team, the Elcano Global Presence Index should be regarded as a “positive (not a normative) Index”, in the sense that countries might increase their global presence by undertaking additional efforts on any of the three dimensions considered. This stance translates into fully compensatory aggregation formulas (i.e. arithmetic averages) being used in the calculation of global presence scores and ranks. However, such an assumption will be challenged in the uncertainty/sensitivity analysis presented at the end of this audit, by simulating the impact of the use of partially compensatory aggregation formulas in the Elcano Global Presence Index results.

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<sup>9</sup> European Commission, Joint Research Centre (JRC), Competence Centre on Composite Indicators and Scoreboards (COIN).

<sup>10</sup> For an in depth discussion on intensive/extensive variables, see e.g. Giampietro, Mario (2014), “Mono-dimensional Accounting and Multidimensional Measures of Sustainable Growth”, *Final deliverable. Appointment letter* No. 258573 (October 25th, 2013) EC-JRC-G03.

The Elcano Global Presence Index 2016 has a very high statistical reliability at the scaled-up dimensions level (Cronbach-alpha value at 0.97), and captures the single latent phenomenon characterised by the conceptual framework. Country ranks are also relatively robust to methodological changes related to the treatment of missing values, weighting, aggregation rule and selection of indicators (less than  $\pm 5$  positions shift with respect to the simulated median in 77% of the countries). The added value of the Index lies in its ability to summarize different aspects of global presence in a more efficient and parsimonious manner than is possible with the indicators and dimensions taken separately. In fact, the Index and the economic and soft dimension rankings differ by ten positions or more in one quarter of the countries; differences between the Index and the military dimension rankings exceed ten positions in 52% of the countries. This is a much desired outcome, because it evidences the added value of the Index as a benchmarking tool, inasmuch as it helps to highlight aspects of global presence that do not emerge directly by looking into the dimensions separately. A seemingly reassuring result is obtained when comparing the differences in ranks between this Index and those that would emerge from looking only at the relative share of a country in either the global population or global GDP. Differences in rankings between Elcano Global Presence Index and rankings based exclusively in GDP shares exceed ten positions for 38% of the countries; this percentage goes up to 78% when considering rankings based only on shares in the global population.

The present audit represents the first collaboration between the Elcano Royal Institute and the European Commission's Joint Research Centre, specifically the Competence Centre on Composite Indicators and Scoreboards. This statistical assessment aims to contribute to ensure the transparency and reliability of the Elcano Global Presence Index and thus to enable policy makers to derive more accurate and meaningful conclusions, and to potentially guide choices on priority setting and policy formulation. The JRC assessment of the 2016 edition of this Index has focused on two main issues: the statistical coherence of the structure, and the impact of key modelling assumptions on the Elcano Global Presence Index scores and ranks.<sup>11</sup> For instance, the JRC analysis complements the reported country rankings for the Index with estimated confidence intervals, in order to better appreciate the robustness of these ranks to the computation methodology (in particular missing data estimation, weights, aggregation formula and the selection of the variables included in the Index). Overall, the main conclusions of the present audit can be summarised as follows: the Elcano Global Presence Index 2016 is sufficiently robust and reliable, with a statistically coherent and balanced multi-level structure. Some minor issues related to the further development of the conceptual framework are also recommended for examination in the next version of the Index.

The practical items addressed in this assessment relate to the statistical soundness of the Index, which is a necessary—but not sufficient—condition for a sound index. Given that the present statistical analysis of the Elcano Global Presence Index will mostly, though not exclusively, be based on correlations, the correspondence of the Index with a real world

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<sup>11</sup> The JRC analysis was based on the recommendations of the OECD & JRC (2008), *Handbook on Constructing Composite Indicators: Methodology and User Guide*, Paris, OECD (<http://www.oecd.org/std/42495745.pdf>) and on more recent research from the JRC. The JRC auditing studies of composite indicators are available at <https://ec.europa.eu/jrc/en/coin> (all audits were carried upon request of the index developers).

phenomenon needs to be critically addressed as correlations need not necessarily represent the real influence of the individual indicators on the phenomenon being measured. The point is that the validity of the Elcano Global Presence Index relies on the interplay between both statistical and conceptual soundness. In this respect, prior to undertaking the final audit of the Index, JRC COIN and the developing team from the Elcano Royal Institute engaged in fruitful and enriching iterative rounds of discussions. These exchanges led to a revision of different aspects of the conceptual framework and methodology of the Index, when compared to that of previous editions. Major modifications relate to the use of denominated variables, the calculation of the scaling coefficients, and normalisation approaches.

## **Statistical coherence in the Elcano Global Presence Index framework**

The pre-audit phase of the Elcano Global Presence Index 2016 started in March 2016. Following on the iterative process during which the Index has been fine-tuned, the current assessment of the statistical coherence in this final version of the 2016 Index followed the following steps.

### *Data checks*

Candidate indicators were selected by the developers for their relevance to a specific dimension, on the basis of the literature review, expert opinion, country coverage, and timeliness. To represent a fair picture of country differences, the Elcano Global Presence Index team denominated the indicators in the economic dimension by GDP, whilst population was chosen to denominate the indicators from the military and soft dimensions.

The 2016 dataset comprises 100 countries and 16 variables. Missing values (prior to imputations) were reported by the development team for only a few of the variables included in the framework. In the economic dimension, services and investments are affected by missing values (1% and 7% of the country cases, respectively). In the soft dimension, apart from tourism (with 1% of missing values), missing values reached significantly high levels in some of the variables included therein (13% in the case of development cooperation, 17% in education, and 41% in culture).

As regards normalisation, the ‘min-max’ approach was applied by the developers to the whole Elcano Global Presence Index data series, i.e. global maximum and minimum values (across all countries and periods) were used in these calculations. This normalisation strategy allows making meaningful comparisons over time, provided that the calculation of the normalised values for the previous years is repeated with each new release of the Index. The final range of values corresponding to each individual indicator was then set to 0-1000.

### *Outlier treatment*

Potentially problematic variables that could bias the overall results were identified as those having absolute skewness greater than 2 and kurtosis greater than 3.5,<sup>12</sup> and were treated

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<sup>12</sup> Groeneveld, Richard A. & Glen Meeden (1984), “Measuring Skewness and Kurtosis” *The Statistician*, 33: 391–399 set the criteria for absolute skewness above one and kurtosis above 3.5. The skewness criterion was relaxed to account for the small sample (100 countries).

by winsorisation. The winsorisation treatment implies that we set the highest values to the next highest ones up until the point that skewness and kurtosis drop within acceptable ranges. Treated variables included services and investments in the economic dimension, as well as migration, tourism and culture in the soft dimension. The number of winsorised values ranged from three to five, except for the investments variable, in which a total of eight country values underwent treatment.

### Statistical assessment

#### (i) Correlation structure

The correlation analysis is based on pair-wise correlations between variables. With 100 countries in the dataset, the threshold for a significant (1% significance level) Pearson correlation coefficient is  $r = 0.25$ . Correlation coefficient values lying within the 0.60-0.90 range are considered as representative of strong and significant correlations. From a theoretical perspective, correlations above 0.90 between variables from the same dimension should be treated with caution, since they are indicative of a redundancy in the information supplied by the indicators affected. On another hand, significantly negative correlations between variables in the same dimension, and between individual variables and the overall Index, should be avoided due to its potentially distorting effects.<sup>13</sup> The full set of statistically significant pair-wise correlations between individual indicators and its own dimension (as well as to the others) is presented in Tables 3.1 to 3.3.

Most of the individual variables in the framework are more strongly correlated to their own dimension than to any other dimension. Accordingly, we can conclude that the allocation of indicators to the individual dimensions is consistent both from a conceptual and statistical perspective. The only exception to this rule is the variable of tourism, which appears to be slightly less correlated to the soft dimension (0.66) than to the economic dimension (0.68).

Table 3.1.  
Pair-wise correlation structure at the dimension level: economic dimension variables

	Variables					Dimensions		
	Energy	Primary	Manufact.	Services	Invest.	Eco.	Military	Soft
Energy	1.00							
Primary		1.00				0.25		
Manufact.			1.00	0.43	0.38	0.66		0.36
Services			0.43	1.00	0.63	0.82		0.54
Invest.			0.38	0.63	1.00	0.83	0.28	0.77

Notes: (1) Numbers represent Pearson correlation coefficients. (2) Non-significant correlations (<0.25) are shown as blanks. (3) Correlations between 0.25-0.60 are highlighted in blue. (4) Correlations between 0.60-0.90 are highlighted in green.

Source: European Commission, Joint Research Centre (JRC), 2017

<sup>13</sup> See OECD & JRC (2008), *op. cit.*

Table 3.2.  
Pair-wise correlation structure at the dimension level: military dimension variables

Variables			Dimensions		
	Troops	Military equip.	Economic	Military	Soft
Troops	1.00	0.31		0.67	0.37
Military equip.	0.31	1.00		0.91	0.41

Notes: (1) Numbers represent Pearson correlation coefficients. (2) Non-significant correlations (<0.25) are shown as blanks. (3) Correlations between 0.25-0.60 are highlighted in blue. (4) Correlations between 0.60-0.90 are highlighted in light green. (5) Correlations above 0.90 are highlighted in darker green.

Source: European Commission, Joint Research Centre (JRC), 2017

Table 3.3.  
Pair-wise correlation structure at the dimension level: soft dimension variables

Variables										Dimensions		
	Mig.	Tou.	Spo.	Cult.	Info.	Tech.	Sci.	Edu.	Dev co.	Eco.	Milit.	Soft
Mig.	1.00	0.35	0.30	0.24	0.40		0.41	0.66	0.52	0.48	0.32	0.60
Tou.	0.35	1.00	0.70	0.41	0.61	0.29	0.61	0.46	0.33	0.68		0.66
Spo.	0.30	0.70	1.00	0.43	0.51	0.25	0.54	0.36	0.33	0.51		0.58
Cult.		0.41	0.43	1.00	0.57	0.60	0.68	0.44	0.48	0.50	0.45	0.74
Info.	0.40	0.61	0.51	0.57	1.00	0.54	0.82	0.55	0.67	0.69	0.34	0.86
Tec.		0.29	0.25	0.60	0.54	1.00	0.65	0.41	0.61	0.33	0.42	0.72
Sci.	0.41	0.61	0.54	0.68	0.82	0.65	1.00	0.67	0.67	0.63	0.41	0.92
Edu.	0.66	0.46	0.36	0.44	0.55	0.41	0.67	1.00	0.54	0.50	0.43	0.76
Dev co.	0.52	0.33	0.33	0.48	0.67	0.61	0.67	0.54	1.00	0.42	0.37	0.80

Notes: (1) Numbers represent Pearson correlation coefficients. (2) Non-significant correlations (<0.25) are shown as blanks. (3) Correlations between 0.25-0.60 are highlighted in blue. (4) Correlations between 0.60-0.90 are highlighted in light green. (5) Correlations above 0.90 are highlighted in darker green.

Source: European Commission, Joint Research Centre (JRC), 2017

A special mention should be made to the indicator on energy, that appears to be neither significantly correlated to its own dimension nor to any other dimension in the framework. In fact, it happens to be significantly correlated only to the migration variable from the soft dimension (0.38). This situation is indicative of a highly differentiated behaviour of this variable with respect to all the remaining indicators in the Elcano Global Presence Index. This result will be taken into account when undertaking the uncertainty/sensitivity analysis, since one of the assumptions to be factored into the robustness checks will be the impact of the exclusion of the variable energy from the indicator framework. A similar result is observed for the variable on primary goods, which has only a borderline statistically significant correlation to the economic dimension.

It is also worth noting the unbalance between the two variables included in the military dimension. As shown in Table 3.2, the military dimension is much more strongly correlated to the military equipment ( $r = 0.91$ ) indicator than to the troops ( $r = 0.67$ ) indicator.

As explained when describing the underlying conceptual framework of the Index, the weighted average scores for each individual dimension have to be scaled-up by either GDP or population before calculating the overall Index scores. As shown in Table 3.4, the three scaled-up dimensions are strongly correlated; moreover, correlation values are also very high between the three of them and the overall final score —in spite of having assigned twice as much weight in the aggregation process to the economic and soft dimensions (0.4) than to the military dimension (0.2). The main drawback of the scaling-up process needed to obtain a final global presence score is the fact that many of the individual indicators eventually are not significantly correlated to the final Index (see Table 3.5). This drawback is particularly relevant for the economic dimension, where none of the original denominated variables is significantly correlated to the final overall scaled-up Index. In addition, only the two of the original (non-scaled up) dimensions —the economic and the soft dimension— remain significantly correlated to the final Elcano Global Presence Index score. Comparatively, stronger correlations are found between the non-scaled variables and the non-scaled version of the Index, calculated as the weighted average of the dimension scores prior to being scaled-up.

Table 3.4.

Correlation between the scaled dimensions, the overall Index and the scaling factors

	Scaled-economic	Scaled-military	Scaled-soft	Elcano Global Presence Index
Scaled-economic	1.00	0.87	0.97	0.99
Scaled-military	0.87	1.00	0.93	0.93
Scaled-soft	0.97	0.93	1.00	0.99
GDP scaling factor	0.95	0.87	0.94	0.95
POP scaling factor	0.36	0.31	0.30	0.34

Notes: (1) Numbers represent Pearson correlation coefficients. (2) Non-significant correlations ( $<0.25$ ) are shown as blanks. (3) Correlations between 0.25-0.60 are highlighted in blue. (4) Correlations between 0.60-0.90 are highlighted in light green. (5) Correlations above 0.90 are highlighted in darker green.

Source: European Commission, Joint Research Centre (JRC), 2017

A final word of caution should be given to the impact of the scaling factors on the Elcano Global Presence Index. The importance of the scale factors in the overall Index is made evident when calculating the values of the coefficient of determination ( $R^2$ ) associated to GDP and population. As measured by the  $R^2$ , cross-country variations in GDP explain up to 90% of the variation observed in the Index scores —whilst only 12% of the variation would be explained by variations in country population values alone. However, as graphically shown in Graph 3.1, similar GDP values (scaling factors) might still translate into quite different Index scores and *vice-versa*.

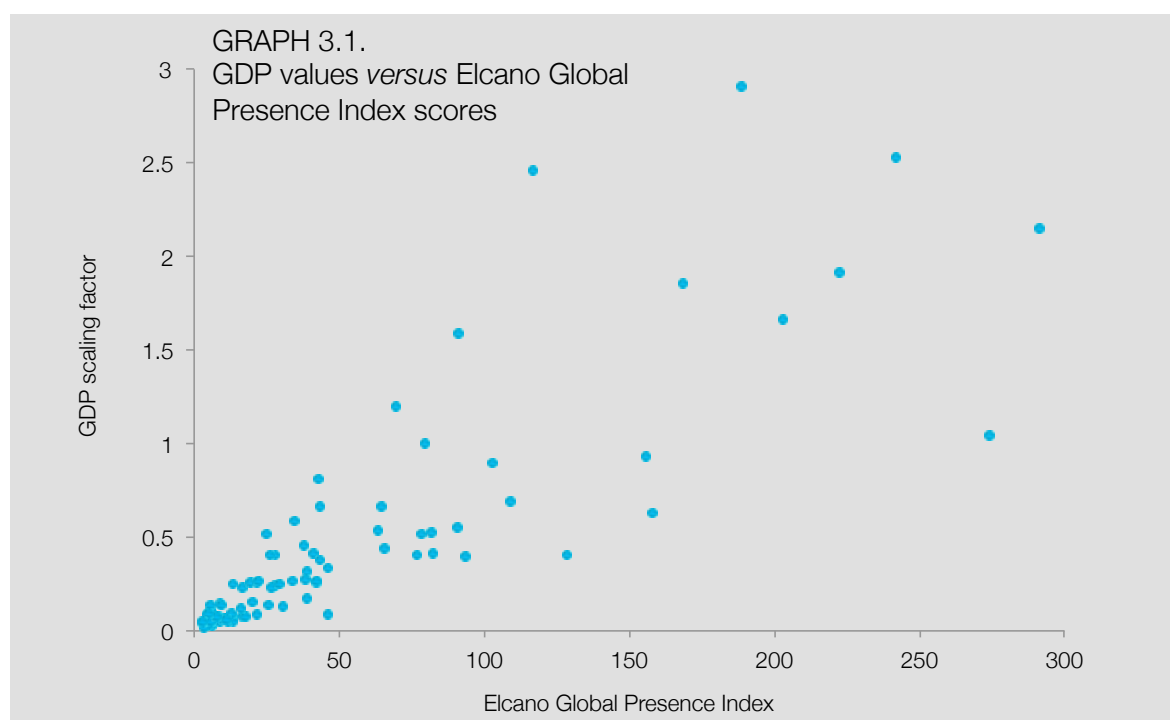
Table 3.5.

Correlation between individual indicators, non-scaled dimensions, the overall Index and the non-scaled version of the overall Index

	Elcano Global Presence Index	Non-scaled Elcano Global Presence Index
Energy		
Primary goods		
Manufactures		0.50
Services		0.64
Investments		0.84
Troops	0.35	0.39
Military equipment	0.52	0.50
Migrations		0.61
Tourism		0.69
Sports		0.55
Culture	0.38	0.72
Information		0.85
Technology	0.47	0.63
Science		0.87
Education		0.73
Development cooperation		0.70
Economic		0.84
Military	0.56	0.56
Soft		0.95

Notes: (1) Numbers represent Pearson correlation coefficients. (2) Non-significant correlations (<0.25) are shown as blanks. (3) Correlations between 0.25-0.60 are highlighted in blue. (4) Correlations between 0.60-0.90 are highlighted in light green. (5) Correlations above 0.90 are highlighted with darker green.

Source: European Commission, Joint Research Centre (JRC), 2017



Notes: Elcano Global Presence Index values above 300 and GDP scaling factor values above three have been omitted from the plot.

Source: European Commission, Joint Research Centre (JRC), 2017

#### *(ii) Principal components analysis and reliability analysis*

Principal component analysis (PCA) and reliability analysis (RA) have been used to assess the extent to which the conceptual framework agrees with the statistical properties of the data. The PCA and the RA have been carried out at the relevant level of analysis, which in this particular case study corresponds to be the level of the denominated variables and dimensions. Ideally, PCA should confirm the presence of a single statistical dimension amongst the variables subject to analysis (i.e., no more than one principal component with eigenvalue greater than 1.0); similarly, a Cronbach-alpha value above 0.7 would confirm the reliability and internal consistency of a particular grouping of variables (i.e. whether or not they are measuring the same underlying construct).<sup>14</sup> Note that neither PCA nor RA would be meaningful for the military dimension, as it comprises only two variables.

Within the economic dimension, two principal components have been found with eigenvalues above the defined threshold (2.013 and 1.184, respectively). The combination of these two principal components explains 63% of the total variance in the underlying indicators. The variables of energy and primary goods load mainly on the second principal component, as opposed to the rest of the variables in the dimension, which load mainly on the first principal component. RA results confirm those of the PCA, since the Cronbach-alpha value (0.426) is below the limit threshold of 0.7. It is also worth noting that the

<sup>14</sup> See Jum C. Nunnally, Jum C. (1978), *Psychometric Theory*, New York, McGraw-Hill.



Cronbach-alpha would increase significantly in case the indicator on energy was omitted from the framework; the same would happen in case of excluding the indicator on primary goods.

Up to three principal components have been identified in the soft dimension. However, except for the first one (eigenvalue 5.027, explaining 56% of the variance), the other two have eigenvalues, which are very close to the 1.0 threshold value (1.094 and 1.041). The view that the conceptual grouping of the indicators in the soft dimension might be considered statistically sound is further supported by the RA results. The Cronbach-alpha value calculated for this dimension is clearly above the threshold (0.898), and could not be improved by the omission of any of the variables present therein.

The three resulting dimensions also share a single statistical dimension that summarises 95% of the total variance, and the three loadings (correlation coefficients) are very similar to each other, ranging from 0.95 to 0.99. The reliability of the three dimensions, measured by the Cronbach-alpha value, is also very high at 0.97, which is well above the 0.7 threshold for a reliable aggregate.

Overall, the tests so far show the Elcano Global Presence Index has a balanced structure, whereby all three scaled-up dimensions are equally important in explaining the same underlying concepts. For the economic dimension, recommendations have also been made pointing towards the possibility of excluding or substituting some of the underlying indicators in future versions of the Index, so as to render it even sounder from both a conceptual and statistical point of view.

### *(iii) Added value of the Elcano Global Presence Index*

A very high statistical reliability among the main components of an Index can be the result of redundancy of information. This is not the case in the Elcano Global Presence Index. In fact, for in between  $\frac{1}{4}$  and  $\frac{1}{2}$  of the 100 countries included in the 2016 Index, the overall ranking differs by ten positions or more from any of the underlying dimensions. In the most extreme cases, differences in ranking go up to 61 positions in the economic and 46 in the soft for Ethiopia, and up to 59 positions in the military dimension in the case of Switzerland. This is a desired outcome, because it evidences the added value of the Elcano Global Presence Index ranking, which helps to highlight other components of global presence that do not emerge directly by looking into the three dimensions separately.

### *Qualitative review*

The Elcano Global Presence Index outputs are evaluated by both the development team and external experts to verify that the overall results are, to a great extent, consistent with current evidence, existing research or prevailing theory.

Notwithstanding the results of the statistical tests already undertaken on the Index, it is important to mention that it should remain open for future improvements as better data, more comprehensive surveys and assessments, and new relevant research studies become available.

## Impact of modelling assumptions on the Elcano Global Presence Index results

The robustness analysis presented in this section is aimed at assessing the simultaneous and joint impact of the underlying modelling choices on the Index scores and rankings. The data used for this exercise are assumed to be error-free since potential outliers and any errors and typos have already been corrected during the computation phase.

The robustness assessment of the Elcano Global Presence Index is based on a combination of a Monte Carlo experiment and a multi-modelling approach that deals with three underlying methodological issues: dimension weights, missing data imputation (for missing values in the economic and soft dimension), and the aggregation formula of the dimension scores. Additionally it was decided to investigate the impact of excluding variables which do not seem to be related to the rest of the variables in the conceptual framework. This is for example the case of the energy indicator from the economic dimension. In general, this robustness assessment aims to respond to some extent to eventual criticism that the country scores associated with aggregate measures are generally not calculated under conditions of certainty, even though they are frequently presented as such.

The robustness analysis is executed at a relevant higher level of aggregation. In this case study, the focus has been put on the three scaled-up dimensions, for which alternative set of weights have been generated using Monte Carlo simulations (1,000 runs, each corresponding to a different set of weights). The weights are randomly sampled from uniform continuous distributions. The range of the weights' variation was chosen to ensure a wide enough interval to have meaningful robustness checks. The limit values considered for uncertainty intervals for the dimension weights are 15% to 50% (see Table 3.6). In all simulations, sampled weights are rescaled to unity sum.

Two alternative strategies for the imputation of missing values have been considered in the uncertainty analysis: the one proposed by the developers —based on expert knowledge— and the one tested by JRC COIN, which is based on the Expectation Maximisation (EM) algorithm. Regarding the aggregation formula, two different approaches have been factored into the robustness analysis (arithmetic *versus* geometric).<sup>15</sup> Whilst the simple arithmetic average is fully compensatory, geometric averages allow only for a partial compensation for comparative disadvantages in some of the dimensions. Consequently, geometric averages reward countries with similar performance in all dimensions, and could be signalling those countries with uneven performance to increase their external projection in those dimensions (in case these are aligned with national priorities) in which they perform with lower scores, and not just in any dimension. Finally, the option of excluding a problematic variable (energy) from the first dimension has also been tested. Excluding a variable implies a proportional reallocation of the weight assigned to the excluded variable among the rest of the variables within the dimension.

Six models were tested based on the combination of expert imputation *versus* EM imputation, arithmetic *versus* geometric average, and exclusion of variables,<sup>16</sup> combined with

<sup>15</sup> Calculated as the weighted generalized mean of the dimension scores.

<sup>16</sup> The option of excluding the energy indicator has been considered only in combination with the expert imputation option. Accordingly, the six scenarios considered are: expert imputation with energy and arithmetic aggregation, expert imputation with

1,000 simulations per model (random weights *versus* fixed weights), for a total of 6,000 simulations (see Table 3.6 for a summary of the uncertainties considered in the 2016 edition).

Table 3.6.

Uncertainty analysis for the Elcano Global Presence Index 2016: weights, missing data, aggregation and omission of selected variables

I. Uncertainty in the treatment of missing values		
Reference: imputation by developers		Alternative: Expectation Maximization (EM)
II. Uncertainty in the aggregation formula at dimension level		
Reference: arithmetic average		Alternative: geometric average
III. Uncertainty in the selection of variables		
Reference: energy included		Alternative: energy excluded
IV. Uncertainty in the weights		
Dimension	Reference value for the weight	Distribution assigned for robustness analysis
Economic	0.40	U[0.15 - 0.50]
Military	0.20	U[0.15 - 0.50]
Soft	0.40	U[0.15 - 0.50]

Source: European Commission, Joint Research Centre (JRC), 2017

### Uncertainty analysis results

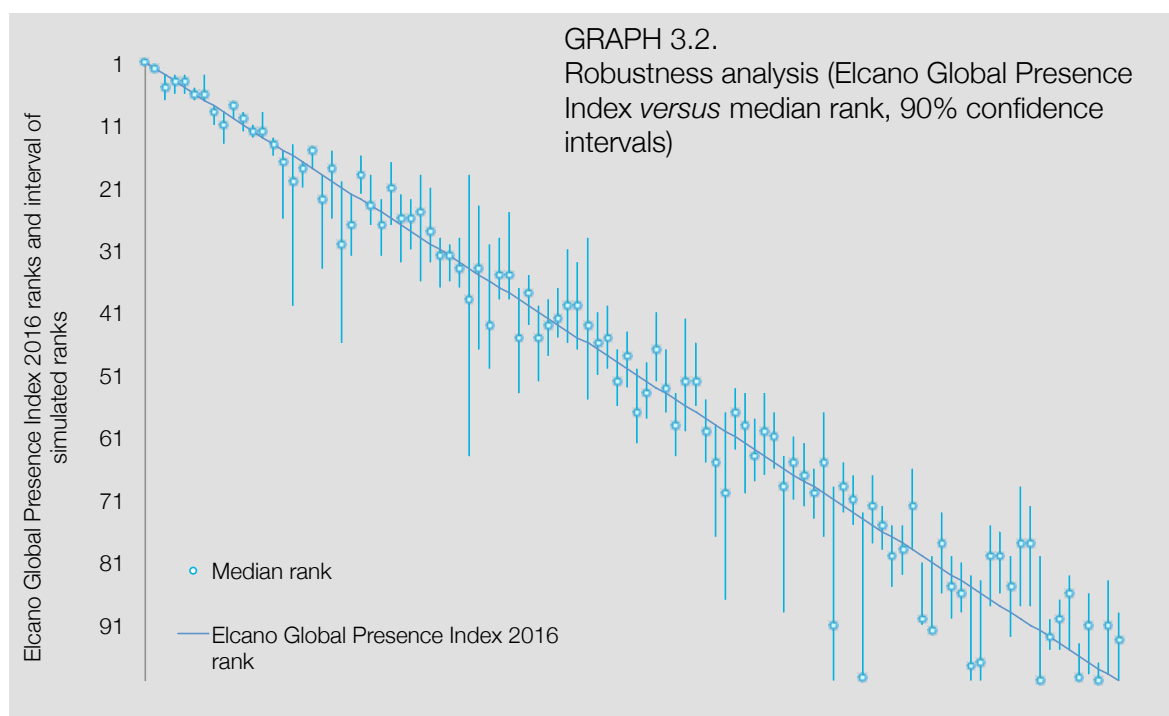
The main results of the robustness analysis are shown in Graph 3.2, with median ranks and 90% confidence intervals computed across the 6,000 Monte Carlo simulations for the Index. Countries are ordered from higher to lower global presence according to their reference rank (blue line), the dot being the median rank. Error bars represent, for each country, the 90% interval across all simulations. Table 3.7 reports the published rankings and the 90% confidence intervals that account for uncertainties in the imputation of missing data, allocation of dimension weights, aggregation formula and inclusion/exclusion of specific variables. Only for seven countries (Thailand, Morocco, Peru, Côte d'Ivoire, Sri Lanka, Sudan and Democratic Republic of Congo) the published ranks lie outside the simulated intervals. For these countries, ranks resulting from the Index should be treated with caution, since they prove to be highly sensitive to changes in the underlying assumptions of the framework. In general, the ranks are relatively robust to changes in the underlying assumptions, as illustrated by the fact that for a majority of the countries the simulated intervals are narrow enough (less than ten positions for 57% of the countries analysed).

Ranks are shown to be relatively robust to changes in the imputation method, the dimension weights, the aggregation formula and the selection of variables. If one considers the median rank across the simulated scenarios as being representative of these scenarios, then the fact that the Index rank is relatively close to the median rank (less than five positions away) for

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energy and geometric aggregation, expert imputation without energy and arithmetic aggregation, expert imputation without energy and geometric aggregation, EM imputation with arithmetic aggregation, and EM imputation with geometric aggregation.

77% of the countries suggests also that the Elcano Global Presence Index is a suitable summary measure. Furthermore, only for seven countries (Lebanon, Angola, Cyprus, Costa Rica, Dominican Republic, Sudan and Democratic Republic of Congo) the difference between the published and the median rank exceeds ten positions, with the maximum divergence corresponding to Angola (26 positions below its published rank). Once again, the global presence of this particular country as assessed by the Index merits special attention from the developers.



Notes: The Spearman rank correlation between the median rank and the Elcano Global Presence Index 2016 rank is 0.981. Median ranks and intervals are calculated over 6,000 simulated scenarios combining random weights, expert-based imputation versus no imputation of missing values, geometric versus arithmetic average, and exclusion of variables from the framework, at the dimension level.

Source: European Commission, Joint Research Centre (JRC), 2017

Table 3.7.  
Elcano Global Presence Index ranks, simulated median ranks and simulated 90% intervals

Country	Elcano Global Presence Index 2016		
	Rank	Median rank	Interval
United States	1	1	[1, 1]
China	2	2	[2, 2]
Germany	3	5	[3, 7]
United Kingdom	4	4	[3, 6]
France	5	4	[3, 6]

Table 3.7.  
Elcano Global Presence Index ranks, simulated median ranks and simulated 90% intervals

Country	Elcano Global Presence Index 2016		
	Rank	Median rank	Interval
Japan	6	6	[5, 7]
Russia	7	6	[3, 7]
Canada	8	9	[8, 11]
Netherlands	9	11	[9, 14]
Italy	10	8	[8, 10]
South Korea	11	10	[9, 12]
Spain	12	12	[11, 13]
India	13	12	[9, 13]
Australia	14	14	[13, 16]
Belgium	15	17	[15, 26]
Switzerland	16	20	[14, 40]
Singapore	17	18	[17, 21]
Brazil	18	15	[15, 18]
Sweden	19	23	[19, 34]
Saudi Arabia	20	18	[15, 26]
Ireland	21	30	[20, 46]
Mexico	22	27	[22, 32]
Thailand	23	19	[16, 22]
Malaysia	24	24	[19, 27]
Austria	25	27	[23, 32]
Turkey	26	21	[17, 27]
United Arab Emirates	27	26	[22, 33]
Denmark	28	26	[23, 31]
Indonesia	29	25	[19, 36]
South Africa	30	28	[21, 33]
Poland	31	32	[29, 37]
Norway	32	32	[30, 36]
Chile	33	34	[29, 37]
Ethiopia	34	39	[19, 64]
Pakistan	35	34	[24, 47]
Nigeria	36	43	[30, 50]
Argentina	37	35	[29, 39]

Table 3.7.  
Elcano Global Presence Index ranks, simulated median ranks and simulated 90% intervals

Country	Elcano Global Presence Index 2016		
	Rank	Median rank	Interval
Greece	38	35	[25, 39]
Czech Republic	39	45	[37, 54]
Israel	40	38	[35, 43]
Finland	41	45	[40, 52]
Hungary	42	43	[39, 48]
Portugal	43	42	[37, 45]
Egypt	44	40	[31, 46]
Iran	45	40	[33, 47]
Bangladesh	46	43	[29, 55]
Ukraine	47	46	[41, 51]
Romania	48	45	[40, 50]
New Zealand	49	52	[47, 56]
Colombia	50	48	[44, 53]
Qatar	51	57	[50, 62]
Philippines	52	54	[49, 58]
Morocco	53	47	[41, 52]
Venezuela	54	53	[47, 57]
Vietnam	55	59	[54, 64]
Kenya	56	52	[42, 60]
Peru	57	52	[46, 56]
Kuwait	58	60	[55, 65]
Kazakhstan	59	65	[59, 77]
Luxembourg	60	70	[57, 87]
Belarus	61	57	[53, 63]
Algeria	62	59	[54, 70]
Slovakia	63	64	[58, 68]
Ghana	64	60	[54, 67]
Bulgaria	65	61	[57, 66]
Iraq	66	69	[64, 89]
Oman	67	65	[61, 71]
Jordan	68	67	[62, 72]
Croatia	69	70	[66, 74]

Table 3.7.  
Elcano Global Presence Index ranks, simulated median ranks and simulated 90% intervals

Country	Elcano Global Presence Index 2016		
	Rank	Median rank	Interval
Tanzania	70	65	[57, 77]
Lebanon	71	91	[69, 100]
Slovenia	72	69	[65, 73]
Ecuador	73	71	[67, 75]
Angola	74	100	[73, 100]
Serbia	75	72	[67, 78]
Lithuania	76	75	[72, 79]
Azerbaijan	77	80	[75, 85]
Panama	78	79	[75, 83]
Uruguay	79	72	[66, 79]
Côte d'Ivoire	80	90	[81, 91]
Cyprus	81	92	[80, 92]
Tunisia	82	78	[73, 86]
Cuba	83	85	[80, 90]
Estonia	84	86	[81, 89]
Costa Rica	85	98	[83, 100]
Dominican Republic	86	97	[84, 100]
Myanmar	87	80	[75, 88]
Sri Lanka	88	80	[76, 86]
Libya	89	85	[80, 93]
Sudan	90	78	[69, 88]
Congo, Democratic Republic	91	78	[72, 88]
Turkmenistan	92	100	[80, 100]
Uzbekistan	93	93	[90, 95]
Latvia	94	90	[87, 95]
Guatemala	95	86	[83, 95]
Iceland	96	100	[94, 100]
Bolivia	97	91	[86, 99]
Malta	98	100	[97, 100]
Yemen	99	91	[84, 99]
Syria	100	94	[89, 100]

Source: European Commission, Joint Research Centre (JRC), 2017

### *Sensitivity analysis results*

Complementary to the uncertainty analysis, sensitivity analysis has been used to identify which of the modelling assumptions have the highest impact on certain country ranks. Graphs 3.3 to 3.5 plots the Elcano Global Presence Index *versus* one-at-a-time changes of the imputation method, the geometric aggregation formula or the exclusion of variables from the model.

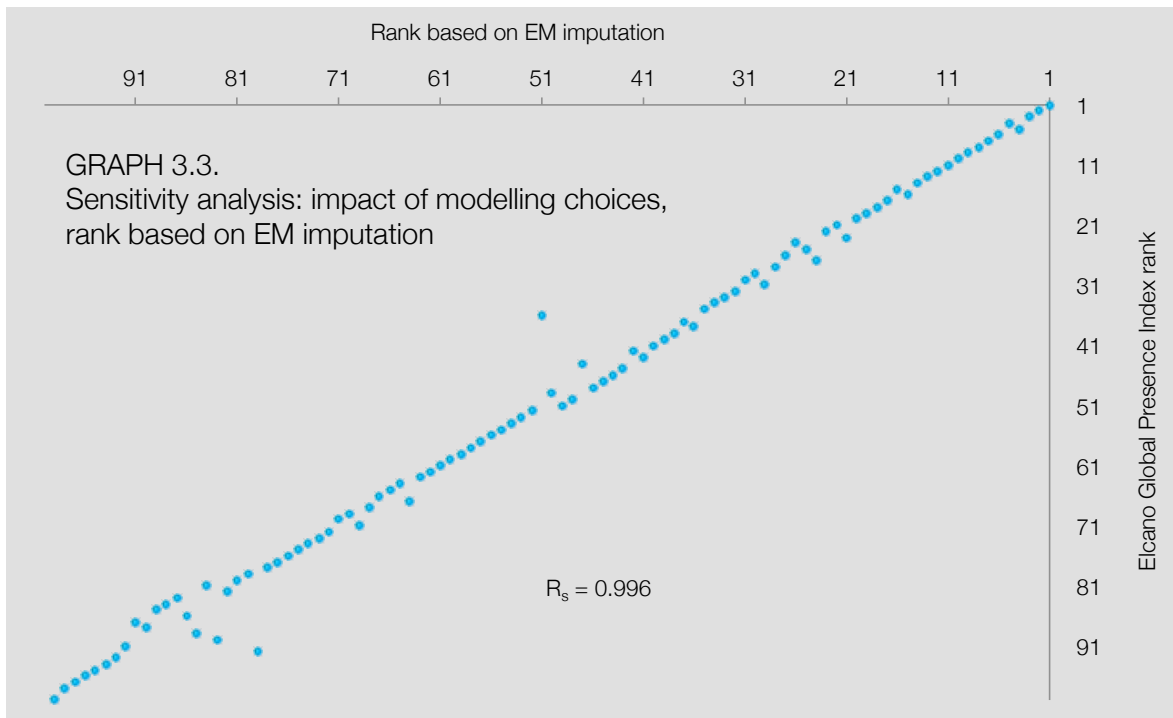
The most influential methodological assumption appears to be the choice of the aggregation formula. The use of a geometric averaging (allowing for only partial compensation across dimension scores) has the largest impact on differences in ranking when compared to the published rankings. In total, ten countries experience shifts of ten or more positions when geometric averaging is used, as opposed to only two when either EM imputation is applied or when energy is removed from the framework. For example, in the most extreme case, a country (Ethiopia) fell by 30 positions when geometric averaging is applied, yet the country falls by three positions if the energy indicator is removed from the framework, and moves by zero places when EM imputation is used. When looking at the impact of removing the indicator on energy from the economic dimension, the two countries that would experience the most severe fall in ranking would be Iraq (25 positions) and Angola (21 positions). The two countries most affected by the choice of EM imputation would be Nigeria, which would fall by 15 positions, and Turkmenistan, which would improve by 13. Note however that these assumptions concern methodological choices only and might overall be less influential than choices related to the background assumptions in the conceptual framework.<sup>17</sup>

Overall, in order to better communicate to what degree a country's rank depends on the modelling choices, it might be worthwhile to present together with the Index scores and ranks the 90% confidence intervals, as reported in Table 3.7. It is reassuring that for over three quarters of the countries, their ranks are mainly attributable to the underlying data and not to the modelling choices<sup>18</sup>.

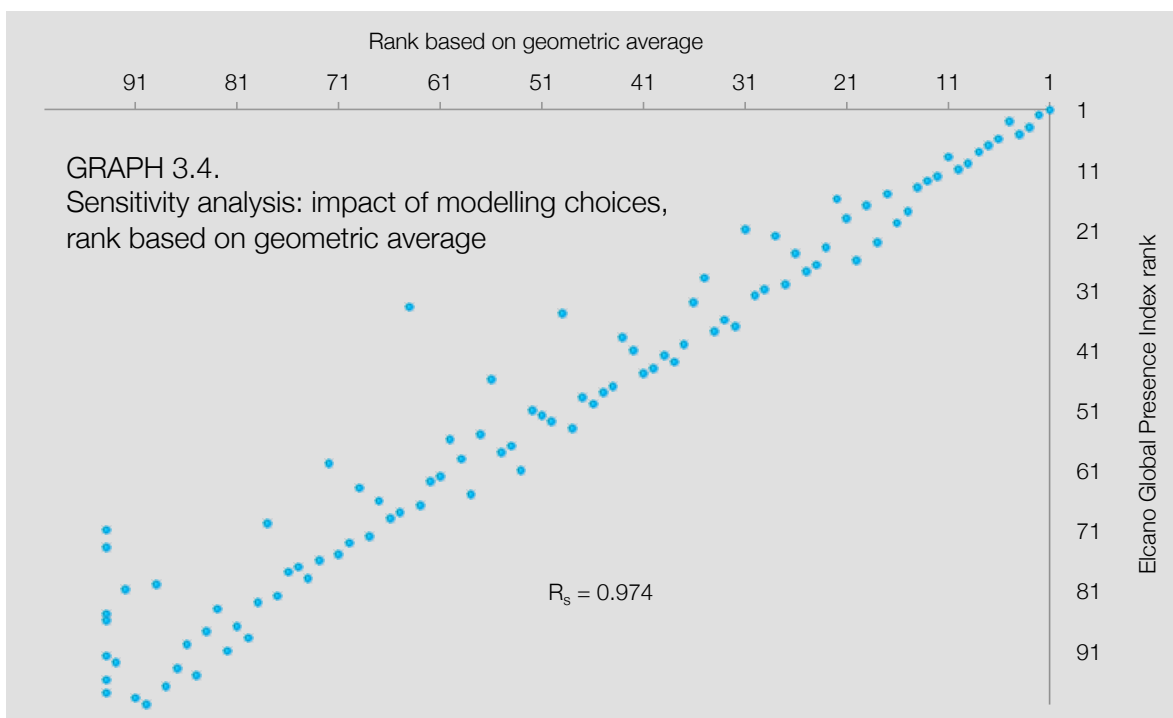
<sup>17</sup> Andrea Saltelli & Silvio O. Funtowicz (2014), "When all Models are Wrong", *Issues in Science and Technology*, Winter, 79–85.

<sup>18</sup> As already mentioned in the uncertainty analysis, at least 77% of the simulated median ranks for the Elcano Global Presence Index are less than five positions away from the reported 2016 rank.

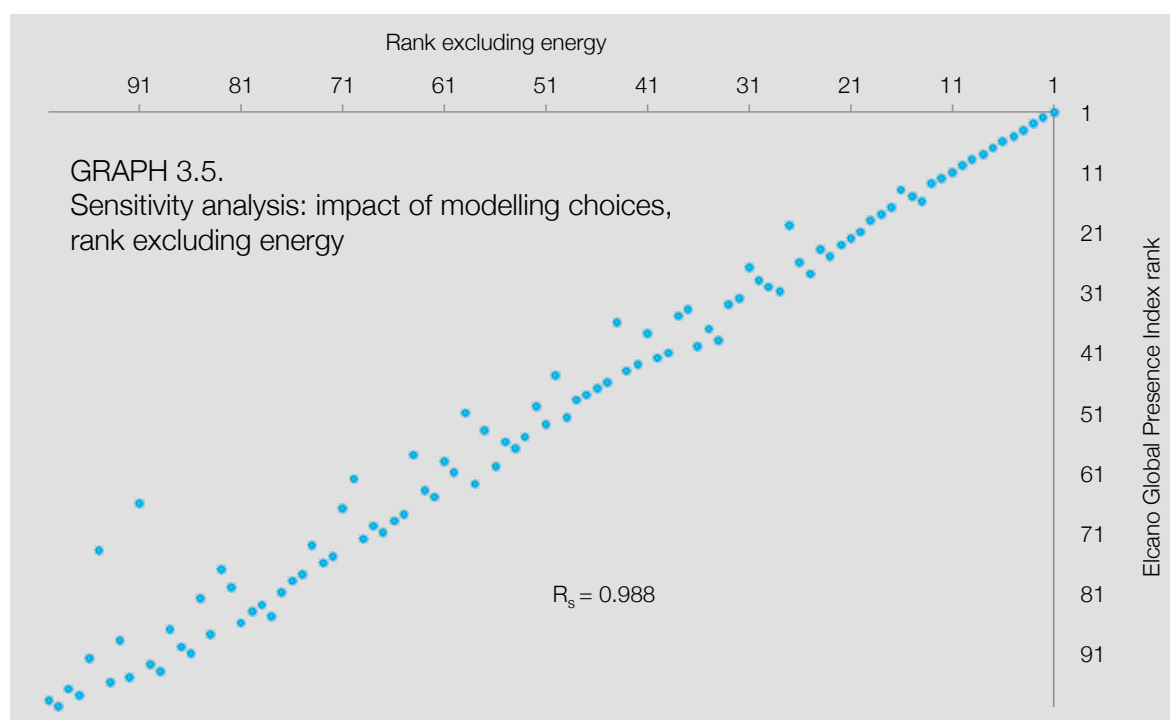




Source: European Commission, Joint Research Centre (JRC), 2017



Source: European Commission, Joint Research Centre (JRC), 2017



Source: European Commission, Joint Research Centre (JRC), 2017

## Conclusion

The JRC analysis suggests that the Elcano Global Presence Index 2016 is sufficiently robust and reliable, with a statistically coherent and balanced multi-level structure. The statistical assessment has shown that it has a very high statistical reliability at the scaled-up dimensions level (Cronbach-alpha value at 0.97), and captures the single latent phenomenon characterised by the conceptual framework.

Points that call for possible refinements of the framework were also identified. These refinements regard mainly to the energy indicator from the economic dimension —and to a lesser extent also to the primary goods indicator from the same dimension. Although present in the conceptual framework, these variables have different behaviour from the rest of the variables in the dimension —and from the immense majority of the remaining variables in the indicator framework. The possibility of excluding the current variable from the framework (or the search for a proxy much better related to the rest of the indicators, in particular to those in the economic dimension) merits further reflection from the developers in preparation of future editions of the Index. Another conceptual issue to be reflected upon by the developers is the possibility to move the tourism indicator from the soft to the economic dimension, as suggested by the similar magnitude of the correlation coefficient between this variable and the two dimensions. This could be an interesting option in case any (or both) of the above mentioned problematic indicators were excluded from the economic dimension.

Overall, the analysis of the correlations at the dimension level reveals that the statistical structure is coherent with its conceptual framework, given that the individual indicators tend

to correlate strongly with their respective dimensions. However, the correlation structure and the individual impact of the variables on the final Index gets blurred once the otherwise necessary scaling-up process is undertaken. This situation is particularly relevant at the level of the economic dimension variables. Given the inescapable bias towards bigger countries —with largest shares of GDP and population— in the Elcano Global Presence Index, the development team should consider for example the option of calculating an additional complementary index based on the aggregation of the dimension scores without scaling them up. In this fashion, the intensity of the effort and the degree of openness achieved by smaller countries could also be properly acknowledged. This alternative Index (and the corresponding rankings) might be presented alongside the standard global presence results.

The Elcano Global Presence Index ranks are also relatively robust to methodological changes related to the treatment of missing values, weighting, aggregation rule and selection of indicators (less than  $\pm 5$  positions shift with respect to the simulated median in 77% of the countries). The value added of the Index is also highlighted by the differences in rankings that emerge from a comparison between this Index and each of the three dimensions: the economic and soft dimension rankings differ by ten positions or more in one quarter of the countries, whilst differences between the Index and the military dimension rankings exceed ten positions in 52% of the countries.

All in all, the audit conducted herein has shown that inferences can be drawn for most countries in the Elcano Global Presence Index. However, some caution may be needed for a few countries, which appear to be highly sensitive to changes in the underlying assumptions in the Index framework. Moreover, the impact of the scaling coefficients (in particular GDP) in the overall Index scores needs to be taken into account when discussing and reflecting upon the global projection of countries around the world.



# Methodological annex

The methodology of this 2016 edition of the Elcano Global Presence Index is based on that of the previous one,<sup>19</sup> which was itself the result of a process of methodological discussions initiated in 2008.

However, two main methodological changes have been incorporated as a result of the statistical audit conducted by the JRC and detailed in chapter 3 of this report.

The main methodological change in this year's edition is that, in order to make each country's performance across the indicators comparable to that of another country, individual indicators are now denominated firstly by countries' Gross Domestic Product (GDP) or population.<sup>20</sup> These intensive/denominated variables can thus be added up and combined together to obtain the dimension scores. Only at a later stage the dimension scores are scaled-up taking into consideration the relative share of a country in global GDP (the economic dimension) or population (both the military and soft dimensions). These scaling coefficients are calculated as the ratio between GDP (or population) of the country and the average GDP (or population) of all the countries considered in each year's edition of the Index. Secondly, the weights of variables and dimensions have been rounded up or down, as detailed in Graph A.1.

We are extremely grateful to Michaela Saisana, Marcos Álvarez-Díaz and the whole COIN team of the JRC for this statistical audit and, very particularly, to Marcos Domínguez-Torreiro for the intense support and very fruitful collaboration throughout the past year.

## Brief history of the project

The first version of the Index, published in 2011, ranks 54 countries according to their 2010 global presence.<sup>21</sup> That edition and, therefore, the design of the Index itself, was coordinated by Ignacio Molina and Iliana Olivé –both senior analysts at the Elcano Royal Institute– and was the result of nearly three years of methodological discussions. These discussions were conducted in the framework of a working group composed by the above-mentioned coordinators of the Index, Narciso Michavila and Antonio Vargas (from GAD3), Émerson Correa (Olympus Consulting), several Elcano senior analysts and other staff members (Félix Arteaga, Carola García-Calvo, Carmen González, Jaime Otero, Juan Antonio Sánchez, and Federico Steinberg), and external experts (Alfredo Arahuetes –Pontificia University of Comillas–, Ángel Badillo –University of Salamanca, currently also senior analyst at the Elcano

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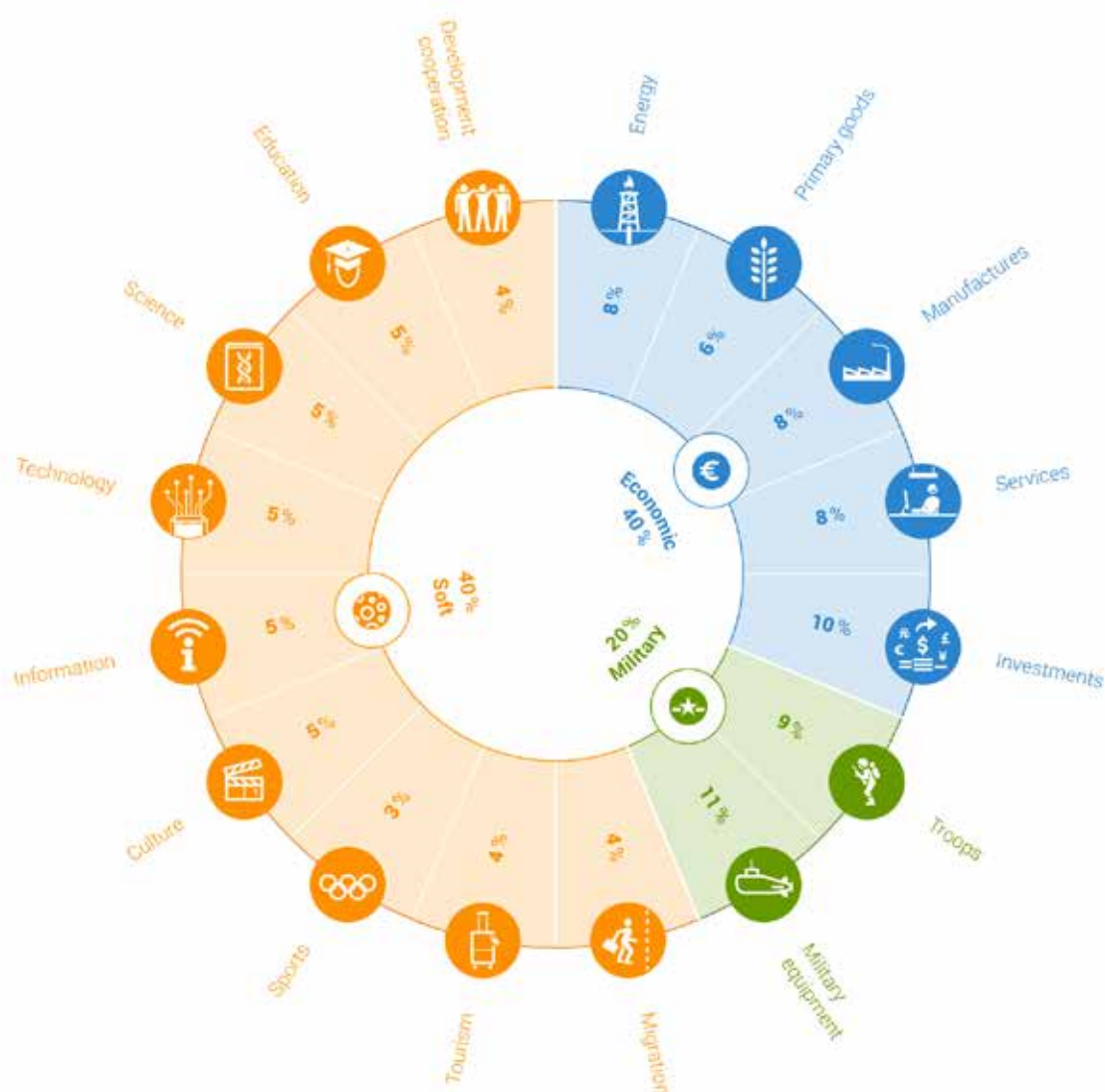
<sup>19</sup> Iliana Olivé & Manuel Gracia (2016), *Elcano Global Presence Report 2016*, Elcano Royal Institute.

<sup>20</sup> The source for GDP and population figures is the World Bank. GDP and population data for 1990, 1995, 2000 and 2005 figures are of those same years (1990 to 2005). GDP and population data for 2010 to 2016 figures correspond to the previous year (2009 to 2015).

<sup>21</sup> Iliana Olivé & Ignacio Molina (2011), "Elcano Global Presence Index", *Estudios Elcano* 2, Elcano Royal Institute.

Royal Institute–, José Fernández Albertos –Spanish National Research Council, CSIC–, and José Ignacio Torreblanca –ECFR Madrid–). We also received methodological suggestions from Philip Purnell (Thomson Reuters), Santiago de Mora-Figueroa, Marqués de Tamarón (Ambassador of Spain), Teresa G. del Valle Irala (University of the Basque Country), Ángel Vilariño (Complutense University of Madrid), Cristina Ortega, Cintia Castellano, and Amaia Bernara (from the FECYT of the Ministry of Science and Innovation).

Graph A.1. Structure of Elcano Global Presence Index



The 2011 edition of the Index included a re-designing of the military equipment variable. This methodological change, led by Félix Arteaga, was based on previous methodological discussions with several experts on that field: Francisco Asensi (Ministry of Defence), Alberto de Blas (Ministry of Defence), Amador Enseñat (Ministry of Defence), Dagmar de Mora-

Figuerola (NATO), Pablo Murga (Ministry of Defence), Diego Ruiz Palmer (NATO), Andrés Sanz (Ministry of Defence), Steven R. Sturn (NATO), and Federico Yaniz (Ministry of Defence).

The 2015 edition of the Index updated the weights of variables and dimensions by means of a new survey to 150 experts in international relations (representing think tanks in all continents) conducted in mid-2015. The results of the survey were added to previous responses obtained in 2012. These combined results aimed at filling off particular time and geographical biases. Also, the information indicator was made more sophisticated by including, in addition to the Internet band-width, explicit references to countries and their citizens in news of global news agencies (AP, AFP, Reuters, Xinhua, ITAR-TASS, EFE, ANSA and DPA).

For the design of both the Elcano European Presence Index, an initiative led by Manuel Gracia, and the calculation of the European Union's global presence, several external experts were consulted anew: Alfredo Arahuetes, Marisa Figuerola (ECFR Madrid), Narciso Michavila, and José Molero (Complutense University of Madrid).

Moreover, the project and its methodology have been presented to and discussed with the Institute's Board of Trustees, the Executive Committee, the Media Committee, the Management Committee, and, on several occasions, the Institute's Scientific Council (including its 2015 meeting and the 2015 experts' survey). We have also received useful comments and suggestions over the years, as a result of numerous meetings to present and discuss progress on the Index. At the national level, these discussions have taken place with members of the Spanish Parliament (2011), officials from the Ministries of Foreign Affairs and Cooperation (2011) and of Economy (2011), analysts and officials from the Presidency of the Government (2011), experts from Accenture Spain (2013), members of the Central Bank of Spain (2014) and both professors and students at different universities (Saint-Louis University of Madrid in 2015, Rey Juan Carlos University in 2014 and 2015, Deusto University in 2016, Salamanca University in 2015 and 2017, and Coruña University in 2017). The Index has also been presented to the general public (once a year) and to foreign diplomats based in Madrid (twice in 2014) and discussed at the Matías Romero Institute in Mexico (2011), at the GIGA Institute in Hamburg (2011), and at the Elcano Royal Institute's Brussels office (2016).

Throughout the life of the project, the final calculation of the Index has been made possible thanks to the generous aid provided in data-gathering by several people and institutions, as well as to those who have participated in the weighting survey: Ángel Aguado (EFE, Spain), Hayden Allen (Accord, South Africa), Alejandro Anaya (Center for Research and Teaching in Economics, Mexico), Barbara d'Ándrea (World Trade Organization), Nisha Arunatilake (Institute of Policy Studies of Sri Lanka), Bruno Ayllón (Complutense University of Madrid, Spain), D Shyam Babu (Centre for Policy Research, India), John Blaxland (ANU Strategic & Defence Studies Centre, Australia), Amelia Branczik (Crisis Group, Belgium), Gordan Bosanac (Centar za mirovne studije, Croatia), Chiao-Ling Chien (UNESCO), Alba Çela (Albanian Institute for International Studies), Alistair D.B. Cook (Institute of Defence and Strategic Studies, Singapore), José Miguel Cortés (Spanish Ministry of Economy), Marie Cross (Institute of International and European Affairs, Ireland), Jean-François Daguzan (Foundation for Strategic Research, France), Rafael Domínguez (University of Cantabria, Spain), Jorge Gómez Arismendi (Fundación para el Progreso, Chile), Christine Ma. Grace R. Salinas (Philippine Institute for Development Studies), Charles Jebuni (Institute of Economic

Affairs, Ghana), Katie Jost (GAD), Gape Kaboyakgosi (Botswana Institute for Development Policy Analysis), Guillermo Kessler (Spanish Ministry of Economy), Changsu Kim (Korea Institute for Defense Analyses, Republic of Korea), Anna Koós (Centre for Strategic and Defence Studies, Hungary) Carlos Latorre (Spanish Agency for International Development Cooperation), José María Lladós (Argentine Council for International Relations), Luis Martí (Spanish Ministry of Economy), Pauline Massart (Security & Global Europe, Belgium), Salvador MasPOCH (Spanish Ministry of Foreign Affairs and Cooperation), Fernando Mier (Spanish Ministry of Economy), Ramón Molina (Spanish Ministry of Foreign Affairs and Cooperation), Manuel Moreno (Spanish delegation to the United Nations and other international organisations based in Geneva), Said Moufti (Royal Institute for Strategic Studies, Morocco), Franklin Oduro (Ghana Center for Democratic Development), Anna Orłonek (demosEUROPA, Poland), Eleni Panagiotarea (Hellenic Foundation for European & Foreign Policy, Greece), Roderick Parkes (Swedish Institute of International Affairs, Sweden), Rodrigo Perera (Borde Político, Mexico), Moisés Pérez (Spanish Ministry of Economy), Juan Pita (Spanish Agency for International Development Cooperation), Henry Plater-Zyberk (Prague Security Studies Institute, Czech Republic), Anton du Plessis (Institute for Security Studies, South Africa), Rosario Pons (EFE), Arantxa Prieto (World Trade Organization), Philip Purnell and Sébastien Velley (Thomson Reuters), Charles P. Ries (Rand, United States), Robert Robinson (Universidad Pontificia de Comillas, Spain), Ventura Rodríguez (Spanish Agency for International Development Cooperation), Pep Ruiz (BBVA Research, Spain), Verónica Samper (Spanish Ministry of Economy), Manuel Sánchez (Spanish Ministry of Economy), Patrick Sandoval (Spanish Ministry of Foreign Affairs and Cooperation), Paul Saunders (Center For the National Interest, United States), Katarzyna Sidlo (Center for Social and Economic Research, Poland), Pedro Sosa (Spanish Ministry of Foreign Affairs and Cooperation), Gabriele Schwarz (Spanish Ministry of Economy), David J. Theroux, (The Independent Institute, United States), José Tregón (Spanish Ministry of Economy), Yan Vaslavsky (MGIMO-Moscow State Institute of International Relations, Russia), Antonio Villafranca (Italian Institute for International Political Studies), Marija Vuksanovic (Centre for Democracy and Human Rights, Montenegro), Bibian Zamora (Spanish Ministry of Foreign Affairs and Cooperation), María Pilar Zaragüeta (EFE, Spain), Mario Abou Zeid (Carnegie Institute, Lebanon) and Ann Zimmerman (OECD).

Lastly, several collaborators and intern students have contributed both to data leverage (including experts' surveys in 2012 and 2015) and to analyses of the results of the Index (Datamérica Global, tweets, blogposts, or ARIs): Nacho Álvarez, Pablo Balsinde, José Ignacio Díaz, Mariola Gomariz, David Hernández, Marcos Ochoa and Manuel Sainz.

## **Main elements of the Elcano Global Presence Index**

This year's edition covers the global presence of a selection of 100 countries. The selection includes the first 92 world economies according to World Bank data (nations with the highest GDP in current US dollars in 2015); Libya, Syria and Venezuela that have no GDP records for 2015 but that were part of this top GDP list in previous editions of the World Bank; as well as countries that are smaller in their economic size but are members of the Organisation for Economic Cooperation and Development (OECD) and/or the European Union (table A.1). For this 2016 edition, ten new countries have been added to the selection. These are Bolivia,



Côte d'Ivoire, Democratic Republic of Congo, Ghana, Jordan, Lebanon, Panama, Serbia, Tunisia, and Yemen.

Table A.1. Countries listed in the Elcano Global Presence Index

Algeria	Ecuador	Lebanon	Serbia
Angola	Egypt	Libya	Singapore
Argentina	Estonia	Lithuania	Slovakia
Australia	Ethiopia	Luxembourg	Slovenia
Austria	Finland	Malaysia	South Africa
Azerbaijan	France	Malta	Spain
Bangladesh	Germany	Mexico	Sri Lanka
Belarus	Ghana	Morocco	Sudan
Belgium	Guatemala	Myanmar	Sweden
Bolivia	Greece	Netherlands	Switzerland
Brazil	Hungary	New Zealand	Syria
Bulgaria	Iceland	Nigeria	Tanzania
Canada	India	Norway	Thailand
Chile	Indonesia	Oman	Tunisia
China	Iran	Pakistan	Turkey
Colombia	Iraq	Panamá	Turkmenistan
Congo DR	Ireland	Peru	Ukraine
Costa Rica	Israel	Philippines	Uzbekistan
Côte d'Ivoire	Italy	Poland	United Arab Emirates
Croatia	Japan	Portugal	United Kingdom
Cuba	Jordan	Qatar	United States of America
Cyprus	Kazakhstan	Republic of Korea	Uruguay
Czech Republic	Kuwait	Romania	Venezuela
Denmark	Kenya	Russia	Vietnam
Dominican Republic	Latvia	Saudi Arabia	Yemen

Finally, in terms of country selection, bear in mind that by making calculations at time intervals that go back to 1990, the intention of the project is to show the two-bloc world, even if in decline. Thus, Russia's 1990 values refer to those of the Soviet Union, those of Germany to the German Federal Republic, those of the Czech Republic to Czechoslovakia, those of Serbia to Yugoslavia. Moreover, Eastern European countries that became independent after 1990 have no value assigned in that year. This is the case for Azerbaijan, Belarus, Estonia, Latvia, Lithuania, Kazakhstan, Turkmenistan, Ukraine and Uzbekistan as

part of the Soviet Union, Slovakia as part of Czechoslovakia, and Croatia and Slovenia as part of Yugoslavia.

Table A.2. Variables, indicators, and sources of the Elcano Global Presence Index

Variable	Indicator	Source
Economic presence		
Energy	Flow of exports of energy products (oil, refined products and gas) (SITC 3)	UNCTADStat
Primary goods	Flow of exports of primary goods (food, beverages, tobacco, agricultural commodities, non-ferrous metals, pearls, precious stones, and non-monetary gold), excluding oil (SITC 0 + 1 + 2 + 4 + 68 + 667+ 971)	
Manufactures	Flow of exports of manufactured goods (chemical products, machinery, transport equipment, other manufactured products) (SITC 5 to 8 minus 667 and 68)	
Services	Flow of exports of services in transport, construction, insurance, financial services, IT, the media, intellectual property, other business services, personal, cultural and leisure services, and public services	
Investments	Stock of foreign direct investment abroad	
Military presence		
Troops	Number of military personnel deployed in international missions and bases overseas	IISS – The Military Balance Report
Military equipment	Weighted sum of aircraft carriers, big ships, destroyers, frigates, nuclear-powered submarines, amphibious ships, medium and heavy strategic aeroplanes, and air tankers	
Soft presence		
Migration	Estimated number of international immigrants in the country at mid-year	United Nations Population Division
Tourism	Thousands of arrivals of non-resident tourists at borders	United Nations World Tourism Organization (UNWTO) – Statistics Database
Sports	Weighted sum of points in the FIFA world ranking and medals won at summer Olympic Games	FIFA and IOC
Culture	Exports of audiovisual services (cinematographic productions, radio and television programs, and musical recordings)	WTO – International Trade Statistics
Information	Number of mentions in news of main international press agencies (Associated Press, Reuters, AFP, DPA, ITARTASS, EFE, ANSA, Xinhua) Internet bandwidth (Mbps)	Factiva database International Telecommunication Union
Technology	Foreign-oriented patents: number of inter-related patent applications filed in one or more foreign countries to protect the same invention	World Intellectual Property Organization (WIPO) – Statistics Database
Science	Number of articles, notes, and reviews published in the fields of the arts and humanities, social sciences, and sciences	Thomson Reuters – Web of Knowledge
Education	Number of foreign students in tertiary education on national territory	UNESCO – Institute for Statistics, OECD – iLibrary
Development cooperation	Total gross flows of official development aid or comparable data	OECD and official national sources

The variables, indicators, and sources for this 2016 Elcano Global Presence Index are the same as for the previous edition, in addition to the aforementioned change done for the measurement of information's presence (table A.2). Several criteria guided the selection of these variables. First, presence is reflected in a single direction, or what could be deemed its unidirectionality. Secondly, the results of presence are measured, and not the means or

assets needed to achieve these results. In addition, all the variables have an explicitly external component, in the sense that they reflect cross-border presence. Presence is given in absolute and not relative terms; in other words, the indicators are not proportional to the demographic or economic size of the country. Likewise, as for any other index, the best explanatory capacity is sought with the fewest number of variables or indicators possible. Finally, hard data on presence are taken, and not data based on perceptions or opinions.<sup>22</sup>

In this 2016 edition, 2,440 cases have been estimated. Thus the proportion of missing and estimated cases represents only 6.7% of a database of 36,475 observations. Again, estimations are based on experts' knowledge (see chapter 3 of this report). Those observations allow us to obtain 58,292 results, which are available at our website ([www.globalpresence.realinstitutoelcano.org](http://www.globalpresence.realinstitutoelcano.org)).

This year, as for previous editions, the performance of the variables is assumed to be linear with the exception of the sports variable. As regards normalisation, the 'min-max' approach is applied; that is, global maximum and minimum values (across all countries and periods). It should be noted that when adding data for this new 2016 edition, a review of figures corresponding to previous years was also conducted, on the basis of data availability in each source. As a result, some records for past few years (including 2010) have changed, thus modifying the maximum value that is referenced in the scaling. Moreover, the inclusion of new countries systematically affects the Index values for the variables that are built on the existing spatial sample. This is the case for sports and military equipment, where the addition of new countries to the index leads to a lower record for each of the 100 countries. Changes caused by updates in original sources or by the enlargement of our selection of countries are added to changes resulting from the methodological improvement applied in this 2016 edition. Therefore, new results may not match those of previous editions of the Index.

## **The inclusion of the European Union in Elcano Global Presence Index**

One of the features of 2012's edition was the composite calculation for the 27 European Union member states. This was undertaken in order to try to quantify the global projection of the Union, as if it were a political and economic union with its own identity.

The foreign presence of the European Union is measured starting in 2005 and considering that the varying composition of the Union should be reflected in the Index. Both the Union's global presence and the Union as the sphere of external projection calculated in the European Presence Index do change with every new enlargement. As a consequence, the Union's presence corresponds to that of the 25 members in 2005, 27 members from 2010 to 2012, and 28 members since 2013.

To measure the European Union's presence in the world we stick to the components of the Elcano Global Presence Index. For each of these components and for every member, the intra-European and extra-European flows must be differentiated, since a mere totalling of their results would be recording their projection in other member states (i.e. consider the intra- and extra-European trade in German goods). This distinction between flows has been made feasible by using additional sources of data, especially Eurostat (Table A.4).

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<sup>22</sup> For more details on the debates and criteria that guided this selection, see Iliana Olivé & Ignacio Molina (2011), *op. cit.*

Since the 2012 edition we calculate the presence of the individual member states within the Union itself: the Elcano European Presence Index.<sup>23</sup> To some extent, methodologically, this indicator is the flip-side of the Global Presence Index for the European Union. In a similar way to the latter, it shows the cross-border presence of the member states, which in the case of the Elcano European Presence Index is limited to the European (and not global) space. It facilitates a comparative analysis of the current situation and recent evolution of the positioning of European countries within the Union. It can also provide relevant information on the position of the member states in the calculation of their European as well as their global presence.

The Elcano European Presence Index aims to be an Elcano Global Presence Index on a European scale, so the structure and methodology of the latter has been respected as far as possible, although some slight modifications have occasionally proved essential (Table A.4). Thus, in general terms, the calculation of European presence modifies the calculation of global presence by reducing the measures of presence on a global scale to the intra-European scale (for example, intra-European migration flows, exports to the rest of the European Union or European foreign students). For that reason three indicators compute a zero value, as they are not part of European's countries' projection inside the European Union: troops, military equipment and development cooperation. Moreover, given the indivisibility of some variables, there was no possibility of distinguishing the extra from the intra-European component, so we stick to the values of global presence and re-scale them considering only the European countries. This is the case of sports, science and information (on its internet component).

It almost always does so by using Eurostat data, just as for the calculation of the global presence of the European Union. Obviously, the change in scale also reduces the scaling: the value of 1,000 assigned to the maximum indicator in the Elcano Global Presence Index is given, in the case of European presence, as the maximum value registered in 2010 by a member state and for the intra-European presence series. Finally, just as in the index for the European Union, the reference area for which European presence is measured is the Union as it has been composed in different moments of time, variations being the result of the enlargement process.

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<sup>23</sup> Results of the Elcano European Presence Index are available at [www.globalpresence.realinstitutoelcano.org](http://www.globalpresence.realinstitutoelcano.org).

Table A.3. Variables, indicators, and sources of the Elcano Global Presence Index calculated for the European Union

Variable	Indicator	Source
Economic presence		
Energy	Extra-EU flows of exports of energy products (oil, refined products, and gas) (SITC 3)	Eurostat
Primary goods	Extra-EU flows of exports of primary goods (food, beverages, tobacco, agricultural commodities, non-ferrous metals, pearls, precious stones, and non-monetary gold), excluding oil (SITC 0 + 1 + 2 + 4 + 68 + 667+ 971)	
Manufactures	Extra-EU flows of exports of manufactured goods (chemical products, machinery, transport equipment, other manufactured products) (SITC 5 to 8 minus 667 and 68).	
Services	Extra-EU flows of exports of services in transport, construction, insurance, financial services, IT, the media, intellectual property, other business services, personal, cultural and leisure services, and public services	
Investments	Stock of foreign direct investment outside the EU	
Military presence		
Troops	Number of military personnel deployed in international missions and bases outside the EU	IISS – The Military Balance Report
Military equipment	Weighted sum of aircraft carriers, big ships, destroyers, frigates, nuclear-powered submarines, amphibious ships, medium and heavy strategic aeroplanes, and air tankers	
Soft presence		
Migration	Estimated number of immigrants from outside the EU	United Nations Population Division and Eurostat
Tourism	Thousands of arrivals of tourists from outside the EU	Statistics database of the United Nations World Tourism Organization (UNWTO) and Eurostat
Sports	Weighted sum of points in the FIFA world ranking and medals won at summer Olympic Games for each EU member state Corrective variable: European audience at the World Cup Final and the opening ceremony of the Olympic Games	FIFA and ICO Reports by Kantar Media and Nielsen
Culture	Extra-EU exports of audiovisual services (cinematographic productions, radio and television programs, and musical recordings)	Eurostat
Information	Number of mentions in news of main international press agencies (Associated Press, Reuters, AFP, DPA, ITARTASS, EFE, ANSA, Xinhua) Internet bandwidth (Mbps)	Factiva database International Telecommunication Union
Technology	Foreign-oriented patents for the total EU member States: number of inter-related patent applications filed in one or more foreign countries to protect the same invention Corrective variable: patents registered for each member state in other member States	World Intellectual Property Organization (WIPO) – Statistics Database
Science	Number of European articles, notes, and reviews published in the fields of the arts and humanities, social sciences, and sciences	Thomson Reuters – Web of Knowledge
Education	Number of non-EU foreign students in tertiary education in the EU	UNESCO – Institute for Statistics, OECD – iLibrary and Eurostat
Development cooperation	Total gross flows of official development aid for all member States	OECD

Table A.4. Variables, indicators, and sources of the Elcano European Presence Index

Variable	Indicator	Source
Economic presence		
Energy	Intra-EU flows of exports of energy products (oil, refined products and gas) (SITC 3)	Eurostat
Primary goods	Intra-EU flows of exports of primary goods (food, beverages, tobacco, agricultural commodities, non-ferrous metals, pearls, precious stones, and non-monetary gold), excluding oil (SITC 0 + 1 + 2 + 4 + 68 + 667+ 971)	
Manufactures	Intra-EU flows of manufactured goods (chemical products, machinery, transport equipment, other manufactured products) (SITC 5 to 8 minus 667 and 68).	
Services	Intra-EU flows of exports of services in transport, construction, insurance, financial services, IT, the media, intellectual property, other business services, personal, cultural and leisure services, and public services	
Investments	Stock of foreign direct investment in the EU	
Military presence		
Troops	Value zero for all countries and years	
Military equipment	Value zero for all countries and years	
Soft presence		
Migration	Estimated number of immigrants from within the EU	Eurostat
Tourism	Thousands of arrivals of tourists from within the EU	Eurostat
Sport	Weighted sum of points in the FIFA world ranking and medals won at the summer Olympic Games	FIFA and IOC
Culture	Intra-EU exports of audiovisual services (cinematographic productions, radio and television programmes, and musical recordings)	Eurostat and national sources
Information	Number of mentions in news of main European press agencies (Associated Press, Reuters, AFP, DPA, and EFE) Internet bandwidth (Mbps)	Factiva database International Telecommunication Union
Technology	Number of patents registered at the European Patent Office (EPO)	Eurostat
Science	Number of articles published in the fields of the arts and humanities, social sciences and sciences	Thomson Reuters – Web of Knowledge
Education	Number of EU foreign students in tertiary education	Eurostat
Development cooperation	Value 0 for all countries and years	

# Statistical annex

TABLE B.1.  
Elcano Global Presence Index 2016

Country	Index value	Position	Position by dimension		
			Economic	Military	Soft
Algeria	16.6	62	61	37	79
Angola	9.0	77	57	94	99
Argentina	42.8	37	40	32	37
Australia	170.5	14	16	18	12
Austria	81.6	25	22	47	24
Azerbaijan	9.4	74	68	84	66
Bangladesh	34.0	46	72	13	75
Belarus	17.5	61	64	50	49
Belgium	158.2	15	10	55	20
Bolivia	3.5	97	94	79	94
Brazil	118.2	18	21	15	19
Bulgaria	13.8	64	62	54	59
Canada	292.9	8	8	20	8
Chile	46.3	34	33	30	48
China	729.6	2	2	4	3
Colombia	28.4	50	46	43	45
Congo DR	5.6	92	96	56	88
Costa Rica	6.0	85	77	94	80
Côte d'Ivoire	6.5	81	86	91	64
Croatia	11.8	69	67	82	52
Cuba	6.9	80	79	88	70
Cyprus	6.3	83	74	92	85
Czech Republic	42.7	38	34	73	35
Denmark	77.6	28	26	41	23
Dominican Republic	6.0	86	81	94	73
Ecuador	9.4	73	73	68	68
Egypt	37.9	44	56	25	29

TABLE B.1.  
Elcano Global Presence Index 2016

Country	Index value	Position	Position by dimension		
			Economic	Military	Soft
Estonia	6.2	84	75	86	82
Ethiopia	46.7	33	95	9	76
Finland	39.1	42	35	62	39
France	515.6	5	5	3	6
Germany	623.0	3	3	14	4
Ghana	13.6	66	87	34	78
Greece	42.4	39	43	26	33
Guatemala	4.5	95	85	78	93
Hungary	40.0	41	37	53	34
Iceland	4.1	96	83	94	90
India	188.5	13	17	7	15
Indonesia	69.9	29	30	12	61
Iran	34.7	45	49	27	43
Iraq	13.8	65	55	64	81
Ireland	93.3	21	18	67	38
Israel	41.4	40	36	40	42
Italy	243.5	10	9	8	10
Japan	466.2	6	6	6	5
Jordan	11.8	68	88	70	50
Kazakhstan	20.6	58	52	87	47
Kenya	22.8	55	93	22	54
Korea	223.6	11	13	10	9
Kuwait	20.0	59	45	63	60
Latvia	4.8	94	82	89	86
Lebanon	10.7	71	69	94	55
Libya	5.8	90	76	81	89
Lithuania	9.1	76	65	80	74
Luxembourg	17.6	60	44	90	77
Malaysia	82.7	24	23	29	28
Malta	3.3	98	91	94	97
Mexico	91.2	23	20	49	32
Morocco	25.9	53	59	24	56



TABLE B.1.  
Elcano Global Presence Index 2016

Country	Index value	Position	Position by dimension		
			Economic	Military	Soft
Myanmar	5.9	88	84	57	92
Netherlands	275.6	9	7	23	13
New Zealand	28.9	49	47	60	36
Nigeria	43.3	36	50	31	25
Norway	63.7	32	27	42	41
Oman	12.7	67	60	58	65
Pakistan	43.6	35	71	11	51
Panama	8.1	78	63	83	84
Peru	21.6	57	58	28	72
Philippines	26.3	52	41	66	53
Poland	65.2	31	29	51	26
Portugal	38.6	43	38	48	40
Qatar	26.9	51	39	69	57
Romania	29.9	48	48	39	44
Russia	419.4	7	15	2	7
Saudi Arabia	103.0	20	28	16	14
Serbia	9.4	75	78	74	58
Singapore	128.8	17	14	38	31
Slovakia	16.5	63	51	77	62
Slovenia	10.3	72	66	72	69
South Africa	66.5	30	31	33	21
Spain	204.1	12	12	17	11
Sri Lanka	5.8	89	80	61	96
Sudan	5.8	91	98	46	91
Sweden	109.9	19	19	59	16
Switzerland	156.2	16	11	75	18
Syria	2.8	100	100	85	87
Tanzania	10.9	70	90	35	95
Thailand	91.2	22	24	21	22
Tunisia	6.4	82	97	65	71
Turkey	79.8	26	32	19	17
Turkmenistan	5.4	93	70	94	100

TABLE B.1.  
Elcano Global Presence Index 2016

Country	Index value	Position	Position by dimension		
			Economic	Military	Soft
Ukraine	31.3	47	54	45	30
UAE	78.7	27	25	36	27
United Kingdom	565.6	4	4	5	2
United States	2,456.9	1	1	1	1
Uruguay	7.5	79	89	52	83
Uzbekistan	5.9	87	92	93	67
Venezuela	25.0	54	53	44	46
Vietnam	22.2	56	42	76	63
Yemen	2.9	99	99	71	98

TABLE B.2.  
Global presence position (selected years)

Country	1990	2000	2010	2016
Algeria	55	50	54	62
Angola	59	63	68	77
Argentina	25	31	38	37
Australia	13	13	14	14
Austria	22	27	21	25
Azerbaijan	-	93	76	74
Bangladesh	62	52	44	46
Belarus	-	65	70	61
Belgium	10	12	12	15
Bolivia	86	89	91	97
Brazil	16	17	18	18
Bulgaria	58	69	64	64
Canada	8	7	9	8
Chile	37	46	42	34
China	11	10	5	2
Colombia	51	57	58	50
Congo DR	76	98	98	92
Costa Rica	75	81	92	85
Côte d'Ivoire	65	76	83	81
Croatia	-	68	65	69
Cuba	63	72	72	80
Cyprus	82	88	73	83
Czech Republic	52	48	40	38
Denmark	21	21	23	28
Dominican Republic	80	79	89	86
Ecuador	64	70	80	73
Egypt	47	42	36	44
Estonia	-	82	84	84
Ethiopia	61	86	63	33
Finland	35	30	34	42
France	4	4	4	5
Germany	5	3	2	3
Ghana	87	66	62	66

TABLE B.2.  
Global presence position (selected years)

Country	1990	2000	2010	2016
Greece	23	28	35	39
Guatemala	81	95	96	95
Hungary	46	41	41	41
Iceland	78	94	94	96
India	15	18	16	13
Indonesia	30	33	30	29
Iran	27	43	46	45
Iraq	49	51	69	65
Ireland	34	29	20	21
Israel	40	39	43	40
Italy	7	8	10	10
Japan	6	6	6	6
Jordan	66	53	57	68
Kazakhstan	-	58	55	58
Kenya	69	67	74	55
Korea	18	14	15	11
Kuwait	56	60	50	59
Latvia	-	83	87	94
Lebanon	79	71	71	71
Libya	50	59	60	90
Lithuania	-	85	79	76
Luxembourg	60	62	52	60
Malaysia	38	26	26	24
Malta	84	97	97	98
Mexico	28	19	25	23
Morocco	31	56	53	53
Myanmar	88	100	99	88
Netherlands	9	9	8	9
New Zealand	48	45	47	49
Nigeria	44	32	31	36
Norway	24	25	24	32
Oman	72	73	77	67
Pakistan	32	47	33	35
Panama	83	96	90	78
Peru	29	54	51	57

TABLE B.2.  
Global presence position (selected years)

Country	1990	2000	2010	2016
Philippines	57	49	59	52
Poland	45	35	29	31
Portugal	43	36	39	43
Qatar	71	77	61	51
Romania	53	55	48	48
Russia	2	5	7	7
Saudi Arabia	20	22	22	20
Serbia	54	87	81	75
Singapore	33	20	19	17
Slovakia	-	64	56	63
Slovenia	-	75	66	72
South Africa	39	40	37	30
Spain	12	11	11	12
Sri Lanka	74	92	85	89
Sudan	73	84	82	91
Sweden	19	16	17	19
Switzerland	17	15	13	16
Syria	36	37	75	100
Tanzania	77	91	93	70
Thailand	41	23	27	22
Tunisia	70	78	78	82
Turkey	26	24	28	26
Turkmenistan	-	99	100	93
Ukraine	-	38	45	47
UAE	67	34	32	27
United Kingdom	3	2	3	4
United States	1	1	1	1
Uruguay	68	74	88	79
Uzbekistan	-	80	86	87
Venezuela	42	44	49	54
Vietnam	14	61	67	56
Yemen	85	90	95	99

TABLE B.3.  
Global presence contribution by dimension (in %)

Country	Economic	Military	Soft
Algeria	43.0	43.3	13.6
Angola	95.7	0.0	4.3
Argentina	45.2	22.4	32.3
Australia	54.6	12.0	33.3
Austria	68.6	4.6	26.8
Azerbaijan	58.2	4.4	37.4
Bangladesh	14.0	78.2	7.8
Belarus	33.4	19.8	46.8
Belgium	82.3	1.6	16.1
Bolivia	60.2	17.1	22.7
Brazil	56.2	20.9	22.9
Bulgaria	47.1	19.1	33.8
Canada	68.2	6.2	25.6
Chile	59.8	21.7	18.5
China	62.6	12.1	25.3
Colombia	46.5	16.1	37.4
Congo DR	30.4	44.7	24.9
Costa Rica	63.2	0.0	36.8
Côte d'Ivoire	43.7	0.2	56.1
Croatia	47.0	4.7	48.3
Cuba	47.6	3.0	49.4
Cyprus	73.1	0.1	26.8
Czech Republic	64.2	2.6	33.2
Denmark	63.2	7.2	29.6
Dominican Republic	53.7	0.0	46.3
Ecuador	48.8	14.2	36.9
Egypt	23.5	32.1	44.4
Estonia	65.2	3.8	31.0
Ethiopia	4.1	90.3	5.6
Finland	61.7	4.5	33.7
France	54.5	18.8	26.7
Germany	67.9	4.1	28.0
Ghana	20.7	62.4	16.9
Greece	36.2	28.2	35.6
Guatemala	64.9	16.2	18.9

TABLE B.3.  
Global presence contribution by dimension (in %)

Country	Economic	Military	Soft
Hungary	55.6	7.1	37.3
Iceland	73.3	0.0	26.7
India	46.7	35.1	18.3
Indonesia	50.3	43.7	6.0
Iran	36.5	31.6	31.9
Iraq	73.4	11.4	15.2
Ireland	84.0	1.5	14.4
Israel	57.4	14.0	28.6
Italy	55.6	18.9	25.5
Japan	52.7	15.5	31.8
Jordan	23.1	10.1	66.8
Kazakhstan	56.8	1.1	42.1
Kenya	10.1	65.5	24.4
Korea	53.4	17.9	28.7
Kuwait	70.4	8.5	21.1
Latvia	63.2	2.6	34.2
Lebanon	49.2	0.0	50.8
Libya	67.4	9.6	23.0
Lithuania	63.8	6.2	29.9
Luxembourg	85.4	0.5	14.1
Malaysia	64.6	12.2	23.2
Malta	76.4	0.0	23.6
Mexico	78.7	4.0	17.3
Morocco	28.7	51.1	20.2
Myanmar	50.0	34.3	15.6
Netherlands	77.3	5.1	17.6
New Zealand	45.1	6.6	48.3
Nigeria	27.9	22.8	49.3
Norway	71.4	8.2	20.4
Oman	56.4	15.5	28.0
Pakistan	11.2	72.2	16.6
Panama	72.7	5.5	21.8
Peru	39.0	47.6	13.4
Philippines	73.0	5.5	21.5
Poland	63.5	4.8	31.7

TABLE B.3.  
Global presence contribution by dimension (in %)

Country	Economic	Military	Soft
Portugal	56.2	9.7	34.1
Qatar	77.7	4.6	17.7
Romania	42.5	21.3	36.2
Russia	23.3	52.3	24.4
Saudi Arabia	42.0	22.6	35.4
Serbia	38.9	11.5	49.6
Singapore	82.5	5.2	12.2
Slovakia	71.0	4.5	24.5
Slovenia	55.6	11.0	33.4
South Africa	50.6	14.3	35.0
Spain	59.3	10.9	29.8
Sri Lanka	56.0	30.6	13.4
Sudan	16.3	66.6	17.1
Sweden	67.6	1.8	30.6
Switzerland	81.7	0.6	17.7
Syria	31.5	11.3	57.2
Tanzania	23.0	69.7	7.2
Thailand	56.9	17.9	25.2
Tunisia	26.3	23.3	50.4
Turkey	38.1	23.2	38.7
Turkmenistan	93.3	0.0	6.7
Ukraine	33.1	13.3	53.6
UAE	65.9	9.5	24.6
United Kingdom	49.8	13.6	36.6
United States	48.4	23.2	28.4
Uruguay	35.3	39.8	24.9
Uzbekistan	41.3	0.1	58.6
Venezuela	41.7	18.2	40.1
Vietnam	79.2	4.0	16.8
Yemen	32.6	40.8	26.6







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