Measures of Global Public Goods and International Spillovers

Charles Kenny, Mallika Snyder, and Dev Patel

Abstract

This paper attempts a first-cut listing of global public goods and international spillover activities, as well as providing some data on their global distribution alongside basic correlational analysis. Few if any goods are "pure" global public goods and there is a spectrum of the extent of spillovers. Some global public goods are not well measured. The listing is far from exhaustive, nor is it based on rigorous selection criteria. But it does suggest considerable diversity in trends, levels and sources of public good and spillover activities.

Keywords: Global public goods, globalization, international institutions

JEL: F55, F60, H87

Center for Global Development
www.cgdev.org

Working Paper 474
February 2018

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All errors are the authors. Thanks to Nancy Birdsall and Ravi Kanbur for comments.

This version, posted on February 8, 2018, replaces a version posted on February 6, 2018. It fixes minor errors in table notes.

The Center for Global Development is grateful for contributions from the Bill & Melinda Gates Foundation in support of this work.

The replication files for this paper are available at https://www.cgdev.org/sites/default/files/measures-global-public-goods-and-international-spillovers-replication-files.zip

Charles Kenny, Mallika Snyder, and Dev Patel. 2018. "Measures of Global Public Goods and International Spillovers." CGD Working Paper 474. Washington, DC: Center for Global Development. https://www.cgdev.org/publication/measures-global-public-goods-and-international-spillovers

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1 Introduction

Activities with impacts that cross borders have an immense role to play in determining development outcomes. These activities include trading and international investment, migration and invasion, pollution and crime, as well as the creation and dissemination of technology, knowledge, information and ideas. Some of these activities involve public goods, many more involve externalities of one kind or another. Making progress towards the Sustainable Development Goals will necessitate better provisioning of global public goods, a reduction in the level of global public bads and a considerable net increase in positive spillovers across countries.

Public goods are non-rival and non excludable—my use of the good does not stop you using the good and I cannot prevent you from using the good. Global public goods cross borders. The atmosphere is a classic global public good. Another is technology—double-entry book-keeping or the internal combustion engine, for example. Countries that produce global public bads like greenhouse gases, which alter the atmosphere, only incur a small part of the cost of the damage they have done, while countries which add to the stock of global public goods by producing new technology only incur a small part of the benefit. Other examples of global public goods are disease eradication, the oceans, shipping routes and the ozone layer.

Kaul et al. (1999) defines, describes and discusses global public good (under)provision and Barrett (2007) has developed a typology of Global Public Goods, falling along a range from those that require the cooperation of all countries (disease eradication, for example) to those that may only require the effort of only one country (because one nation alone sees significant enough benefits to justify meeting the full costs of GPG provision and can provide the good alone—the global positioning system (GPS) provides one example).

Cross-border impacts spread far beyond contributions to (or damage of) global public goods. Many goods that are rival and excludable still involve costs and benefits that cross borders, often in the form of externalities—positive or negative impacts on another country which that country did not choose to incur. Illegal drugs are one example: consumption of the drug is rival and excludable, but, combined with its illegality, carries externalities involving violent crime that crosses borders. Industry subsidies are others, since if one country subsidizes production, that has a negative effect on the price of goods in other countries.

Even seemingly private transactions can create positive (or negative) externalities. Trade across borders, for example, might be seen as a purely private transaction between two entities. Unless the nature of the product itself involves externalities (the trade is in toxic

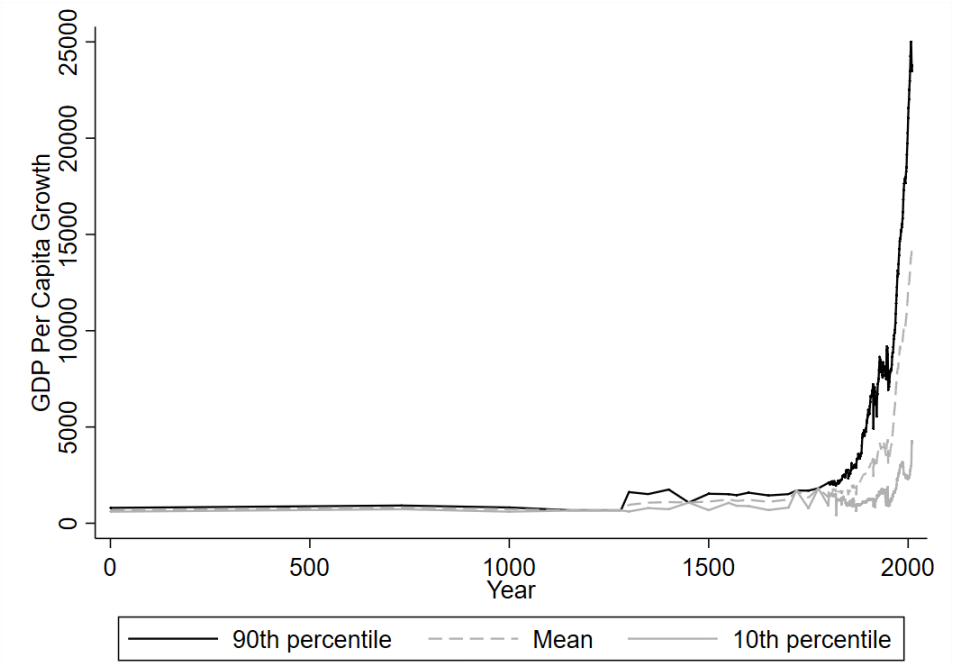
waste, as it might be), there might be no reason to consider levels of trade as indicating some type of cross-border externality. However, larger aggregate trade volumes allow for greater specialization and wider choice, providing a benefit that goes beyond the sum of the individual private transactions. Countries benefit from the movement of goods, services, finance and people across borders as well as ideas and technologies. They also benefit from the networks which ease that movement—shipping lanes, air routes, fiber cables and roads.

At the same time, few goods (or bads) are purely public and cross-border externalities are often small. And the production of such goods is often poorly measured or proxied. To take one example, we have measures of research and development spending and patents, but both are very imperfect proxies for the production of useful knowledge. This makes any potential list of policies and country features that have a material cross-border impact arguable, incomplete, and subjective. We present such an arguable, incomplete and subjective list in this paper.

For all of the gaps and uncertainties around inclusion, prioritization and measurement, a focus on global public goods and international spillovers is central to any effort to speed global development because they are vital to global human wellbeing. This is simple to demonstrate. For most of human history, countries everywhere were poor. And then some countries began to get richer. The technologies that allowed these countries to get rich spread—which is why, after millennia of everywhere being poor, almost everywhere nowadays is far richer, as can be seen from the trends in levels of GDP per capita in Figure 1. The figure uses data from the Maddison database to show that the 2010 income of the richest countries in the world (90th percentile) is around 26 times the global average income in 1820 while the global average itself has increased almost 16 times. The world as a whole has benefited from the technological change that has initially drove income gains in the richest countries. The progress has been truly global—the figure shows that countries at the tenth (poorest) percentile have incomes per capita almost 10 times their level of 1820. If the technologies behind labor productivity did not spread across borders, then one country increasing productivity would have no relation to the output per capita of other countries. The historical pattern would be of random spikes or sustained jumps in one country not closely followed by any other. Instead, the evidence is of a positive association between global and country growth as well as the level and growth of neighbor income and home country growth (Kenny, 1999).

This is not to deny long-term divergence in incomes. At a time when everyone was poor, the gaps in income were far smaller than they are today when some countries are incredibly wealthy and a few remain almost as poor as ever. But it is clear that the takeoff in incomes is a global phenomenon. And a global process is a far more likely explanation than

Figure 1: Global Distribution of GDP Per Capita Levels



Note: Figure 1 shows the global distribution of GDP per capita growth levels, respectively, for the average country as well as the 90th and 10th percentiles during a particular year. This figure uses a fixed sample of all countries with data in year 1. All data comes from Maddison(The Maddison Project, 2013).

the randomly synchronized autarkic economic takeoff of almost every country worldwide at previously unprecedented rates after millennia of stagnation.

Figure 2 turns to life expectancy to tell a similar story. Once again, after centuries of stagnation, progress in one country was quickly followed by progress that has spread worldwide. The world's least healthy countries in the fifth percentile of the distribution of life expectancy see higher life expectancies than the 95th percentile did a century ago. It is also possible to track the rapid spread of a number of technologies that underpin that change. For example, the first hepatitis vaccine came on the market in 1981. Since then, coverage has spread worldwide, as seen in Figure 3. Norms of behavior—from sending children to school through greater belief in the equality of men and women and of people of different ethnic groups—have also spread worldwide in a manner that strongly suggests global contagion of views rather than solely independent country-(or below country-)level processes (Kenny and Patel, 2017).

The impact of factors external to individual countries is not all positive, of course: war, international crime, regional pollution and pandemic spillovers are four negative cross-border influences. The global financial crisis that began with the irresponsibility of investment banks in the US and Europe is another example. But given the strong evidence that global flows

Figure 2: Global Trends in Life Expectancy

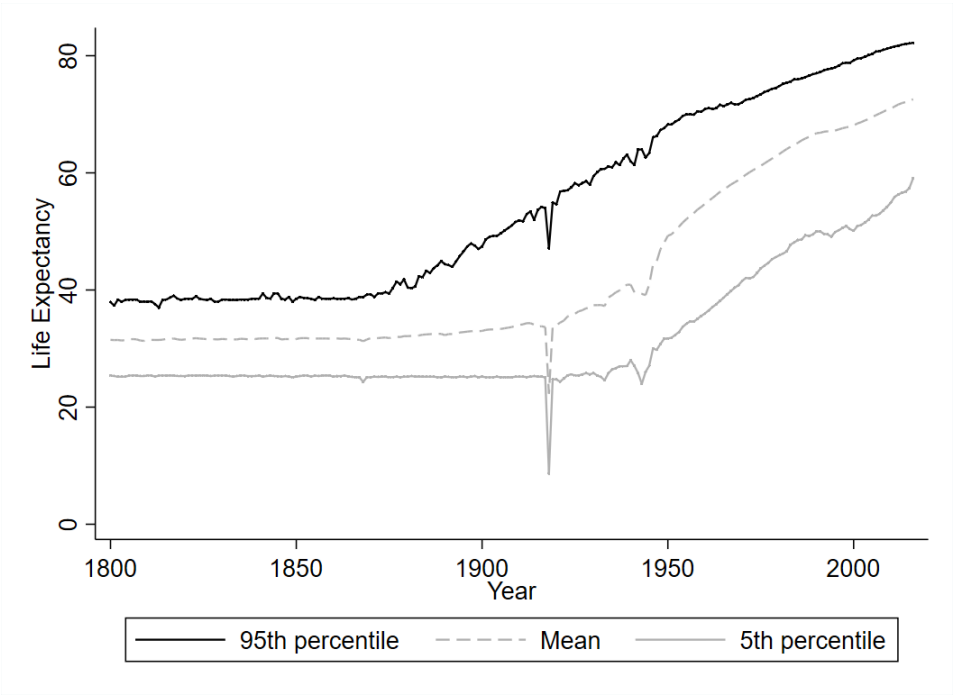
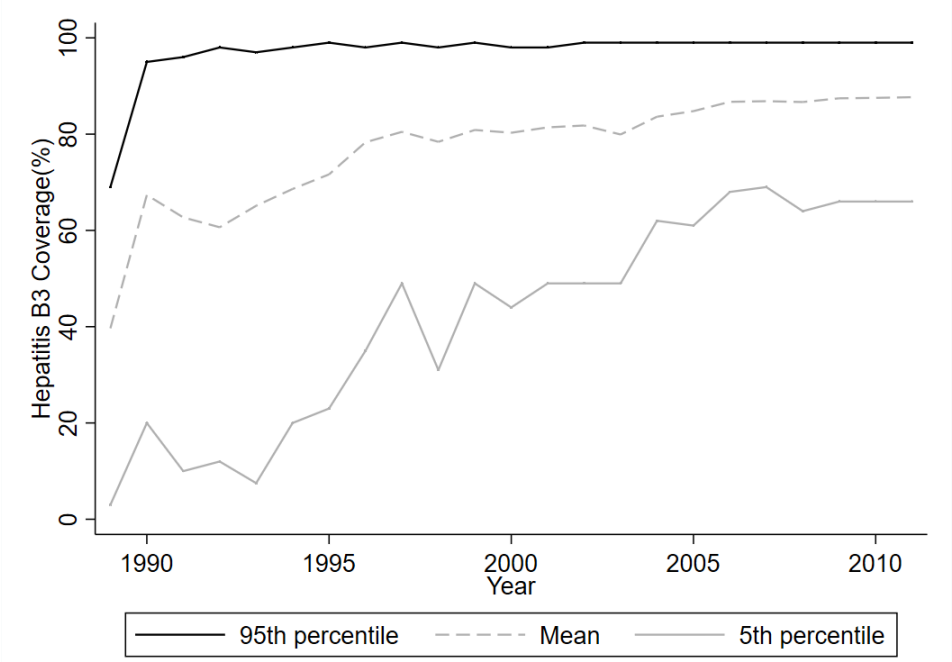


Figure 3: Global Trends in Hepatitis B3 Vaccine Coverage



Note: Figures 2 and 3 show global trends in life expectancy and Hepatitis B3 vaccination coverage, respectively. All data comes from Gapminder (Gapminder, 2016; United Nations Children's Fund (UNICEF) and World Health Organization (WHO), 2012).

have been a vital factor in development progress that has left the world richer, healthier, less violent, more educated and more democratic than ever before, the net impact of cross-border externalities and global public goods has clearly been considerably positive.

And, taking positive and negative spillovers combined, it appears clear that over the long term, what happens in the rest of the world matters more to development outcomes of an average individual country more than the "independent" or truly endogenous actions and policy choices of that average country. Global development is, plainly, a global endeavor. This demonstrates the importance of cross-border spillovers including issues of global public goods in meeting future development challenges, including the Sustainable Development Goals.

With regard to the Goals specifically, a number directly involve global commons including combating climate change and its impacts, conserving and sustainably using the oceans, protecting and restoring forests, and halting biodiversity loss and revitalizing the Global Partnership for Sustainable Development. But all other goals critically depend on global commons or cross-border externalities. The economic goals of ending poverty and hunger, jobs and economic growth, industrialization require both flows of technology but also trade, finance and people. The goal of ensuring healthy lives specifically targets the global eradication of pandemics including HIV/AIDS and malaria as well as relying on the cross border flow of life saving technologies including vaccines and antibiotics. Meeting the infrastructure goals in water, sanitation and energy is expected to require considerable cross-border finance. And the gender, educational and institutional goals will be supported by cross-border flows of knowledge and norms.

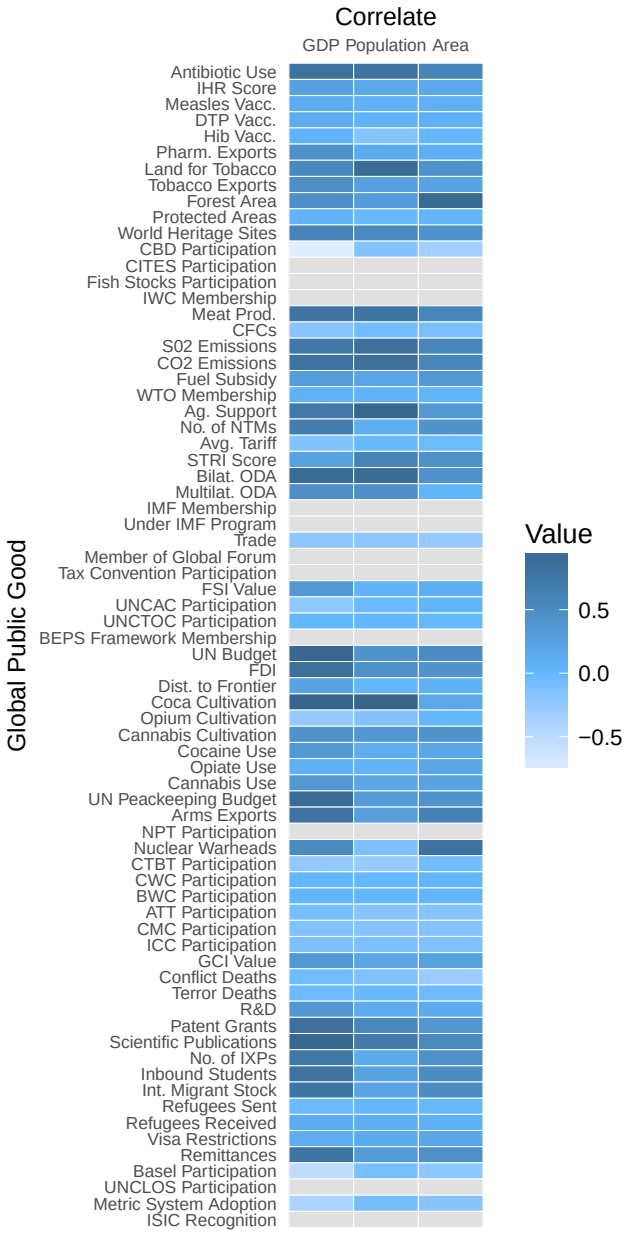
2 Method

We list 72 measures of global public goods and activities with considerable international spillovers, with a focus on being illustrative rather than exhaustive. Some of these goods or activities involve tangible commodities, such as arms exports; some are numbers of people, such as refugees received; others are less tangible and serve to measure a country's commitment to some global goal that generates externalities for other countries, such as being a party to the Nuclear Non-Proliferation Treaty. In listing these various goods and examining their spatial and temporal distribution, our focus is usually on the "state" of these goods and their stocks and flows, rather than on specific policy efforts undertaken or contributions relative to the size of an economy. Contrast the Commitment to Development Index of the Center for Global Development, which explicitly attempts to measure "policy effort". Again, we do not attempt to create a composite measure of country contributions to GPGs

or spillovers, limiting our effort to classification amongst health, environment, economy, security, knowledge and technology, and migration.

Figure 4 shows the correlations between the GPGs studied in this paper and GDP, population, and land area. The following sections provide individual factsheets on each GPG, including maps of their spatial distribution; line graphs of their temporal distribution, where applicable; and lists of the top 10 producers or consumers of the good in question, where applicable. The top ten lists are weighted in the case of variables reported as a percentage or score as opposed to an absolute amount. The weight is either population, area, or GDP, depending on which is most appropriate to approximate the global impacts of country performance. The rationale for the selection of these goods is also discussed at the start of each section, and the correlations between each of these goods identified in the conclusion of each section. The analysis is conducted using only countries with a population of one million people or greater in 2016, and the data sources used are described in the factsheet notes.

Figure 4: Relationship between GPGs and Correlates



Note: Figure 4 shows the relationship between the GPGs studied in this paper, in the order they appear, and GDP in PPP-adjusted constant 2011 international billion USD, population, and land area in sq. km., using data from the World Bank's World Development Indicators for the latter three variables (World Bank, 2017). The GPGs are unadjusted by any other variables, though some are presented in adjusted form later in the paper.

3 Health

In this section (pages 14 to 22), we examine GPGs and spillovers that are closely related to the health of individuals and populations.

Many of these GPGs are related to infectious disease, given the ability of such diseases to cross borders. The use of antibiotics saves lives and improves health, but it also increases the risk of antibiotic-resistant diseases. Antibiotic use in agriculture accounts for the considerable majority of use worldwide and has also been implicated in antibiotic resistance. Between 2000 and 2010, human consumption of antibiotic drugs, another contributor to antibiotic resistance, increased by 35%. India was the world's largest consumer in 2010, followed by China and the United States. Between them, the three countries accounted for 42% of global antibiotic consumption (Van Boeckel et al., 2014). We do not, however, have sufficient data to create a factsheet on human use, and instead focus on antibiotic use in agriculture. Government efforts for control and prevention of infectious disease are the bulk of our other measures. The World Health Organization's International Health Regulations play an important role in shaping public health responses to disease outbreaks and reducing the risk they cross borders, and we use an average of WHO scores on surveillance, preparedness, and response to measure country commitments to the IHR. To reflect the 'global stock' of response capacity we weight scores by country population on the grounds that there is a greater risk of pandemic emergency in larger-population countries. We also look at immunization rates for measles, DTP(diptheria, tetanus, and pertussis), and Hib(haemophilus influenzae type B). While most of the benefit of vaccination goes to the individual vaccinated, global 'herd immunity' thanks to high vaccination rates reduces the risk of infection to all.

The remaining health-related GPGs are tangible commodities. Exports of pharmaceutical products can play a role in helping improve health outcomes in other countries. Tobacco production and exports, on the other hand, can worsen health outcomes for non-domestic consumers.

Another measure that might be included in a list of health GPGs and spillovers includes research and development of new medicines and techniques; we could not find suitable data for analysis and presentation of this GPG.

4 Environment

In this section (pages 23 to 35), we examine GPGs and spillovers that are closely related to the natural environment.

Some of these variables deal directly with terrestrial characteristics and flora. Forests, for example, play an important role in regulating the environment, and forest area is the first of the GPGs examined in this section. Protected areas such as national parks and UNESCO World Heritage sites can also have biodiversity and cultural impacts that extend beyond the borders of the countries in which they are situated.

Other variables deal with fauna including treaties and conventions such as the Convention on Biological Diversity, CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora), and the United Nations Fish Stocks Agreement, which have served to protect biodiversity. We also examine meat production as a GPG, given its potential to adversely affect the natural environment through such channels as deforestation, water use and greenhouse gas emissions.

The remaining measures deal with fossil fuels, which have been implicated in climate change. We look at total emissions of carbion dioxide and anthropogenic sulfur dioxide and consumption of chlorofluorocarbons, which are important metrics of contribution to the greenhouse effect, as well as subsidies for fossil fuels, which measures in a sense how government policy can affect greenhouse gas emissions and consequently the environment experienced by the rest of the world.

Other global public goods or spillovers that we have not included involve actual measures of biodiversity, ocean acidification, phosphorous and nitrogen cycles, or freshwater shocks and use, which are also important in this regard (Steffen et al., 2015).

5 Economy

In this section (pages 36 to 55), we examine GPGs and spillovers that are closely related to international economic activity.

Trade—both exports and imports—provides for mutually beneficial exchange across borders. A country's membership in the World Trade Organization, given its role in influencing global trade and setting norms and standards, is also a global good. Barriers to trade such as tariffs, agricultural subsidies, and industrial subsidies (in the form of Non-Tariff Measures) can generate negative externalities, and we examine all of these, as well as a country's average score according to the Services Trade Restrictiveness Index.

Foreign aid and investment can benefit recipient countries that are directly involved, while aid for global public goods, while underfunded (Birdsall and Diofasi, 2015), has an important role to play (Kanbur, 2004) We look at bilateral ODA (Overseas Development Assistance) and multilateral ODA in this context. We also look at a country's contribution to the 2016-18 United Nations budget, whether they are a member of the International Monetary Fund

(IMF), and whether they are currently being loaned to by the IMF, ie. under IMF program (this might be seen as having a negative spillover effect because of the risk of cross-border contagion). Foreign direct investment is the final measure in this category.

Finally, we look at variables that are associated with doing business more broadly as well as corruption. Many of these involve various attempts to better regulate business practices related to taxes, such as participation in the Inclusive Framework on BEPS (Base Erosion and Profit Shifting), the Global Forum on Transparency and Exchange of Information for Tax Purposes, and the Convention on Mutual Administrative Assistance in Tax Matters. On a similar note, we also look at country scores on the Financial Secrecy Index. Other variables focus explicity on crime and corruption, such as the United Nations Convention against Corruption (UNCAC) and the United Nations Convention on Transnational Organized Crime (UNCTOC). Ease of doing international business broadly is measured using the IFC Distance to Frontier score.

Additional GPGs or spillovers that might be measured in future research include providing a base for trans-boundary criminal activity, and economic growth or banking sector weakness (given that the impacts of both dynamism and collapse cross borders).

6 Security

In this section (pages 56 to 75), we examine GPGs and spillovers related to international security.

Many of these variables relate to illicit drugs, which can have major security and health spillovers globally. We look at the consumption of three key drugs (cannabis, cocaine, and opiates) and the production of their source materials(cannabis, coca bush, and opium poppy.)

Other variables deal with conventional weapons. Arms exports are an arguable exception to mutually beneficial trade and the Arms Trade Treaty (ATT) and the Cluster Munitions Convention play an important role in regulating trade in and use of conventional weapons. (A better measure of the harm caused by the arms trade might arguably be exports to countries with low respect for civil and political rights).

Weapons of Mass Destruction can have even more devastating spillovers. In terms of nuclear weapons, we look at nuclear weapons stocks held by countries, as well as their participation in important frameworks to regulate nuclear weapons, such as the Nuclear Non-Proliferation Treaty (NPT) and the Comprehensive Test Ban Treaty (CTBT). We also look at participation in the Chemical Weapons Convention (CWC) and the Biological Weapons Convention (BWC).

Finally, we look at additional variables related to other aspects of security. The In-

ternational Criminal Court (ICC) has played a role in prosecuting cases of crimes against humanity, and so we look at ratification of its Rome Statute. A country's cybersecurity is also of interest, and for that we use as a proxy the Global Cybersecurity Index Value for a particular country.

Given the spillover costs of terrorism and international civil conflict, we add the number of conflict deaths in each country worldwide in 2015 and the number of terror deaths in each country worldwide.

7 Knowledge and Technology

In this section (pages 76 to 81), we examine GPGs and spillovers that are closely related to knowledge and technology.

Research and development expenditure is the first of the GPGs studied in this section. Intellectual property rights in the form of patents are an important driver of innovation, and so we also look at total patent grants (although this is a weak measure of innovation itself). Academic research is captured through scientific and technical journal articles (a measure which does not capture quality). Internet access, in the form of internet exchange points (IXPs), and the number of inbound international students in a country, can also facilitate greater global exchange of ideas and information.

8 Migration

In this section (pages 82 to 87) we examine GPGs and spillovers that are closely related to migration.

We report international migrant stock, the measure of the number of people born outside a country who currently reside there; we also look at refugees departing a country (which might—arguably—be seen as a burden on the international system); and refugees entering a country.

The remaining GPGs in this section deal with other aspects of migration. Visa restrictions make movement of people more difficult, while remittances are an important consequence of migration that can improve home country prospects.

9 Norms

In this section (pages 88 to 91), we examine GPGs that are closely related to norms that influence interactions between countries, and which facilitate easier communication between

individuals from these countries.

The first of these is participation in the United Nations Convention on the Law of the Sea and in the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, important agreements that have shaped interactions between countries. We then look at adoption of the metric system, which allows for greater comparability of units across countries. Finally, we study the International Student Identity Card, a more recent development that allows students from certain countries to access cultural institutions with student status in other countries.

10 Conclusion

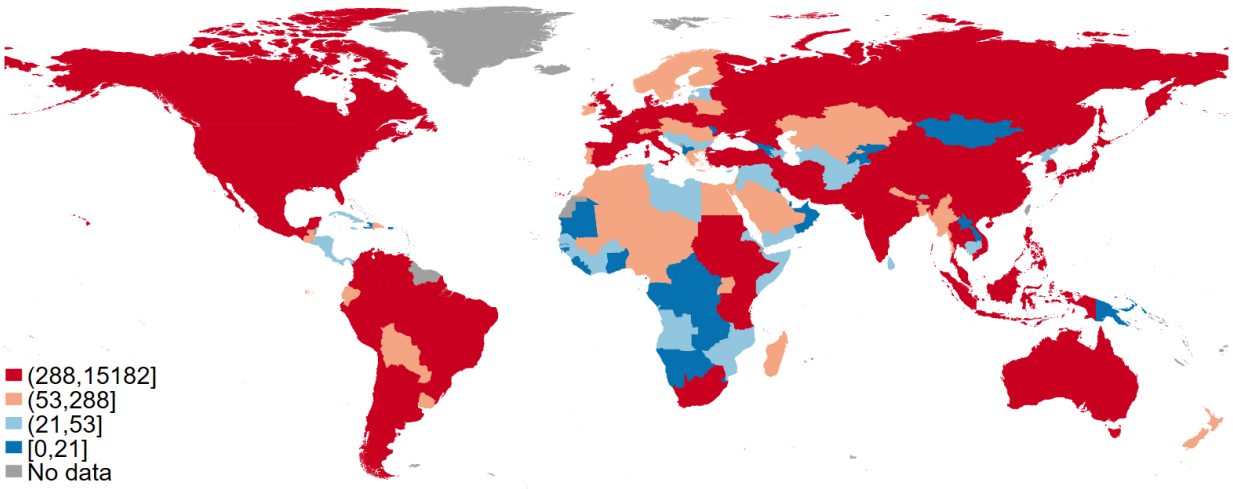
The data presented in this paper make clear how much the 'stock' of global public goods and externalities —as well as threats to public goods— rests in the Global South. Table 57 lists the top twenty countries in terms of the number of times they appear in top ten lists in the rest of the report. Brazil, India, the Russian Federation, Pakistan and China all appear in the top ten, with seven more developing countries in the top twenty. China is the world's largest producer of greenhouse gases as well as its largest producer of patents, for example. That suggests the need for truly global cooperation to preserve and increase our stock of goods while limiting the production of global public bads—'responsible use' strategies.

Regarding global public bads in particular, including climate change, the global public bad under discussion is closely linked to national (and even global) public goods. In the case of greenhouse gases, we want developing countries to consume a lot more electricity because it is a vital part of development progress. Or in the case of antimicrobial use, we want developing countries to consume more antibiotics because they reduce the burden of infectious disease. 'Responsible use' in the poorest countries involves more electricity and more antibiotics than they currently consume. But at the same time, purely by weight of population, that means most use of both energy and antibiotics is already and will increasingly be in developing countries. So 'responsible use' strategies have to be strategies designed primarily with those countries in mind. That is not what is happening in energy, for example, where renewables research is concentrated in the rich world and focused on technologies that may work better there. Again, with antimicrobial use, many of the strategies to limit that use are being designed with developed country settings in mind. The same may well apply more broadly, and suggest the need for stronger global cooperation in delivering the solutions which allow developing countries to achieve far higher levels of material wellbeing while preserving stocks of global public goods and minimizing negative spillovers and the production of global public bads. Such cooperation will be vital in meeting the SDGs, and

may require some considerable redesign and strengthening of international institutions that can help deliver on GPGs (Kanbur, 2017).

11 Global Public Goods Factsheets

Figure 5: Antibiotics Use in Agriculture



Note: Figure 5 shows quartiles of antibiotics use in thousands of kilograms in 2010 using data from Van Boeckel et al. (2015).

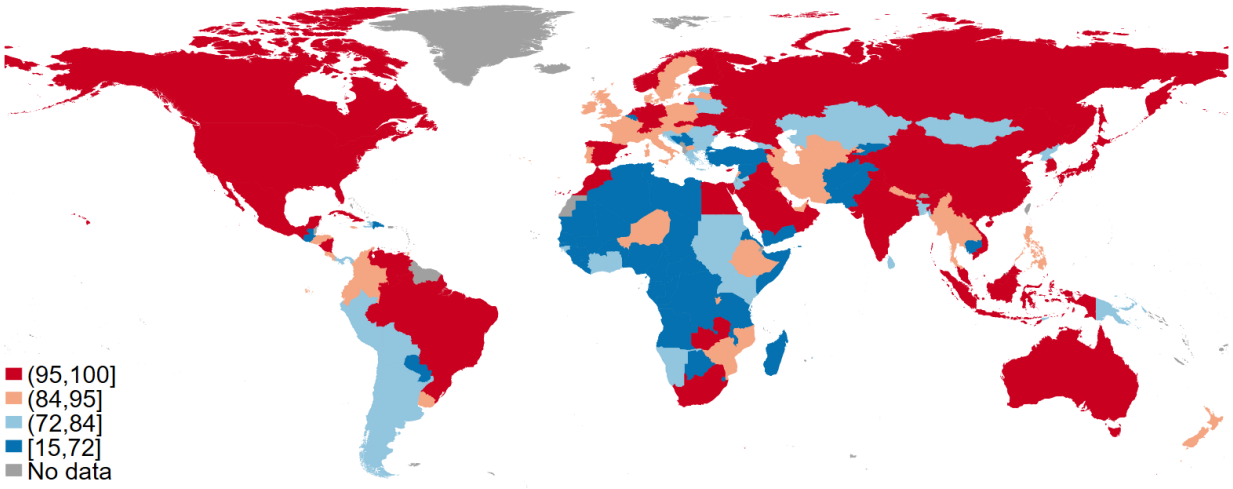
Table 1: Top 10 Countries

Rank	Country	Antibiotic Use
1	China	15182
2	United States	8496
3	Brazil	5428
4	India	2076
5	Germany	1852
6	Spain	1595
7	Russian Federation	1527
8	Mexico	1366
9	France	1345
10	Canada	1188

Note: Table 1 lists the top 10 countries in terms of antibiotic use in agriculture, measured in thousands of kilograms.

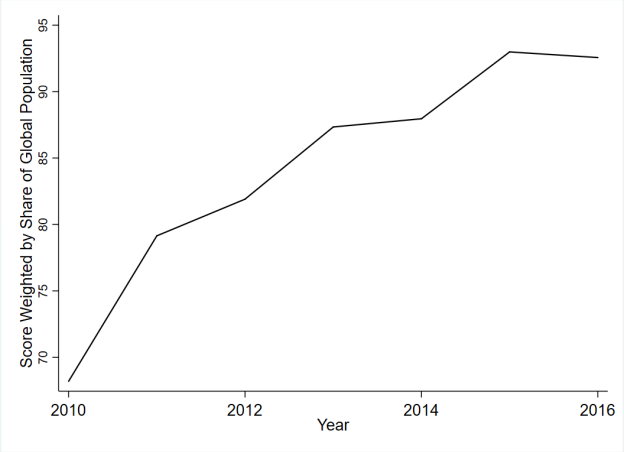
Source: Van Boeckel, Thomas P., Charles Brower, Marius Gilbert, Bryan T. Grenfell, Simon A. Levin, Timothy P. Robinson, Aude Teillant, and Ramanan Laxminarayan. 2015. "Global Trends in Antimicrobial Use in Food Animals." *Proceedings of the National Academy of Sciences of the United States of America* 112(18): 5649-54. *PMC*. Web. Accessed October 16, 2017. Data provided by authors.

Figure 6: WHO International Health Regulations



Note: Figure 6 shows quartiles of average score for surveillance, response, and preparedness for the WHO International Health Regulations using the most recent year available.

Figure 7: Trends in IHR Score



Note: Figure 7 shows trends in the average of surveillance, response, and preparedness scores according to the WHO IHR. Trends presented are weighted by country share of global population.

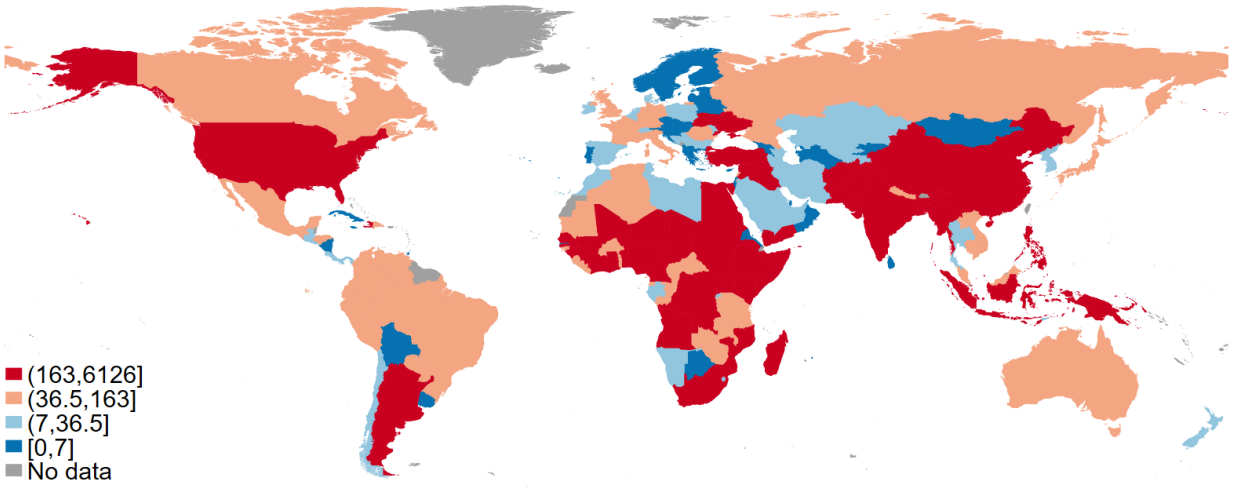
Table 2: Top 10 Countries under 75

Rank	Country	IHR Score
1	Pakistan	44
2	Nigeria	72
3	Turkey	72
4	Congo, Dem. Rep.	66
5	Tanzania	68
6	Algeria	67
7	Kenya	74
8	Sudan	75
9	Afghanistan	70
10	Ghana	73

Note: Table 2 lists the top 10 countries by population with average IHR scores of surveillance, response, and preparedness that are less than 75. The value displayed is the rounded IHR score average.

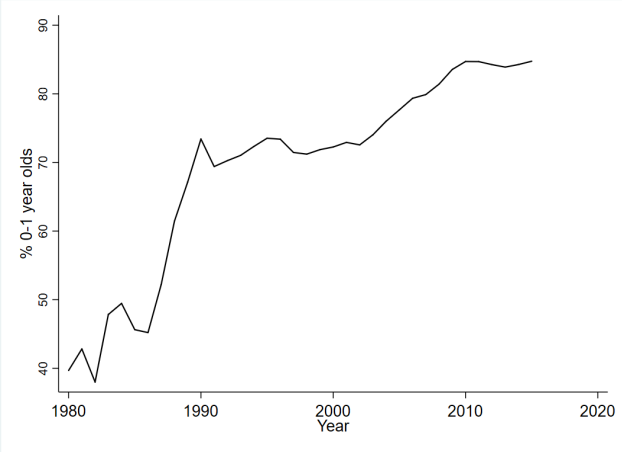
Source: World Health Organization. 2017. "International Health Regulations (2005) monitoring framework: All capacities data by country 2010-2016." Global Health Observatory data repository. Accessed July 10, 2017.

Figure 8: Measles Vaccination



Note: Figure 8 shows quartiles of the latest value in thousands of the total number of 1-year olds not immunized against measles according to the latest WHO data available. This is calculated by multiplying the complement of vaccination rates among 1-year olds by country population and percent of population aged 0-1.

Figure 9: Trends in Measles Vaccine Coverage



Note: Figure 9 shows trends in immunization coverage for measles. Trends presented are for immunization rate weighted by country share of world population aged 0-1, and so measures average immunization rates among 1-year olds worldwide for countries with available data.

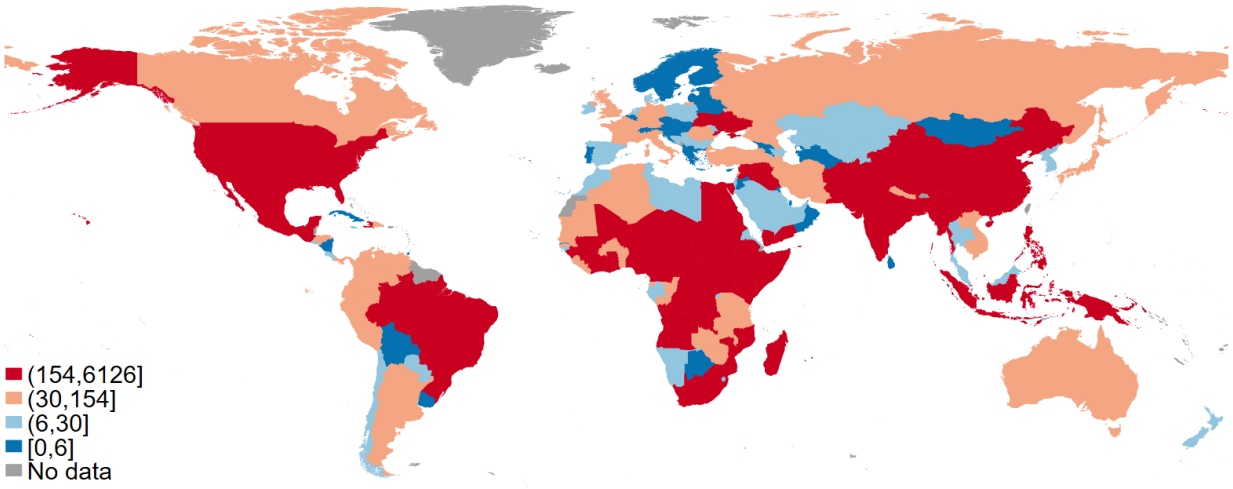
Table 3: Top 10 Countries

Rank	Country	Not Vacc.
1	India	6126
2	Nigeria	6001
3	Pakistan	3914
4	Indonesia	3121
5	Ethiopia	1362
6	Congo, Dem. Rep.	1248
7	Iraq	994
8	Angola	965
9	Philippines	842
10	Bangladesh	735

Note: Table 3 lists the top 10 countries in terms of the number of 1-year olds in thousands not vaccinated for measles using the most recently available data. This is calculated by multiplying the complement of the immunization rate among 1-year olds by country population aged 0-1.

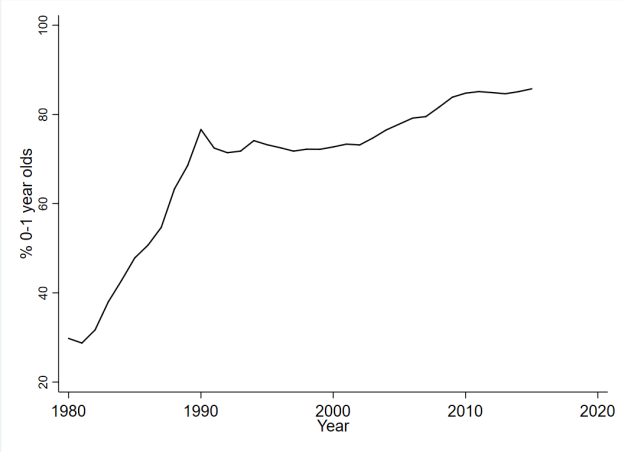
Sources: World Health Organization. 2017. "Measles (MCV) immunization coverage among 1-year-olds (%)." Global Health Observatory data repository. Accessed July 10, 2017.

Figure 10: DTP Vaccination



Note: Figure 10 shows quartiles of the latest value in thousands of the number of 1-year olds not immunized against diptheria, tetanus, and pertussis using the DTP3 vaccine according to the latest WHO data available. This is calculated by multiplying the complement of vaccination rates among 1-year olds by country population and percent of population aged 0-1.

Figure 11: Trends in DTP Vaccine Coverage



Note: Figure 11 shows trends in DTP3 immunization coverage. Trends presented are for immunization rate weighted by country share of world population aged 0-1, and so measures average immunization rates among 1-year olds worldwide for countries with available data.

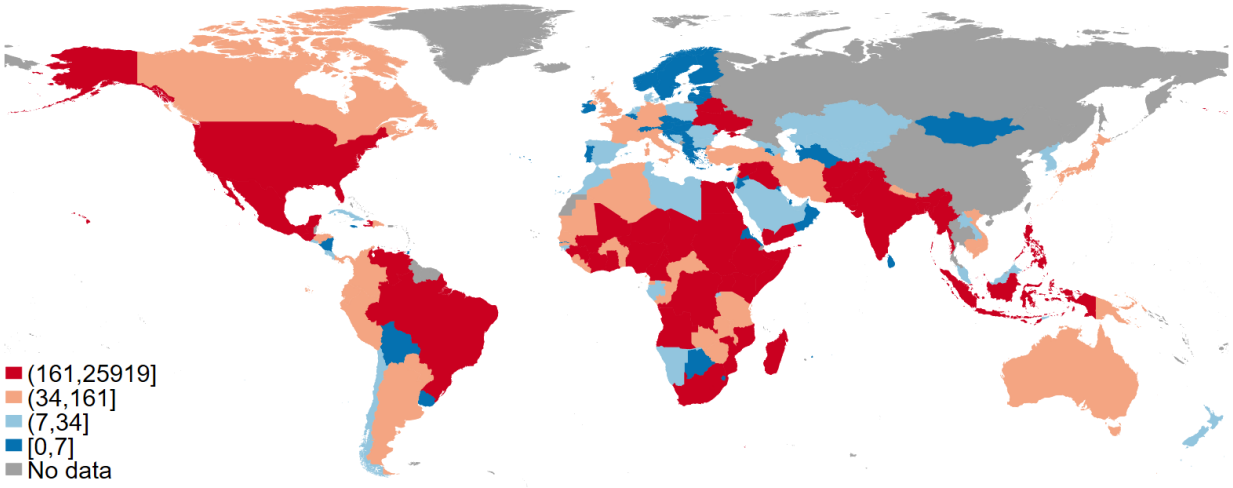
Table 4: Top 10 Countries

Rank	Country	Not Vacc.
1	India	6126
2	Nigeria	5740
3	Pakistan	2810
4	Indonesia	1913
5	Philippines	1872
6	Congo, Dem. Rep.	1129
7	Iraq	971
8	Ethiopia	867
9	Angola	772
10	South Africa	716

Note: Table 4 lists the top 10 countries in terms of the number of 1-year olds in thousands not vaccinated for DTP using the most recently available data. This is calculated by multiplying the complement of the immunization rate among 1-year olds by country population aged 0-1.

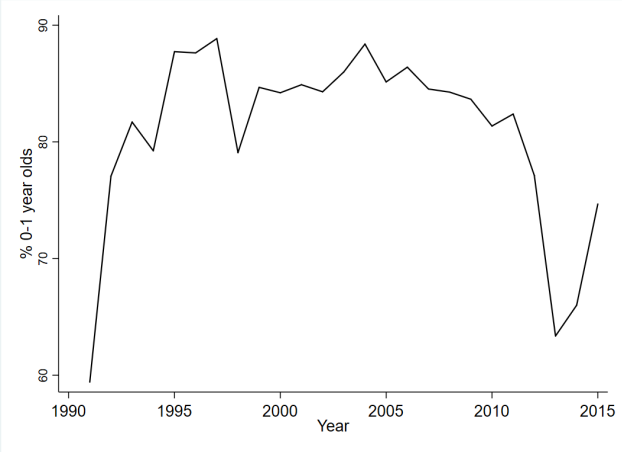
Sources: World Health Organization. 2017. "Diphtheria tetanus toxoid and pertussis (DTP3) immunization coverage among 1-year-olds (%)." Global Health Observatory data repository. Accessed July 10, 2017.

Figure 12: Hib Vaccination



Note: Figure 12 shows quartiles of the latest value in thousands of the number of 1-year olds not immunized against Hib using the Hib3 vaccine according to the latest available WHO data. This is calculated by multiplying the complement of vaccination rates among 1-year olds by country population and percent of population aged 0-1.

Figure 13: Trends in Hib Vaccine Coverage



Note: Figure 13 shows trends in Hib3 immunization coverage. Trends presented are for immunization rate weighted by country share of world population aged 0-1, and so measures average immunization rates among 1-year olds worldwide for countries with available data.

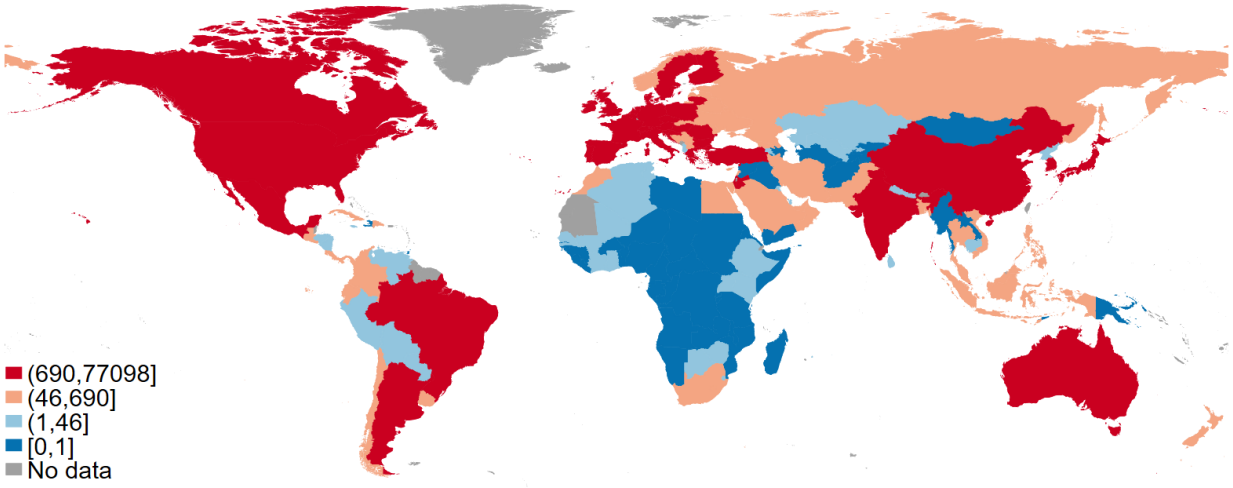
Table 5: Top 10 Countries

Rank	Country	Not Vacc.
1	India	25919
2	Nigeria	5740
3	Pakistan	2810
4	Indonesia	1913
5	Philippines	1872
6	Congo, Dem. Rep.	1129
7	Iraq	971
8	Ethiopia	867
9	Angola	772
10	South Africa	716

Note: Table 5 lists the top 10 countries in number of 1-year olds in thousands not vaccinated for Hib using the most recently available data. This is calculated by multiplying the complement of the immunization rate among 1-year olds by country population aged 0-1.

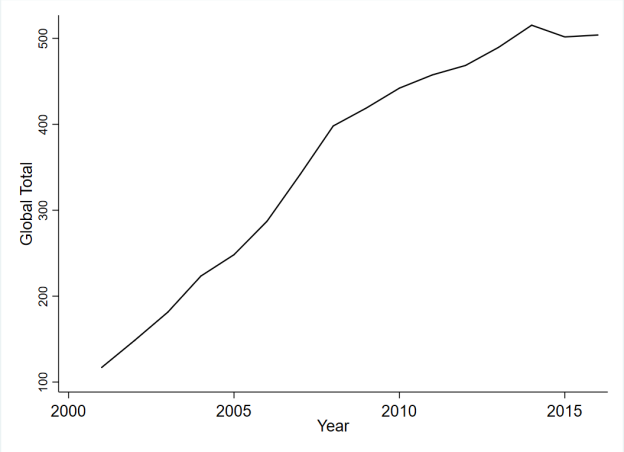
Sources: World Health Organization. 2017. "Hib (Hib3) immunization coverage among 1-year-olds (%)." Global Health Observatory data repository. Accessed July 10, 2017.

Figure 14: Pharmaceutical Exports



Note: Figure 14 shows quartiles of the latest value of pharmaceutical exports for each country in millions USD, based on data from the Intracen Trademap.

Figure 15: Trends in Pharmaceuticals Exports



Note: Figure 15 shows trends in total worldwide pharmaceutical exports in billions USD.

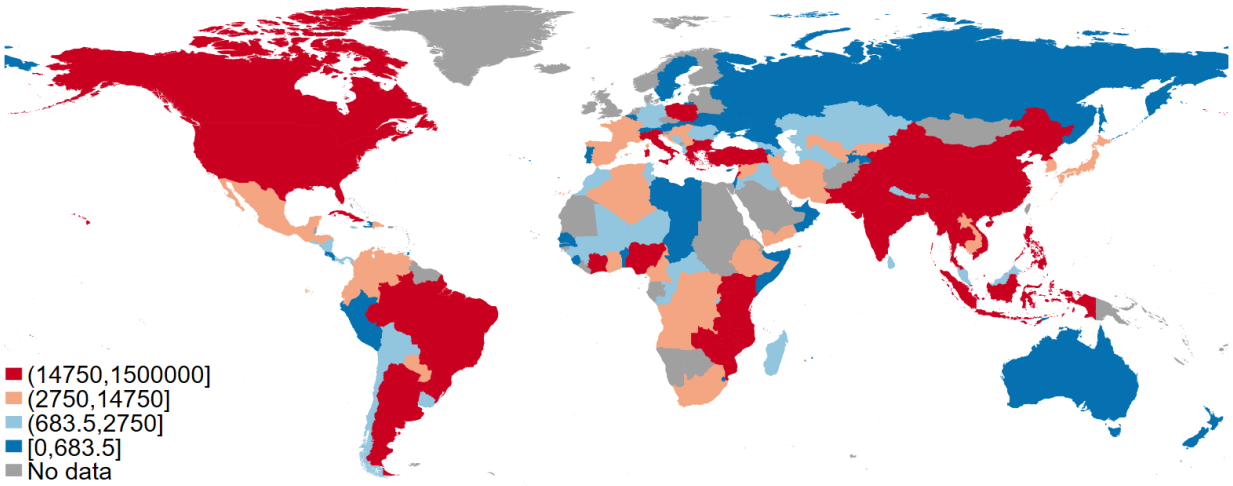
Table 6: Top 10 Countries

Rank	Country	Pharm. Exports
1	Germany	77
2	Switzerland	67
3	United States	47
4	Belgium	42
5	United Kingdom	33
6	Ireland	32
7	France	30
8	Netherlands	29
9	Italy	21
10	India	13

Note: Table 6 lists the top 10 countries in terms of the latest value of pharmaceutical exports, valued in billions USD.

Source: International Trade Center. 2017. "List of exporters for the selected product (Product Code 30: Pharmaceutical Products). 2001-2016." Trade Map. Accessed June 9, 2017.

Figure 16: Land Devoted to Tobacco Production



Note: Figure 16 shows quartiles of land used for tobacco cultivation in hectares for 2012 using data from the FAOSTAT Gateway in 2014 and the Tobacco Atlas.

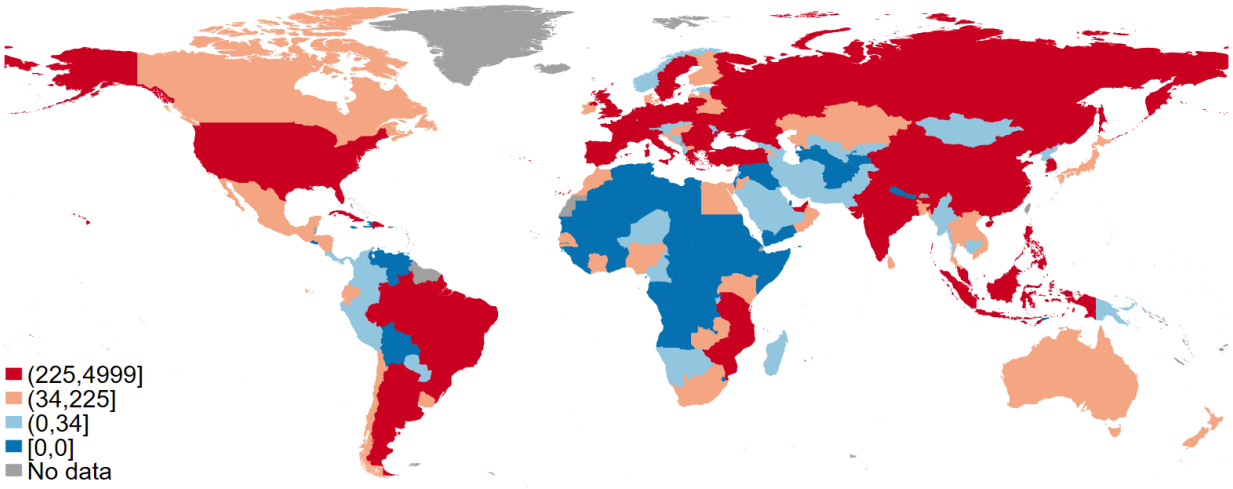
Table 7: Top 10 Countries

Rank	Country	Land for Tobacco
1	China	1500
2	India	495
3	Brazil	410
4	Indonesia	250
5	Malawi	160
6	Tanzania	156
7	United States	136
8	Turkey	108
9	Zimbabwe	93
10	Lebanon	85

Note: Table 7 lists the top 10 countries in terms of land devoted to tobacco production in thousands of hectares in 2012.

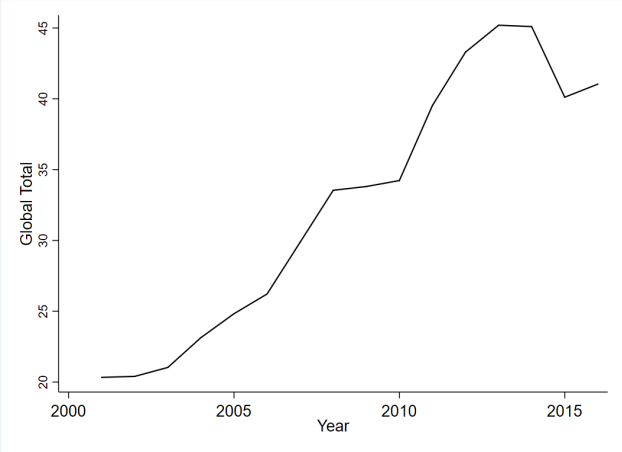
Source: The Tobacco Atlas. 2017. "Land Devoted to Growing Tobacco–Production by country: area in hectares, 2012." The Tobacco Atlas. Accessed July 25, 2017.

Figure 17: Tobacco Exports



Note: Figure 17 shows quartiles of the latest value of tobacco and manufactured tobacco subsititutes exports for each country in millions USD, based on data from the Intracen Trademap.

Figure 18: Trends in Tobacco Exports



Note: Figure 18 shows trends in exports of total tobacco and manufactured tobacco substitutes in billions USD.

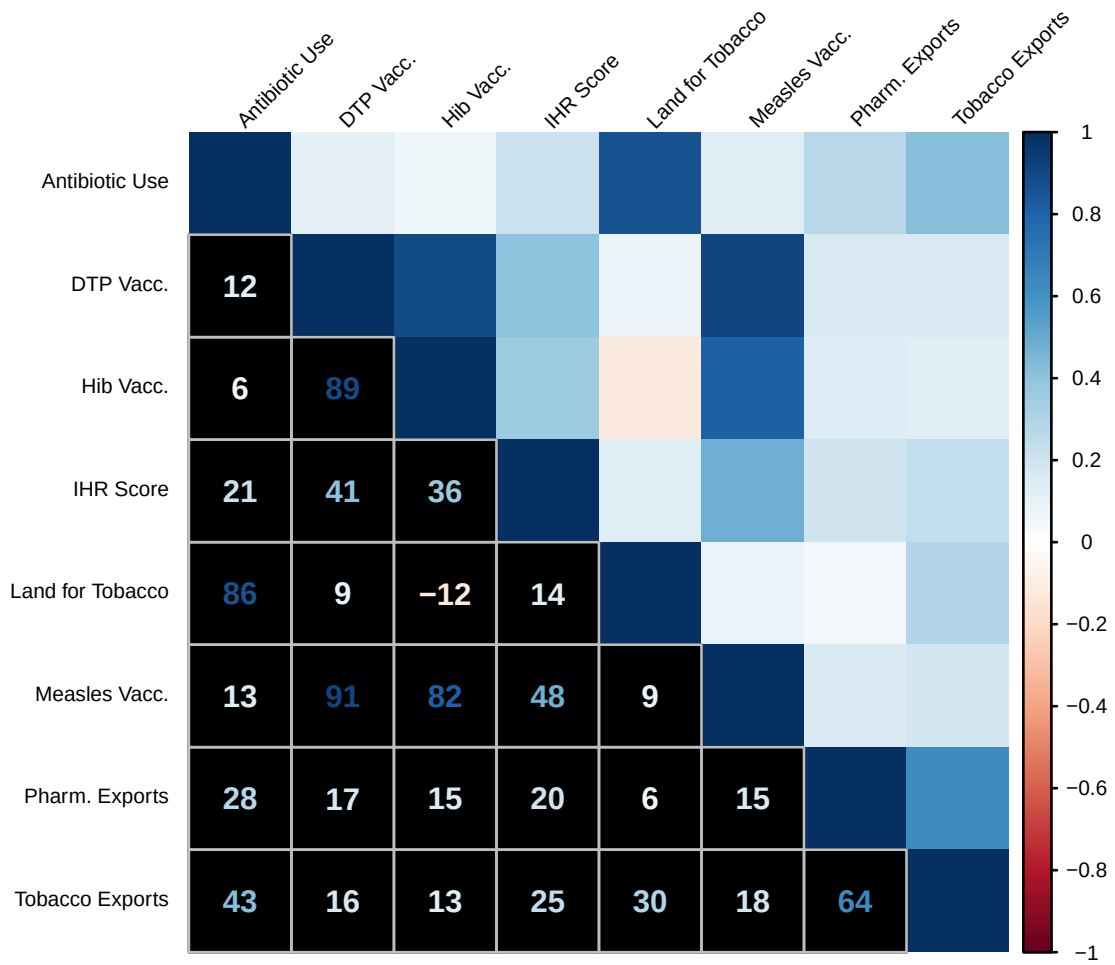
Table 8: Top 10 Countries

Rank	Country	Tobacco Exports
1	Germany	4999
2	Netherlands	3491
3	United States	2264
4	Poland	2170
5	Brazil	2123
6	Belgium	1539
7	China	1377
8	Hong Kong SAR, China	1193
9	Singapore	1185
10	Korea, Rep.	1073

Note: Table 8 lists the top 10 countries in terms of the latest value of tobacco and manufactured tobacco substitutes exports, valued in millions USD.

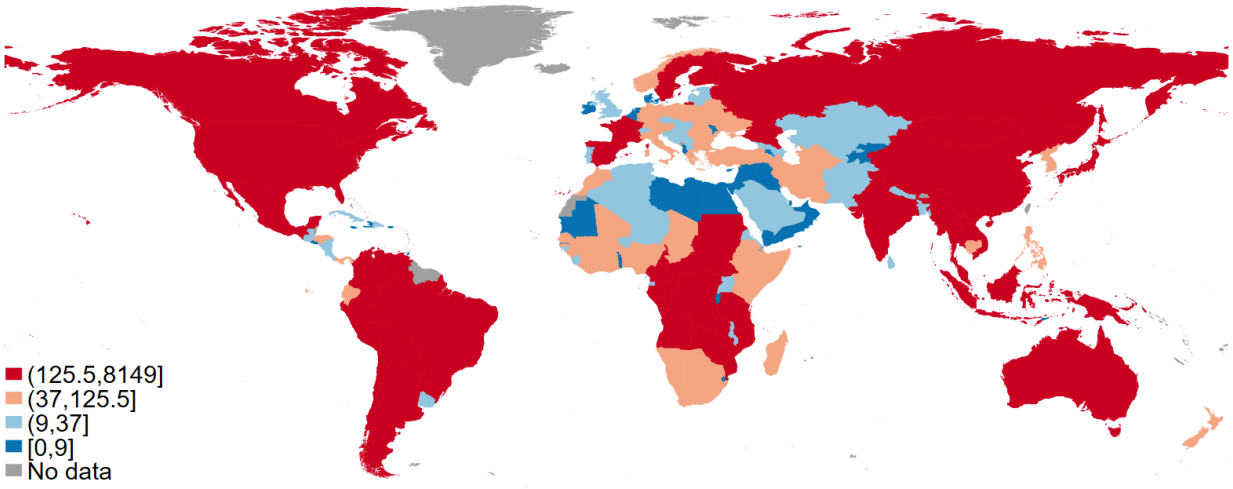
Source: International Trade Center. 2017. "List of exporters for the selected product (Product Code 24: Tobacco and manufactured tobacco substitutes). 2001-2016." Trade Map. Accessed September 6, 2017.

Figure 19: Correlation Matrix for Health Variables



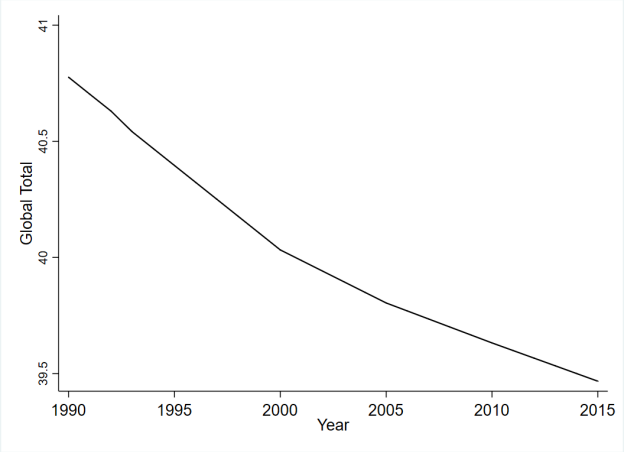
Note: Figure 19 shows the correlation matrix of variables used in the preceding section of the paper. Numbers designate percentages for correlations. The GPGs are unadjusted by any other variables, though some are presented in adjusted form in the paper.

Figure 20: Forest Area



Note: Figure 20 shows quartiles of the forest area in thousands of square kilometers for each country using the most recently available data from the World Bank.

Figure 21: Trends in Forest Area



Note: Figure 21 shows trends in total forest area in millions of square kilometers for all countries with available data from 1990 to 2015.

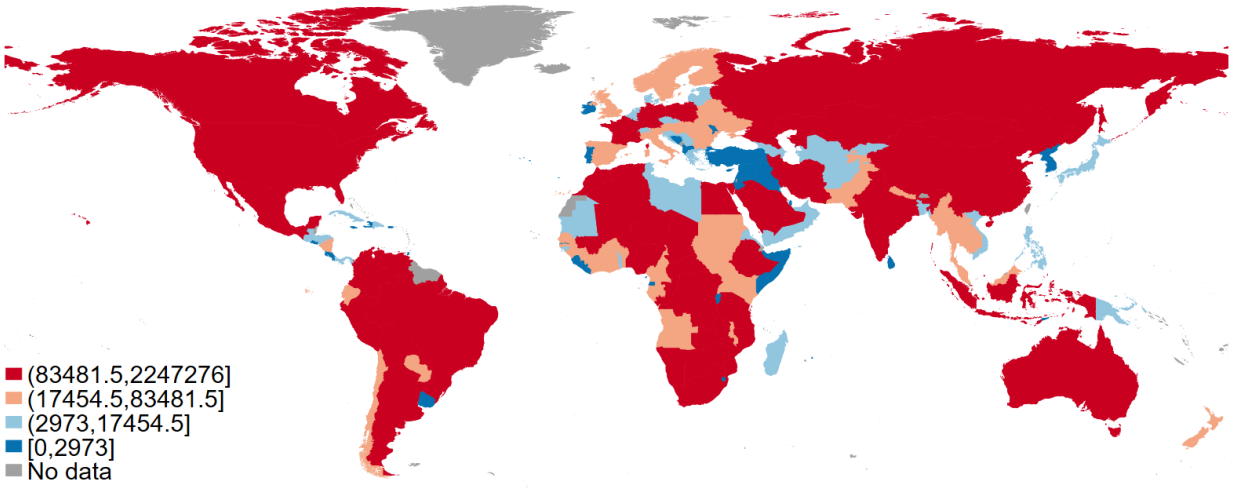
Table 9: Top 10 Countries

Rank	Country	Forest Area
1	Russian Federation	8149
2	Brazil	4935
3	Canada	3471
4	United States	3101
5	China	2083
6	Congo, Dem. Rep.	1526
7	Australia	1248
8	Indonesia	910
9	Peru	740
10	India	707

Note: Table 9 lists the top 10 countries in terms of forest area in thousands of sq.km.

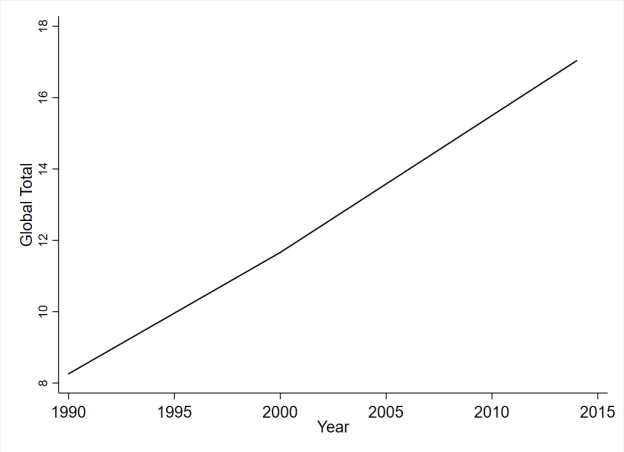
Source: World Bank. 2017. "Forest area (sq. km.) 1990-2015." World Bank Databank: World Development Indicators. Accessed July 11, 2017.

Figure 22: Terrestrial and Marine Protected Areas



Note: Figure 22 shows quartiles of the total terrestrial and marine protected areas in sq. km given the most recently available data from the World Bank's World Development Indicators. This is obtained by multiplying the percentage of country territorial area that is protected by country surface area.

Figure 23: Trends in Protected Areas



Note: Figure 23 shows trends in the quantity of total terrestrial and marine areas for all countries with available data in millions of sq. km.

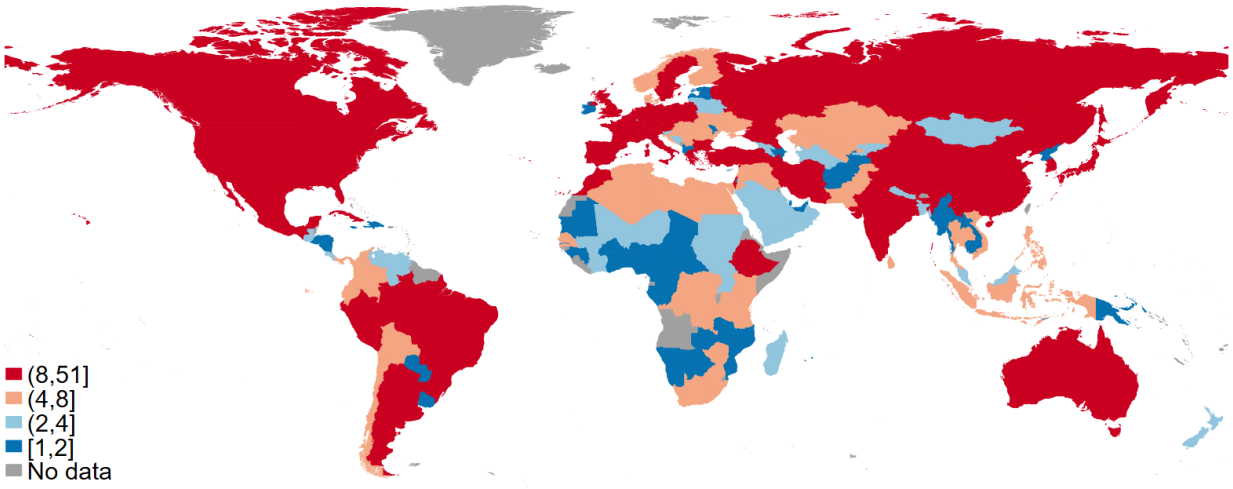
Table 10: Top 10 Countries

Rank	Country	Protected Areas
1	Australia	2247
2	Brazil	1735
3	Russian Federation	1496
4	China	1493
5	United States	1457
6	Canada	623
7	Saudi Arabia	607
8	Venezuela, RB	335
9	Zambia	285
10	Congo, Dem. Rep.	283

Note: Table 10 lists the top 10 countries in terms of terrestrial and marine areas in thousands of sq.km. This is obtained by multiplying the percentage of territorial area that is protected by country surface area.

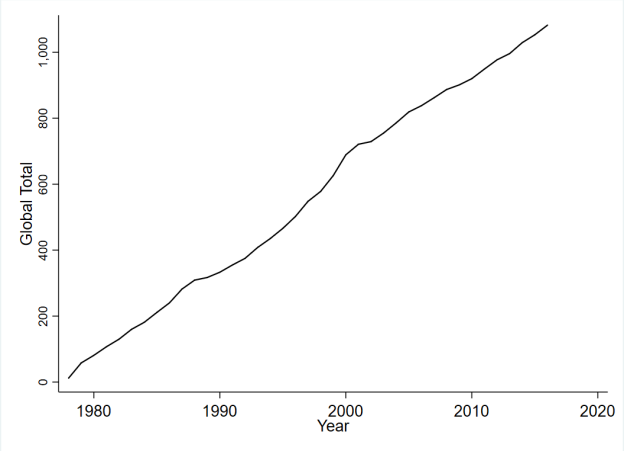
Source: World Bank. 2017. "Terrestrial and marine protected areas (% of total territorial area)." World Bank Databank: World Development Indicators. Accessed June 8, 2017.

Figure 24: World Heritage Sites



Note: Figure 24 shows quartiles of the total number of cultural, natural, or mixed UNESCO World Heritage Sites for each country according to the most recently available UNESCO data.

Figure 25: Trends in World Heritage Sites



Note: Figure 25 shows trends in global total number of cultural, natural, or mixed UNESCO World Heritage Sites over time using UNESCO data.

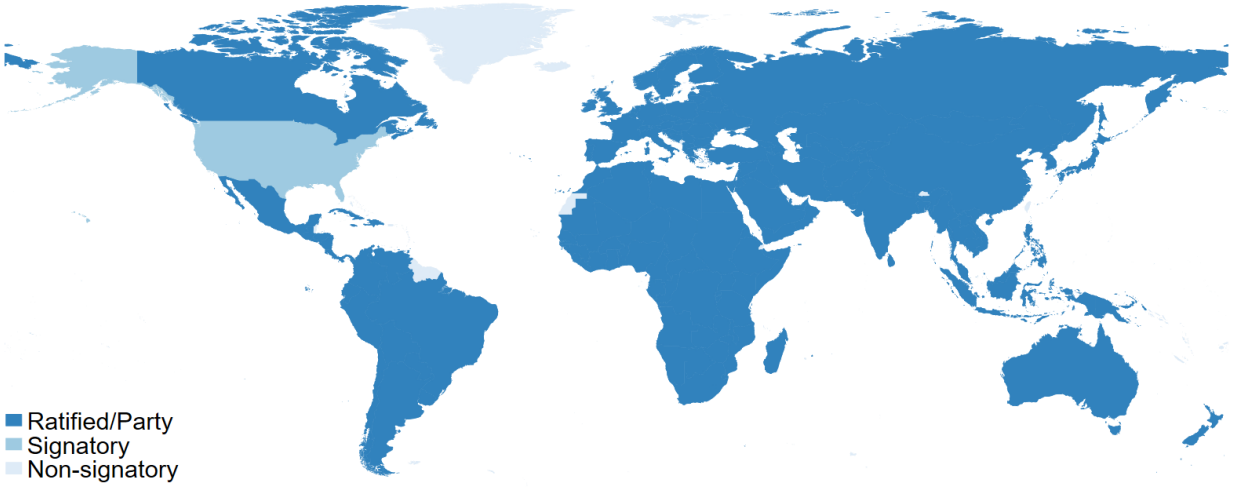
Table 11: Top 10 Countries

Rank	Country	World Heritage Sites
1	Italy	51
2	China	50
3	Spain	45
4	France	42
5	Germany	41
6	India	35
7	Mexico	34
8	United Kingdom	30
9	Russian Federation	26
10	United States	23

Note: Table 11 shows the top 10 countries in terms of the number of cultural, natural, or mixed UNESCO World Heritage Sites.

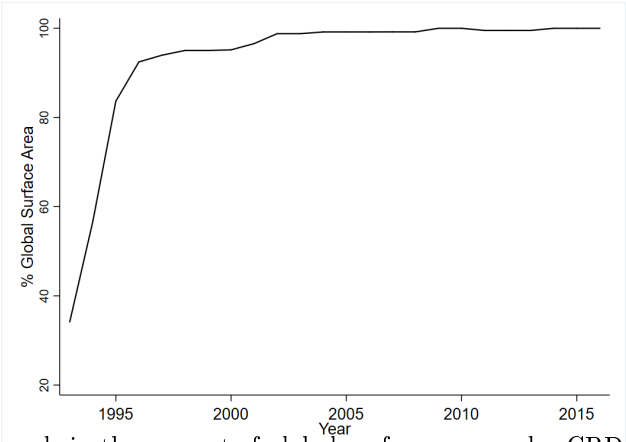
Source: United Nations Educational, Scientific and Cultural Organization. 2017. "World Heritage List". UNESCO. Accessed July 12, 2017.

Figure 26: Convention on Biological Diversity Participation



Note: Figure 26 shows the status of each country with reference to the Convention on Biological Diversity.

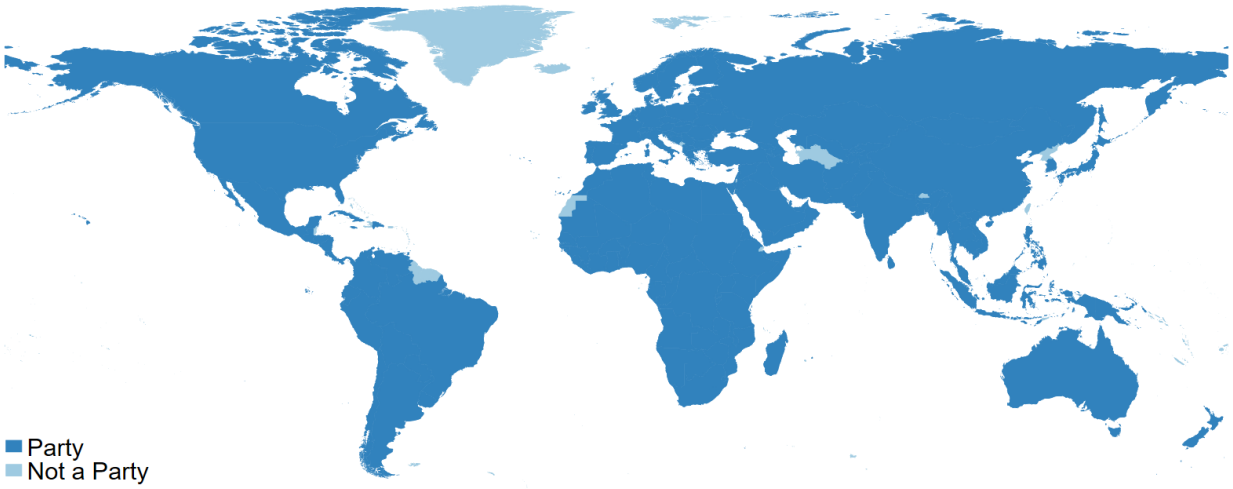
Figure 27: Trends in CBD Participation



Note: Figure 27 shows trends in the percent of global surface area under CBD. This is obtained by adding the number of parties to CBD, weighted by their share of global surface area, in a particular year. Parties refers to both signatories and full state parties.

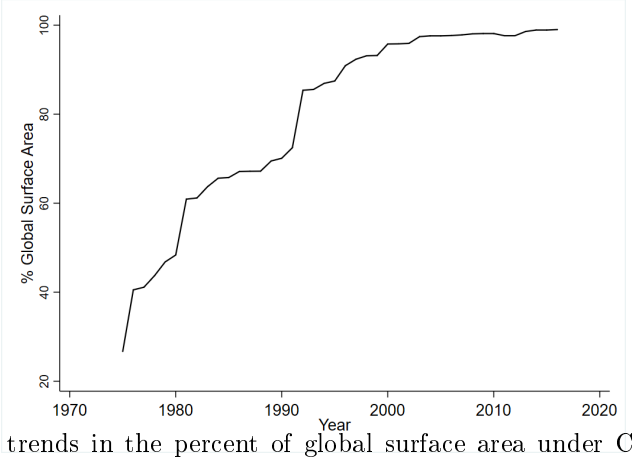
Source: Convention on Biological Diversity. 2017. "CBD List of Parties." CBD. Accessed July 5, 2017.

Figure 28: CITES Participation



Note: Figure 28 shows the status of each country with reference to the Convention on International Trade in Endangered Species of Wild Fauna and Flora.

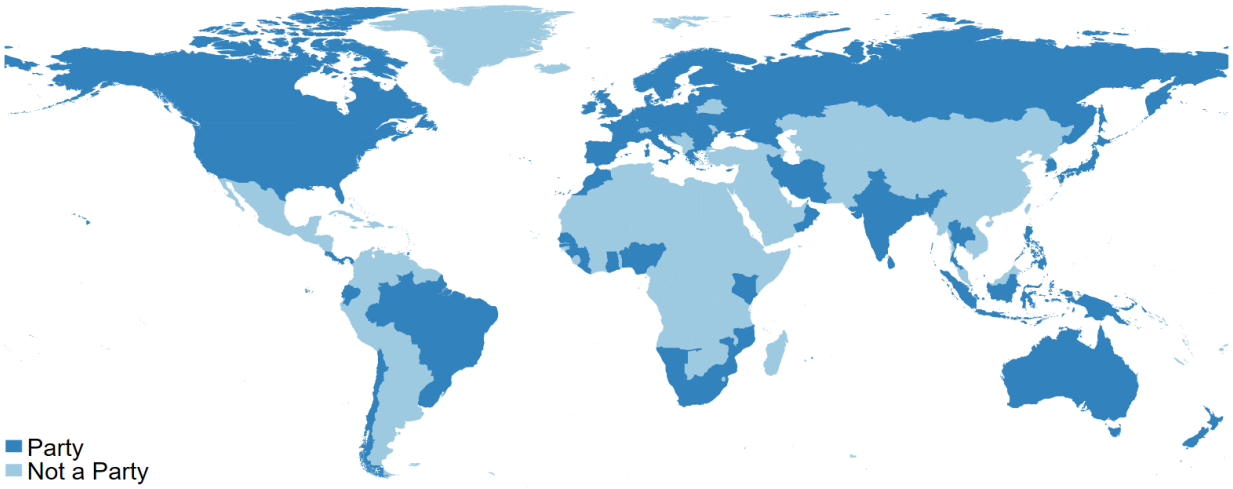
Figure 29: Trends in CITES Participation



Note: Figure 29 shows trends in the percent of global surface area under CITES. This is obtained by adding the number of parties to CITES, weighted by their share of global surface area, in a particular year.

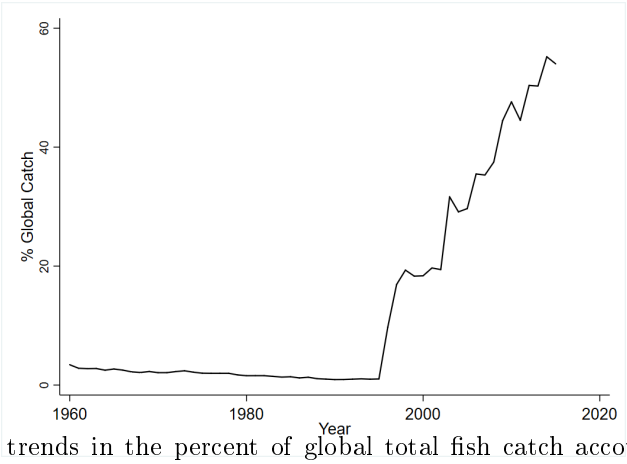
Source: Convention on International Trade in Endangered Species of Wild Fauna and Flora. 2017. "List of Contracting Parties." CITES. Accessed July 5, 2017.

Figure 30: Fish Stocks Agreement Participation



Note: Figure 30 shows the status of each country with reference to the UN Fish Stocks Agreement.

Figure 31: Trends in Fish Stocks Agreement Participation

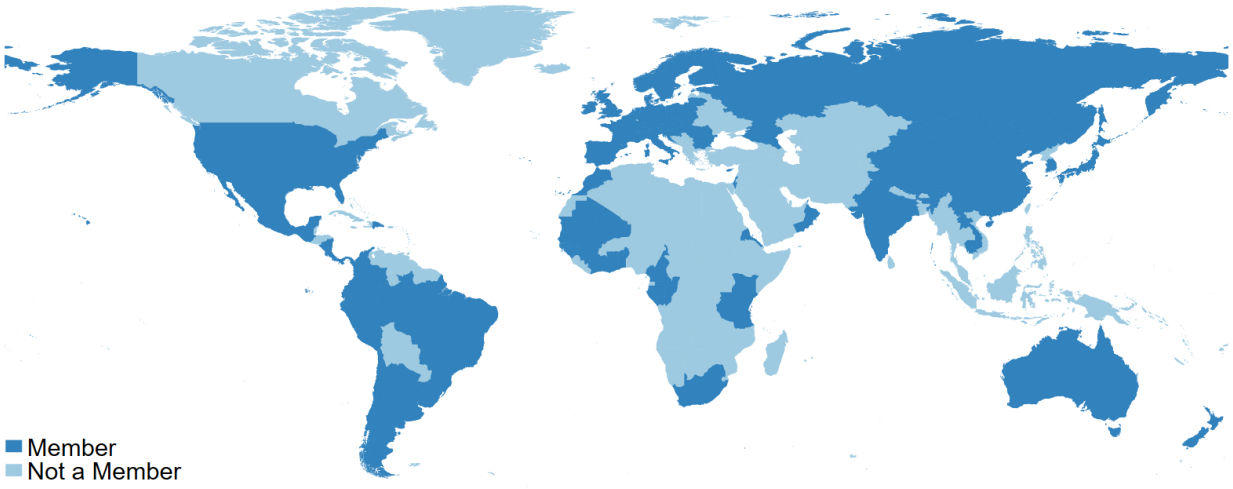


Note: Figure 31 shows trends in the percent of global total fish catch accounted for by parties to the UN Global Fish Stocks Agreement. This is obtained by adding the number of parties to the agreement, weighted by their share of the global fish catch, in a particular year. Fish catch is measured in tonnes based on FAO Global Capture Production data, and includes catch of marine, freshwater, and diadromous fishes caught in marine and inland environments.

Sources: United Nations Division for Ocean Affairs and the Law of the Sea. 2017. "Chronological lists of ratifications of, accessions and successions to the Convention and the related Agreements." Accessed January 25, 2017.

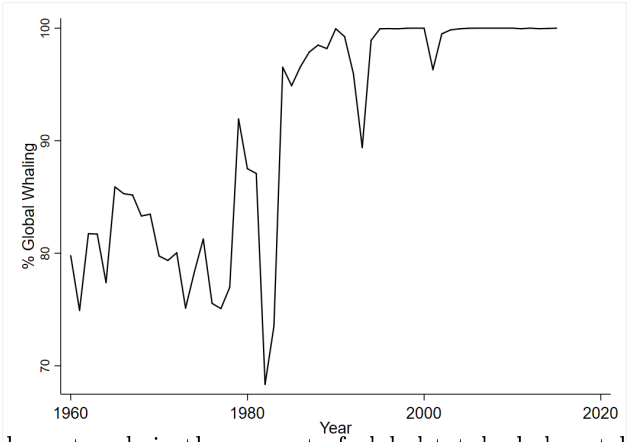
Food and Agriculture Organization. 2017. "Catch of marine, freshwater, and diadromous fishes caught in marine and inland environments 1950-2015." Global Capture Production. Accessed September 6, 2017.

Figure 32: International Whaling Commission Membership



Note: Figure 32 shows the status of each country with reference to membership of the the International Whaling Commission.

Figure 33: Trends in IWC Membership

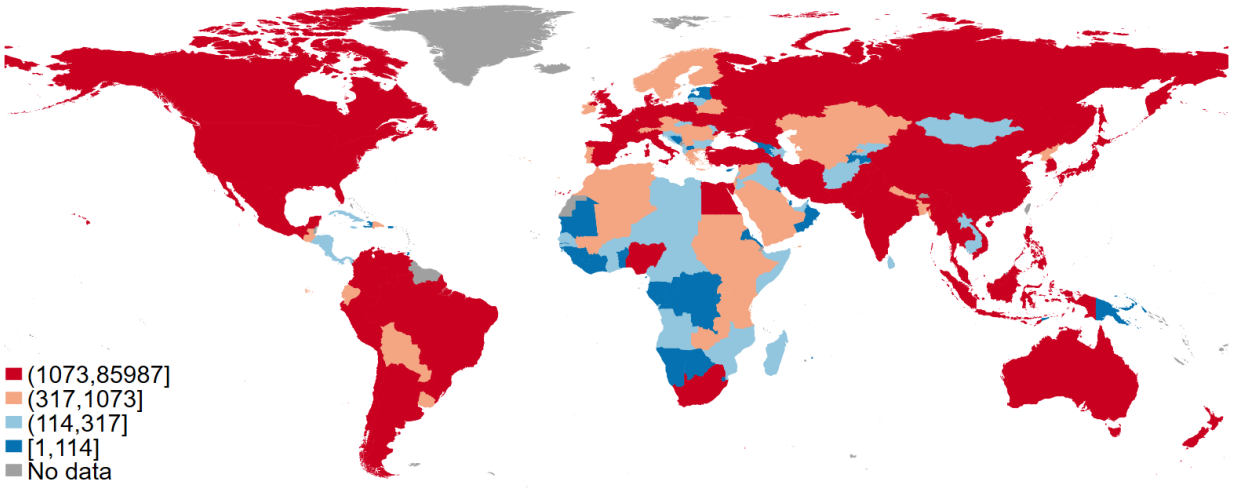


Note: Figure 33 shows shows trends in the percent of global total whale catch accounted for by members of the International Whaling Commission. This is obtained by adding the number of parties to the agreement, weighted by their share of the global whale catch, in a particular year. Whaling data is measured in number of whales based on FAO Global Capture Production data, and includes catch of sperm whales, fin whales, pilot whales, and blue whales.

Sources: International Whaling Commission. 2017. "Membership and Contracting Governments." IWC. Accessed July 10, 2017.

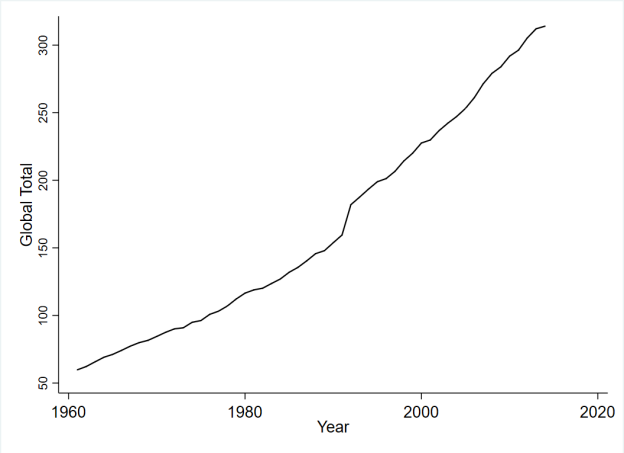
Food and Agriculture Organization. "Catch of sperm whales, fin whales, pilot whales, and blue whales 1950-2015." Global Capture Production. Accessed September 6, 2017.

Figure 34: Meat Production



Note: Figure 34 shows quartiles of the total meat production in thousands of tonnes from meat and livestock animals for each country using the most recently available data from the FAOSTAT database.

Figure 35: Trends in Meat Production



Note: Figure 35 shows trends in global total meat production in millions of tonnes from 1961-2014.

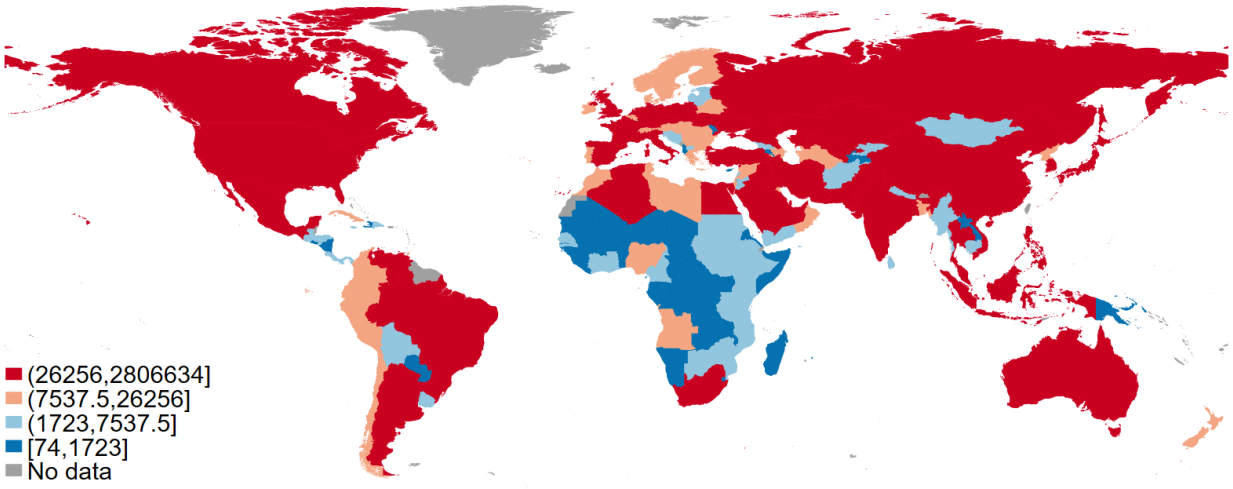
Table 12: Top 10 Countries

Rank	Country	Meat Prod.
1	China	85987
2	United States	42308
3	Brazil	26053
4	Russian Federation	8669
5	Germany	8288
6	India	6421
7	Mexico	6224
8	Spain	5733
9	France	5489
10	Argentina	5193

Note: Table 12 lists the top 10 countries in terms of meat production in thousands of tonnes, using the most recently available data.

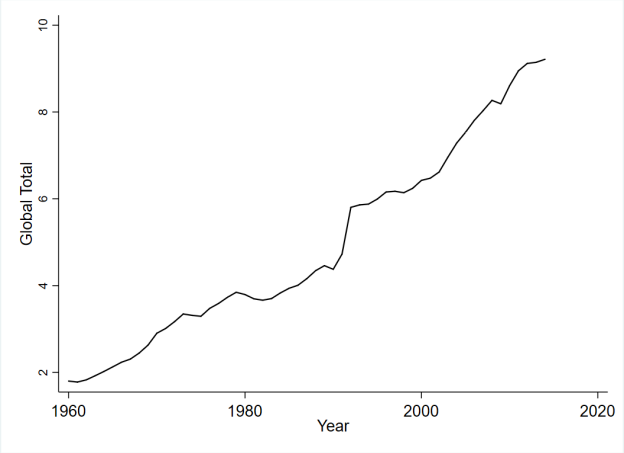
Sources: Food and Agriculture Organization. "Livestock primary for Meat(all forms) Production Quantity 1961-2014." FAOSTAT. Accessed July 11, 2017.

Figure 36: Carbon Dioxide Emissions



Note: Figure 36 shows quartiles of fossil fuel carbon dioxide emissions in thousands of tonnes of carbon from solid, liquid, and gas fuel consumption; cement production; and gas flaring for each country using the latest available data in the period 1751-2014.

Figure 37: Trends in CO_2 Emissions



Note: Figure 37 shows trends in global total carbon dioxide emissions in billions of tonnes of carbon.

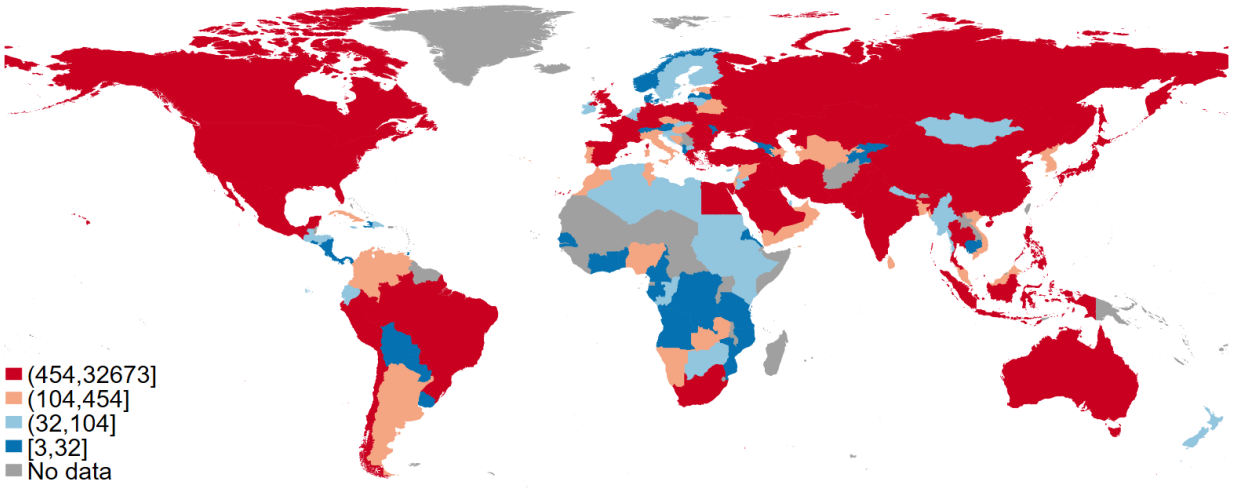
Table 13: Top 10 Countries

Rank	Country	Total Emissions
1	China	2807
2	United States	1433
3	India	610
4	Russian Federation	465
5	Japan	331
6	Germany	196
7	Iran, Islamic Rep.	177
8	Saudi Arabia	164
9	Korea, Rep.	160
10	Canada	146

Note: Table 13 lists the top 10 countries in terms of carbon dioxide emissions in millions of tonnes of carbon.

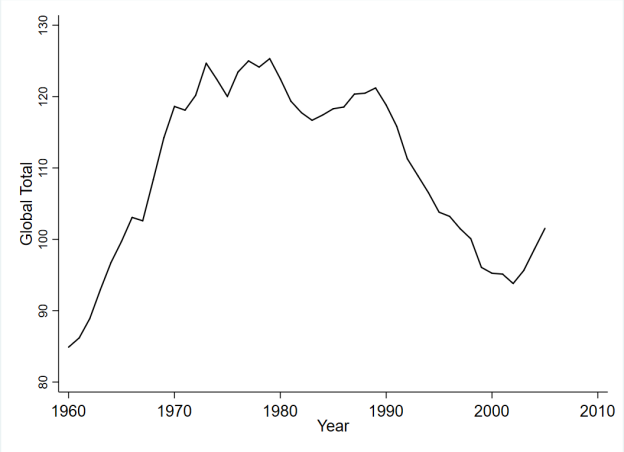
Source: Boden, T.A., Marland, G., and Andres, R.J. 2017. "National CO2 Emissions from Fossil-Fuel Burning, Cement Manufacture, and Gas Flaring: 1751-2014." Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy. Accessed July 6, 2017.

Figure 38: Sulfur Dioxide Emissions



Note: Figure 38 shows quartiles of anthropogenic sulfur dioxide emissions from all sources in gigagrams using the latest available data from the NASA Socioeconomic Data and Applications Center.

Figure 39: Trends in SO_2 Emissions



Note: Figure 39 shows trends in global total sulfur dioxide emissions in thousands of gigagrams.

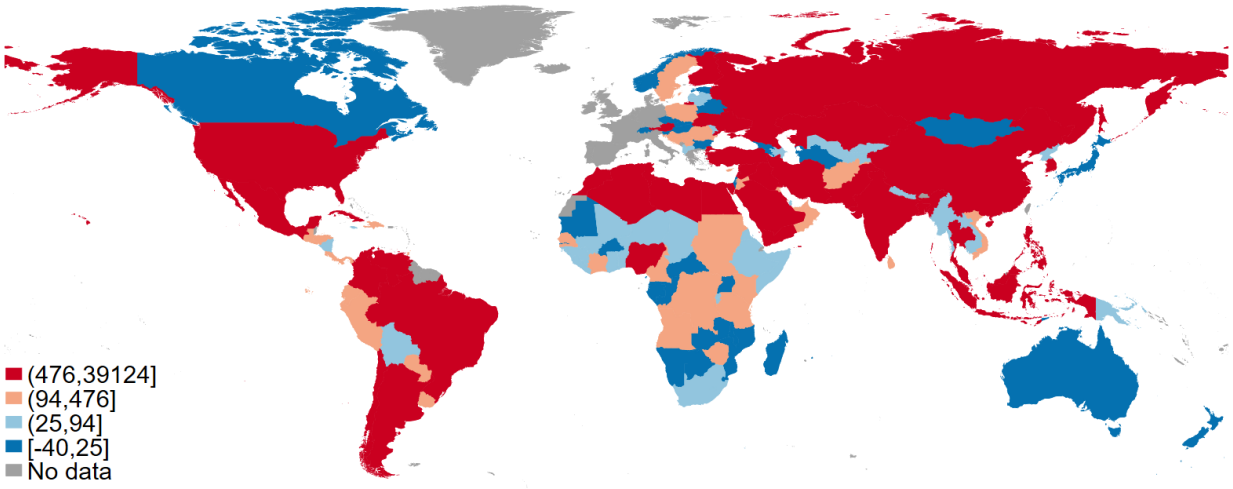
Table 14: Top 10 Countries

Rank	Country	Total Emissions
1	China	32673
2	United States	13106
3	India	6275
4	Russian Federation	5975
5	Kazakhstan	2581
6	Australia	2522
7	South Africa	2477
8	Mexico	2145
9	Canada	2024
10	Iran, Islamic Rep.	1598

Note: Table 14 lists the top 10 countries in terms of sulfur dioxide emissions in gigagrams.

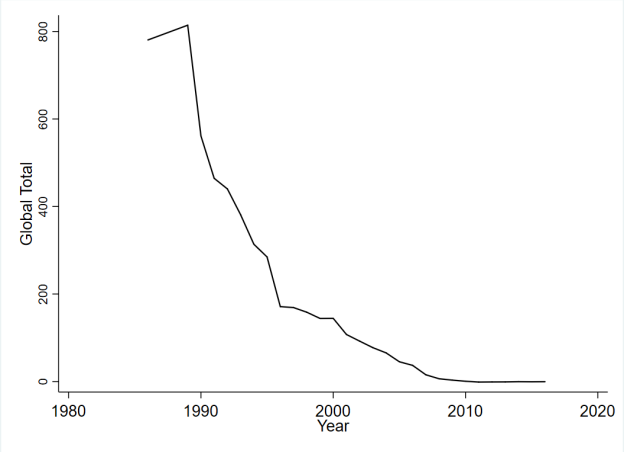
Source: Smith, S.J., J. van Aardenne, Z. Klimont, R.J. Andres, A. Volke, and S. Delgado Arias. 2011. "Anthropogenic Sulfur Dioxide Emissions, 1850-2005: National and Regional Data Set by Source Category, Version 2.86." Data distributed by the NASA Socioeconomic Data and Applications Center (SEDAC), CIESIN, Columbia University, Palisades, New York. Accessed November 7, 2017.

Figure 40: Chlorofluorocarbon Consumption



Note: Figure 40 shows quartiles of chlorofluorocarbon consumption in ODP tonnes for each country using the latest available data in 2000 from the United Nations Environment Programme. ODP tonnes are a product of the metric tonnage of a substance and its ozone depleting potential (ODP). CFC use has fallen dramatically as a result of regulations such as the Montreal Protocol, although existing CFC banks continue to affect the environment.

Figure 41: Trends in CFC Consumption



Note: Figure 41 shows trends in global total CFC consumption in thousands of ODP tonnes.

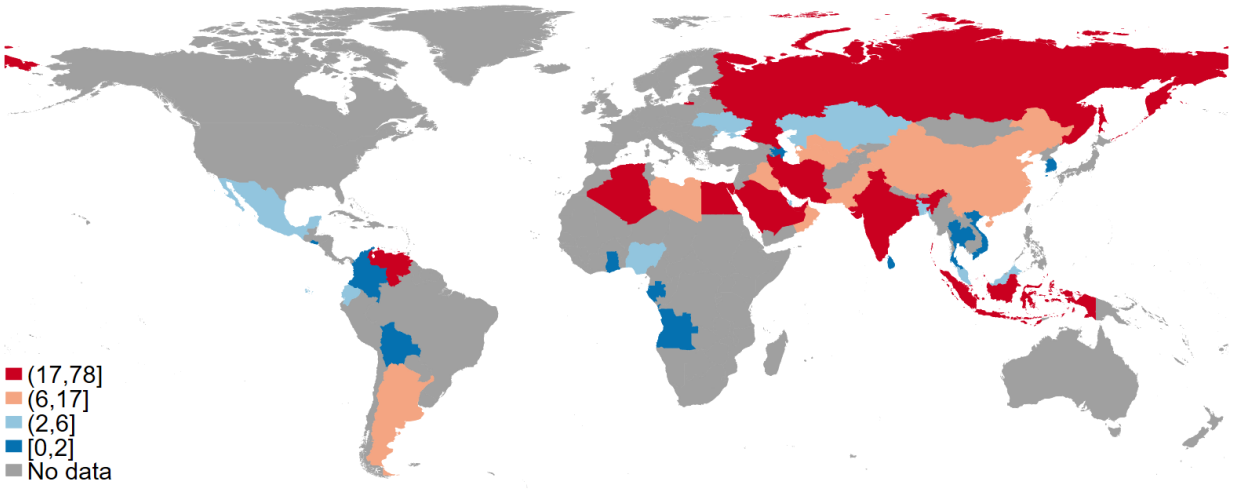
Table 15: Top 10 Countries

Rank	Country	CFCs
1	China	39124
2	Russian Federation	23821
3	Brazil	9275
4	Korea, Rep.	7395
5	India	5614
6	Indonesia	5411
7	Iran, Islamic Rep.	4157
8	Nigeria	4095
9	Thailand	3568
10	Mexico	3060

Note: Table 15 lists the top 10 countries in terms of CFC consumption in ODP tonnes in 2000.

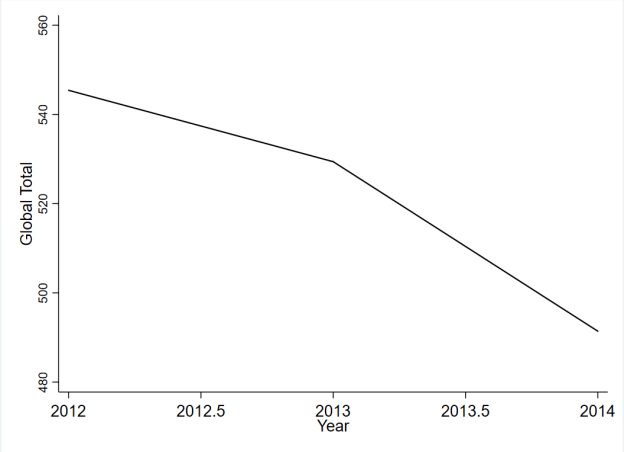
Source: United Nations Environment Programme. 2017. "Data Access Centre: ODS Consumption 1986-2016; Annex A Group I; Parties: All; Ignore non-reported values." Accessed November 7, 2017.

Figure 42: Fuel Subsidies



Note: Figure 42 shows quartiles of the subsidies for oil, electricity, gas and coal combined in real 2013 billion USD given the most recently available data from the World Energy Outlook.

Figure 43: Trends in Fossil Fuel Subsidies



Note: Figure 43 shows trends in total fossil fuel subsidies in real 2013 billion USD for all countries with available data from 2012-2014.

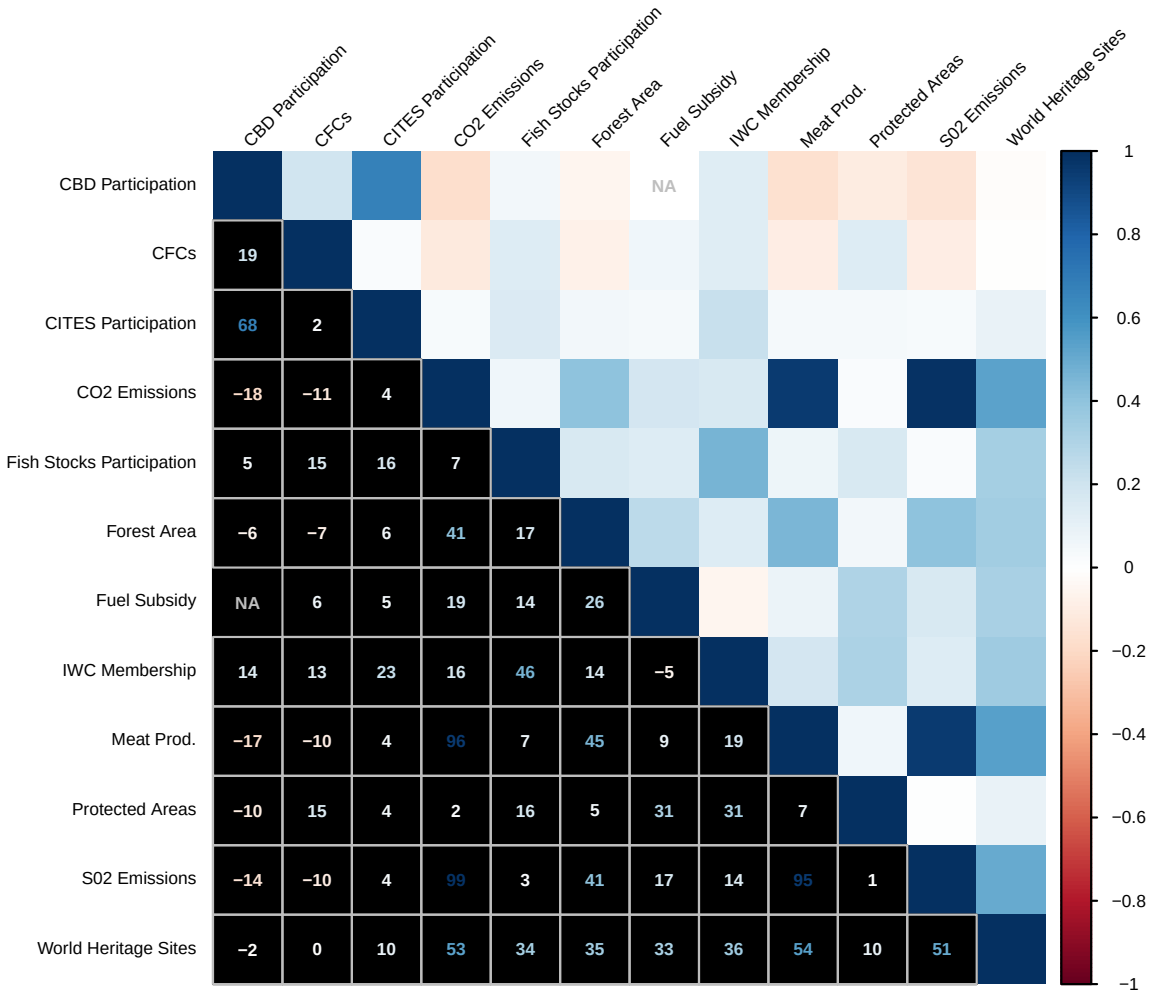
Table 16: Top 10 Countries

Rank	Country	Fuel Subsidy
1	Iran, Islamic Rep.	78
2	Saudi Arabia	71
3	Russian Federation	40
4	India	38
5	Venezuela, RB	31
6	Indonesia	28
7	Egypt, Arab Rep.	23
8	Algeria	20
9	United Arab Emirates	18
10	China	17

Note: Table 16 lists the top 10 countries in terms of the latest value of fossil fuel subsidies available, measured in real 2013 billion USD.

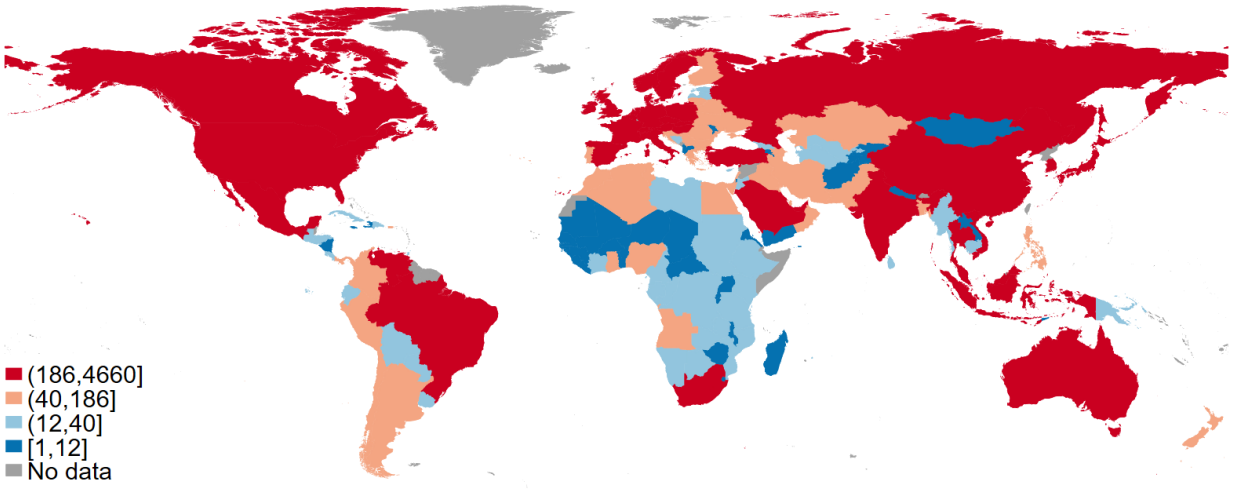
Source: International Energy Agency. 2015."Fossil Fuel Subsidies 2012-2014." World Energy Outlook. Accessed July 12, 2017.

Figure 44: Correlation Matrix for Environment Variables



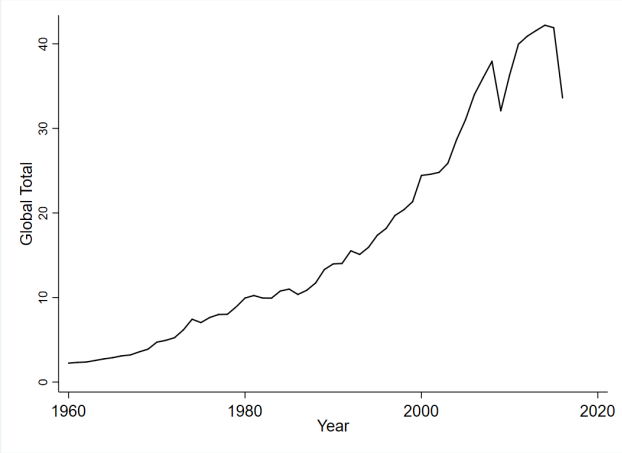
Note: Figure 44 shows the correlation matrix of variables used in the preceding section of the paper. Numbers designate percentages for correlations. The GPGs are unadjusted by any other variables, though some are presented in adjusted form in the paper.

Figure 45: Trade



Note: Figure 45 shows quartiles of the amount of trade in constant 2010 USD billions for each country given the most recently available data from the World Bank's World Development Indicators. This is obtained by multiplying the amount of trade as a percent of GDP by GDP for all countries.

Figure 46: Trends in Trade



Note: Figure 46 shows trends in total trade in constant 2010 USD trillion. This is obtained by multiplying the amount of trade as a percent of GDP by GDP for all countries.

Table 17: Top 10 Countries

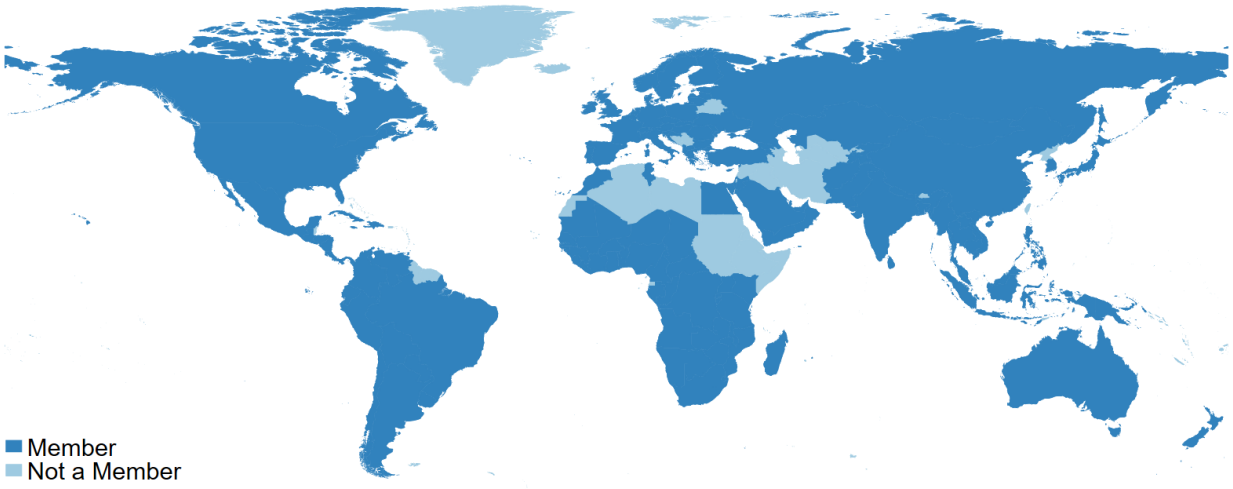
Rank	Country	Trade
1	United States	4660
2	China	3522
3	Germany	3190
4	Japan	2131
5	France	1703
6	United Kingdom	1599
7	Netherlands	1342
8	Italy	1177
9	Canada	1173
10	Korea, Rep.	1013

Note: Table 17 lists the top 10 countries in terms of trade measured in billion constant 2010 USD. This is obtained by multiplying the amount of trade as a percent of GDP by GDP.

Sources: World Bank. 2017. "Trade (% of GDP) 1990-2015." World Bank Databank: World Development Indicators. Accessed June 8, 2017.

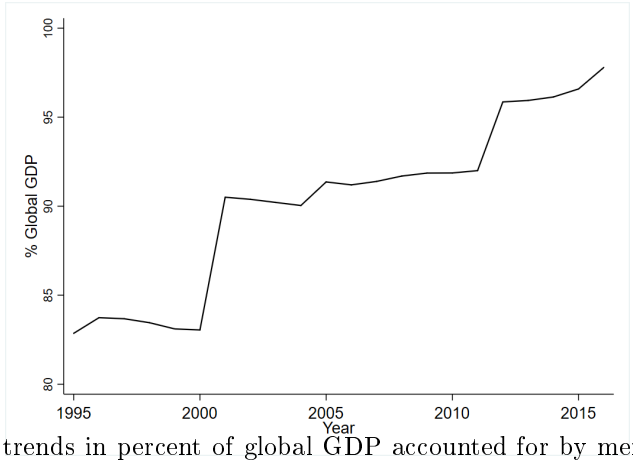
World Bank. 2018. "GDP (Constant 2010 US $)." World Bank Databank: World Development Indicators. Accessed February 8, 2018.

Figure 47: WTO Membership



Note: Figure 47 shows the current status of each country with reference to membership in the World Trade Organization.

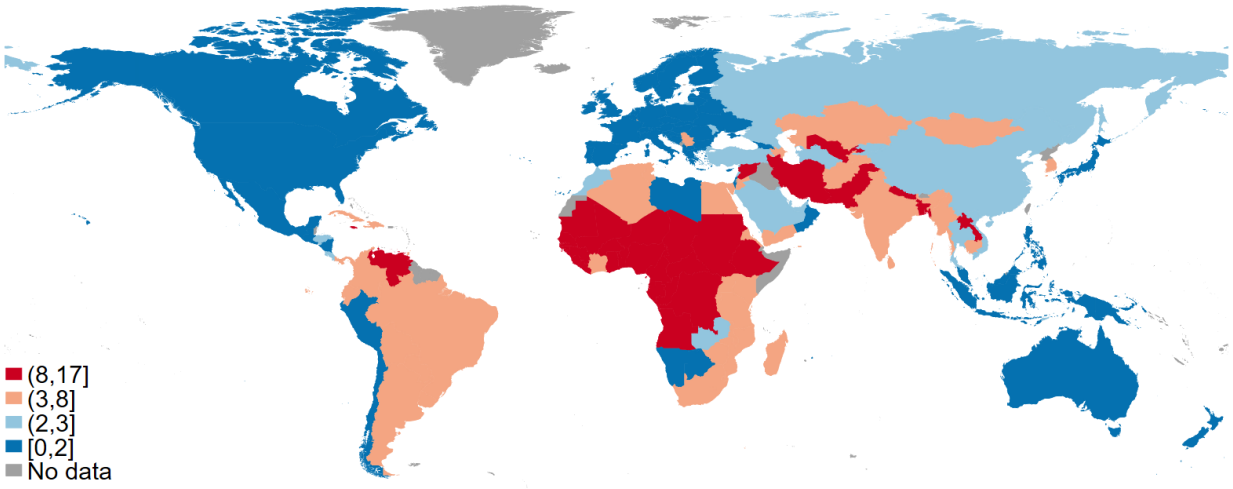
Figure 48: Trends in WTO Membership



Note: Figure 48 shows trends in percent of global GDP accounted for by members of the WTO. This is obtained by adding the number of members of the WTO, weighted by their share of global GDP, in a particular year.

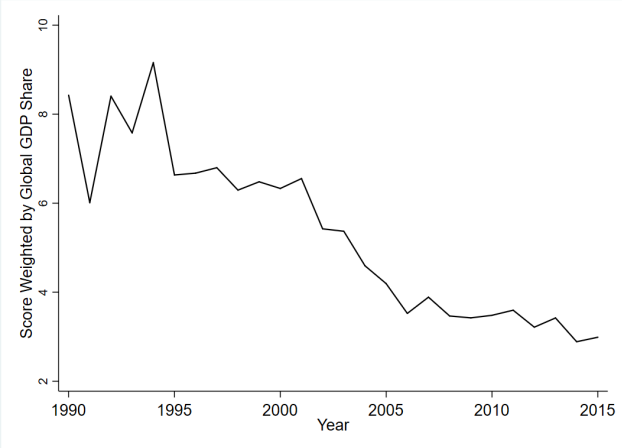
Source: World Trade Organization. 2017. "Members and Observers." WTO. Accessed July 10, 2017.

Figure 49: Tariff Rate



Note: Figure 49 shows quartiles of the applied, weighted mean of the tariff rate across all products for each country given the most recently available data from the World Bank.

Figure 50: Trends in Tariffs



Note: Figure 50 shows trends in average tariff rates, weighted by country share of global GDP. Outliers of tariff rates higher than 100 are removed from the sample.

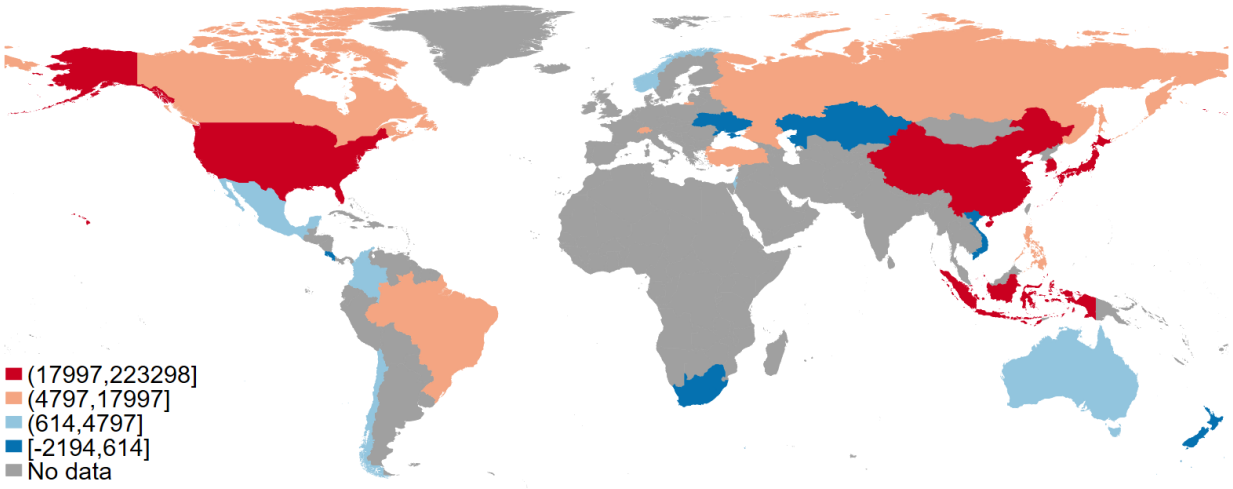
Table 18: Top 10 Countries

Rank	Country	Avg. Tariff
1	China	3
2	India	6
3	United States	2
4	Brazil	8
5	Iran, Islamic Rep.	15
6	Russian Federation	3
7	Nigeria	10
8	Pakistan	10
9	Korea, Rep.	5
10	Egypt, Arab Rep.	7

Note: Table 18 lists the top 10 countries in terms of the average tariff imposed, weighted by GDP. The value displayed is the average tariff.

Source: World Bank. 2017. "Tariff rate, applied, simple mean, all products (%)." World Bank Databank: World Development Indicators. Accessed June 8, 2017.

Figure 51: Agricultural Support



Note: Figure 51 shows quartiles of the Agricultural Total Support Estimate for each country, the sum of producer, consumer, and general services support estimates in millions USD using the most recently available data from the OECD. The data does not list European Union countries individually, so they are excluded from the map but included in Figure 52 and Table 19.

Figure 52: Trends in Agricultural Support

Note: Figure 52 shows trends in total TSE values in billions USD.

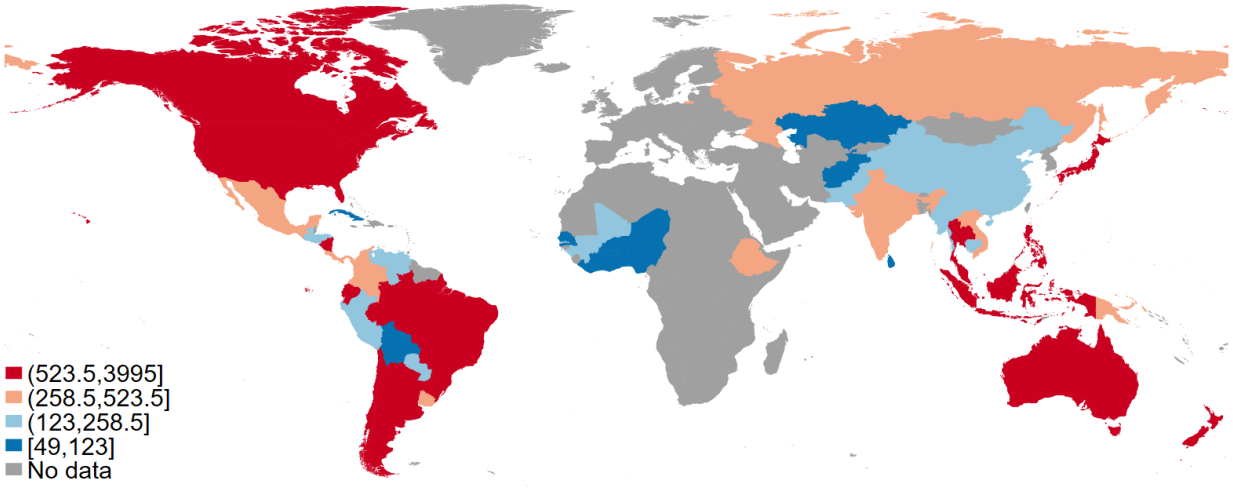
Table 19: Top 10 Countries

Rank	Country	Ag. Support
1	China	223298
2	European Union	100910
3	United States	82153
4	Japan	45571
5	Indonesia	35684
6	Korea, Rep.	20735
7	Turkey	17997
8	Russian Federation	12514
9	Brazil	9635
10	Switzerland	7262

Note: Table 19 lists the top 10 countries in terms of the value of the Total Support Estimate as measured in millions USD using the most recently available data.

Source: Organisation for Economic Co-operation and Development. 2017. "Agricultural support (indicator)". OECD. Accessed November 9, 2017. doi: 10.1787/6ea85c58-en

Figure 53: Number of Non-Tariff Barriers



Note: Figure 53 shows quartiles of the total number of non-tariff measures in place for each country according to the most recent data from UNCTAD. Although measures are not comparable, according to UNCTAD, we sum them to provide a rough measure of industrial protecrion.

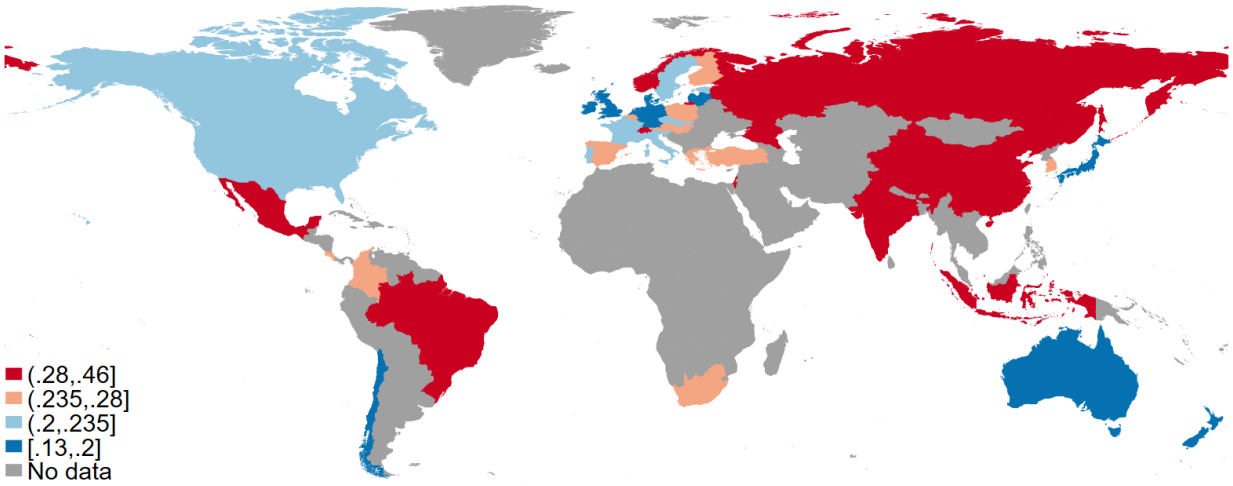
Table 20: Top 10 Countries

Rank	Country	No. of NTMs
1	United States	3995
2	China	251
3	Japan	900
4	Brazil	934
5	India	266
6	Australia	1707
7	Russian Federation	458
8	Indonesia	573
9	Thailand	1088
10	Canada	657

Note: Table 20 lists the top 10 countries in terms of the number of Non-Tariff measures in place, weighted by GDP. The value displayed is the number of NTMs. This does not include the European Union, since the dataset does not list NTMs by individual EU countries.

Source: United Nations Conference on Trade and Development (UNCTAD). 2017. "Tables by Countries." TRAINS: The global database on Non-Tariff Measures. Accessed July 12, 2017.

Figure 54: Services Trade Restrictiveness Index



Note: Figure 54 shows quartiles of the average across sectors of the Services Trade Restrictiveness Index for each country using the most recently available data from OECD. Values are between 0 and 1.

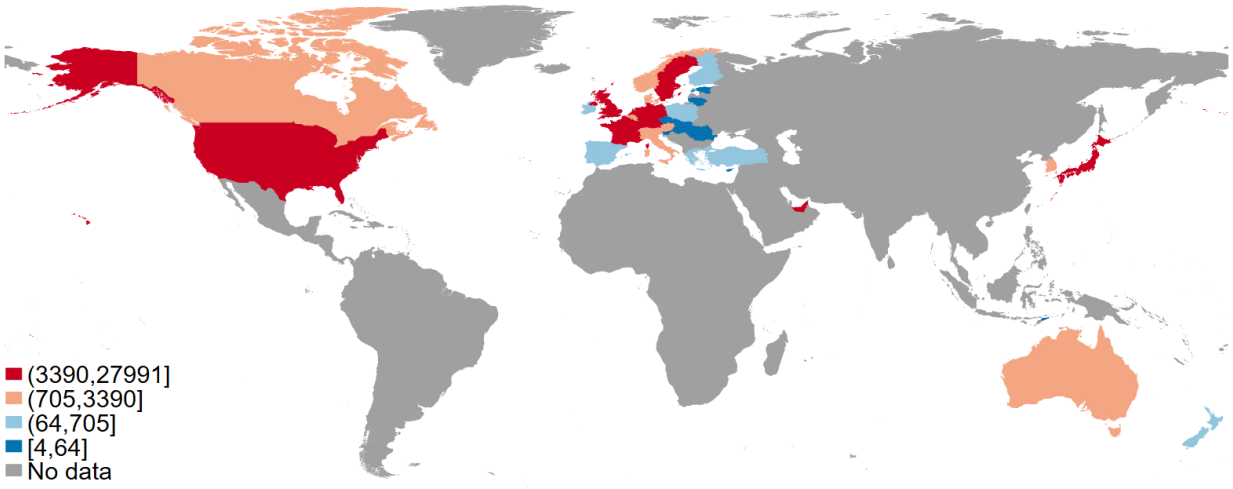
Table 21: Top 10 Countries

Rank	Country	STRI Score
1	China	.4
2	United States	.23
3	India	.46
4	Russian Federation	.41
5	Indonesia	.44
6	Brazil	.32
7	Japan	.19
8	Germany	.18
9	Mexico	.31
10	France	.23

Note: Table 21 lists the top 10 countries in terms of the average value of the Services Trade Restrictiveness Index across all sectors, weighted by GDP. The value displayed is the mean STRI score.

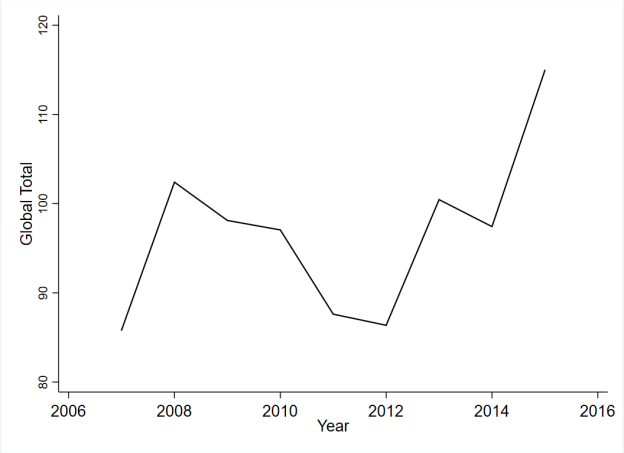
Source: OECD. 2017. "Services Trade Restrictiveness Index 2014-2016." OECD Stat. Accessed July 27, 2017.

Figure 55: Bilateral ODA



Note: Figure 55 shows quartiles of total commitments in bilateral ODA for each country in real 2015 million USD using the most recently available data from the OECD.

Figure 56: Trends in Bilateral ODA



Note: Figure 56 shows trends in total bilateral ODA in real 2015 billions USD from 2007 to 2015.

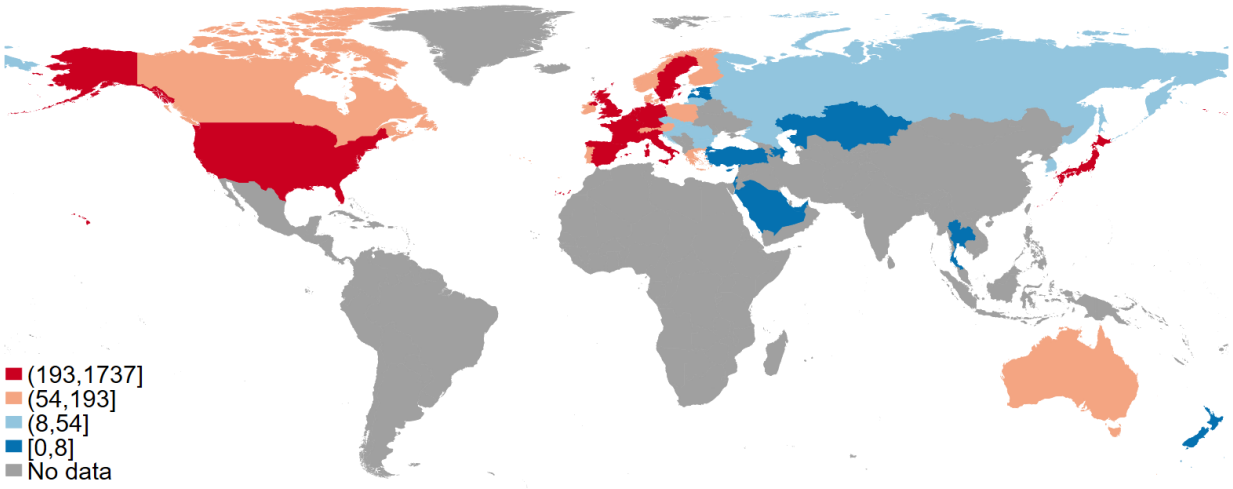
Table 22: Top 10 Countries

Rank	Country	Bilat. ODA
1	United States	27991
2	Japan	18964
3	Germany	15399
4	United Kingdom	8482
5	France	7849
6	United Arab Emirates	5854
7	Netherlands	4667
8	Sweden	4202
9	Norway	3390
10	Canada	2627

Note: Table 22 lists the top 10 countries in terms of bilateral ODA, using the most recently available OECD data, and in units of real 2015 million USD.

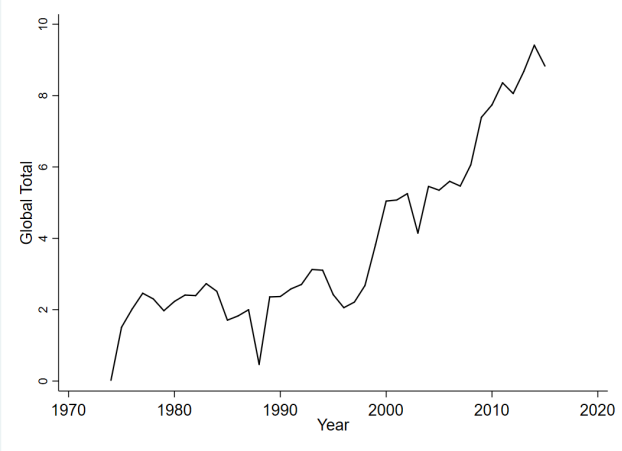
Source: OECD. 2017. "Table 3a." OECD. Accessed July 12, 2017.

Figure 57: Multilateral ODA



Note: Figure 57 shows quartiles of total commitments in imputed multilateral ODA for each country at constant 2015 prices in million USD using the most recently available data from the OECD.

Figure 58: Trends in Multilateral ODA



Note: Figure 58 shows trends in total imputed multilateral ODA in real 2015 billions USD from 1974 to 2015.

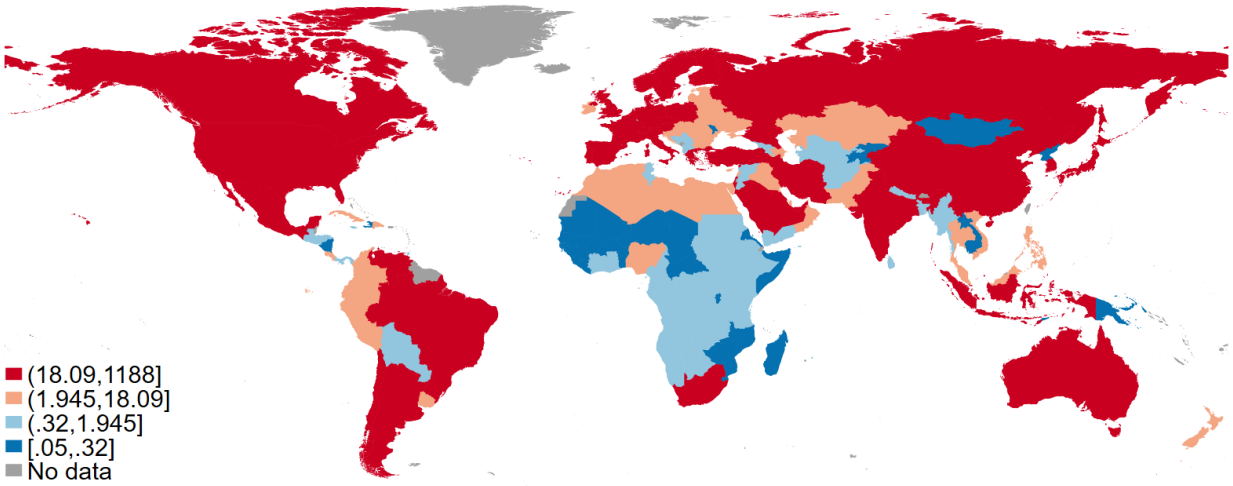
Table 23: Top 10 Countries

Rank	Country	Multilat. ODA
1	United Kingdom	1737
2	Germany	1178
3	France	1110
4	United States	813
5	Italy	684
6	Spain	381
7	Netherlands	378
8	Japan	368
9	Sweden	367
10	Belgium	232

Note: Table 23 lists the top 10 countries in terms of imputed multilateral ODA, using the most recently available OECD data, and in units of real 2015 million USD.

Source: OECD. 2017. "Table 2a." OECD. Accessed July 12, 2017.

Figure 59: Contribution to UN Budget



Note: Figure 59 shows quartiles of the contribution of each country in USD millions to the 2016-2018 UN budget. This is calculated by multiplying the percentage contribution of each country to the UN budget by the 2016-2017 programme budget, which is $5.4 billion.

Table 24: Top 10 Countries

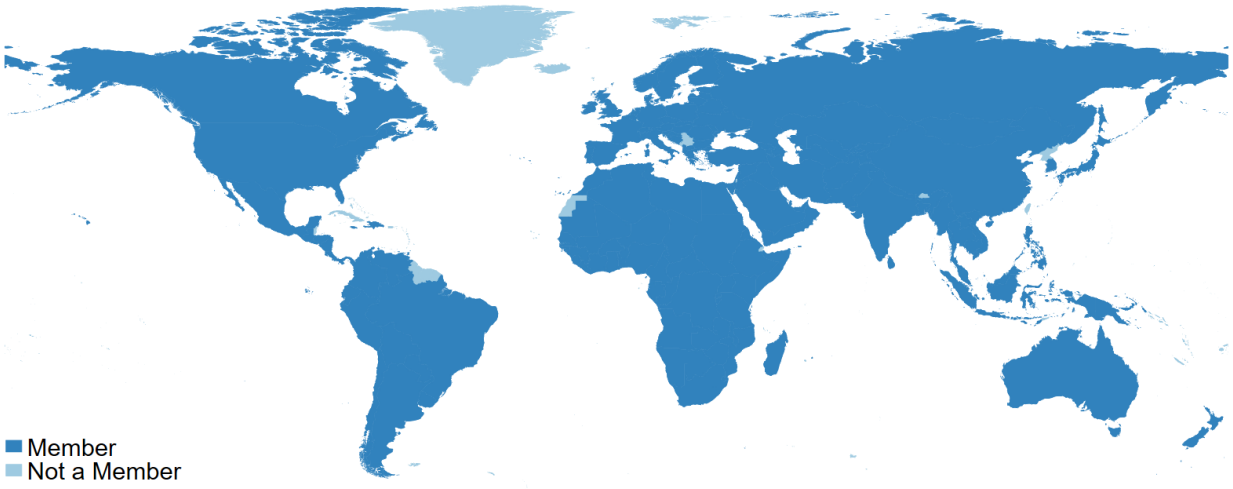
Rank	Country	UN Budget
1	United States	1188
2	Japan	523
3	China	428
4	Germany	345
5	France	262
6	United Kingdom	241
7	Brazil	206
8	Italy	202
9	Russian Federation	167
10	Canada	158

Note: Table 24 lists the top 10 countries in terms of their contribution in USD millions to the United Nations 2016-18 budget using the above calculation.

Sources: United Nations General Assembly. 2015. "Seventieth session: Agenda item 147: Scale of assessments for the apportionment of the expenses of United Nations peacekeeping operations." Accessed July 14, 2017.

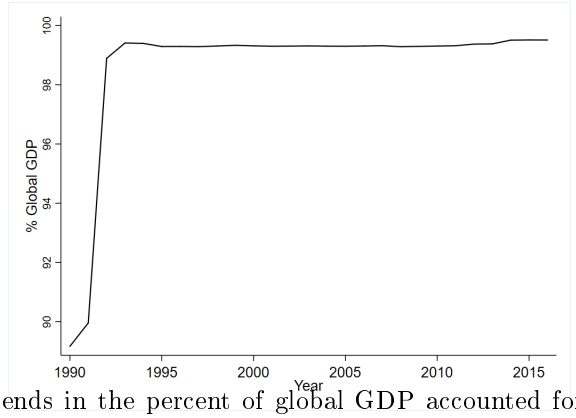
United Nations General Assembly. 2016. "Resolutions adopted by the General Assembly on 23 December 2015: 70/247. Programme budget for the biennium 2016-2017." Accessed November 9, 2017.

Figure 60: IMF Membership



Note: Figure 60 shows the status of each country with reference to membership of the International Monetaary Fund.

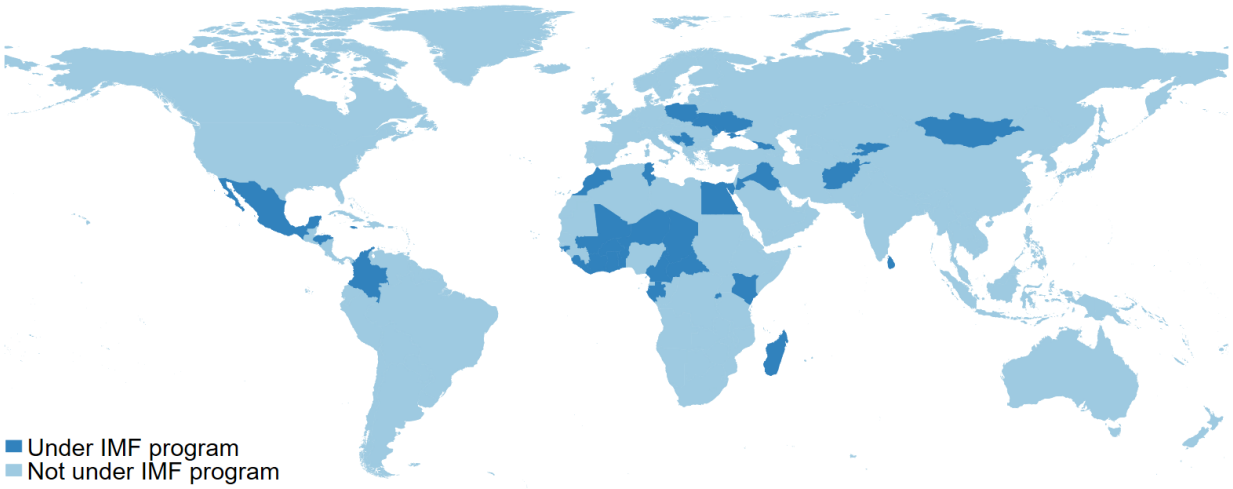
Figure 61: Trends in IMF Membership



Note: Figure 61 shows trends in the percent of global GDP accounted for by members of the IMF for all countries with available data. This is obtained by adding the number of current IMF members, weighted by their share of global GDP, in a particular year. As a result, this does not account for a few countries that left the Fund briefly and were readmitted, such as Poland, or countries that left the Fund permanently, such as Cuba.

Source: International Monetary Fund. 2017. "List of Members." IMF. Accessed July 5, 2017.

Figure 62: Under IMF Program Status



Note: Figure 62 shows whether or not a country currently is a borrower from the International Monetary Fund.

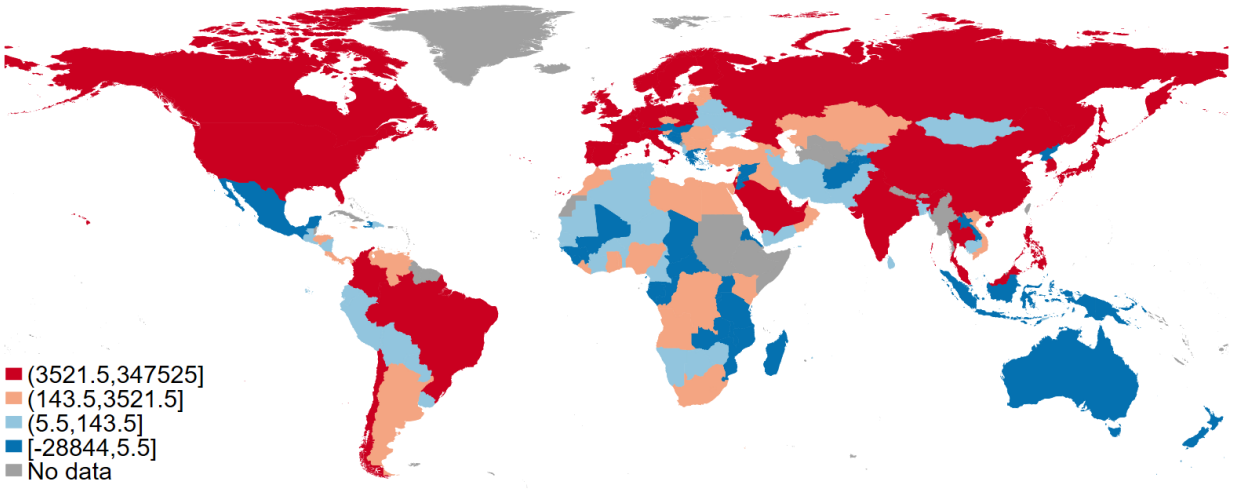
Table 25: Top 10 Countries

Rank	Country	GDP
1	Mexico	2147
2	Egypt, Arab Rep.	987
3	Poland	987
4	Colombia	639
5	Iraq	598
6	Ukraine	327
7	Morocco	260
8	Sri Lanka	242
9	Kenya	142
10	Tunisia	123

Note: Table 25 lists the top 10 countries currently borrowing from the IMF by GDP measured in PPP-adjusted constant 2011 international billion USD.

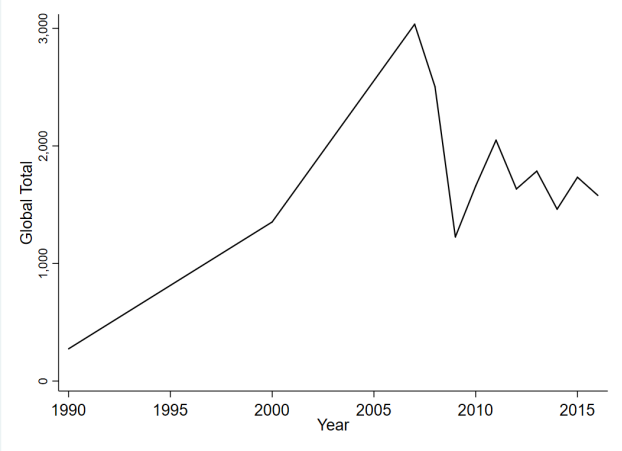
Source: International Monetary Fund. 2017. "IMF Lending Arrangements as of June 30, 2017." IMF. Accessed July 11, 2017.

Figure 63: FDI Net Outflows



Note: Figure 63 shows quartiles of net outflows of foreign direct investment in current USD millions using the most recent data from the World bank's World Development Indicators.

Figure 64: Trends in FDI



Note: Figure 64 shows trends in total FDI over time in current billions USD.

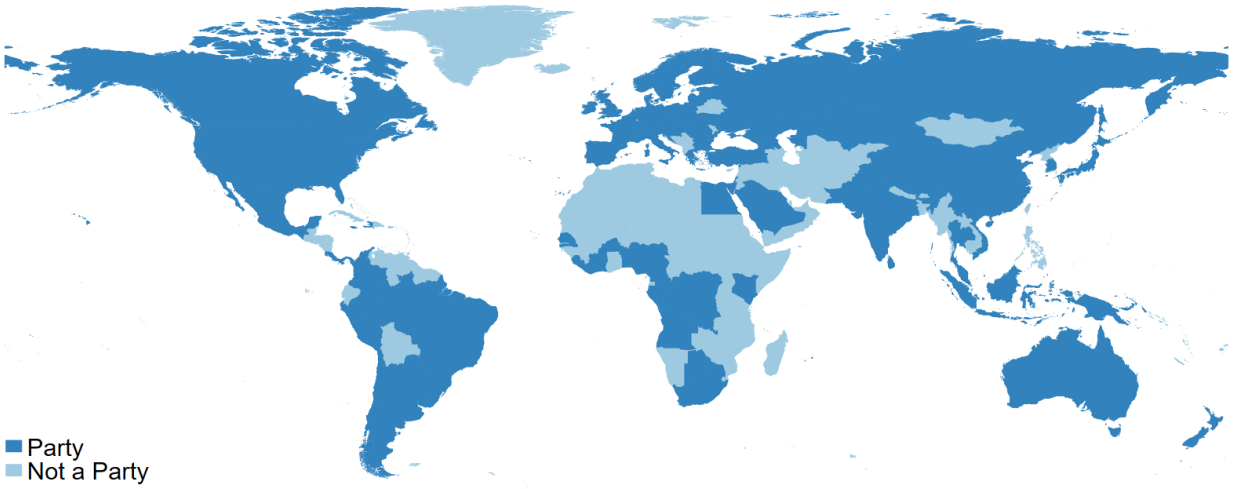
Table 26: Top 10 Countries

Rank	Country	FDI
1	United States	348
2	China	217
3	Japan	170
4	Netherlands	140
5	Ireland	102
6	Germany	76
7	Hong Kong SAR, China	71
8	Canada	64
9	France	60
10	Spain	54

Note: Table 26 lists the top 10 countries in terms of FDI net outflows in current billions USD using the most recently available data from the World Bank.

Source: World Bank. 2017. "Foreign direct investment, net outflows (BoP, current US$)." World Bank Databank: World Development Indicators. Accessed July 11, 2017.

Figure 65: Membership in BEPS Inclusive Framework



Note: Figure 65 shows the status of each country regarding the BEPS Inclusive Framework.

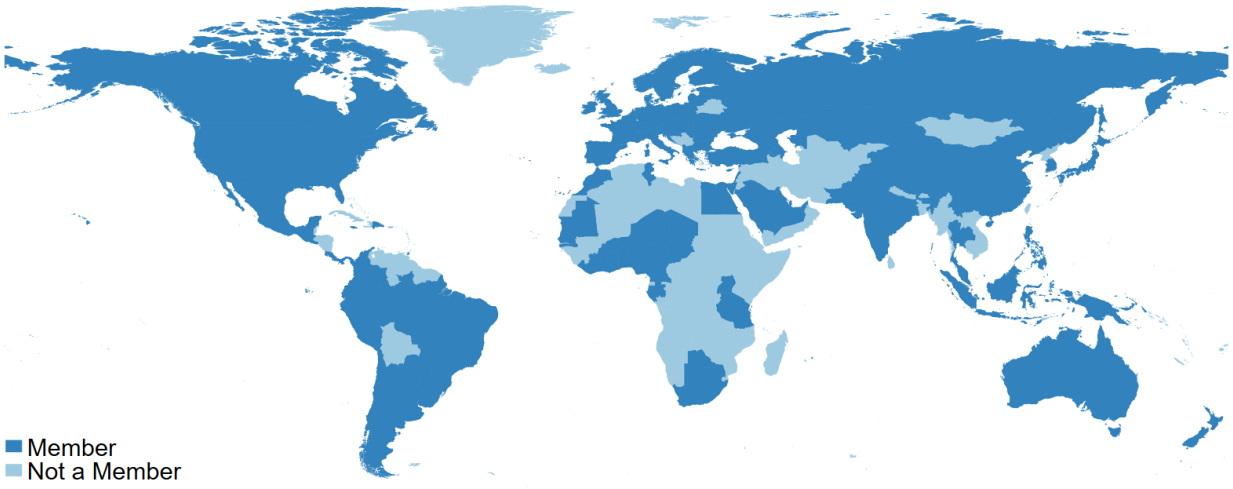
Table 27: Top 10 Countries

Rank	Country	GDP
1	Iran, Islamic Rep.	1271
2	Philippines	748
3	United Arab Emirates	622
4	Iraq	598
5	Algeria	567
6	Bangladesh	541
7	Venezuela, RB	536
8	Qatar	304
9	Myanmar	283
10	Kuwait	273

Note: Table 27 lists the top 10 countries not under the BEPS Inclusive Framework by GDP measured in PPP-adjusted constant 2011 international billion USD.

Source: Organisation for Economic Co-Operation and Development. 2017. "Members of the Inclusive Framework on BEPS." Accessed July 7, 2017.

Figure 66: Global Forum Membership



Note: Figure 66 shows the membership status of each country with reference to the Global Forum on Transparency and Exchange of Information for Tax Purposes.

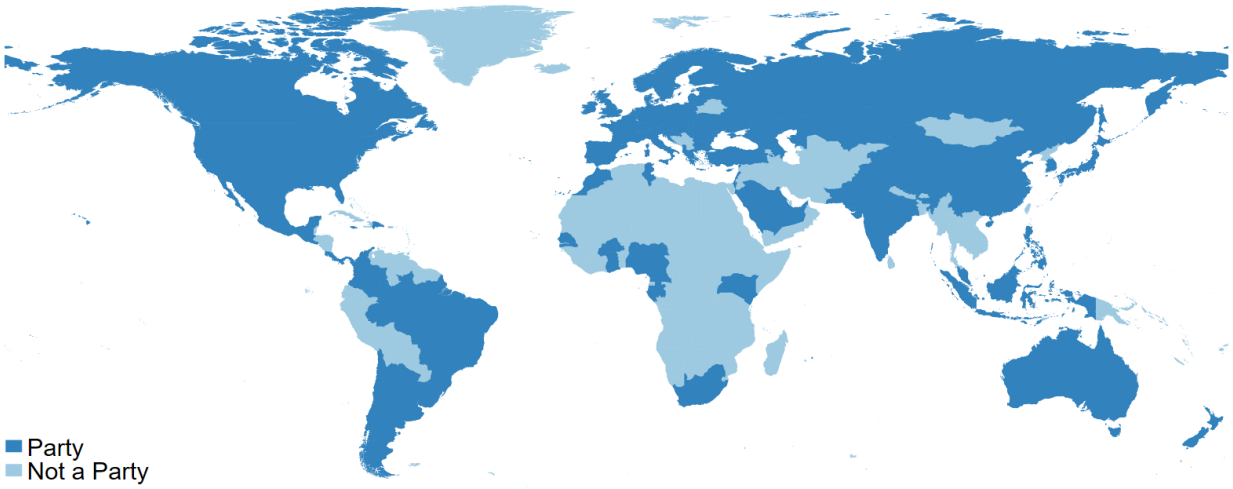
Table 28: Top 10 Countries

Rank	Country	GDP
1	Iran, Islamic Rep.	1271
2	Iraq	598
3	Algeria	567
4	Vietnam	552
5	Bangladesh	541
6	Venezuela, RB	536
7	Hong Kong SAR, China	399
8	Myanmar	283
9	Sri Lanka	242
10	Uzbekistan	192

Note: Table 28 lists the top 10 countries not part of the Global Forum by GDP measured in PPP-adjusted constant 2011 international billion USD.

Source: Organisation for Economic Co-Operation and Development. 2017. "Global Forum on Transparency and Exchange of Information for Tax Purposes: About the Global Forum:Global Forum members & observers." Accessed July 10, 2017.

Figure 67: Convention on Mutual Assistance in Tax Matters Participation



Note: Figure 67 shows the status of each country with reference to the Convention on Mutual Administrative Assistance in Tax Matters.

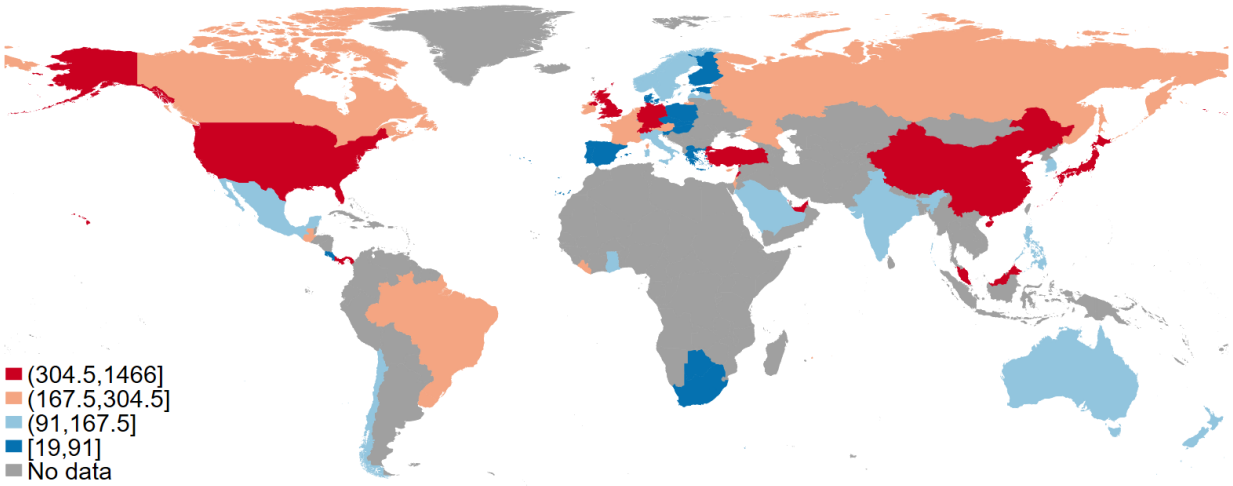
Table 29: Top 10 Countries

Rank	Country	GDP
1	Iran, Islamic Rep.	1271
2	Thailand	1080
3	Egypt, Arab Rep.	987
4	Iraq	598
5	Algeria	567
6	Vietnam	552
7	Bangladesh	541
8	Venezuela, RB	536
9	Hong Kong SAR, China	399
10	Peru	384

Note: Table 29 lists the top 10 countries not part of the Convention on Mutual Administrative Assistance in Tax Matters by GDP measured in PPP-adjusted constant 2011 international billion USD.

Source: Organisation for Economic Co-Operation and Development. 2017."Jurisdictions Participating in the Convention on Mutual Administrative Assistance in Tax Matters." Accessed July 13, 2017.

Figure 68: Financial Secrecy Index



Note: Figure 68 shows quartiles of the 2015 Financial Secrecy Index Value for each country. The FSI Value is weighted by country share of global financial exports.

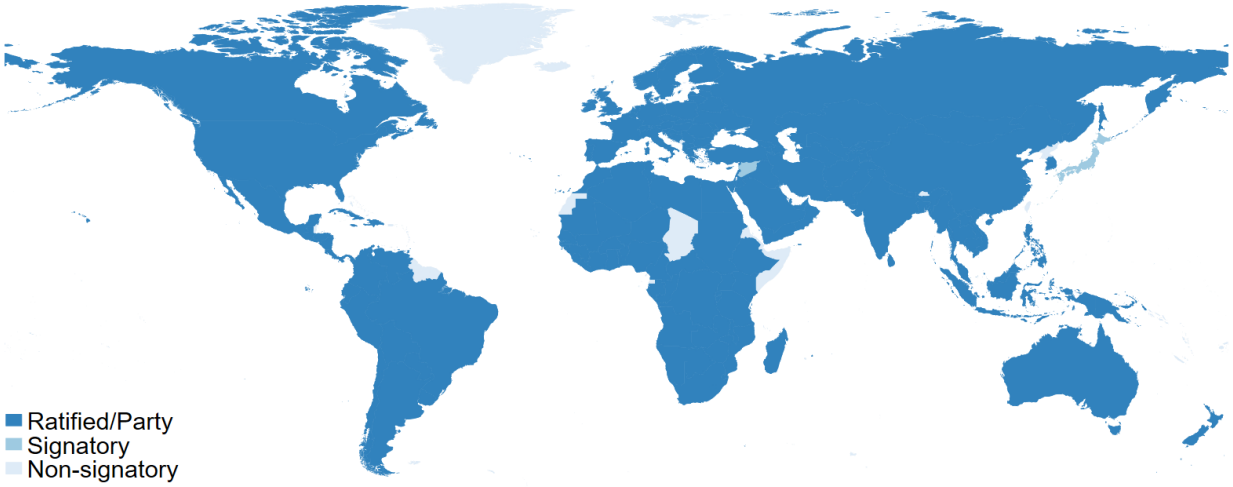
Table 30: Top 10 Countries

Rank	Country	FSI Value
1	United States	1255
2	China	312
3	Germany	702
4	Japan	418
5	India	148
6	United Kingdom	380
7	Russian Federation	243
8	Brazil	264
9	Switzerland	1466
10	France	242

Note: Table 30 lists the top 10 countries in terms of their Financial Secrecy Index Value, weighted by GDP measured in PPP-adjusted constant 2011 international billion USD. The value displayed is the FSI value.

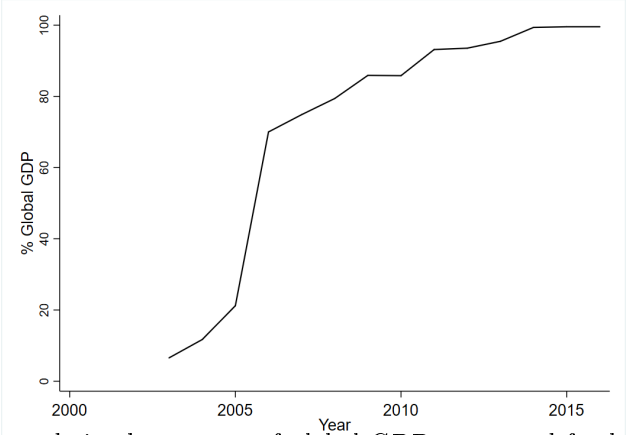
Source: Tax Justice Network. 2015. "Financial Secrecy Index - 2015 Results." Accessed July 10, 2017.

Figure 69: UNCAC Participation



Note: Figure 69 shows the status of each country with regard to participation in the United Nations Convention against Corruption.

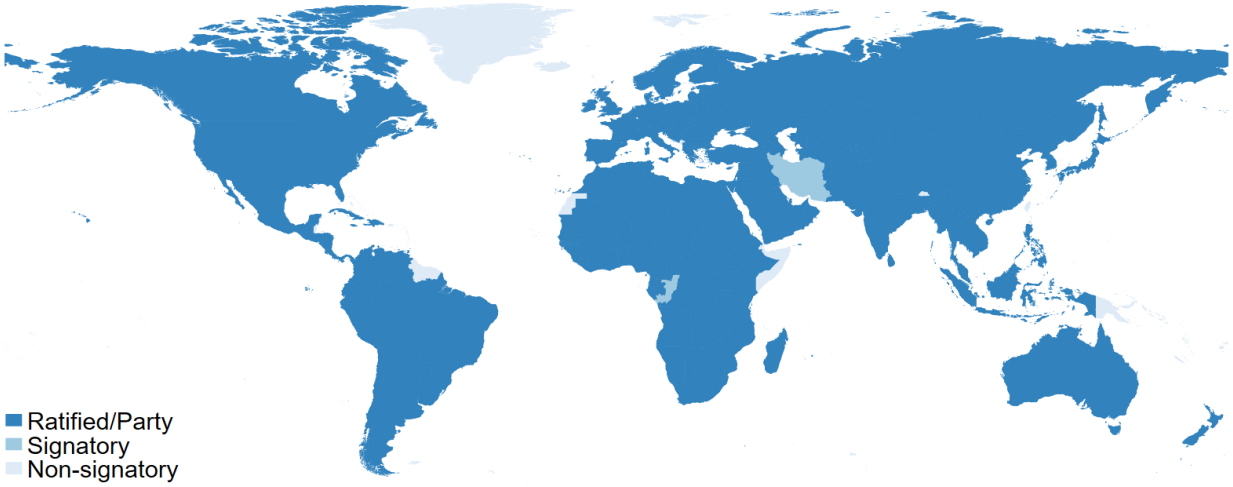
Figure 70: Trends in UNCAC Participation



Note: Figure 70 shows trends in the percent of global GDP accounted for by parties to UNCAC for all countries with available data. This is obtained by adding the number of UNCAC parties, weighted by their share of global GDP, in a particular year. Parties includes both signatories and full parties.

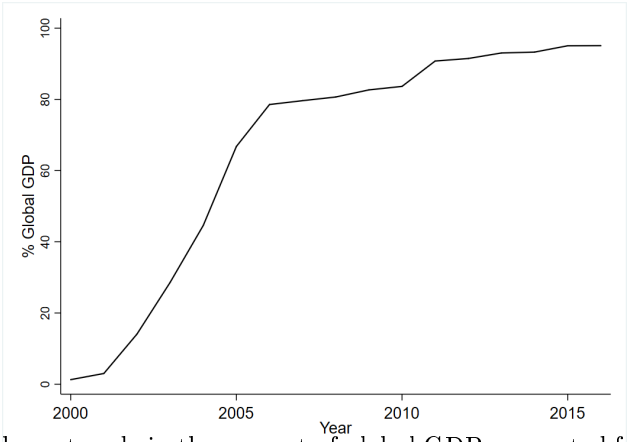
Source: United Nations Office on Drugs and Crime (UNODC). 2017. "UN Convention against Corruption: Signature and Ratification Status." Accessed July 13, 2017.

Figure 71: UNTOC Participation



Note: Figure 71 shows the status of each country with regard to participation in the United Nations Convention on Transnational Organized Crime.

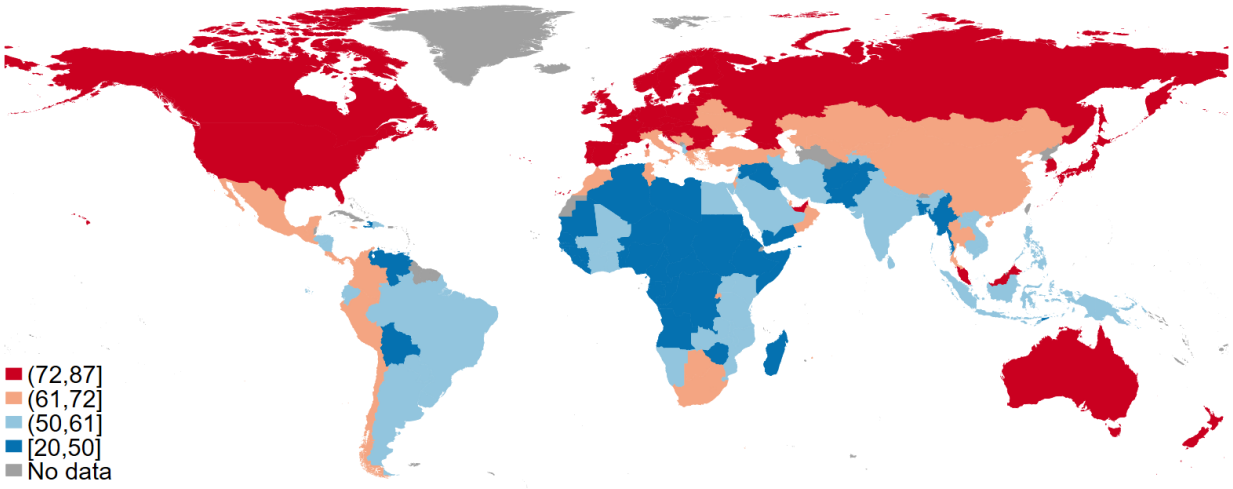
Figure 72: Trends in UNTOC Participation



Note: Figure 72 shows shows trends in the percent of global GDP accounted for by parties to UNTOC for all countries with available data. This is obtained by adding the number of UNTOC parties, weighted by their share of global GDP, in a particular year. Parties includes both signatories and full parties.

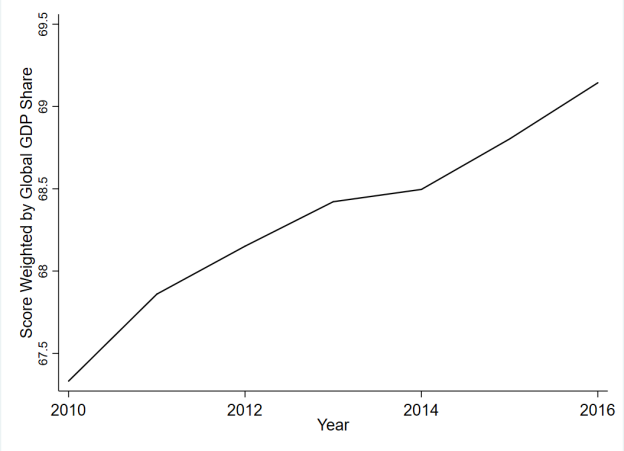
Source: United Nations. 2000. "United Nations Convention against Transnational Organized Crime." United Nations Treaty Collection. Accessed July 11, 2017.

Figure 73: IFC Distance to Frontier Score



Note: Figure 73 shows quartiles of the IFC Distance to Frontier Global for each country, using the most recently available IFC data, on a scale from 0 to 100, where 100 indicates excellent regulatory performance with regard to ease of doing business.

Figure 74: Trends in Distance to Frontier Score



Note: Figure 74 shows trends in average IFC Distance to Frontier Global scores, weighted by country share of global GDP.

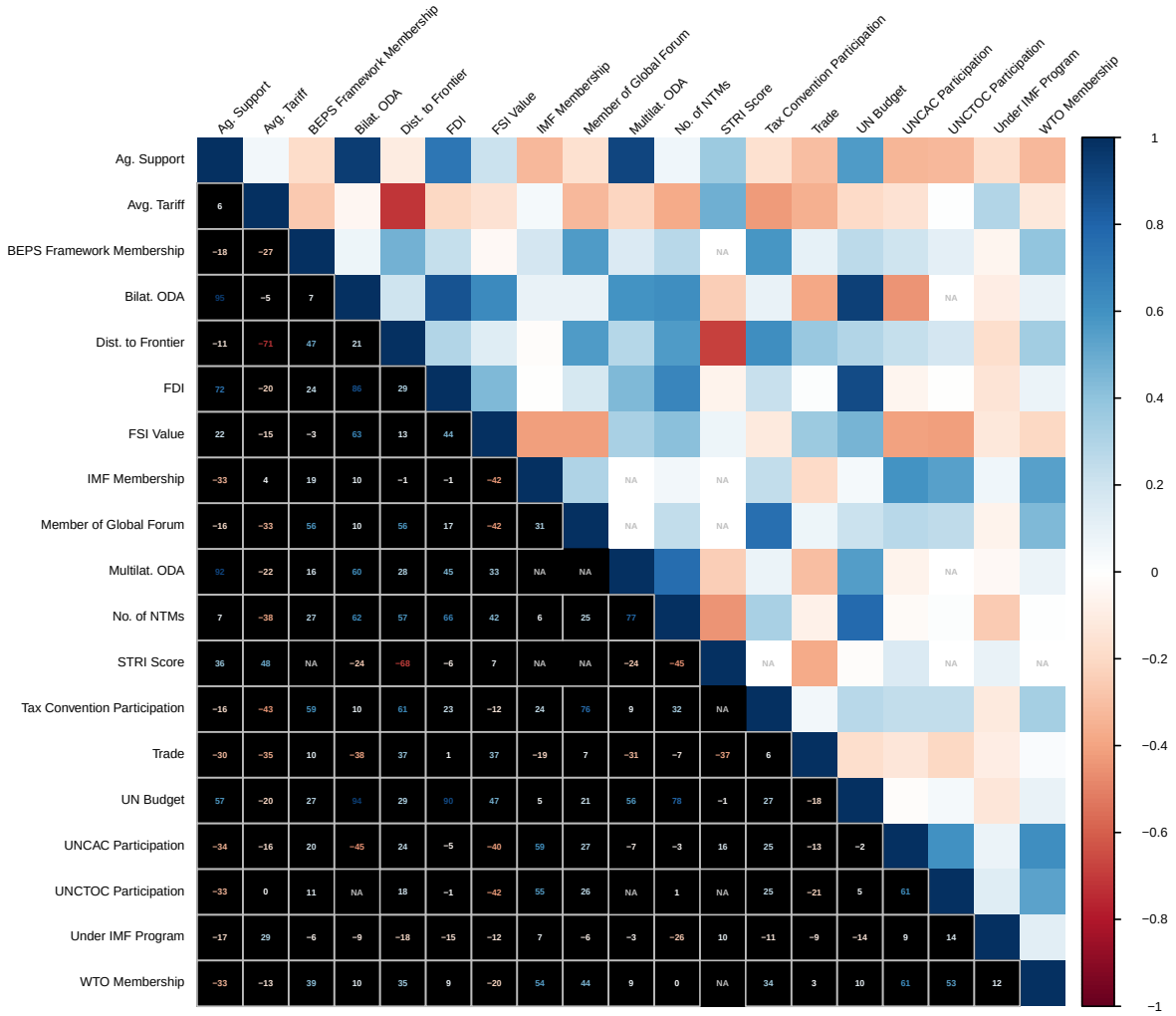
Table 31: Top 10 Countries under 50

Rank	Country	Dist. to Frontier
1	Pakistan	49
2	Nigeria	44
3	Algeria	46
4	Venezuela, RB	36
5	Iraq	45
6	Bangladesh	41
7	Myanmar	44
8	Sudan	46
9	Libya	33
10	Angola	38

Note: Table 31 lists the top 10 countries with a Distance to Frontier score under 50, weighted by constant 2011 international PPP-adjusted GDP, using the most recently available data.

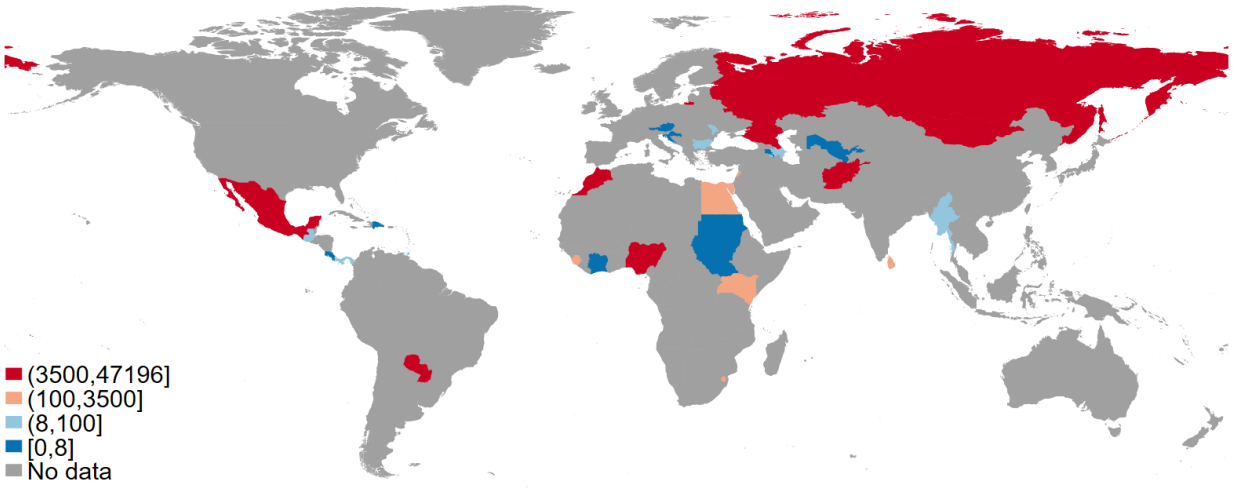
Source: World Bank. 2017. "Doing Business: Distance to Frontier." Accessed June 9, 2017.

Figure 75: Correlation Matrix for Economy Variables



Note: Figure 75 shows the correlation matrix of variables used in the preceding section of the paper. Numbers designate percentages for correlations. The GPGs are unadjusted by any other variables, though some are presented in adjusted form in the paper.

Figure 76: Cannabis Cultivation



Note: Figure 76 shows quartiles of number of hectares of land used for outdoors herb cannabis cultivation for each country, using the most recent data available from the World Drug Report 2016.

Table 32: Top 10 Countries

Rank	Country	Cannabis Cultivation
1	Morocco	47196
2	Russian Federation	24096
3	Mongolia	15000
4	Mexico	13000
5	Afghanistan	10000
6	Paraguay	6000
7	Nigeria	4529
8	Lebanon	3500
9	Swaziland	1500
10	Sri Lanka	500

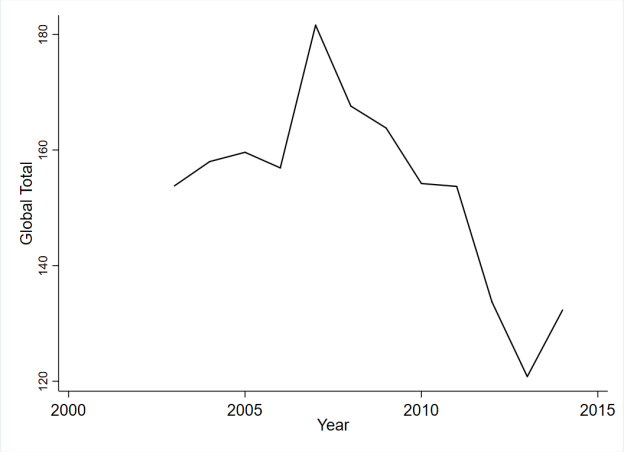
Note: Table 32 lists the top 10 countries in terms of number of hectares of land used for cannabis cultivation, according to the most recently available data from the World Drug Report 2016.

Source: United Nations Office on Drugs and Crime. 2016. "Table 8.3: Cannabis cultivation, production and eradication: Global illicit cultivation of coca bush, 2003-2014 (hectares)." *World Drug Report 2016.* Accessed July 14, 2017.

Figure 77: Coca Bush Cultivation

Note: Figure 77 shows terciles of number of hectares of land used for coca bush cultivation for each country, using the most recent data available from the World Drug Report 2016.

Figure 78: Trends in Coca Bush Cultivation



Note: Figure 78 shows trends in total coca bush cultivation in thousands of hectares.

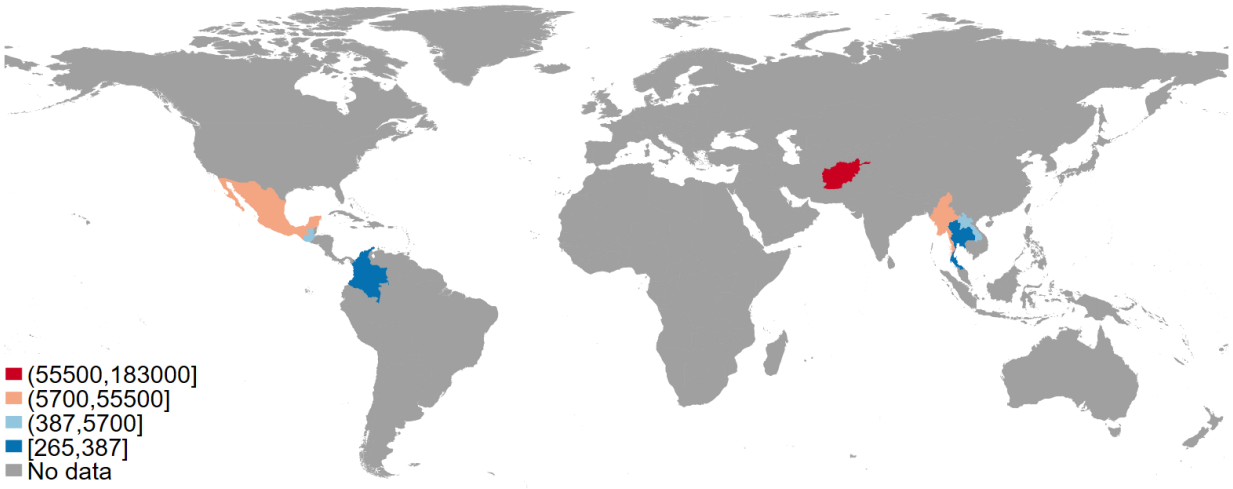
Table 33: Top 3 Countries

Rank	Country	Coca Cultivation
1	Colombia	69000
2	Peru	42900
3	Bolivia	20400

Note: Table 33 lists the top 3 countries in terms of coca bush cultivation in hectares using the most recently available data from the World Drug Report 2016.

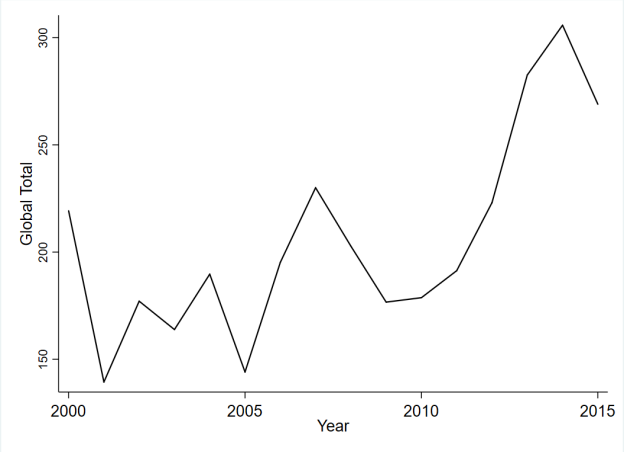
Source: United Nations Office on Drugs and Crime. 2016. "Table 8.1: Coca cultivation, production and eradication: Global illicit cultivation of coca bush, 2003-2014 (hectares)." *World Drug Report 2016.* Accessed July 14, 2017.

Figure 79: Opium Poppy Cultivation



Note: Figure 79 shows quartiles of number of hectares of land used for opium poppy cultivation for each country, using the most recent data available from the World Drug Report 2016.

Figure 80: Trends in Opium Poppy Cultivation



Note: Figure 80 shows trends in total opium poppy cultivation in thousands of hectares.

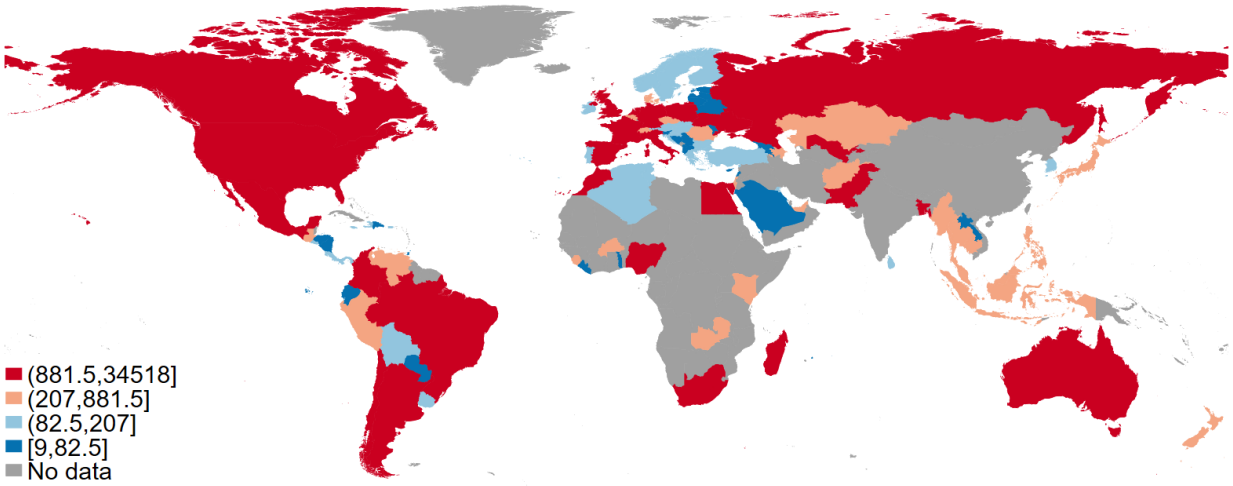
Table 34: Top 7 Countries

Rank	Country	Opium Cultivation
1	Afghanistan	183000
2	Myanmar	55500
3	Mexico	24800
4	Lao PDR	5700
5	Guatemala	640
6	Colombia	387
7	Thailand	265

Note: Table 34 lists the top 7 countries in terms of opium poppy cultivation in hectares using the most recently available data from the World Drug Report 2016.

Source: United Nations Office on Drugs and Crime. 2016. "Table 8.2: Opium cultivation, production and eradication: Global illicit cultivation of coca bush, 2003-2014 (hectares)." *World Drug Report 2016*. Accessed July 14, 2017.

Figure 81: Cannabis Use



Note: Figure 81 shows quartiles of the best estimate for the average annual prevalence of use of cannabis in thousands of individuals aged 15-64 using the most recently available data from the United Nations Office on Drugs and Crime.This is obtained by multiplying the prevalence of use by the population aged 15-64 of each country. In the case of some countries, prevalence is measured for alternate age groups(eg. 12-64) and years, but we assume that the prevalence rate is for the population aged 15-64 due to data limitations.

Table 35: Top 10 Countries

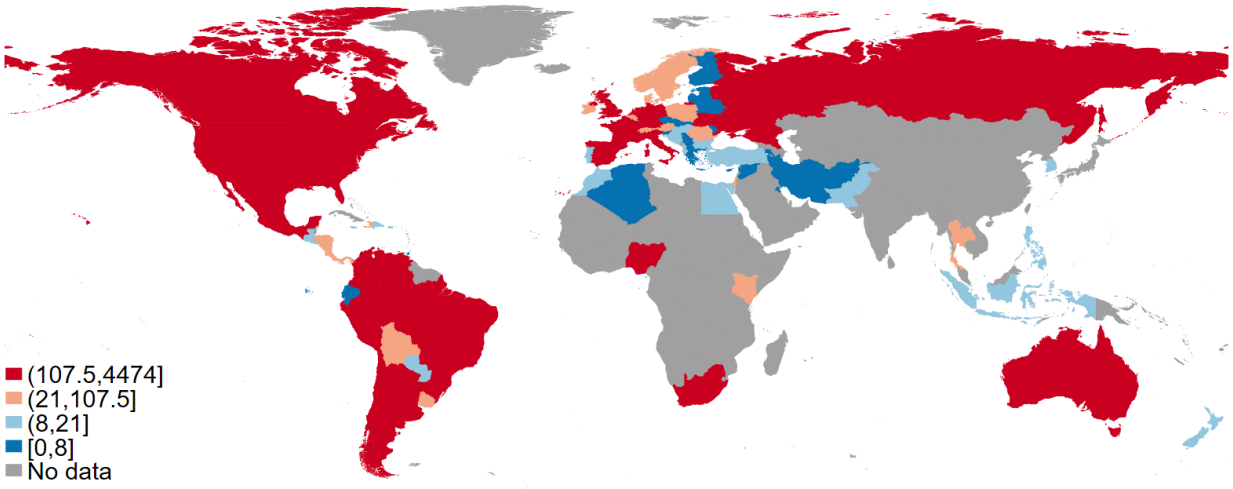
Rank	Country	Cannabis Use
1	United States	34518
2	Nigeria	14140
3	France	4639
4	Pakistan	4216
5	Brazil	3759
6	Egypt, Arab Rep.	3668
7	Italy	3550
8	Bangladesh	3550
9	Russian Federation	3472
10	Canada	3109

Note: Table 35 lists the top 10 countries in terms of number of individuals who use cannabis in thousands using the most recently available data from the UNODC. This is obtained by multiplying the prevalence of use by the population aged 15-64 of each country.

Sources: UNODC Statistics. "Annual Prevalence, General Population - Cannabis." Web. Accessed July 14, 2017.

World Bank. 2017. "Population ages 15-64, total." World Bank Databank: World Development Indicators. Accessed November 3, 2017.

Figure 82: Cocaine Use



Note: Figure 82 shows quartiles of the best estimate for the average annual prevalence of use of cocaine in thousands of individuals aged 15-64 using the most recently available data from the United Nations Office on Drugs and Crime.This is obtained by multiplying the prevalence of use by the population aged 15-64 of each country. In the case of some countries, prevalence is measured for alternate age groups(eg. 12-64) and years, but we assume that the prevalence rate is for the population aged 15-64 due to data limitations.

Table 36: Top 10 Countries

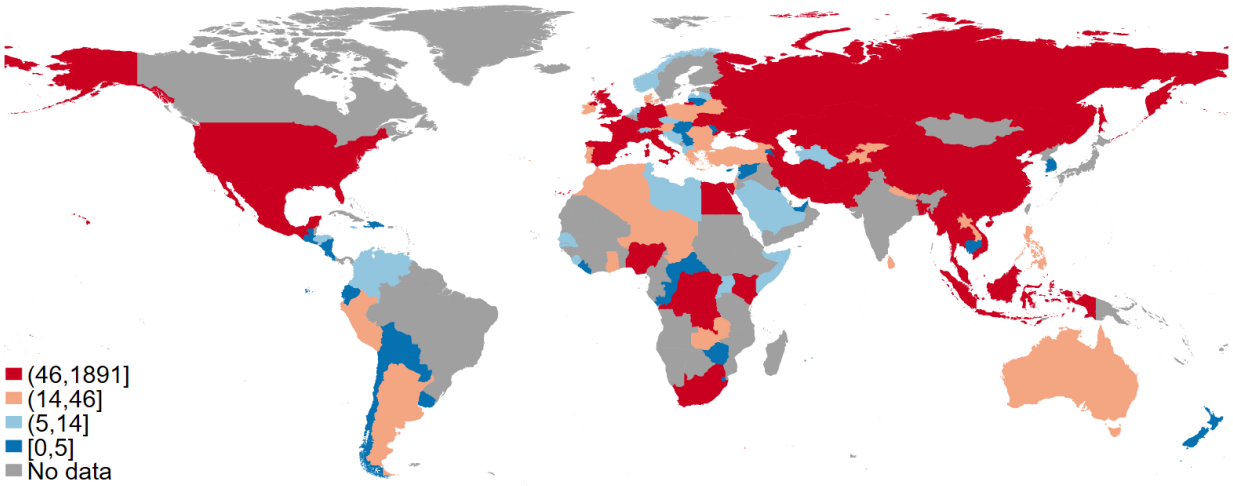
Rank	Country	Cocaine Use
1	United States	4474
2	Brazil	1012
3	United Kingdom	1009
4	Nigeria	692
5	Spain	675
6	France	460
7	Germany	434
8	Italy	425
9	Mexico	423
10	South Africa	374

Note: Table 36 lists the top 10 countries in terms of number of individuals who use cocaine in thousands using the most recently available data from the UNODC. This is obtained by multiplying the prevalence of use by the population aged 15-64 of each country.

Sources: UNODC Statistics. "Annual Prevalence, General Population - Cocaine." Accessed July 14, 2017.

World Bank. 2017. "Population ages 15-64, total." World Bank Databank: World Development Indicators. Accessed November 3, 2017.

Figure 83: Opiate Use



Note: Figure 83 shows quartiles of the best estimate for the average annual prevalence of use of opiates in thousands of individuals aged 15-64 using the most recently available data from the United Nations Office on Drugs and Crime.This is obtained by multiplying the prevalence of use by the population aged 15-64 of each country. In the case of some countries, prevalence is measured for alternate age groups(eg. 12-64) and years, but we assume that the prevalence rate is for the population aged 15-64 due to data limitations.

Table 37: Top 10 Countries

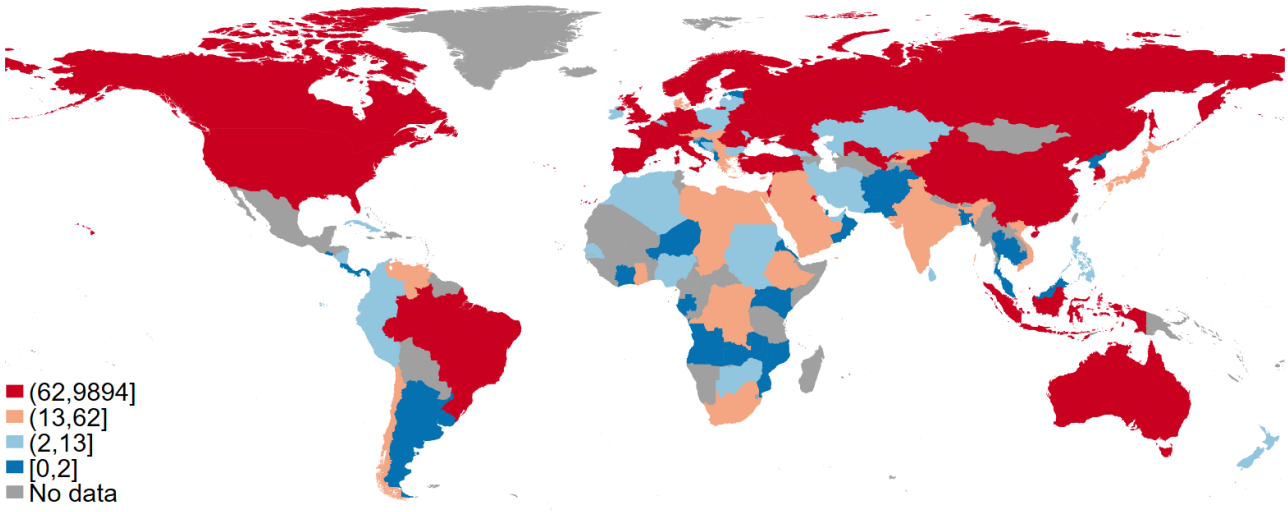
Rank	Country	Opiate Use
1	China	1891
2	Russian Federation	1393
3	United States	1321
4	Iran, Islamic Rep.	1296
5	Pakistan	1171
6	Nigeria	692
7	Afghanistan	492
8	Bangladesh	398
9	Vietnam	344
10	Ukraine	324

Note: Table 37 lists the top 10 countries in terms of number of individuals who use opiates in thousands using the most recently available data from the UNODC. This is obtained by multiplying the prevalence of use by the population aged 15-64 of each country.

Source: UNODC Statistics. 2017. "Annual Prevalence, General Population - Opiates." Accessed July 14, 2017.

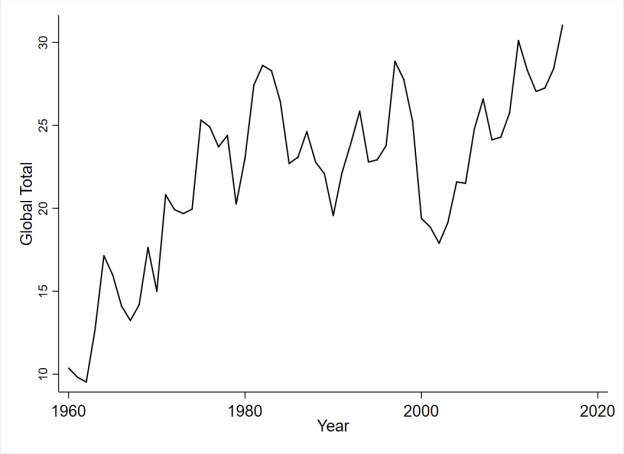
World Bank. 2017. "Population ages 15-64, total." World Bank Databank: World Development Indicators. Accessed November 3, 2017.

Figure 84: Arms Exports



Note: Figure 84 shows quartiles of arms exports for each country given the most recently available data from the World Bank. Units used are millions of SIPRI trend indicator units.

Figure 85: Trends in Arms Exports



Note: Figure 85 shows trends in total arms exports in billions of SIPRI trend indicator units.

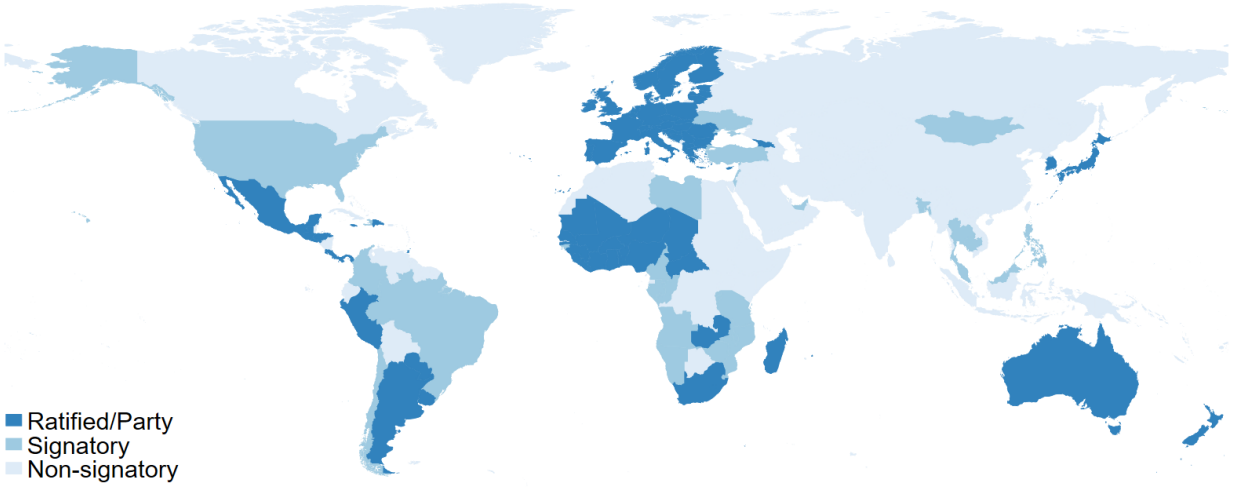
Table 38: Top 10 Countries

Rank	Country	Arms Exports
1	United States	9894
2	Russian Federation	6432
3	Germany	2813
4	France	2226
5	China	2123
6	United Kingdom	1393
7	Israel	1260
8	Italy	802
9	Korea, Rep.	534
10	Ukraine	528

Note: Table 38 lists the top 10 countries in terms of arms exports in millions of SIPRI trend indicator units, as measured using the most recently available World Bank data.

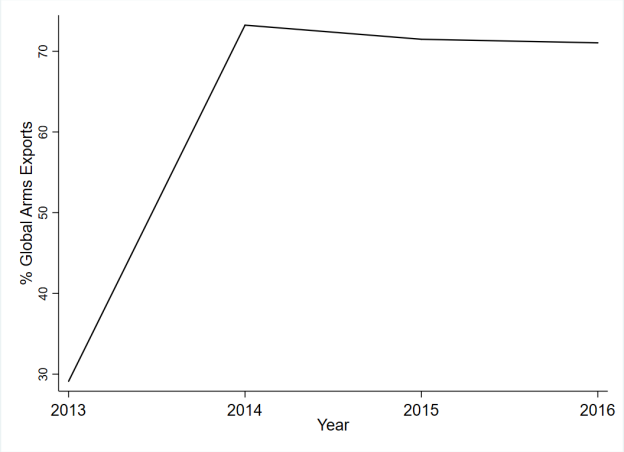
Source: World Bank. 2017. "Arms exports (SIPRI trend indicator values)." World Bank Databank: World Development Indicators. Accessed June 8, 2017.

Figure 86: ATT Participation



Note: Figure 86 shows the status of each country with regard to the Arms Trade Treaty using the most recently available data.

Table 39: Trends in ATT Participation



Note: Figure 39 shows trends in the percent of global GDP accounted for by ATT parties for all countries with available data. This is obtained by adding the number of ATT parties, weighted by their share of global GDP, in a particular year. Parties include both signatories and full parties.

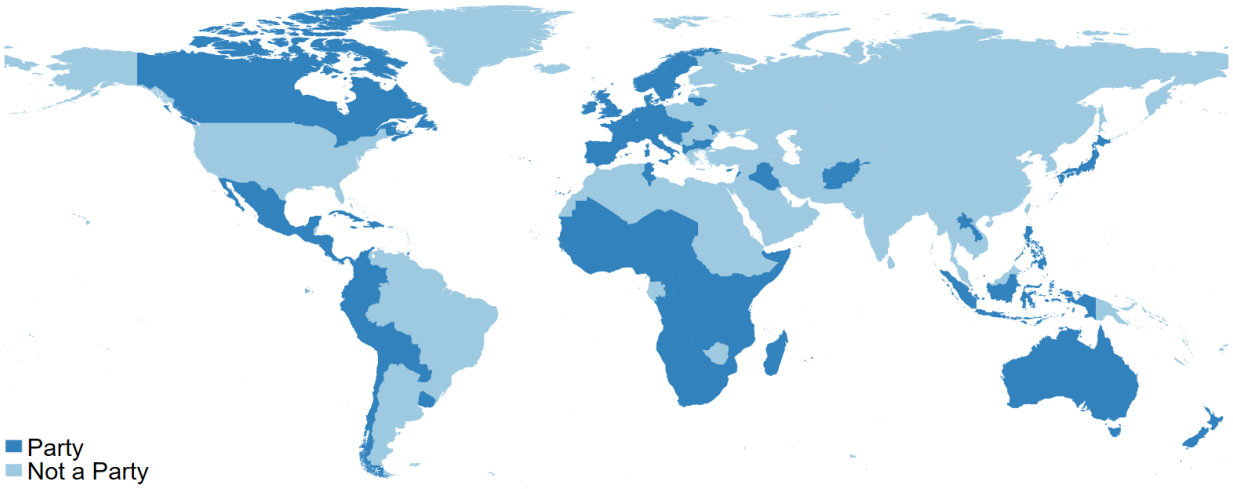
Table 40: Top 10 Countries

Rank	Country	GDP
1	China	19854
2	India	8068
3	Russian Federation	3524
4	Indonesia	2811
5	Saudi Arabia	1629
6	Canada	1564
7	Iran, Islamic Rep.	1271
8	Egypt, Arab Rep.	987
9	Pakistan	940
10	Iraq	598

Note: Table 40 lists the top 10 countries not party to ATT by GDP measured in PPP-adjusted constant 2011 international billion USD.

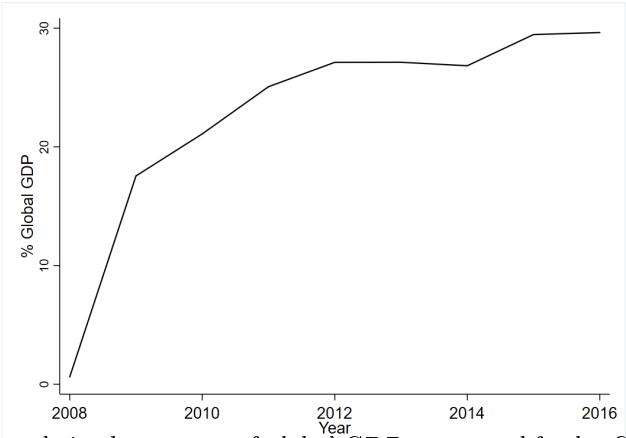
Source: United Nations Treaty Collection. 2017. "Arms Trade Treaty." Accessed July 7, 2017.

Figure 87: CCM Participation



Note: Figure 87 shows the status of each country with regard to the Convention on Cluster Munitions using the most recently available data.

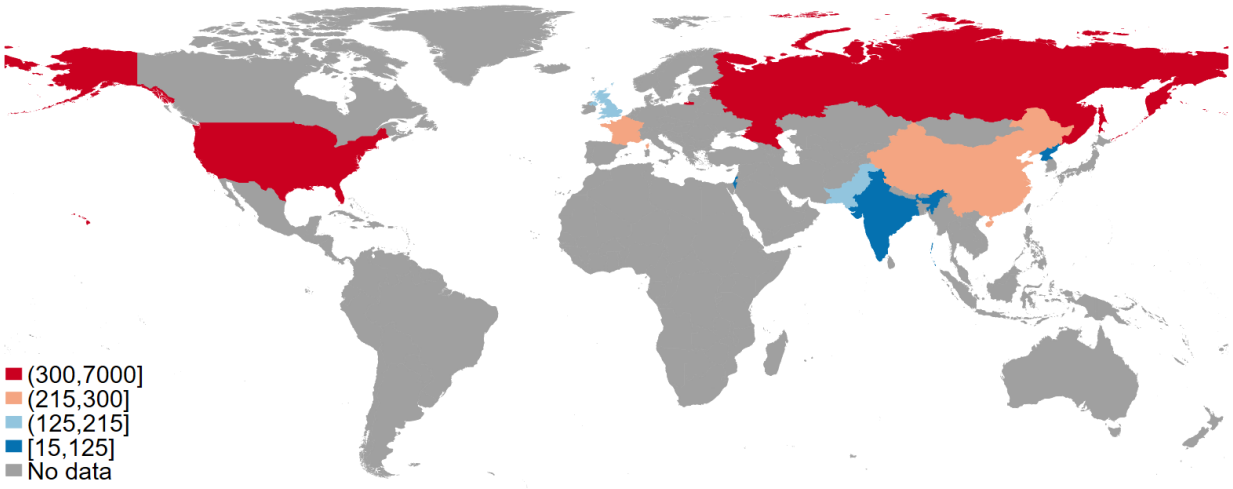
Figure 88: Trends in CCM Participation



Note: Figure 88 shows trends in the percent of global GDP accounted for by CCM parties for all countries with available data. This is obtained by adding the number of CCM parties, weighted by their share of global GDP, in a particular year. Parties include both signatories and full parties.

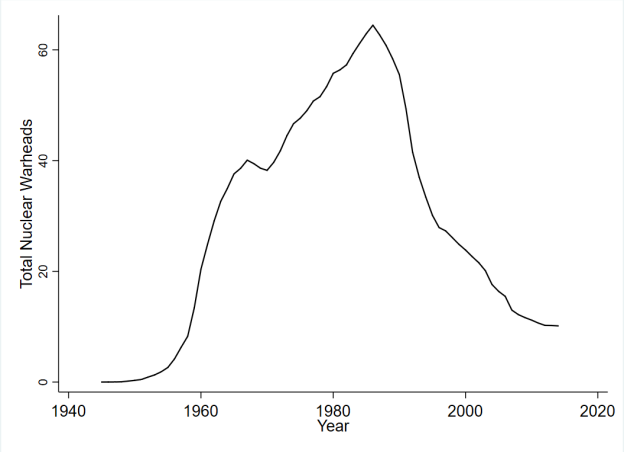
Source: United Nations Treaty Collection. 2017. "Convention on Cluster Munitions." Accessed July 7, 2017.

Figure 89: Nuclear Weapons Stocks



Note: Figure 89 shows quartiles of the total number of nuclear warheads for each country using the average estimate of the most recently available data from SIPRI.

Figure 90: Trends in Nuclear Weapons Stocks



Note: Figure 90 shows trends in the total nuclear warheads in thousands for all countries with available data using data from Our World in Data based on data from Federation of American Scientists.

Table 41: Top 9 Countries

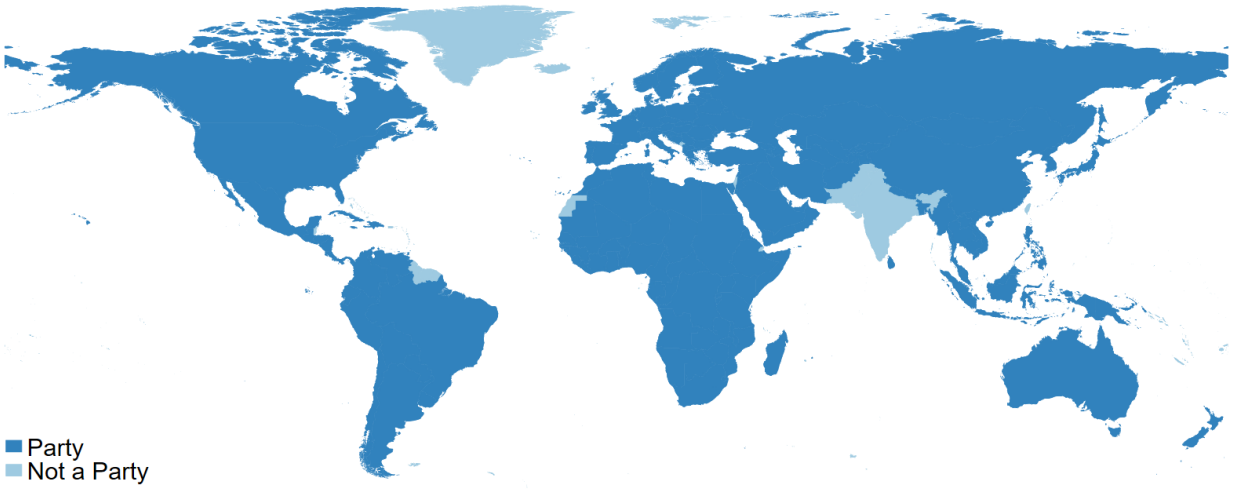
Rank	Country	Nuclear Warheads
1	Russian Federation	7000
2	United States	6800
3	France	300
4	China	270
5	United Kingdom	215
6	Pakistan	135
7	India	125
8	Israel	80
9	Korea, Dem. Rep.	15

Note: Table 41 lists the top countries in terms of the total number of nuclear warheads using the average estimate of the most recently available data from SIPRI.

Sources: Kile, Shannon N. and Hans M. Kristensen. 2017. "Table 1: World nuclear forces, January 2017." *Trends in World Nuclear Forces: SIPRI Fact Sheet.* Stockholm International Peace Research Insitute(SIPRI). Accessed September 7, 2017.

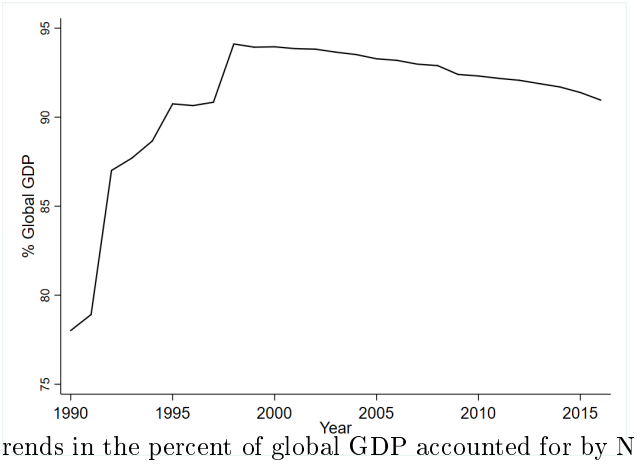
Kristensen, Hans M. and Robert S. Norris. 2015. "Nuclear Weapons Inventory by Country." Our World in Data. Accessed September 7, 2017.

Figure 91: NPT Participation



Note: Figure 91 shows quartiles of the status of each country with regard to the Treaty on the Non-Proliferation of Nuclear Weapons using the most recently available data.

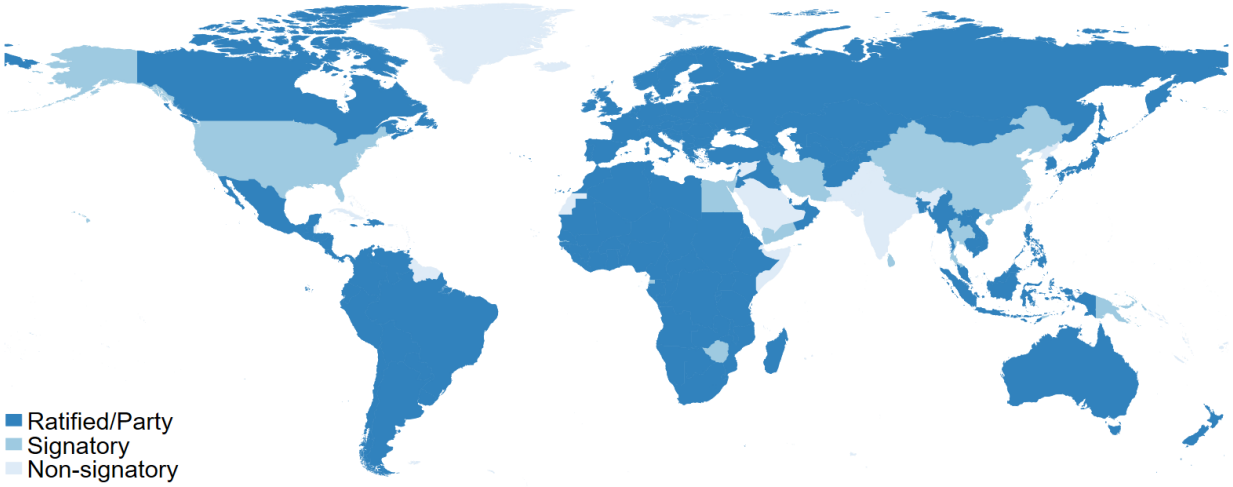
Figure 92: Trends in NPT Participation



Note: Figure 92 shows trends in the percent of global GDP accounted for by NPT parties for all countries with available data. This is obtained by adding the number of NPT parties, weighted by their share of global GDP, in a particular year. Parties include both signatories and full state parties.

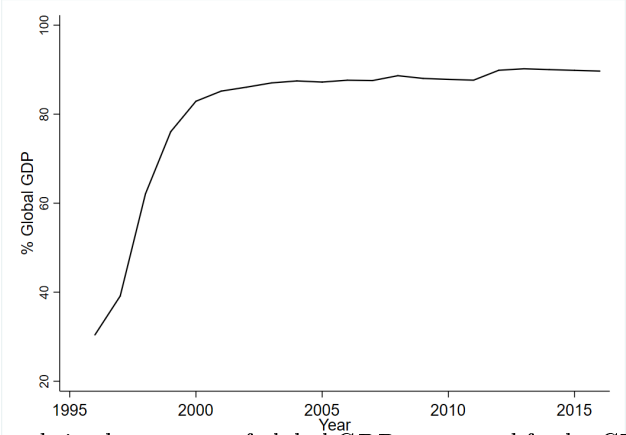
Source: United Nations Office for Disarmament Affairs. 2017. "Treaty on the Non-Proliferation of Nuclear Weapons." Accessed July 7, 2017.

Figure 93: CTBT Participation



Note: Figure 93 shows the status of each country with regard to the Comprehensive Test Ban Treaty using the most recently available data.

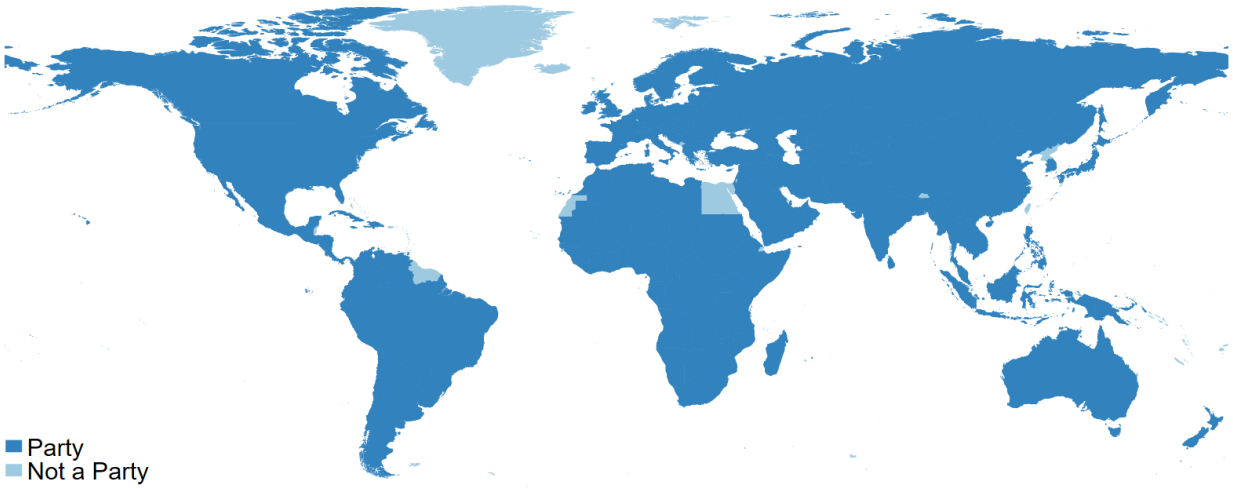
Figure 94: Trends in CTBT Participation



Note: Figure 94 shows trends in the percent of global GDP accounted for by CTBT parties for all countries with available data. This is obtained by adding the number of CTBT parties, weighted by their share of global GDP, in a particular year. Parties include both signatories and full state parties.

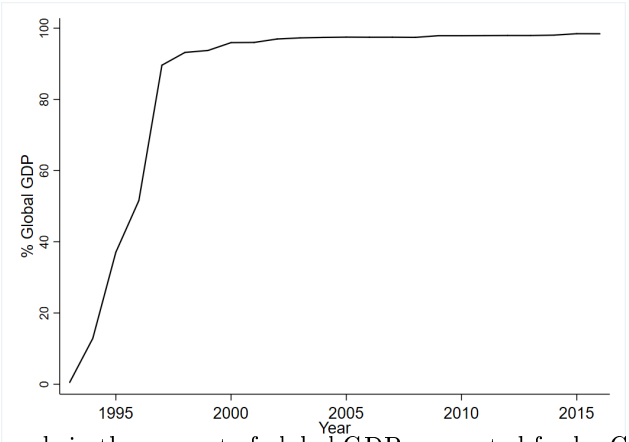
Source: Preparatory Commission for the Comprhensive Nuclear Test Ban Treaty Organization. "Status of Signature and Ratification." Accessed July 7, 2017.

Figure 95: CWC Participation



Note: Figure 95 shows the status of each country with regard to the Chemical Weapons Convention using the most recently available data.

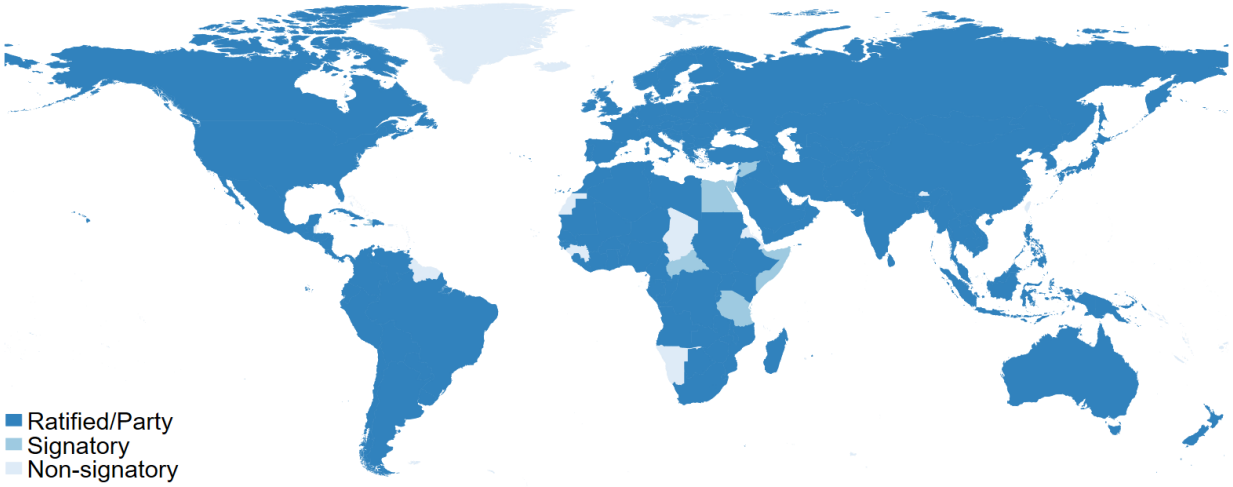
Figure 96: Trends in CWC Participation



Note: Figure 96 shows trends in the percent of global GDP accounted for by CWC parties for all countries with available data. This is obtained by adding the number of CWC parties, weighted by their share of global GDP, in a particular year. Parties include both signatories and full state parties.

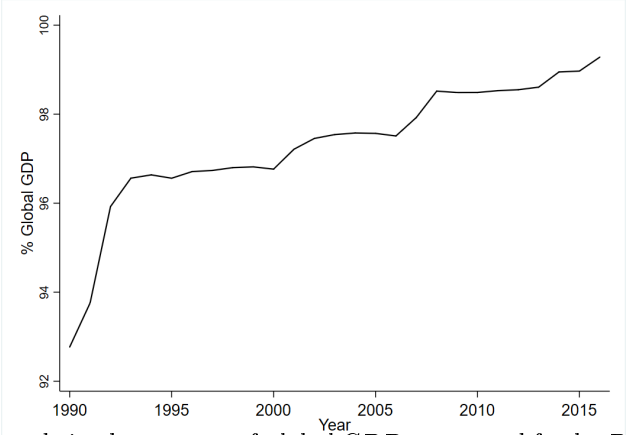
Source: Arms Control Association. "Chemical Weapons Convention Signatories and States-Parties." Web. Accessed July 7, 2017.

Figure 97: BWC Participation



Note: Figure 97 shows the status of each country with regard to the Biological Weapons Convention using the most recently available data.

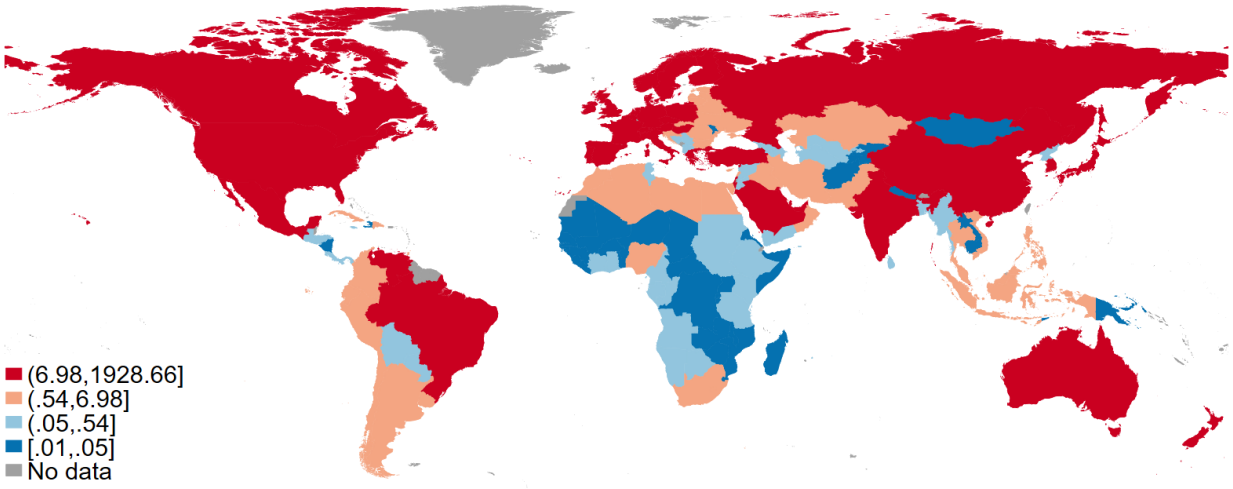
Figure 98: Trends in BWC Participation



Note: Figure 98 shows trends in the percent of global GDP accounted for by BWC parties for all countries with available data. This is obtained by adding the number of BWC parties, weighted by their share of global GDP, in a particular year. Parties include both signatories and full state parties.

Source: Arms Control Association. "Biological Weapons Convention Signatories and States-Parties." Accessed July 7, 2017.

Figure 99: Contribution to UN Peacekeeping Budget



Note: Figure 99 shows quartiles of the financial contribution of each country in USD millions to the 2016-2018 UN peackeeping budget. This is calculated by multiplying the percentage contribution in each country by the 2017-2018 approved budget of $6.8 billion.

Table 42: Top 10 Countries

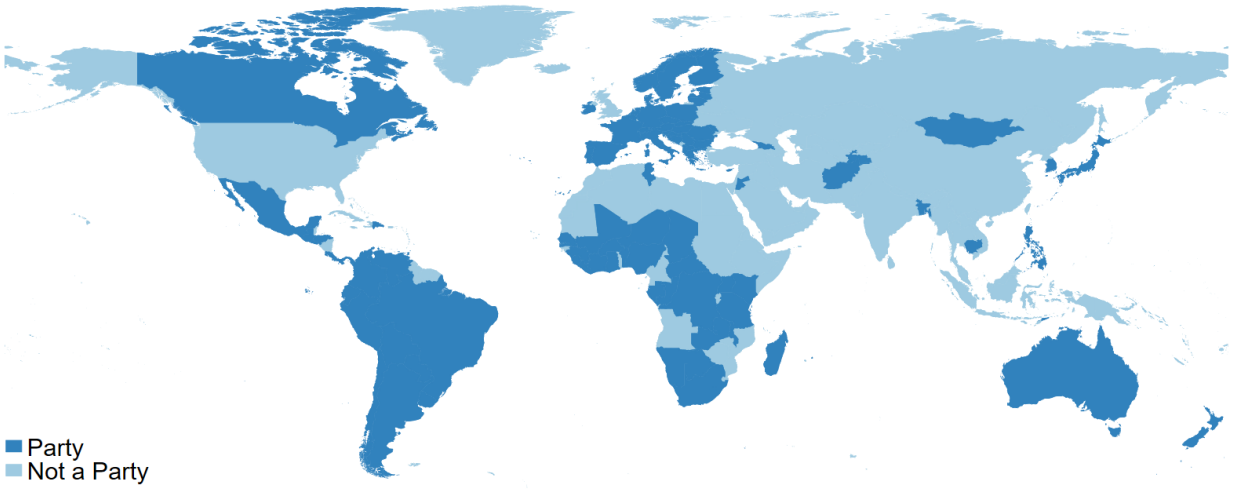
Rank	Country	UN Peackeeping Budget
1	United States	1929
2	Japan	737
3	France	490
4	Germany	486
5	United Kingdom	454
6	China	451
7	Italy	302
8	Russian Federation	214
9	Canada	203
10	Spain	202

Note: Table 42 lists the top 10 countries in terms of their financial contribution in USD millions to the United Nations 2016-18 peackeeping budget, using the above calculation.

Sources: United Nations General Assembly. 2015. "Seventieth session: Agenda item 147: Scale of assessments for the apportionment of the expenses of United Nations peacekeeping operations." Accessed July 14, 2017.

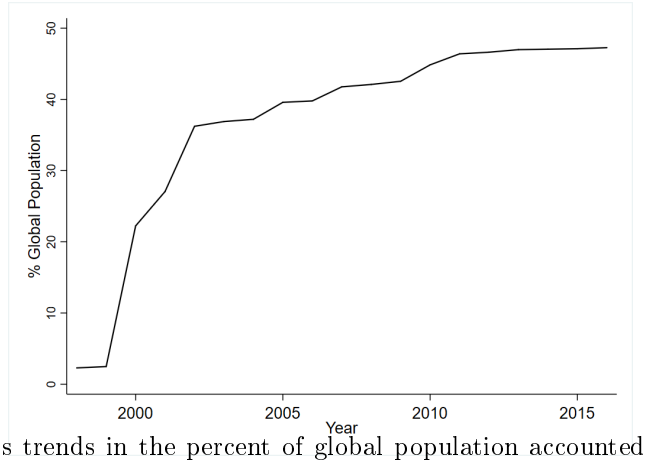
United Nations General Assembly. 2017. "Approved resources for peacekeeping operations for the period from 1 July 2017 to 30 June 2018: Note by the Secretary-General." Accessed November 9, 2017.

Figure 100: ICC Participation



Note: Figure 100 shows the status of each country with regard to the Rome Statute of the International Criminal Court using the most recently available data.

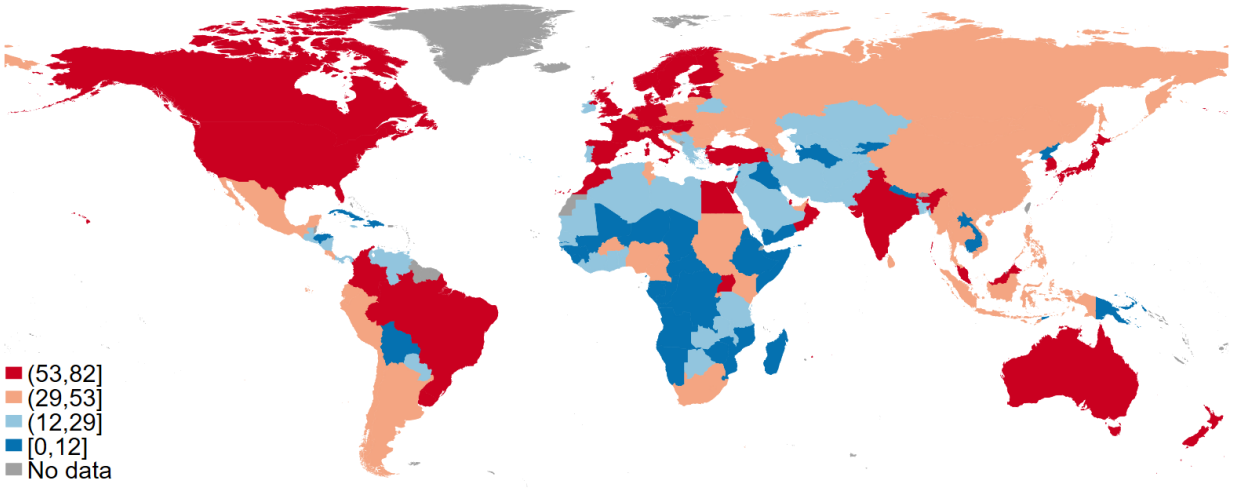
Figure 101: Trends in ICC Participation



Note: Figure 101 shows trends in the percent of global population accounted for by ICC parties for all countries with available data. This is obtained by adding the number of ICC parties, weighted by their share of global population, in a particular year. Parties include both signatories and full state parties.

Source: United Nations Treaty Collection. 2017. "Rome Statute of the International Criminal Court." Accessed November 9, 2017.

Figure 102: Global Cybersecurity Index



Note: Figure 102 shows quartiles of the value of the Global Cybersecurity Index 2014 for each country, with values adjusted to 0 to 100, and where higher values indicate better cybersecurity.

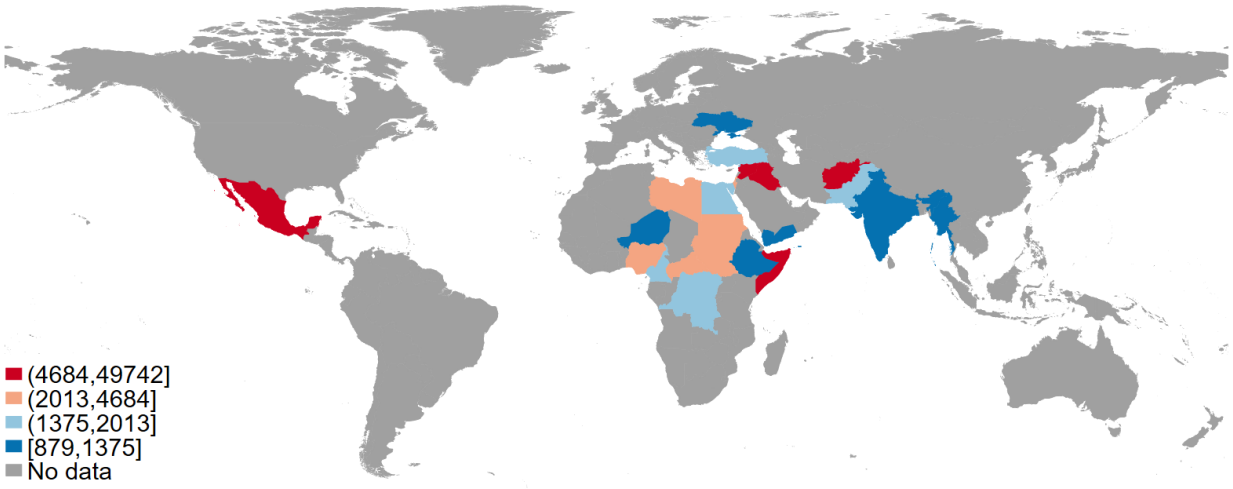
Table 43: Top 10 Countries

Rank	Country	GCI Value
1	Pakistan	18
2	Iraq	3
3	Algeria	18
4	Venezuela, RB	21
5	Kazakhstan	18
6	Ireland	21
7	Kuwait	6
8	Greece	21
9	Uzbekistan	15
10	Angola	9

Note: Table 43 lists the top 10 highest-GDP countries with GCI scores below 29. Ranking is according to GDP measured in 2011 constant real PPP-adjusted international USD billion, and the value displayed is the GCI score.

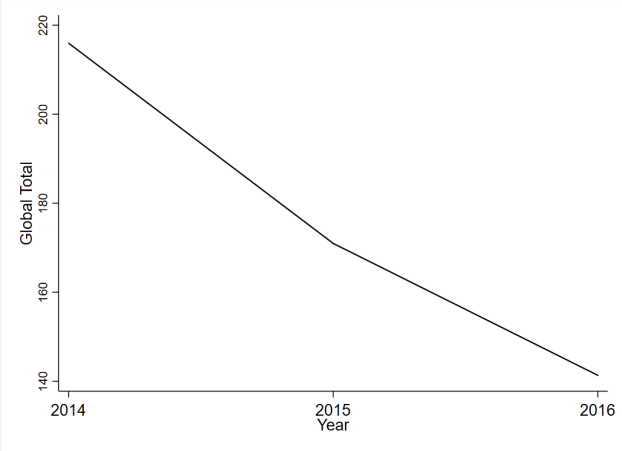
Source: International Telecommunication Union (ITU). 2014. "Global Cybersecurity Index (GCI) 2014." Accessed June 9, 2017.

Figure 103: Armed Conflict-related Deaths



Note: Figure 103 shows quartiles of deaths due to armed conflict for each country given the most recently available data from Wikipedia.

Figure 104: Trends in Armed Conflict Deaths



Note: Figure 104 shows trends in fatalities in thousands related to armed conflict from 2014-2016.

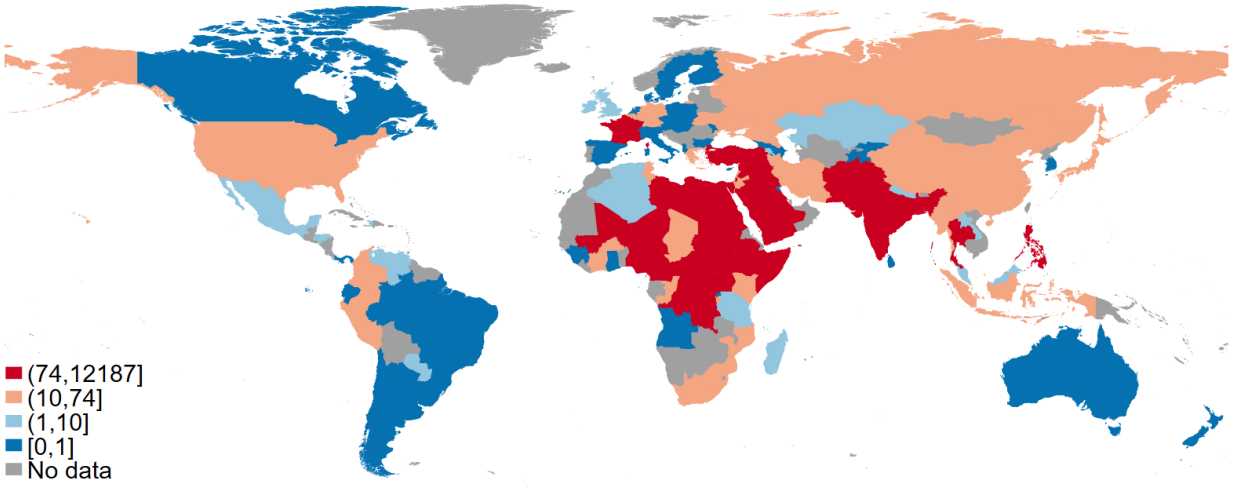
Table 44: Top 10 Countries

Rank	Country	Conflict Deaths
1	Syrian Arab Republic	49742
2	Iraq	23898
3	Afghanistan	23539
4	Mexico	12224
5	Somalia	5575
6	Nigeria	4684
7	Sudan	3891
8	South Sudan	3544
9	Central African Republic	3347
10	Libya	2865

Note: Table 44 lists the top 10 countries in terms of the number of armed conflict-related fatalities given the most recently available data from Wikipedia.

Source: Wikipedia. 2017. "Deaths by country" in "List of ongoing armed conflicts." Accessed November 6, 2017.

Figure 105: Terrorism Related Deaths



Note: Figure 105 shows quartiles of deaths related to terrorist incidents in 2016 for each country given the most recently available data from Wikipedia.

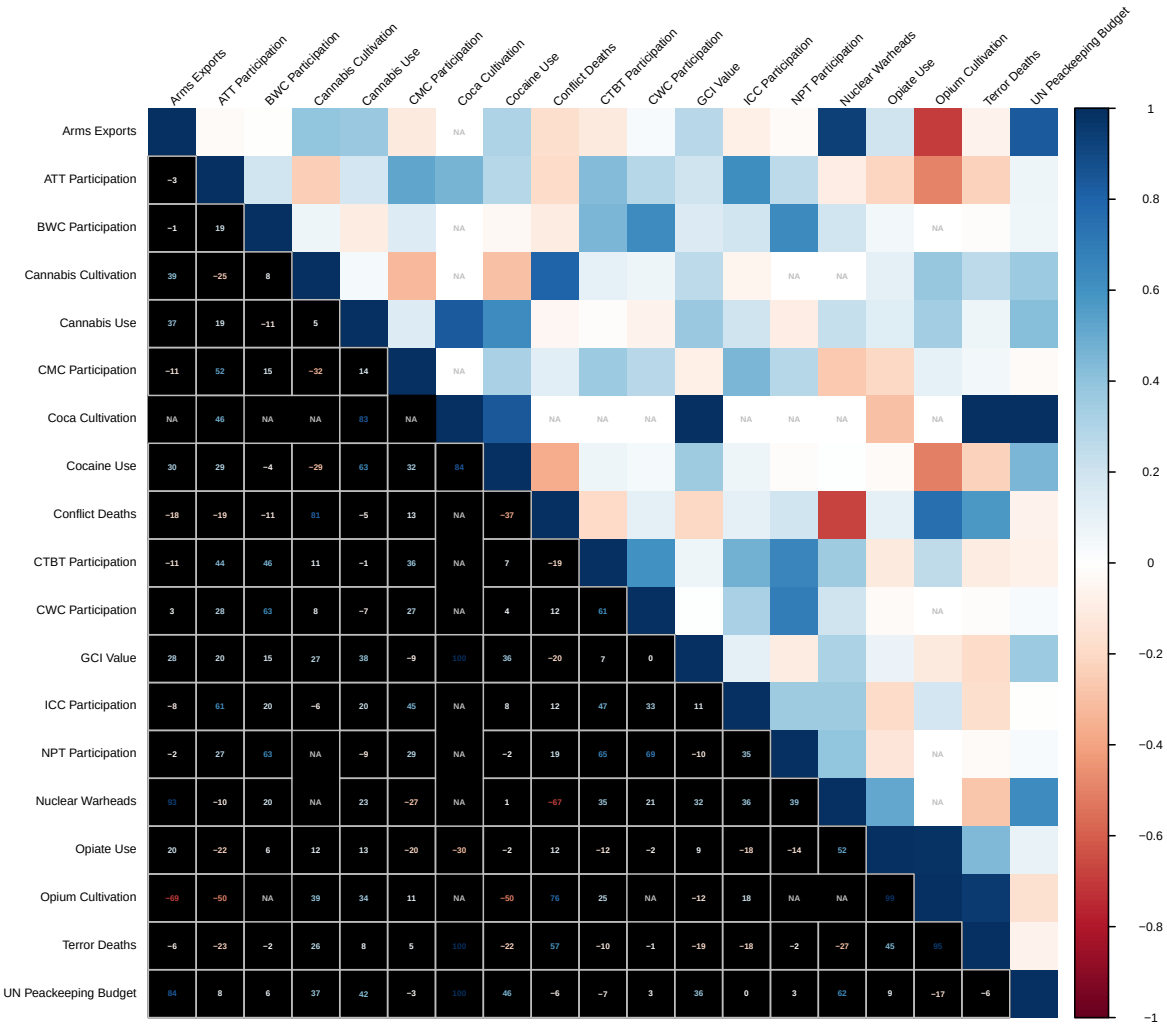
Table 45: Top 10 Countries

Rank	Country	Terror Deaths
1	Iraq	12187
2	Afghanistan	6119
3	Syrian Arab Republic	2755
4	Nigeria	2164
5	Somalia	1558
6	Yemen, Rep.	1517
7	Pakistan	1112
8	Turkey	1004
9	South Sudan	633
10	Libya	631

Note: Table 45 lists the top 10 countries in terms of the number of terrorist incident-related fatalities in 2016 given the most recently available data from Wikipedia

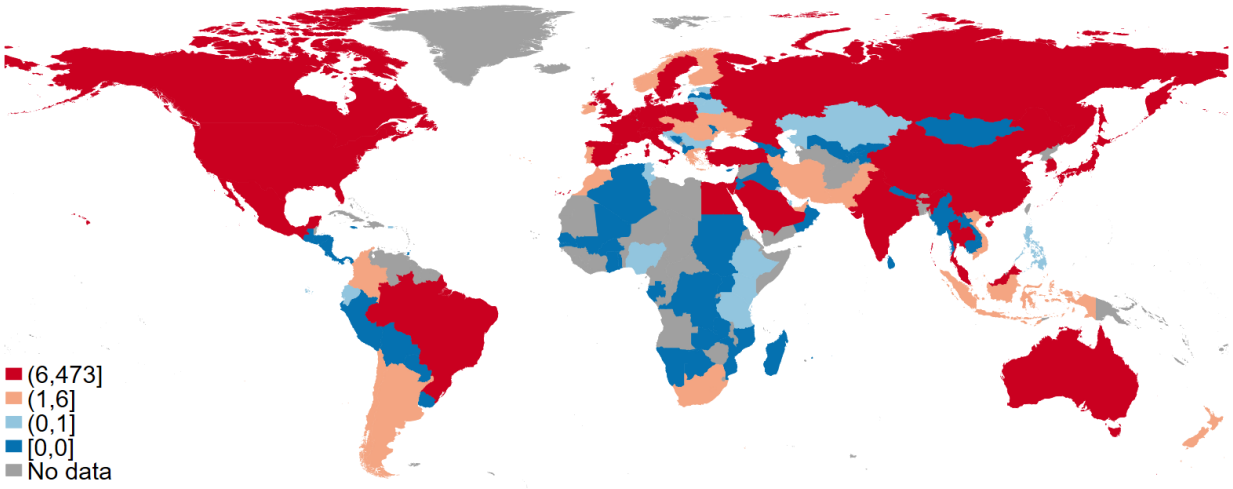
Source: Wikipedia. 2017. "Terrorist incidents by country in 2016" in "Number of terrorist incidents by country." Accessed November 6, 2017.

Figure 106: Correlation Matrix for Security Variables



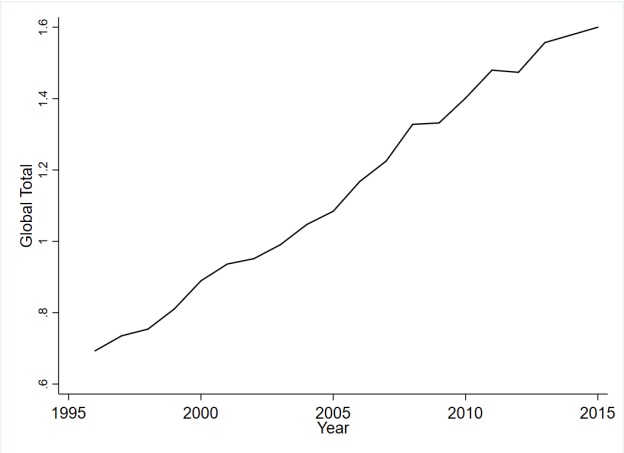
Note: Figure 106 shows the correlation matrix of variables used in the preceding section of the paper. Numbers designate percentages for correlations. The GPGs are unadjusted by any other variables, though some are presented in adjusted form in the paper.

Figure 107: Research and Development Expenditure



Note: Figure 107 shows quartiles of the research and development expenditure in PPP-adjusted constant 2011 billion international USD. for each country given the most recently available data from the World Bank's World Development Indicators. This is measured by multiplying R&D expenditure as a percent of GDP by GDP.

Figure 108: Trends in R & D Spending



Note: Figure 108 shows trends in total research and development expenditure measured in PPP-adjusted constant 2011 trillion international USD.

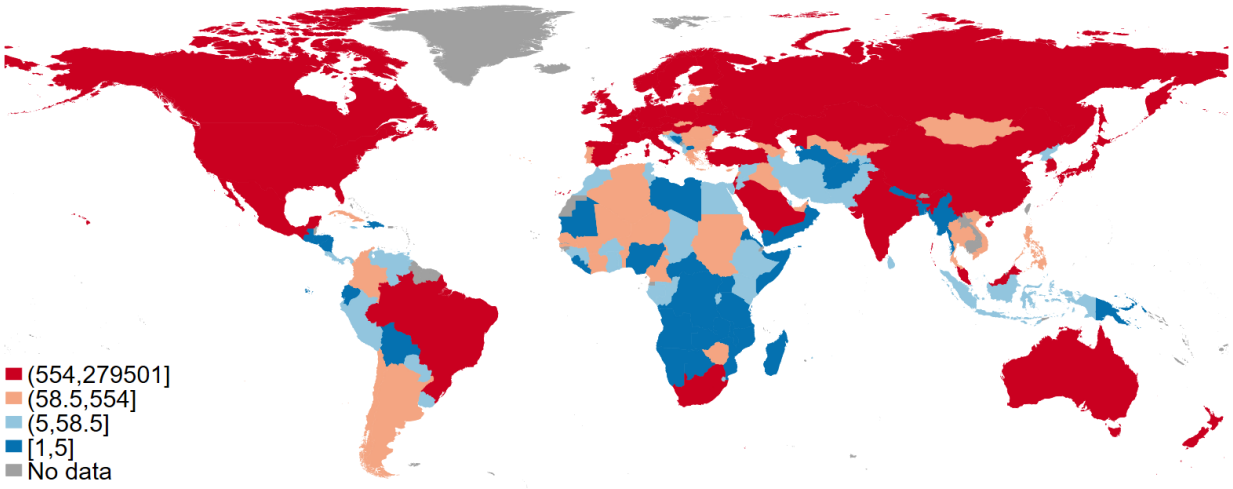
Table 46: Top 10 Countries

Rank	Country	R & D
1	United States	473
2	China	384
3	Japan	158
4	Germany	103
5	Korea, Rep.	74
6	France	56
7	India	47
8	United Kingdom	43
9	Russian Federation	40
10	Brazil	37

Note: Table 46 lists the top 10 countries in terms of research and development expenditure in PPP-adjusted constant 2011 billion international USD, using the most recently available World Bank data. This is obtained by multiplying R&D spending as a percentage of GDP by GDP.

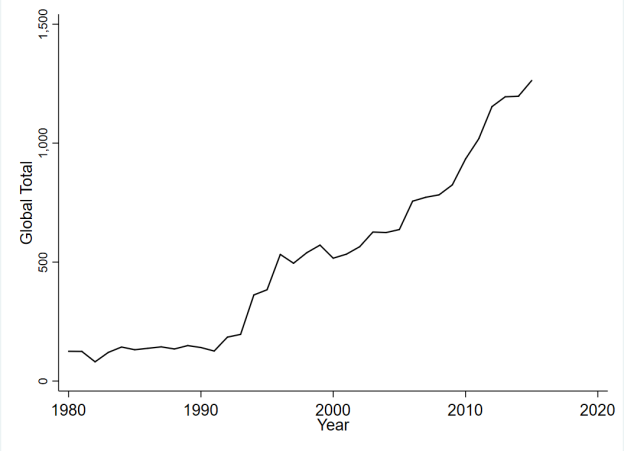
Source: World Bank. 2017. "Research and development expenditure (% of GDP)" World Bank Databank: World Development Indicators. Accessed June 8, 2017.

Figure 109: Total Patent Grants



Note: Figure 109 shows quartiles of total patent grants, including both direct and PCT national phase entries, for each country using the most recently available data from the WIPO Patent Database.

Figure 110: Trends in Patent Grants



Note: Figure 110 shows trends in total patent grants in thousands from 1980 to 2015 using WIPO data.

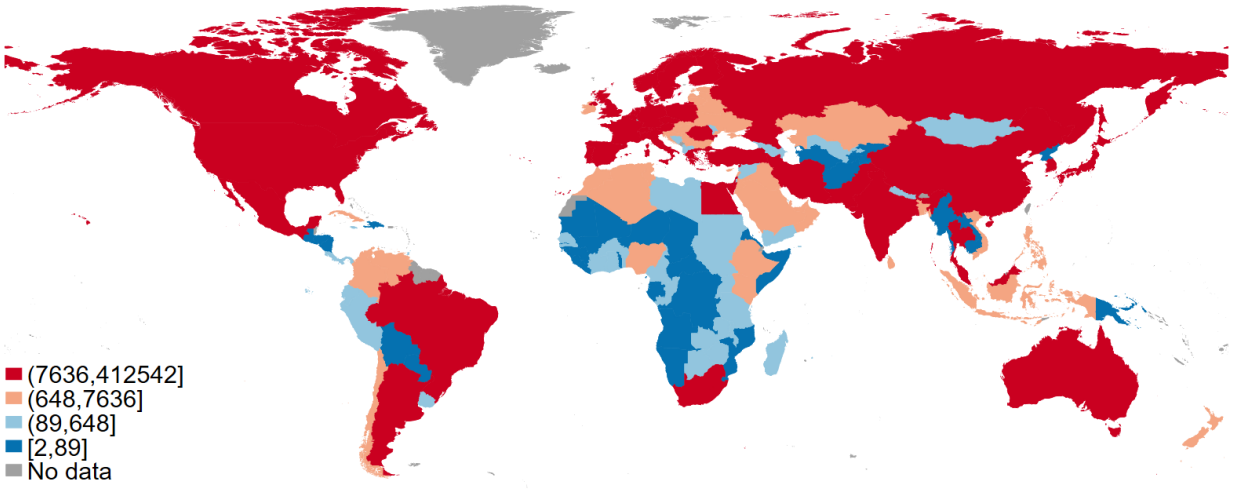
Table 47: Top 10 Countries

Rank	Country	Patent Grants
1	China	280
2	Japan	271
3	United States	257
4	Korea, Rep.	109
5	Germany	87
6	France	44
7	Russian Federation	25
8	Switzerland	22
9	United Kingdom	22
10	Italy	19

Note: Table 47 lists the top 10 countries in terms of total patents granted in thousands, using the most recently available data from the WIPO Patent Database.

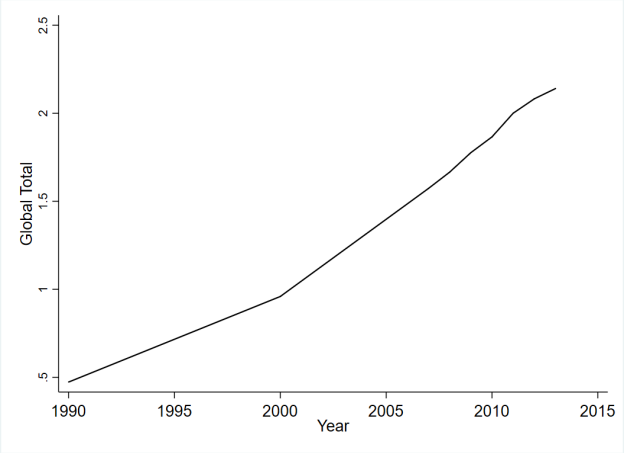
Source: World Intellectual Property Organization (WIPO). "Total patent grants (direct and PCT national phase entries): Total count by applicant's origin (equivalent count): 1980-2015." WIPO IP Statistics Data Center. Accessed July 10, 2017.

Figure 111: Scientific and Technical Publications



Note: Figure 111 shows quartiles of the number of scientific and technical journal articles for each country using the most recently available data from the World Bank.

Figure 112: Trends in Publications



Note: Figure 112 shows trends in total scientic and technical journal articles in millions from 2011 to 2016 using data from the World Bank.

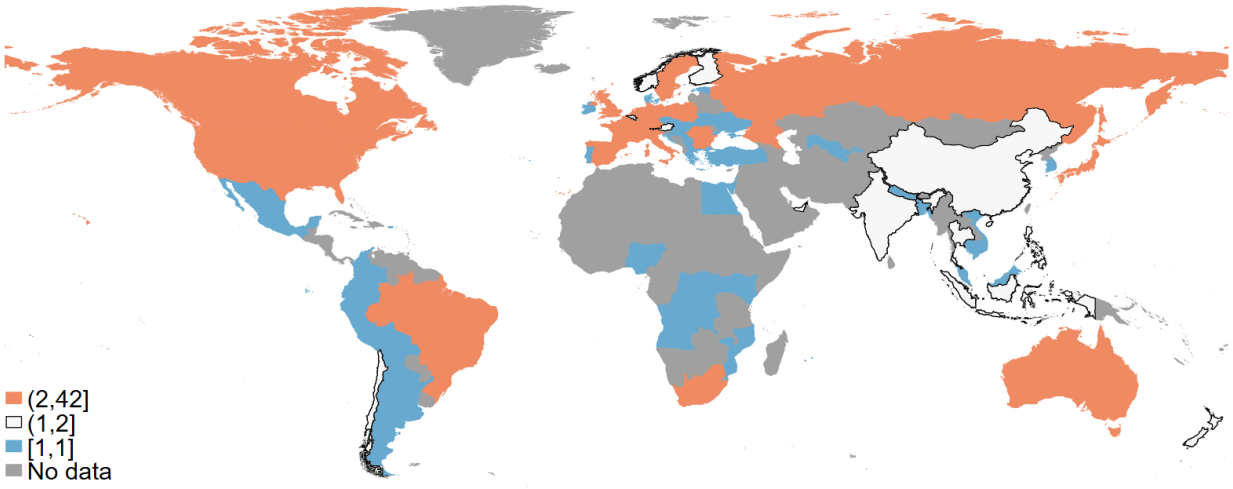
Table 48: Top 10 Countries

Rank	Country	Scientific Publications
1	United States	413
2	China	401
3	Japan	103
4	Germany	101
5	United Kingdom	97
6	India	93
7	France	73
8	Italy	66
9	Korea, Rep.	59
10	Canada	58

Note: Table 48 lists the top 10 countries in terms of scientific and technical journal articles in thousands, using the most recently available data from the World Bank.

World Bank. 2017. "Scientific and technical journal articles." World Bank Databank: World Development Indicators. Accessed June 8, 2017.

Figure 113: Number of Internet Exchange Points(IXPs)



Note: Figure 113 shows terciles of the number of internet exchange points(IXPs) for each country using the most recently available data from Data Center Map. We use quartiles in most other maps used in this paper, but since most countries in the sample only have 1 IXP, terciles are more appropriate here.

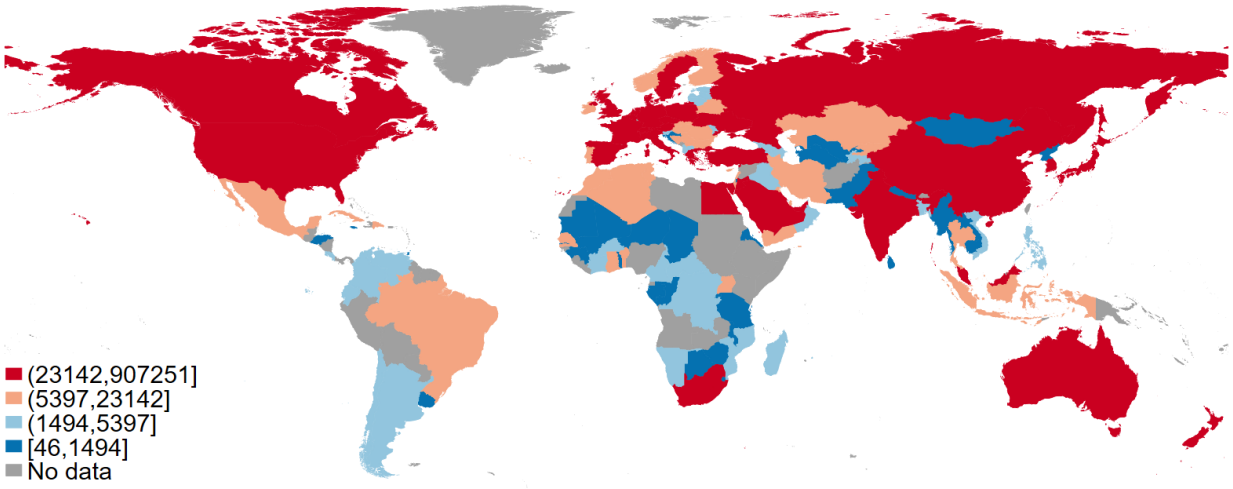
Table 49: Top 10 Countries

Rank	Country	No. of IXPs
1	United States	42
2	Brazil	23
3	France	12
4	Germany	11
5	Sweden	9
6	United Kingdom	8
7	Canada	7
8	Romania	6
9	Netherlands	6
10	South Africa	6

Note: Table 49 lists the top 10 countries in terms of number of IXPs, using the most recently available data from Data Center Map.

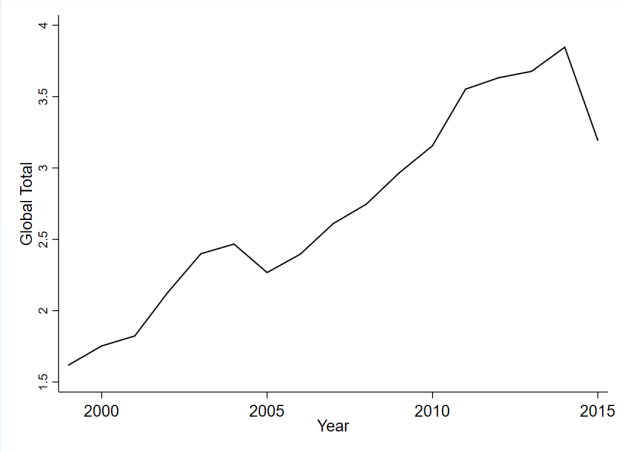
Source: Data Center Map. "Internet Exchange Points." Accessed July 6, 2017.

Figure 114: Inbound International Students



Note: Figure 114 shows quartiles of the number of inbound international students for each country using the most recently available data from UNESCO.

Figure 115: Trends in Inbound International Students



Note: Figure 115 shows trends in total inbound international students in millions.

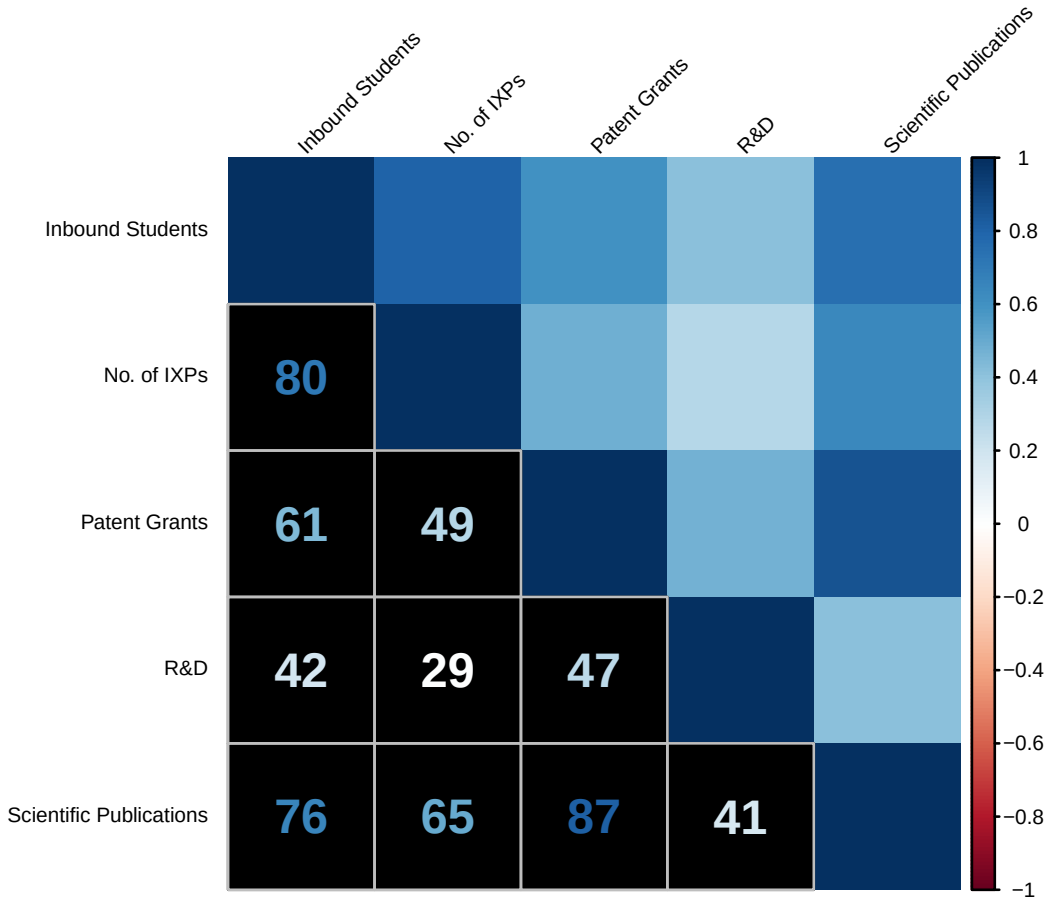
Table 50: Top 10 Countries

Rank	Country	Inbound Students
1	United States	907
2	United Kingdom	429
3	Australia	294
4	France	235
5	Germany	229
6	Russian Federation	226
7	Canada	151
8	Japan	133
9	China	123
10	Italy	90

Note: Table 50 lists the top 10 countries in terms of inbound international students in thousands using the most recently available data from UNESCO.

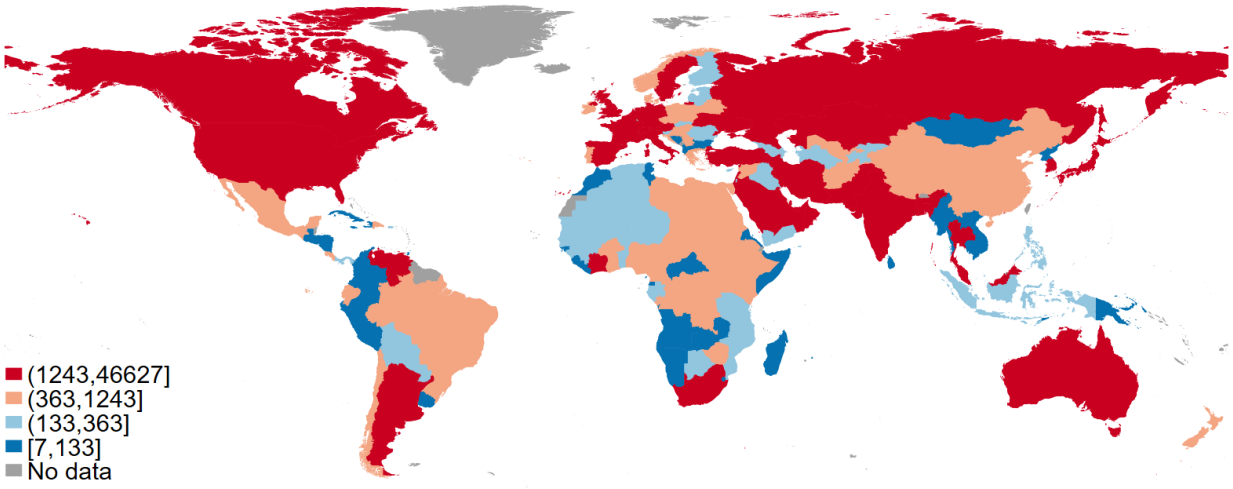
Source: United Nations Scientific, Educational, and Cultural Organization (UNESCO) Institute for Statistics. "Education: Inbound internationally mobile students by host region." Accessed June 8, 2017.

Figure 116: Correlation Matrix for Knowledge Variables



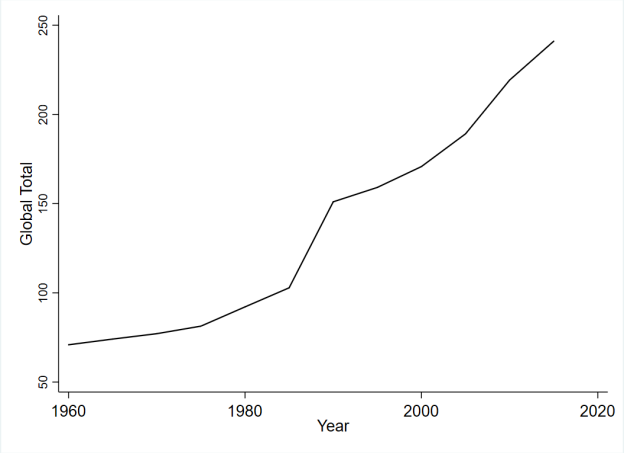
Note: Figure 116 shows the correlation matrix of variables used in the preceding section of the paper. Numbers designate percentages for correlations. The GPGs are unadjusted by any other variables, though some are presented in adjusted form in the paper.

Figure 117: International Migrant Stock



Note: Figure 117 shows quartiles of the international migrant stock in thousands of people for each country given the most recently available data from the World Bank.

Figure 118: Migrant Stock Trends



Note: Figure 118 shows the trends in total international migrant stock in millions of people.

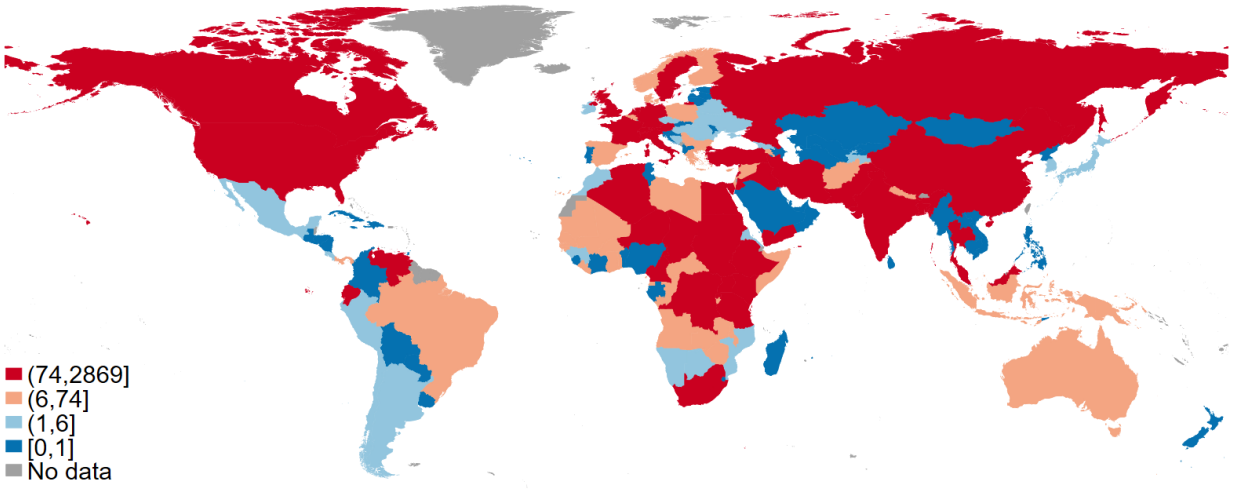
Table 51: Top 10 Countries

Rank	Country	Int. Migrant Stock
1	United States	46627
2	Germany	12006
3	Russian Federation	11643
4	Saudi Arabia	10186
5	United Kingdom	8543
6	United Arab Emirates	8095
7	Canada	7836
8	France	7784
9	Australia	6764
10	Spain	5853

Note: Table 51 shows the ten countries with the highest international migrant stock in thousands of people.

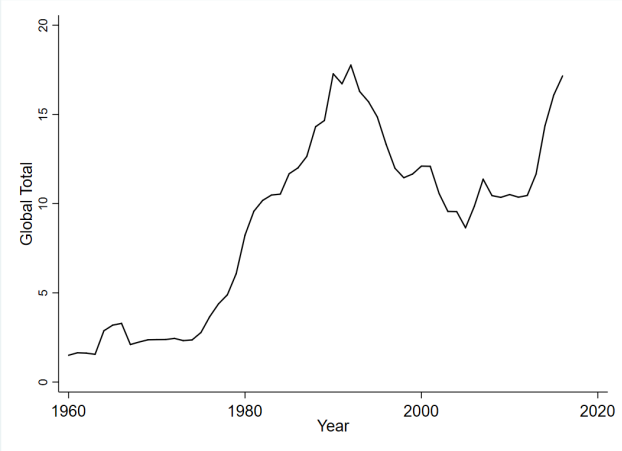
Source: World Bank. 2017. "International migrant stock, total." World Bank Databank: World Development Indicators. Accessed November 17, 2017.

Figure 119: Refugees Received



Note: Figure 119 shows quartiles of the number of refugees received from all countries of origin for each country in thousands using the most recently available UNHCR data.

Figure 120: Trends in Refugees Received



Note: Figure 120 shows trends in total number of refugees in millions received by all countries.

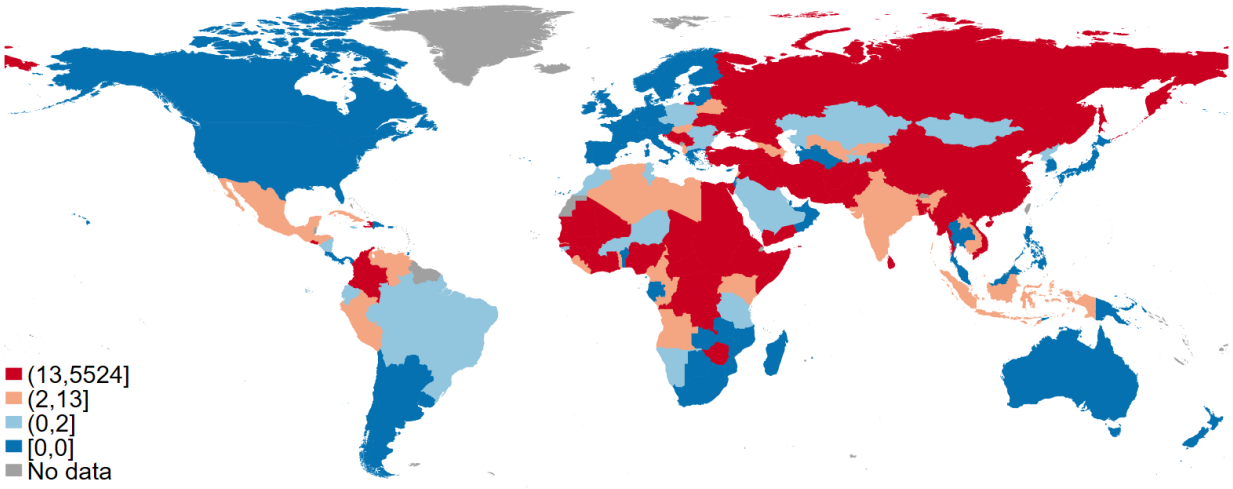
Table 52: Top 10 Countries

Rank	Country	Refugees Received
1	Turkey	2869
2	Pakistan	1353
3	Lebanon	1013
4	Iran, Islamic Rep.	979
5	Uganda	941
6	Ethiopia	792
7	Jordan	685
8	Germany	669
9	Congo, Dem. Rep.	452
10	Kenya	451

Note: Table 52 lists the top 10 countries in terms of number of refugees received in thousands of people using the most recently available UNHCR data.

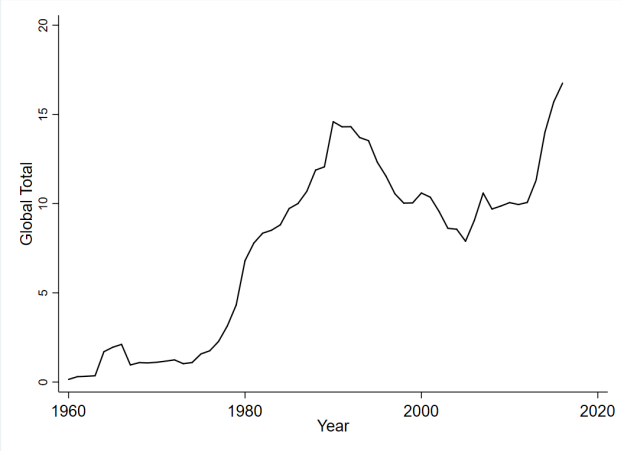
Source: United Nations High Commissioner on Refugees (UNHCR Population Statistics). 2017. "Time Series: Refugees (incl. refugee-like situations): All years, All countries/territories of asylum, All origins." Accessed July 6, 2017.

Figure 121: Refugees Sent



Note: Figure 121 shows quartiles of the number of refugees sent from all countries in thousands for each country in a given year using the most recently available UNHCR data.

Figure 122: Trends in Refugees Sent



Note: Figure 122 shows trends in total number of refugees sent in millions by all countries.

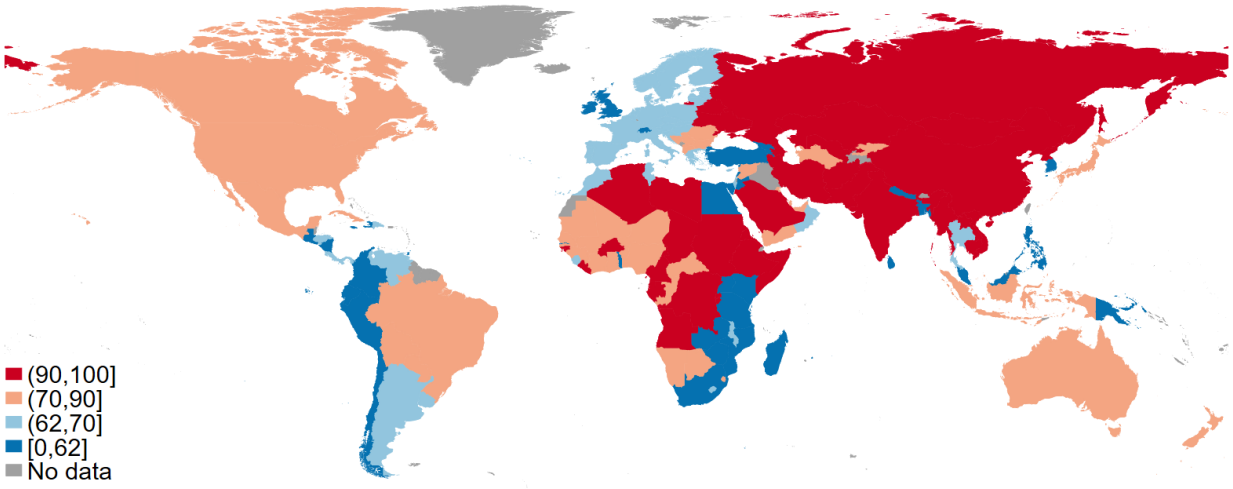
Table 53: Top 10 Countries

Rank	Country	Refugees Sent
1	Syrian Arab Republic	5524
2	Afghanistan	2501
3	South Sudan	1437
4	Somalia	1012
5	Sudan	651
6	Congo, Dem. Rep.	537
7	Central African Republic	491
8	Myanmar	490
9	Eritrea	459
10	Burundi	408

Note: Table 53 lists the top 10 countries in terms of number of refugees sent in thousands of people using the most recently available UNHCR data.

Source: UNHCR Population Statistics. 2017. "Time Series: Refugees (incl. refugee-like situations): All years, All countries/territories of asylum, All origins." Accessed July 6, 2017.

Figure 123: Visa Restrictions



Note: Figure 123 shows quartiles of the average presence of visa restrictions across all dyad pairs involving the country where the country is the reporter, adjusted to a 0 to 100 index, for each country using data from Neumayer (2010).

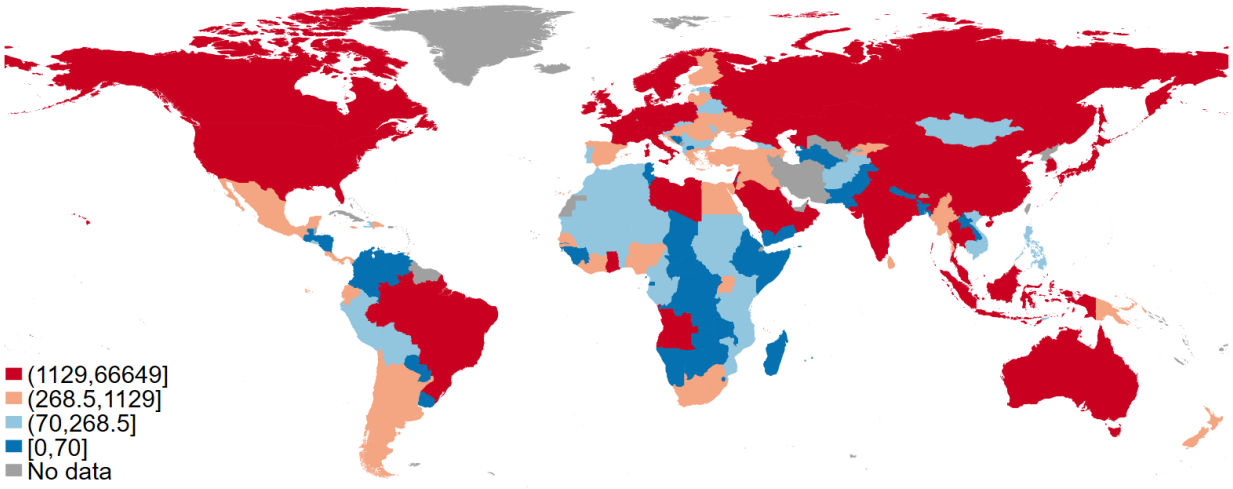
Table 54: Top 10 Countries

Rank	Country	GDP
1	China	19854
2	United States	17214
3	India	8068
4	Japan	4856
5	Russian Federation	3524
6	Germany	3643
7	Indonesia	2811
8	Brazil	2912
9	France	2546
10	Saudi Arabia	1629

Note: Table 54 lists the top 10 countries in terms of average presence of visa restrictions in all dyad pairs where the country is the reporter, weighted by GDP. The value displayed is GDP in PPP-adjusted 2011 constant international billion USD.

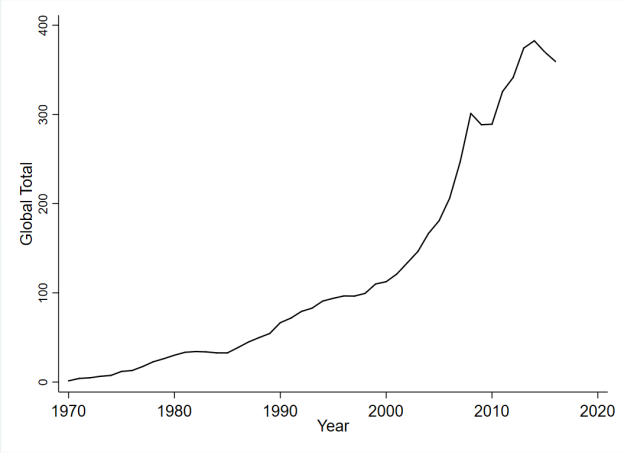
Source: Neumayer, Eric. 2010. "Visa restrictions and bilateral travel." *The Professional Geographer* 62(2):1-11. Data accessed July 10, 2017 on author website.

Figure 124: Paid Personal Remittances



Note: Figure 124 shows quartiles of the paid personal remittances in current millions USD for each country given the most recently available data from the World Bank.

Figure 125: Trends in Remittances



Note: Figure 125 shows trends in total paid personal remittances in current billions USD.

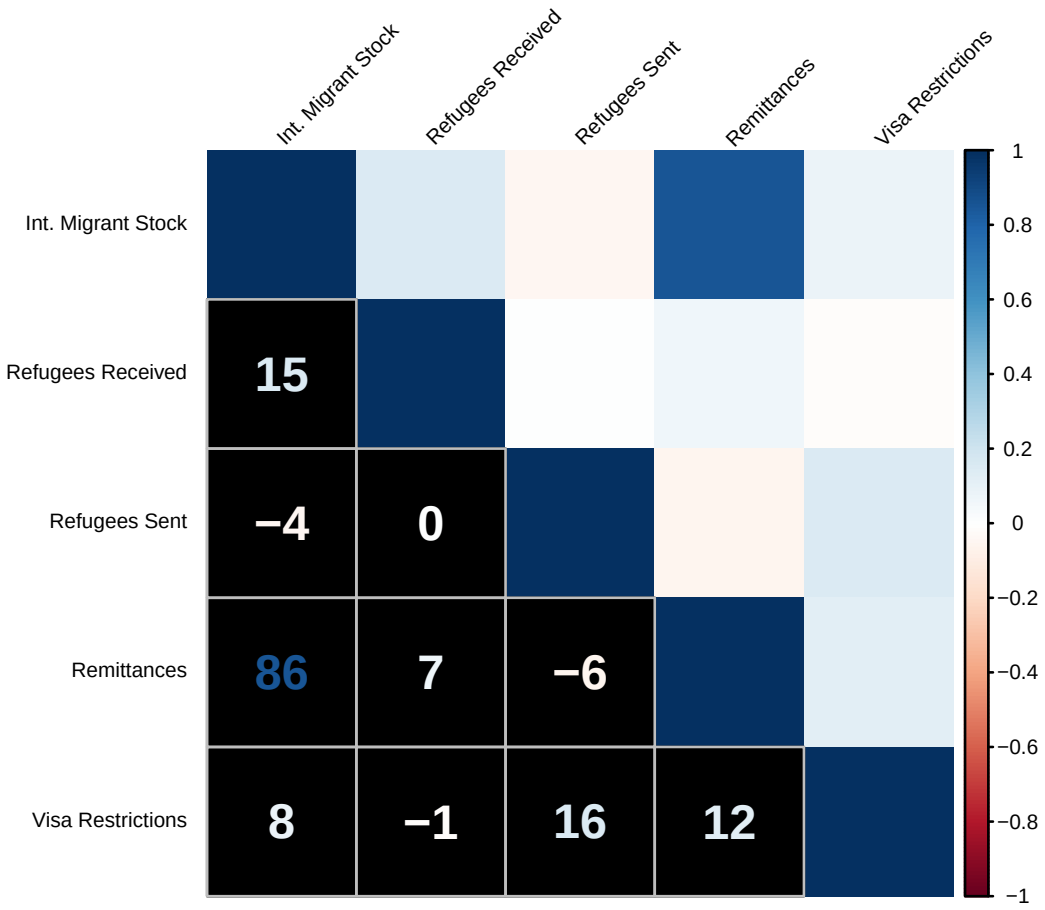
Table 55: Top 10 Countries

Rank	Country	Remittances
1	United States	67
2	Saudi Arabia	39
3	Switzerland	25
4	Germany	21
5	China	20
6	Russian Federation	17
7	Kuwait	15
8	France	13
9	Qatar	12
10	Oman	11

Note: Table 55 lists the top 10 countries in terms of paid personal remittances in current billions USD given the most recently available data from the World Bank.

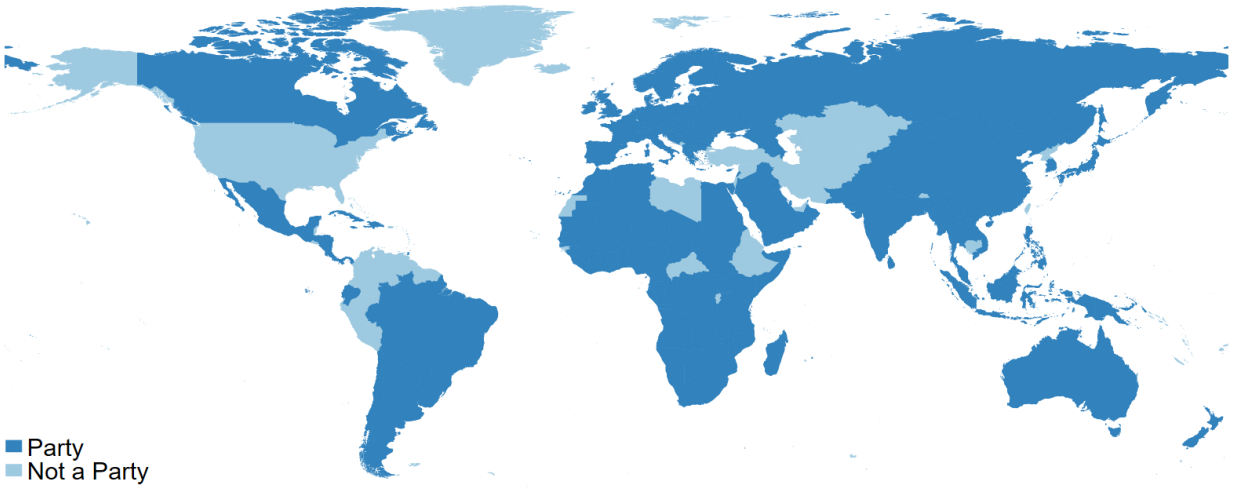
Source: World Bank. 2017. "Personal remittances, paid (current US$)" World Bank Databank: World Development Indicators. Accessed June 8, 2017.

Figure 126: Correlation Matrix for Migration Variables



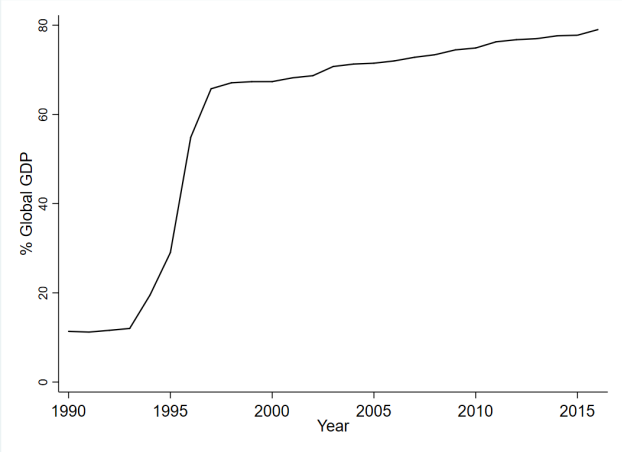
Note: Figure 126 shows the correlation matrix of variables used in the preceding section of the paper. Numbers designate percentages for correlations. The GPGs are unadjusted by any other variables, though some are presented in adjusted form in the paper.

Figure 127: UNCLOS Participation



Note: Figure 127 shows the status of each country with reference to the United Nations Convention on the Law of the Sea.

Figure 128: Trends in UNCLOS Participation



Note: Figure 128 shows trends in the percent of global GDP accounted for by UNCLOS parties for all countries with available data. This is obtained by adding the number of UNCLOS parties, weighted by their share of global GDP, in a particular year.

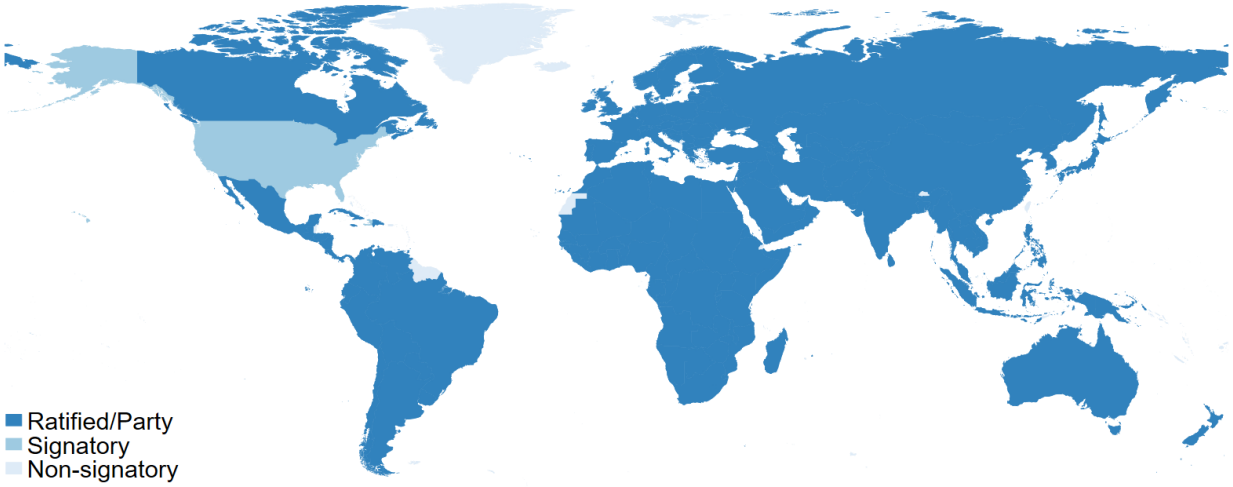
Table 56: Top 10 Countries

Rank	Country	GDP
1	United States	17214
2	Turkey	1883
3	Iran, Islamic Rep.	1271
4	Colombia	639
5	United Arab Emirates	622
6	Venezuela, RB	536
7	Kazakhstan	417
8	Hong Kong SAR, China	399
9	Peru	384
10	Israel	279

Note: Table 56 lists the top 10 countries not party to UNCLOS by GDP measured in PPP-adjusted constant 2011 international billion USD.

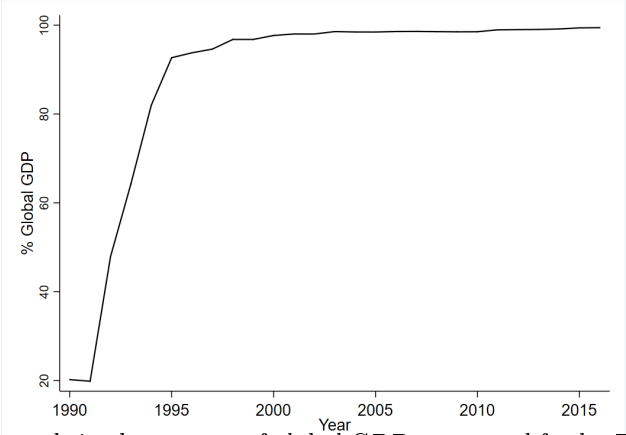
Source: United Nations Division for Ocean Affairs and the Law of the Sea. 2017. "Chronological lists of ratifications of, accessions and successions to the Convention and the related Agreements." Accessed July 5, 2017.

Figure 129: Basel Convention Participation



Note: Figure 129 shows the status of each country with reference to participation in the Basel Convention on Control of Transboundary Movements of Hazardous Wastes and their Disposal.

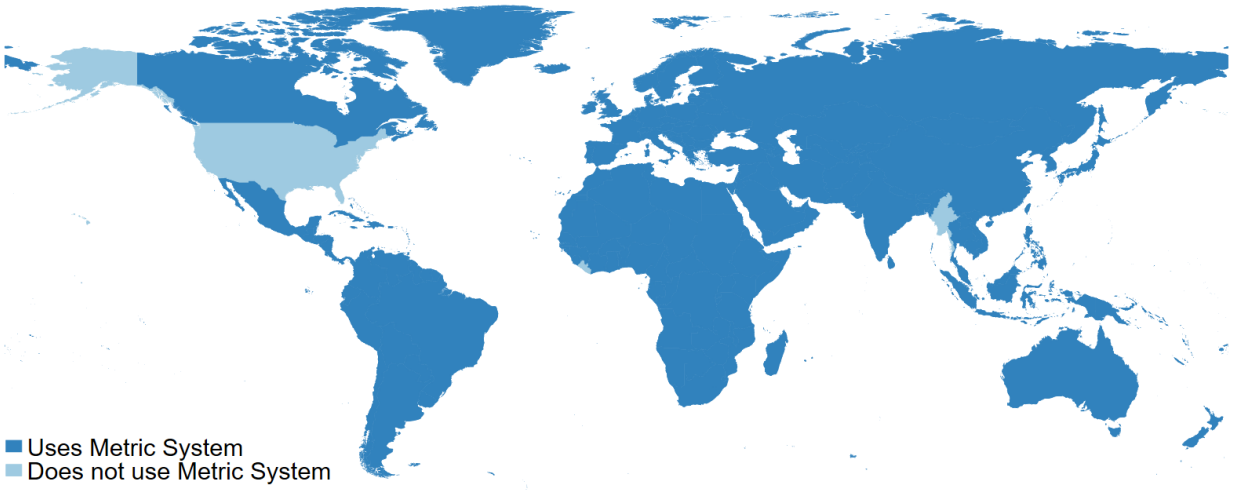
Figure 130: Trends in Basel Participation



Note: Figure 130 shows trends in the percent of global GDP accounted for by Basel parties for all countries with available data. This is obtained by adding the number of Basel parties, weighted by their share of global GDP, in a particular year. Parties includes both signatories and full parties.

Source: Basel Convention. 2017. "Parties to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal." Accessed July 5, 2017.

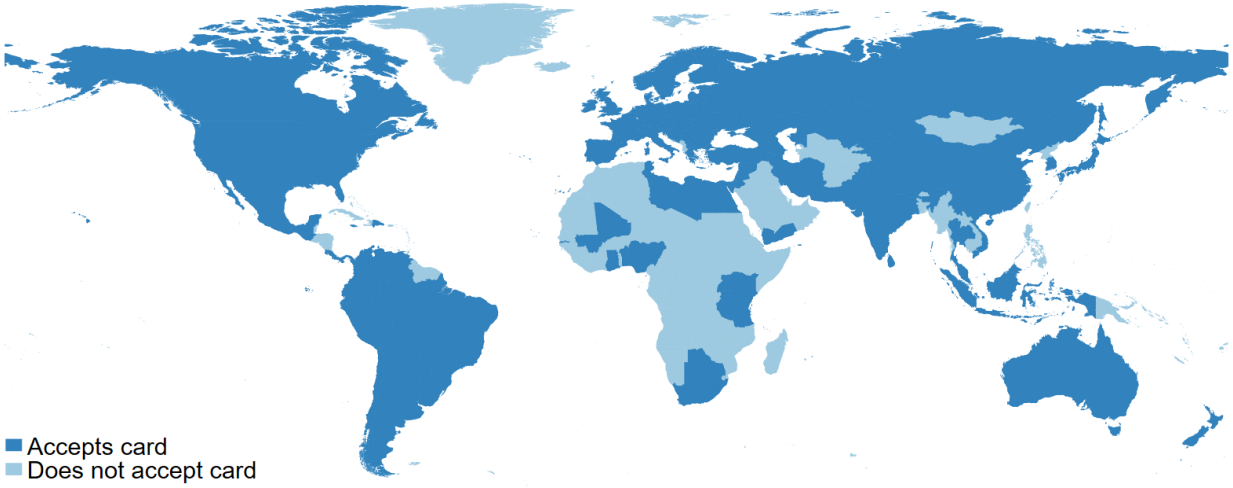
Figure 131: Adoption of the Metric System



Note: Figure 131 shows the status of the adoption of the metric system for each country using the most recently available data from the CIA World Factbook.

Source: Central Intelligence Agency. 2017. "Appendix G: Weights and Measures. *The World Factbook*. Accessed July 6, 2017.

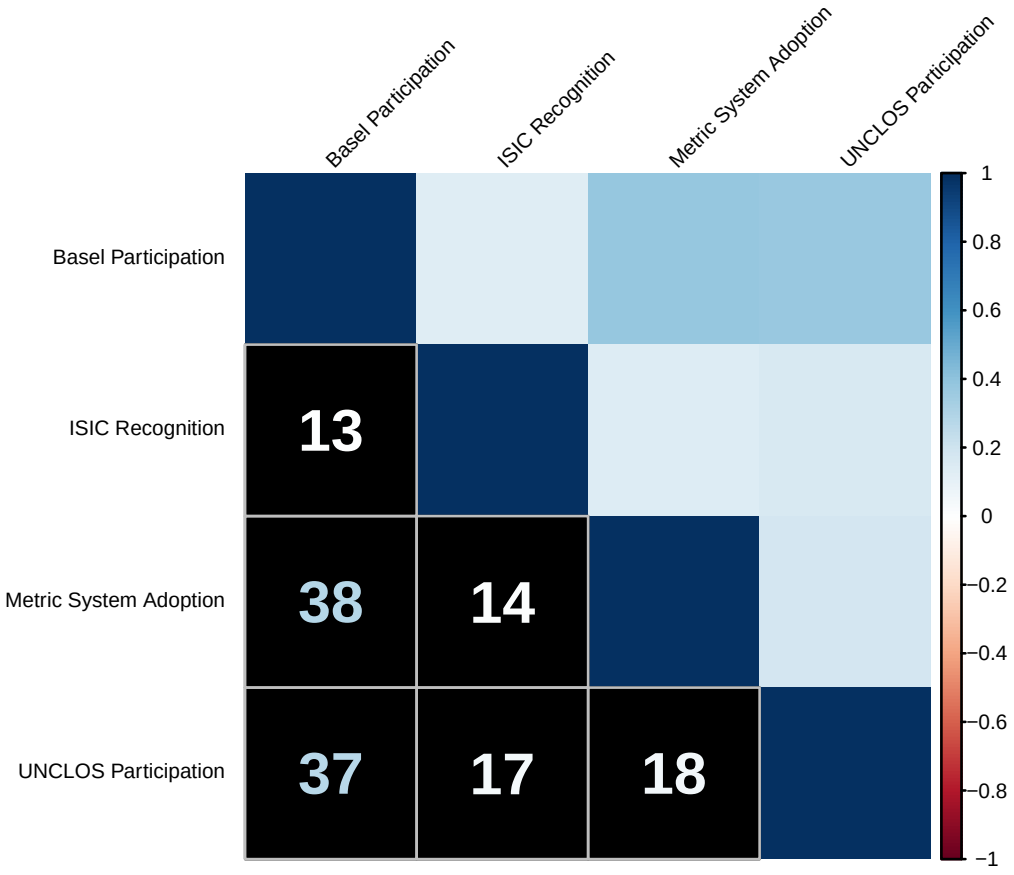
Figure 132: Recognition of the International Student Identity Card(ISIC)



Note: Figure 132 shows the status of recognition of the International Student Identity Card(ISIC) for each country using the most recently available ISIC data.

Source: International Student Identity Card (ISIC). "ISIC Around the World." Accessed July 6, 2017.

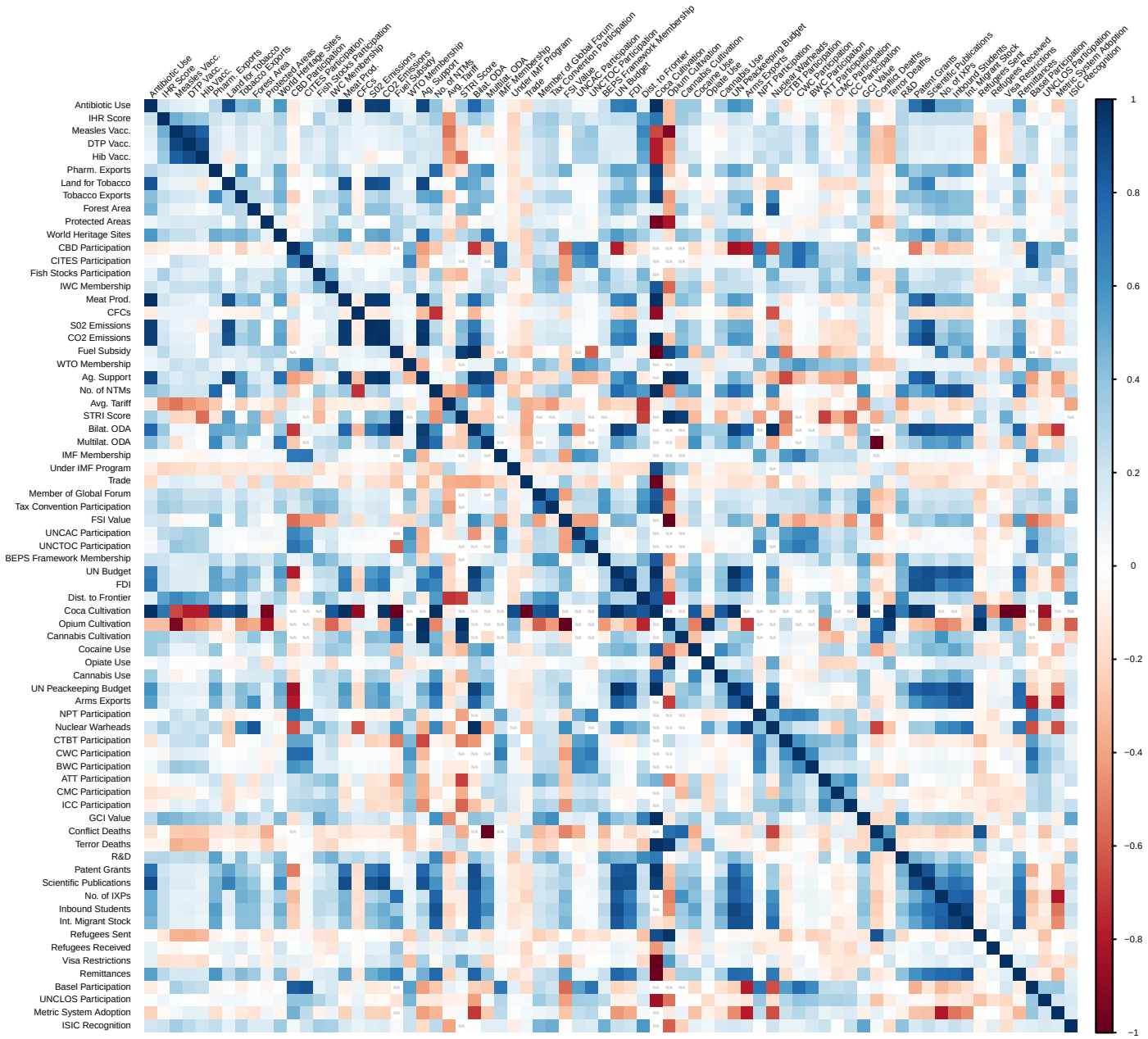
Figure 133: Correlation Matrix for Norms Variables



Note: Figure 133 shows the correlation matrix of variables used in the preceding section of the paper. Numbers designate percentages for correlations. The GPGs are unadjusted by any other variables, though some are presented in adjusted form in the paper.

12 All Global Public Goods

Figure 134: Correlation Matrix for All Variables



Note: Figure 134 shows the correlation matrix of all variables used in this paper, grouped by the section of the paper in which they appear. Numbers designate percentages for correlations. The GPGs are unadjusted by any other variables, though some are presented in adjusted form in the paper.

Table 57: Top 20 Countries in Terms of Appearances in Top 10 Lists

Rank	Country	Appearances
1	United States	37
2	China	33
3	Russian Federation	31
4	Germany	25
5	India	25
6	France	24
7	Brazil	20
8	Japan	18
9	Canada	17
10	Pakistan	17
11	United Kingdom	16
12	Nigeria	16
13	Iraq	14
14	Indonesia	14
15	Iran, Islamic Rep.	13
16	Italy	12
17	Mexico	11
18	Korea, Rep.	11
19	Algeria	10
20	Venezuela, RB	10

Note: Table 57 lists the top 20 countries in terms of number of times they appear in the top 10 lists in these factsheets.

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