

SDG & SQL Report

Country Analysis

An analysis of data on economic growth, inequality, renewable energy and climate change through the prism of the UN's Sustainable Development Goals.

SDG 7 · 8 · 10 · 13 · 3

- DATASET: GLOBAL COUNTRY INFORMATION DATASET 2023
- GLOBAL DATA ON SUSTAINABLE ENERGY (2000-2020)

Link to the GitHub project containing all the queries used:

www.github.com/manzodanilo/SDG-SQL-Report-Country-Analysis



Purpose of the Report

This SQL project analyses the performance of the 20 countries with the highest GDP in the 2023 dataset, supplemented by an analysis of the full list of countries included in the datasets. We will assess progress towards five Sustainable Development Goals. The aim is to identify countries that stand out positively in terms of sustainable development, economic performance and social aspects, using comparable quantitative indicators.

Analyse

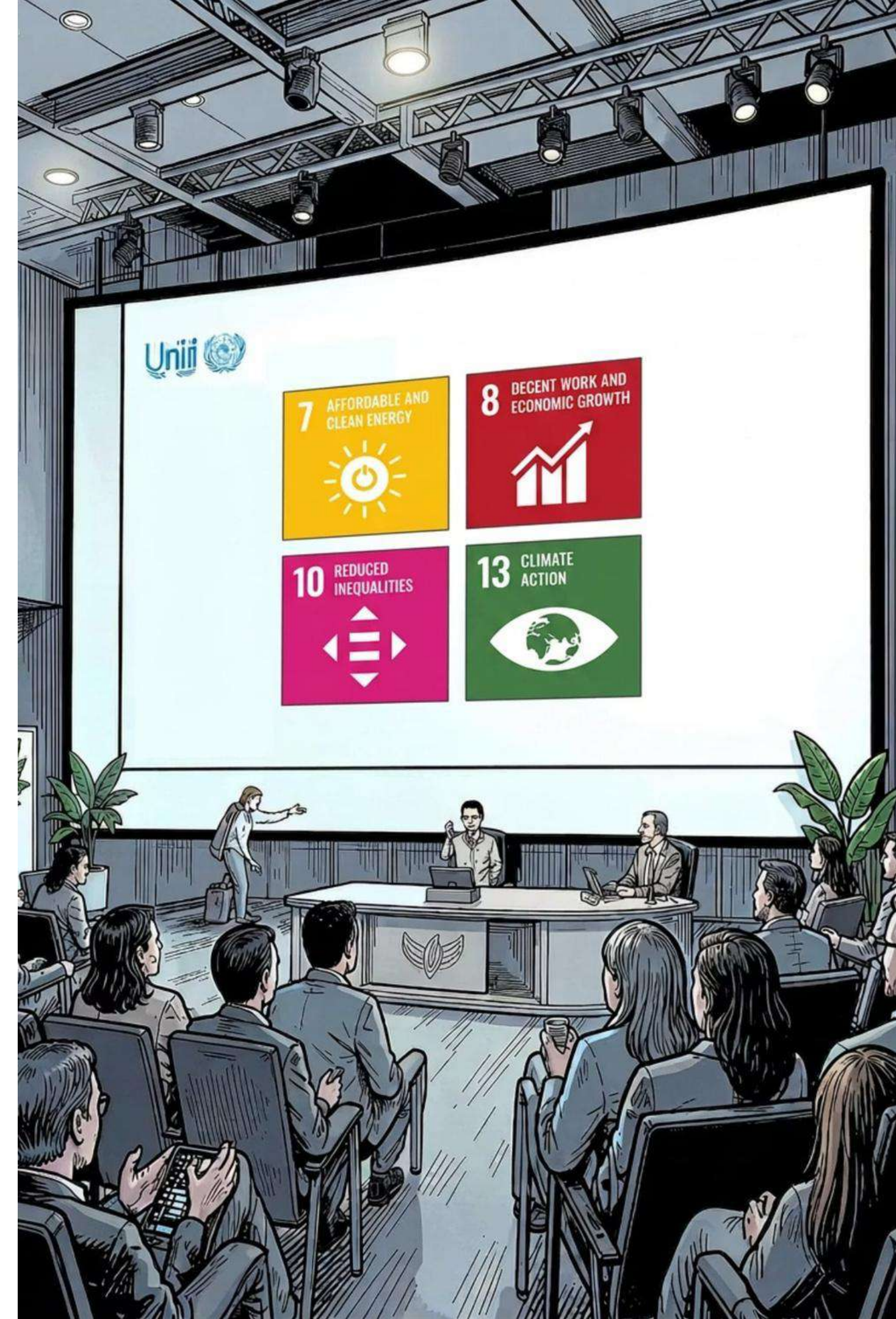
Economic, social and environmental indicators using structured SQL queries

Compare

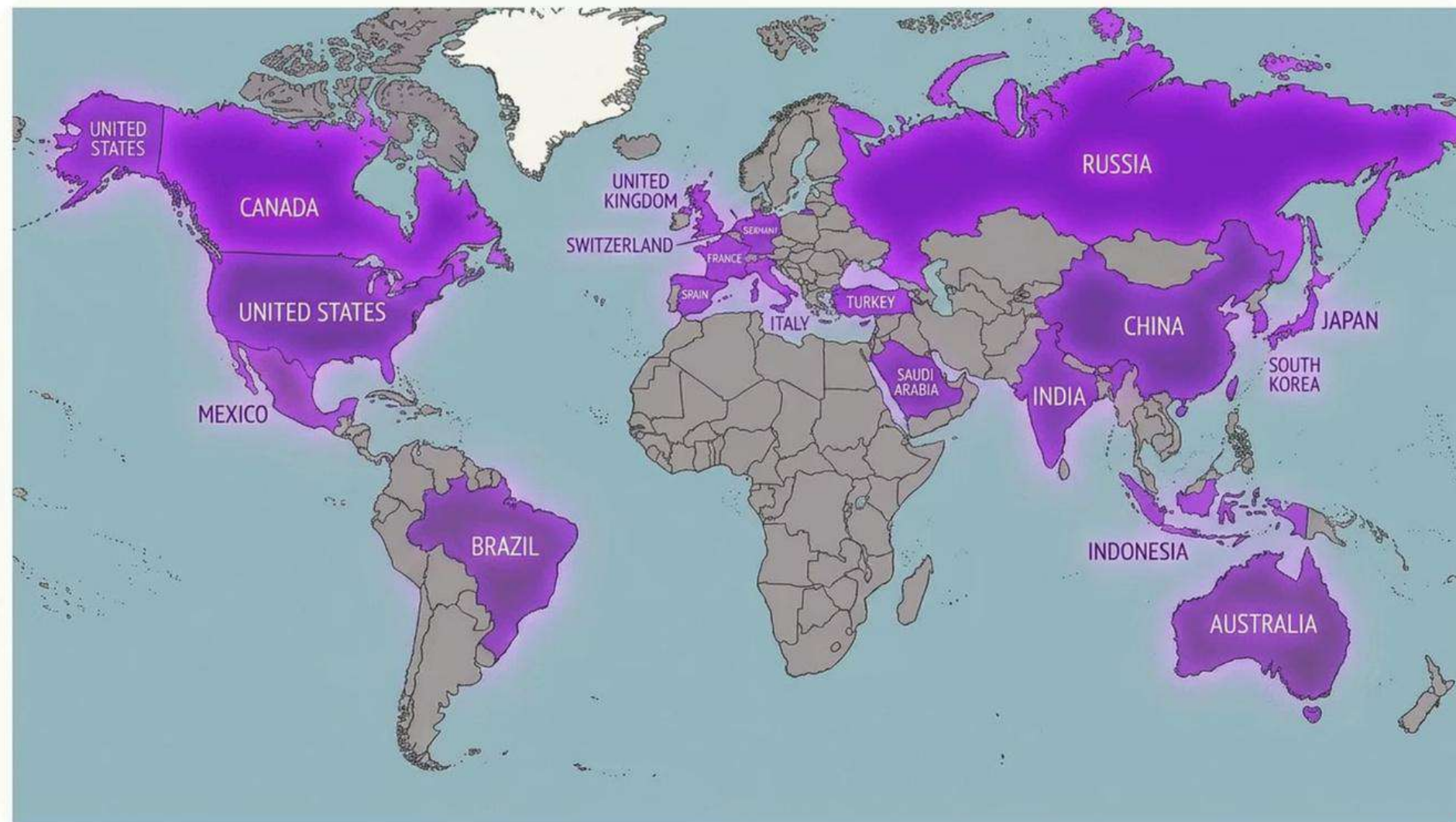
Countries with mature economies

Identify

Countries that perform well and those that do not, for further in-depth analysis



Country selection: the world's top 20 economies



Selection criteria

For obvious reasons of time and resources, I will analyse only those 20 countries with the highest GDP, as I assume they are the ones most likely to drive and lead the way in new economic, social and environmental policies.

The world's top 20 economies account for a significant share of global GDP and emissions. To provide a comprehensive overview, the report also includes a brief ranking of certain countries, taking into account all those included in the available datasets, with specific indicators and labels.

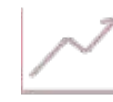
The world's top 20 economies

The five goals to analyse



SDG 7 — Affordable and clean energy

To ensure that everyone has access to affordable, reliable, sustainable and modern energy services.



SDG 8 — Decent work and economic growth

To promote inclusive, sustained and sustainable economic growth, full and productive employment, and decent work for all.



SDGs 3 and 10 — Good health and reducing inequalities

To reduce economic inequalities both within and beyond national borders, and to ensure a healthy life and promote well-being for everyone at all ages.



SDG 13 — Combating climate change

Urgent measures must be taken to tackle climate change and its impacts by regulating emissions and promoting developments in renewable energy.

Indicators and Parameters for the Goals

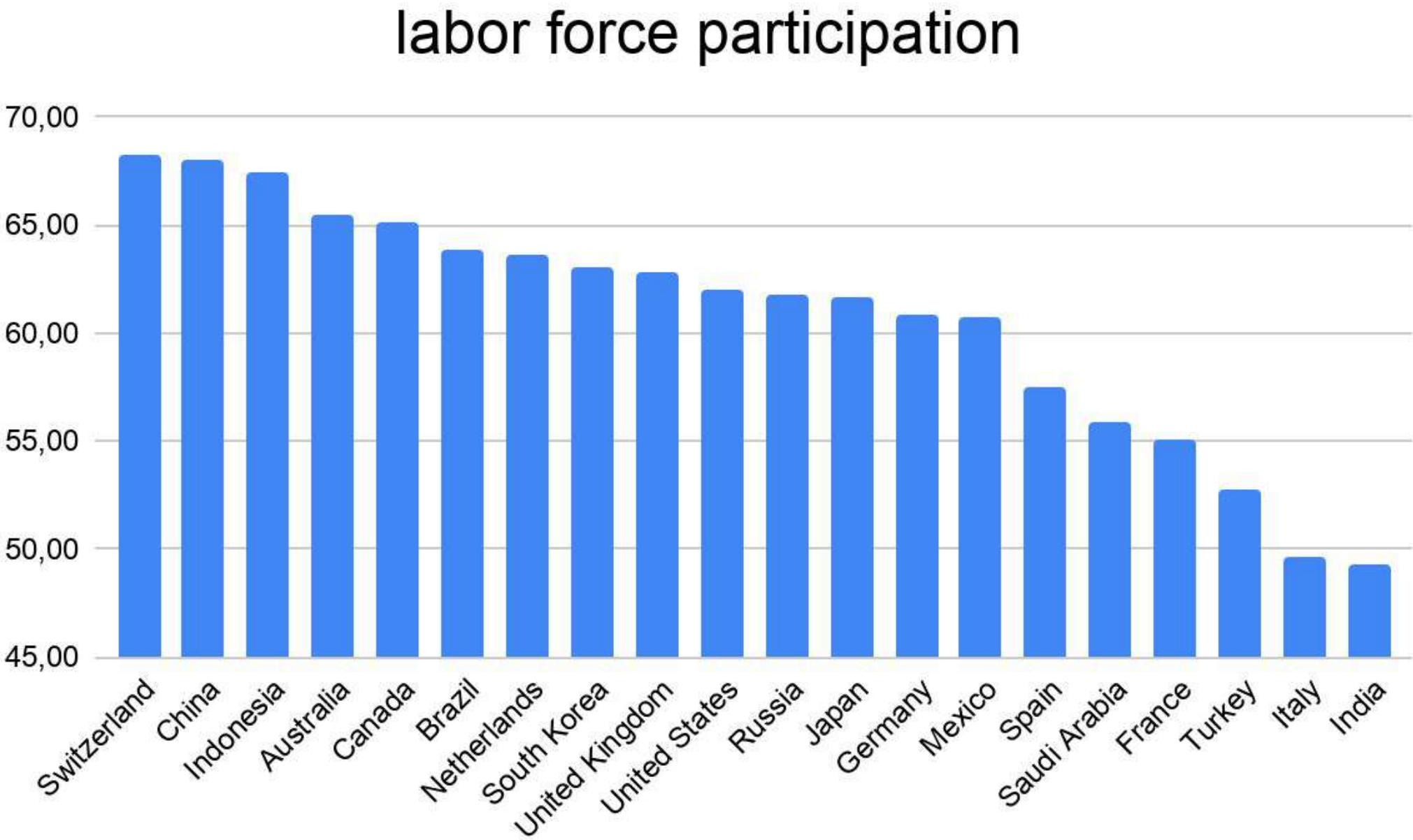
To assess progress towards the Sustainable Development Goals, we will use specific quantitative indicators derived from globally comparable data parameters.

1	2
Goal 8 — Economic growth Indicators: Labor force participation Average GDP growth (annual %) Unemployment rate Total tax rate: total tax burden as a percentage of trading profits.	Goals 3 and 10 — Good health and reducing inequalities Indicators: • life expectancy • maternal mortality ratio • Gross tertiary education enrollment % • Physicians per thousand • Per capita GDP
3 Goals 7 and 13 – Climate change and clean energy Indicators: • Value co2 emissions (metric tons per capita): per capita carbon dioxide emissions in metric tonnes. • Low-carbon electricity (% electricity): the proportion of electricity generated from low-carbon sources (nuclear and renewable sources).	

Goal 8 — Economic Growth

Labor force participation

Looking at the labour force participation data for the 20 largest economies in 2023, we can see that Switzerland, China and Indonesia have similar rates of labour force participation amongst their respective populations. These stand at 68.30 per cent, 68.00 per cent and 67.50 per cent respectively.

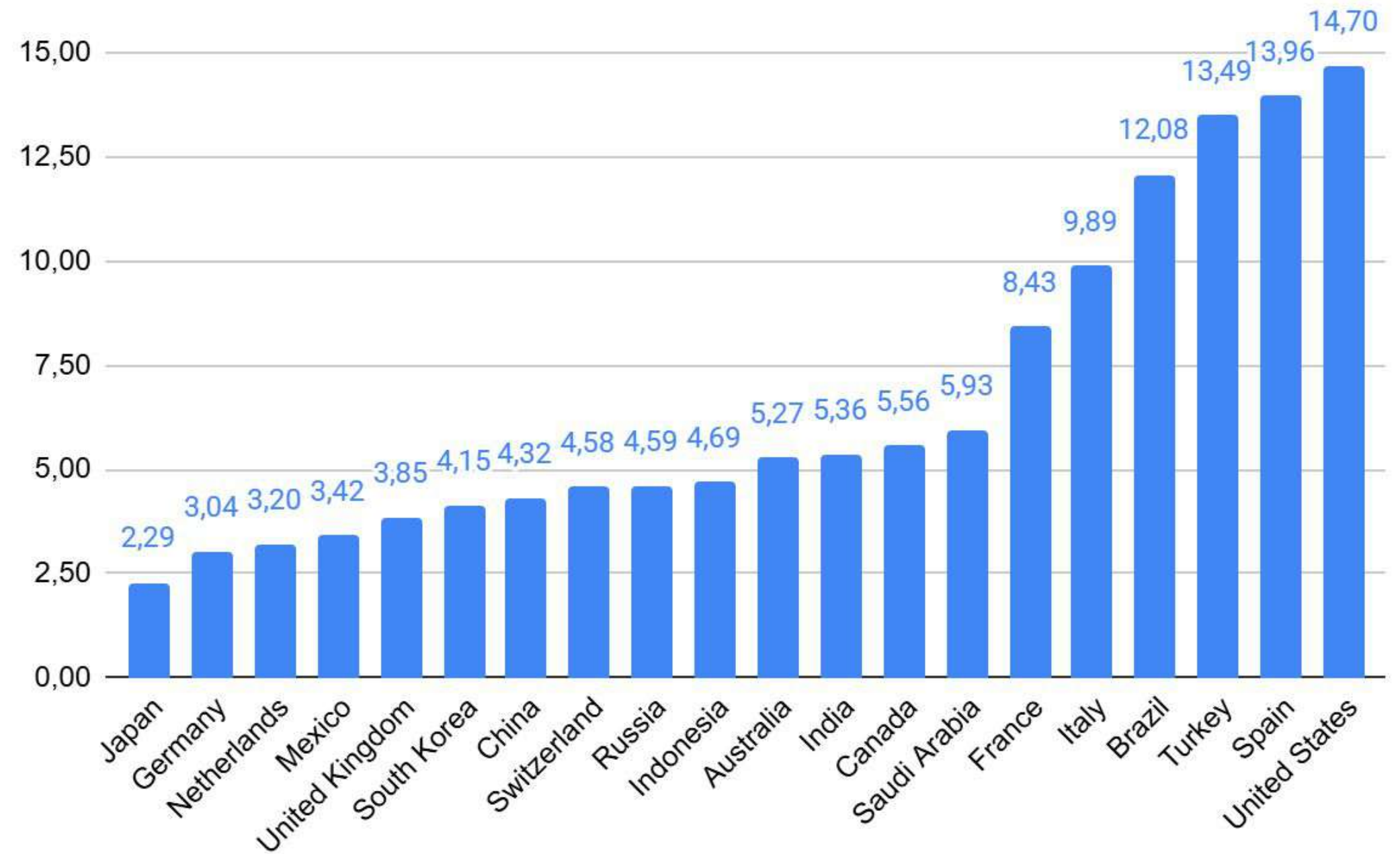


Unemployment rate

To examine the economic aspect in even greater depth, I have extracted the unemployment rates for each country. It is noticeable that, for countries with low unemployment rates, the figures are fairly consistent.

One outlier is the 14.7* per cent rate in the United States, despite it being the world's largest economy.

*The dataset reports 14.7% for the US, which appears to reflect the 2020 pandemic peak rather than 2023; treated as a data quality issue.



Which economies have the highest average GDP growth rate?

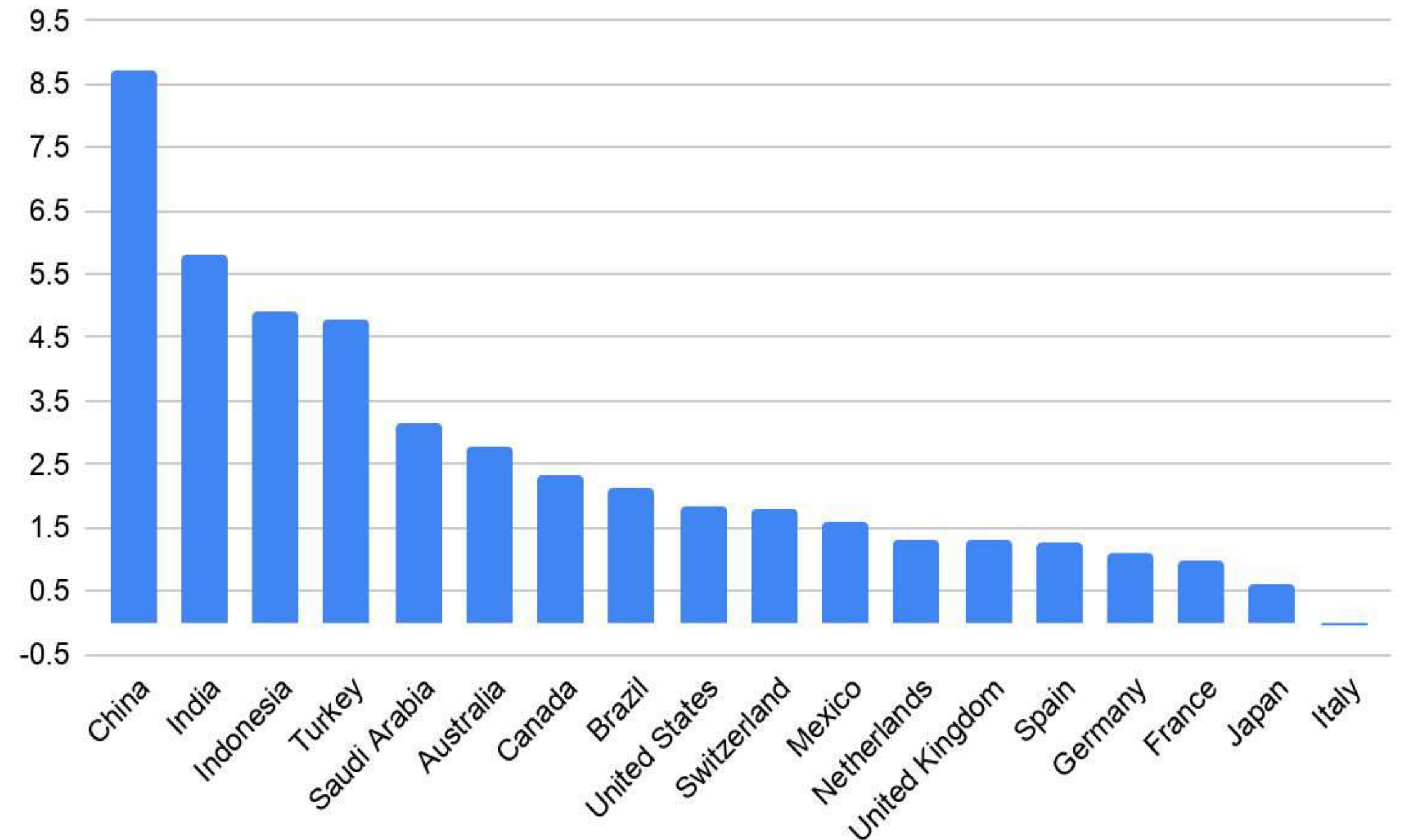
By cross-referencing the data from the two tables, 'global-data-on-sustainable-energy' and the materialised view named 'mv_top_20_countries_gdp', it is immediately apparent which of the selected countries had the highest average economic growth between 2000 and 2020.

The top five countries are:

1. China
2. India
3. Indonesia
4. Turkey
5. Saudi Arabia.

With China pulling well ahead of the other countries by a considerable margin

Note: There are 18 countries selected, not 20, because Russia and South Korea are not included in the 'global-data-on-sustainable-energy' dataset

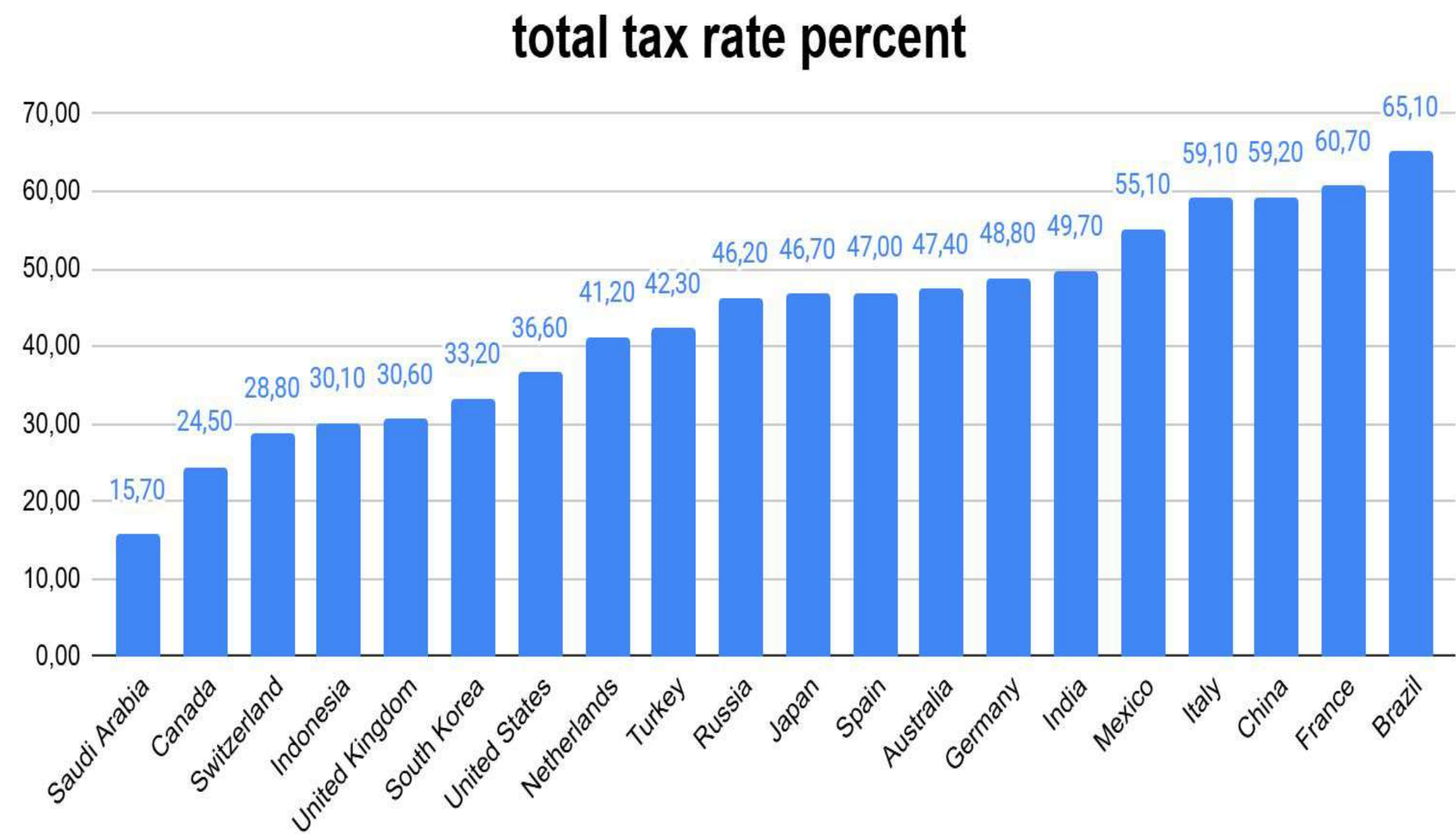


Total tax rate

The **total tax rate** indicates the percentage of total taxes deducted from business profits. Indirectly, it can be interpreted as a **disincentive to start a business**.

The higher the total tax rate, the less incentive there may be to start a new business.

The most notable outlier is the United States, which ranks sixth despite being one of the most market-oriented economies. However, this figure must be interpreted in the context of the tax structure and the applicable deductions.



Goal 10: tertiary education and economic well-being

Correlation between gross enrolment in tertiary education and per capita GDP in the 20 countries analysed

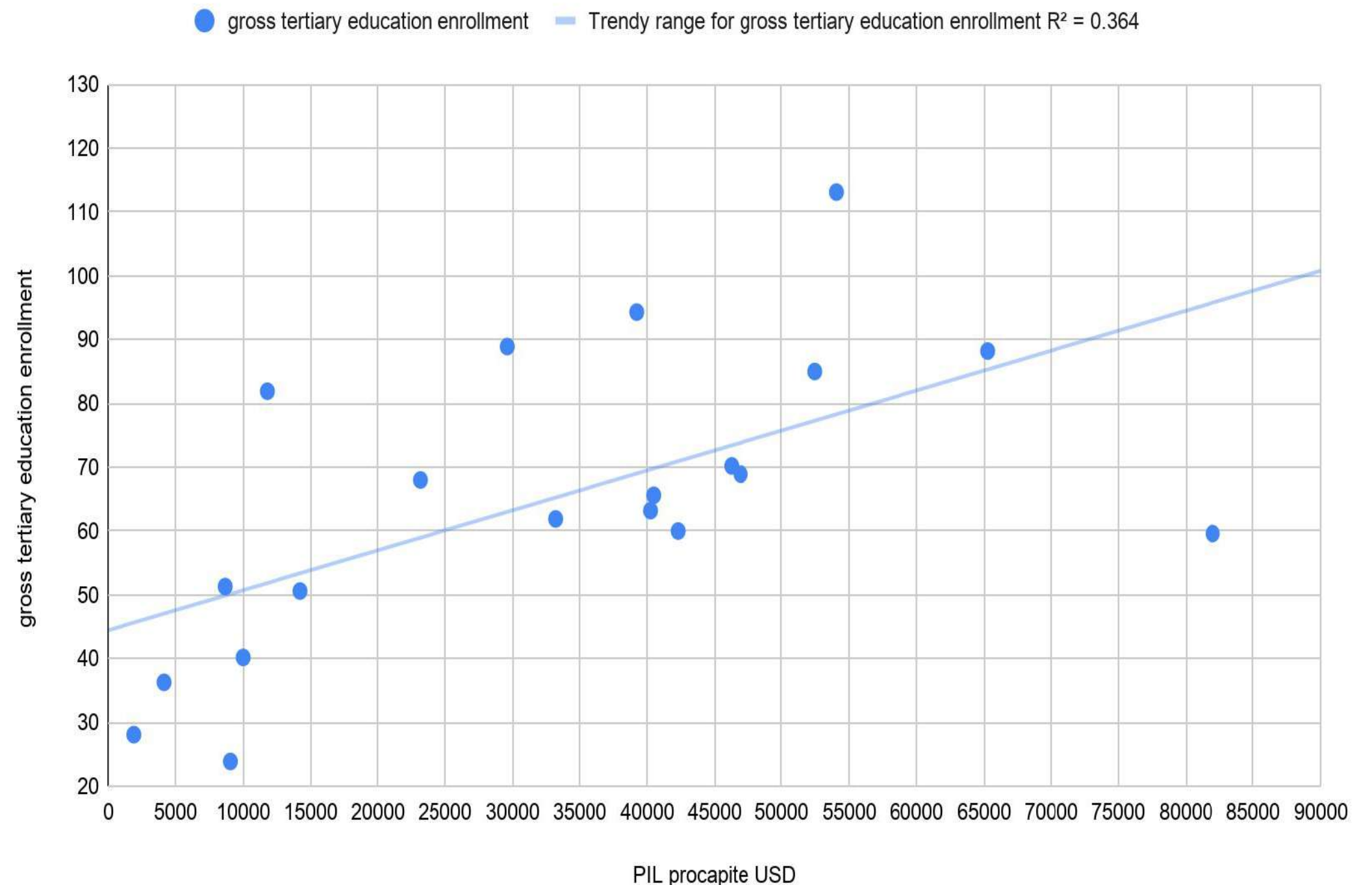
Among the 20 countries with the highest total GDP, there is a moderate positive linear correlation between gross enrolment in tertiary education and per capita GDP ($r \approx +0.60$; $R^2=0,364$). Generally speaking, countries with higher participation rates in tertiary education also tend to have a higher GDP per capita. However, the variation in the data suggests that education and average income do not move in direct proportion to one another: other factors, such as public policies, the structure of the economy and the quality of institutions, may contribute to both.

The result indicates a statistical association and does not prove a causal link.

As regards the gross primary enrolment rate, there are no noteworthy findings to highlight, as all figures are close to 100 per cent or higher.

Correlation coefficient calculated in Excel using the data extracted via the query.

Per capita GDP and participation in tertiary education



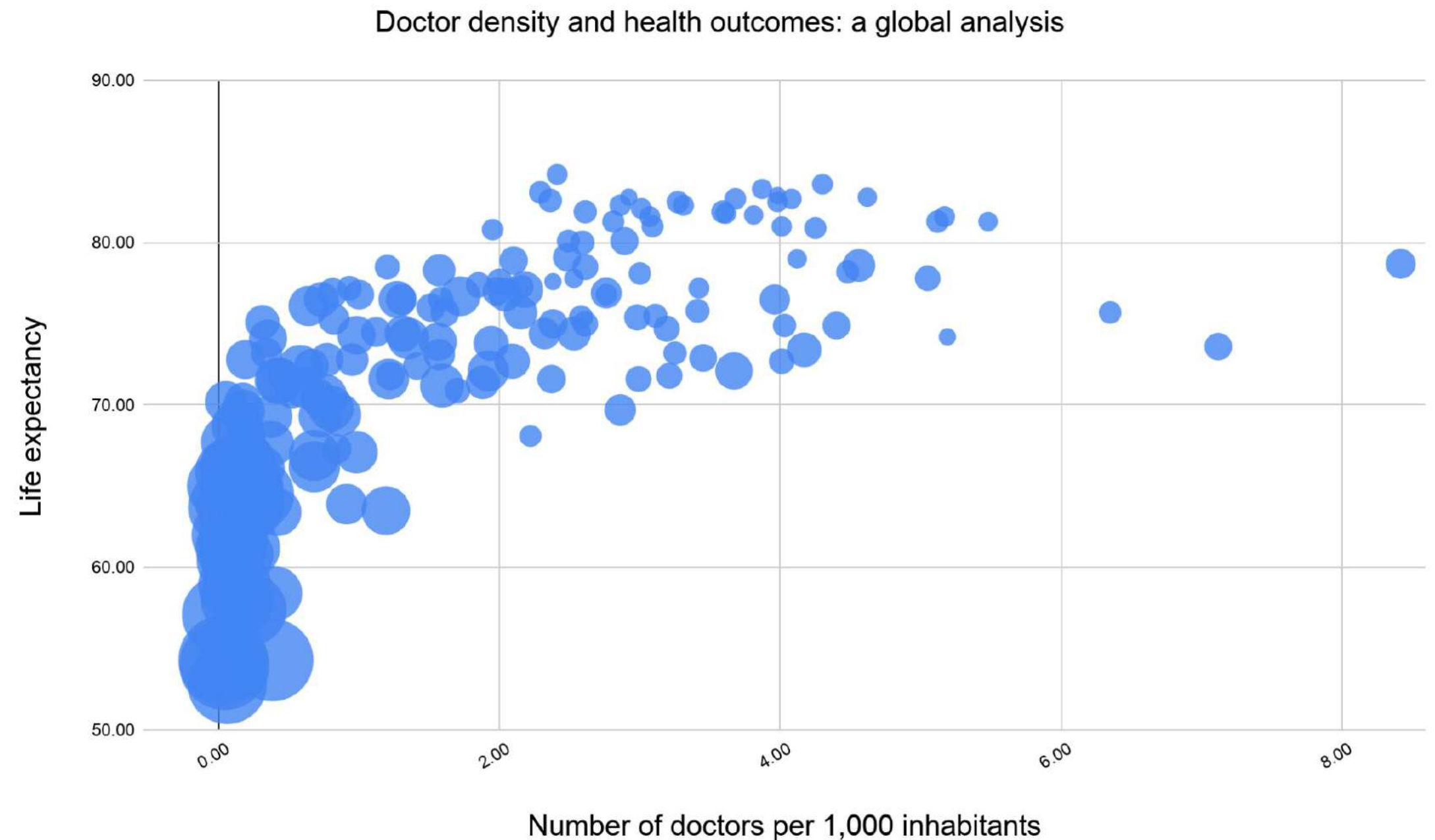
Goal 3

A descriptive comparison of doctor density and health outcomes

For this analysis, the sample is expanded to include the entire dataset, as restricting the analysis to just the 20 countries with the highest GDP would reduce the variability of the health indicators and limit the observation of global inequalities.

In the countries analysed, a higher density of doctors per 1,000 inhabitants tends to be associated with higher life expectancy and lower maternal mortality.

The analysis is descriptive and does not establish causality: per capita GDP, investment in healthcare, education, the quality of institutions and access to essential services may simultaneously influence both the availability of doctors and health outcomes. Further research would be required to isolate the role of doctors.



Bubble size: maternal mortality per 100,000 live births (log10 scale).

Goal 7 e 13

Relationship between average GDP growth and changes in per capita CO₂ emissions (2000–2019)

The comparison includes 17 of the 20 largest economies by GDP in 2023. Russia and South Korea are not included in the historical sustainability dataset; for Turkey, no data on per capita CO₂ emissions is available for the years covered by the comparison.

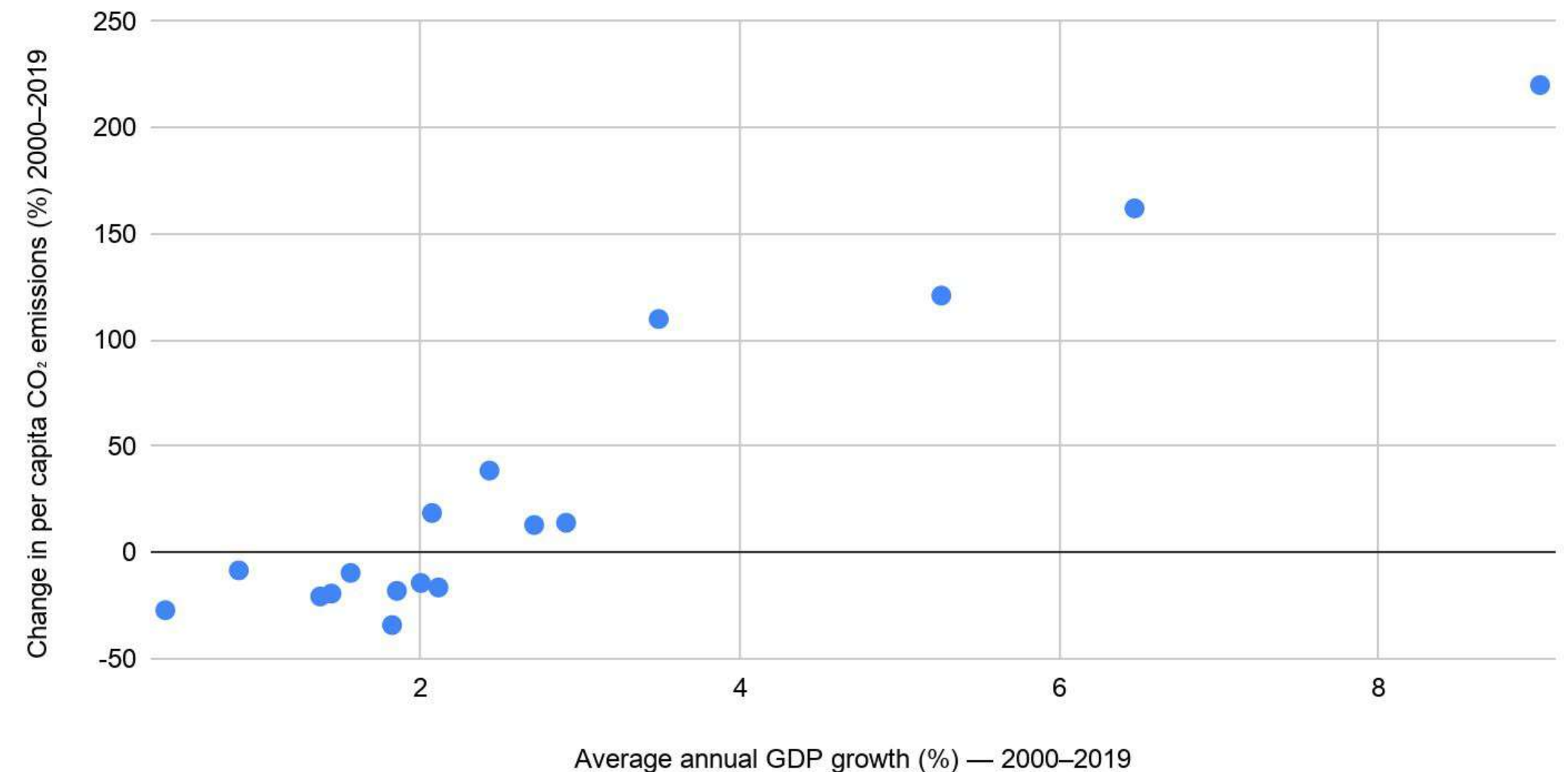
Between 2000 and 2019, some countries recorded both positive average annual GDP growth and a reduction in per capita CO₂ emissions. In the graph, these countries are plotted below the zero line on the emissions axis and mainly include Western economies, such as the United States, Switzerland, Spain and the United Kingdom.

China, India, Indonesia and Saudi Arabia, on the other hand, show the largest increases in per capita CO₂ emissions, linked to rates of economic growth that are higher than the sample average.

The results therefore show that economic growth and a reduction in per capita CO₂ emissions can coexist. The analysis is descriptive and does not allow us to identify the causes of these trends.

Period analysed: 2000–2019. The year 2020 has been excluded due to the unavailability of CO₂ emissions data in the sample and to minimise distortion caused by the pandemic shock.

Economic growth and changes in per capita CO₂ emissions in the major economies (2000–2019)



Classification criteria for the 20 largest economies

These are the criteria I will use to classify the 20 countries as ‘Positive’, ‘In transition’, ‘Critical’ and ‘At risk’.

The proportion of electricity from low-carbon sources (renewables and nuclear) does not automatically equate to decarbonisation. A country is considered to be undergoing a credible transition when it has a high share of electricity from low-carbon sources, whilst having reduced per capita emissions in the preceding period. The ‘In transition’ category also includes countries showing mixed signals, to ensure that a single indicator does not determine the overall assessment.

The ‘Electricity from fossil fuels (TWh)’ indicator is not used as it is an absolute value, heavily influenced by the economic and demographic size of the countries.

Sustainability Profile	Low-carbon quota 2019	Change in per capita CO ₂ emissions, 2000–2019	GDP: average annual growth, 2000–2019
Encouraging signs	> 75%	< 0%	> 0%
In transition	- From 25% to 75%, - or > 75% with per capita CO₂ emissions not falling; - or quota <25% with CO₂ levels falling.	< 0%; >= 0% if low-carbon quota > 75% < 0% if low-carbon quota < 25%	> 0%
critical	< 25%	>= 0%	Any
At risk	Any	>= 0%	<= 0%

The low-carbon share relates to domestic electricity generation and not to the energy system as a whole; therefore, it does not directly measure emissions from transport, industry and heating.

Ranking of the 20 largest economies: results

Country	Low-carbon quota 2019	Change in per capita CO ₂ emissions, 2000–2019	GDP: average annual growth, 2000–2019	Sustainability Profile
Switzerland	94.62%	-14.48%	2.00%	Encouraging signs
France	90.54%	-19.46%	1.44%	Encouraging signs
Brazil	85.31%	38.46%	2.43%	In transition
Canada	82.38%	12.83%	2.71%	In transition
Spain	58.82%	-18.18%	1.85%	In transition
United Kingdom	54.92%	-34.28%	1.82%	In transition
Germany	52.61%	-20.82%	1.37%	In transition
Italy	39.76%	-27.29%	0.40%	In transition
United States	37.76%	-16.59%	2.11%	In transition
China	31.67%	219.95%	9.01%	In transition
Japan	25.86%	-8.54%	0.86%	In transition
Netherlands	22.10%	-9.72%	1.56%	In transition
Mexico	21.97%	18.48%	2.07%	Critical
India	21.48%	161.90%	6.47%	Critical
Australia	21.38%	13.87%	2.91%	Critical
Indonesia	16.26%	120.86%	5.26%	Critical
Saudi Arabia	0.06%	109.80%	3.49%	Critical

Methodological note: the classification includes 17 of the 20 largest economies. Russia and South Korea are not included in the energy dataset; for Turkey, not all the required indicators are available for the period 2000–2019.

Classification of countries based on the entire dataset

Country	Low-carbon quota 2019	Change in per capita CO ₂ emissions, 2000–2019	GDP: average annual growth, 2000–2019	Sustainability Profile
Comoros	0	220.00%	3.22%	Critical
Kiribati	0	200.00%	2.38%	Critical
Belgium	68.24	-20.69%	1.72%	In transition
Slovenia	68.34	-6.46%	2.47%	In transition
Iceland	100.00	-26.46%	3.18%	Encouraging signs
Sweden	98.01	-34.31%	2.33%	Encouraging signs

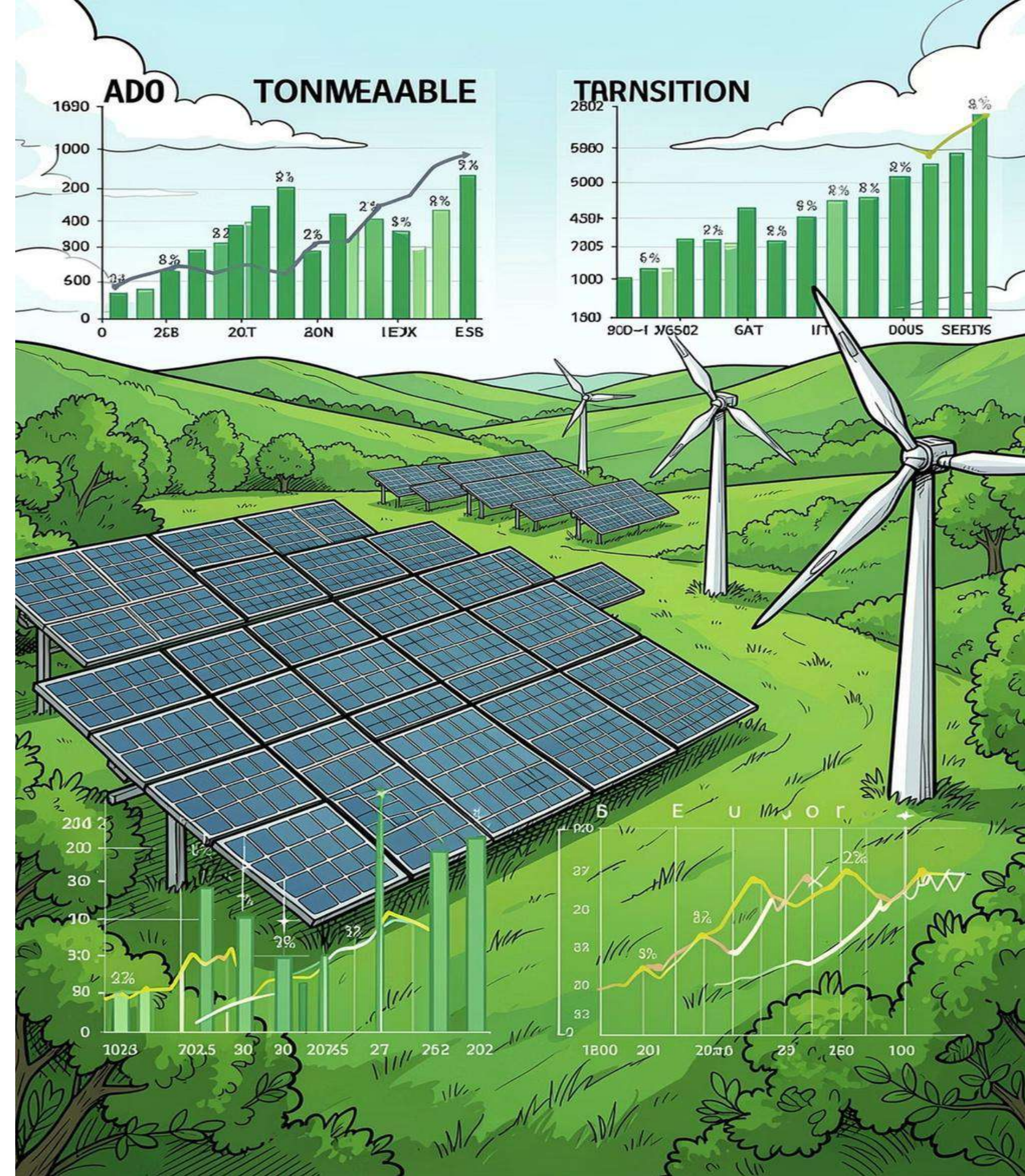
What do the figures for the 20 countries with the highest gross domestic product reveal?

The countries that stand out from the analysis of the twenty most economically significant countries are Switzerland and France, with 94.62 per cent and 90.54 per cent of their energy produced from low-carbon sources respectively.

As might be expected, developing countries or net oil exporters, such as Indonesia and Saudi Arabia, rank at the bottom in terms of the proportion of their national electricity generation derived from renewables or nuclear power.

Australia presents an unexpected finding. Despite being a country belonging to the Western bloc, where sustainable development policies are more advanced, and despite being a mature economy, it has the lowest share in the low-carbon index for 2019.

On the other hand, Brazil ranks third in terms of its low-carbon share compared with 2019. However, the 'low-carbon share' indicator measures the percentage of electricity generation from low-carbon sources (nuclear and renewables), but does not take into account deforestation, land use or total national emissions.



What emerges from an analysis of the entire list of countries

Encouraging signs



Iceland and Sweden

With almost 100 per cent of domestic electricity generation coming from low-carbon sources. Per capita CO₂ emissions have been falling since 2000, whilst average annual GDP growth has been rising.

Countries in transition



Belgium and Slovenia

Countries in transition but with good prospects for achieving significant levels of economic and environmental sustainability.



Critical

Comoros and Kiribati

Among the countries classified as 'Critical', there is GDP growth but, in contrast, negative environmental indicators. The Comoros and Kiribati are the most representative examples, taking into account the parameters used and the weighting assigned to them.

Conclusions and next steps

Limitations of the analysis

- Datasets that are not perfectly aligned with one another
- Partial coverage of the indicators for the Sustainable Development Goals set by the UN in the 2030 Agenda.
- Data on environmental sustainability is missing for some countries.

Where to focus your attention

Based on the findings of the analysis, taking into account the three indicators:

- **countries showing signs of distress:** Comoros, Kiribati and Saudi Arabia;
- **Encouraging signs:** Iceland, Sweden and Switzerland;
- **In transition:** Belgium, Slovenia and Brazil.

Future analysis

It will be necessary to draw on more comprehensive datasets to gain a deeper understanding of the accuracy of this analysis regarding the countries ranked at the top of the various sustainability profiles, in order to verify and understand their actual sustainable development.

