Global CO2 Trends

Caroline Jang, Angela Meng, Claire Rong, Tejjas Kaul



How do per-capita CO_2 emissions differ across continents and regions, how is GDP per capita related?

Motivation:
Relevance to energy, geopolitics, and environmental finance; it's something we've all heard about before in the news but want an unbiased answer for.

Data:

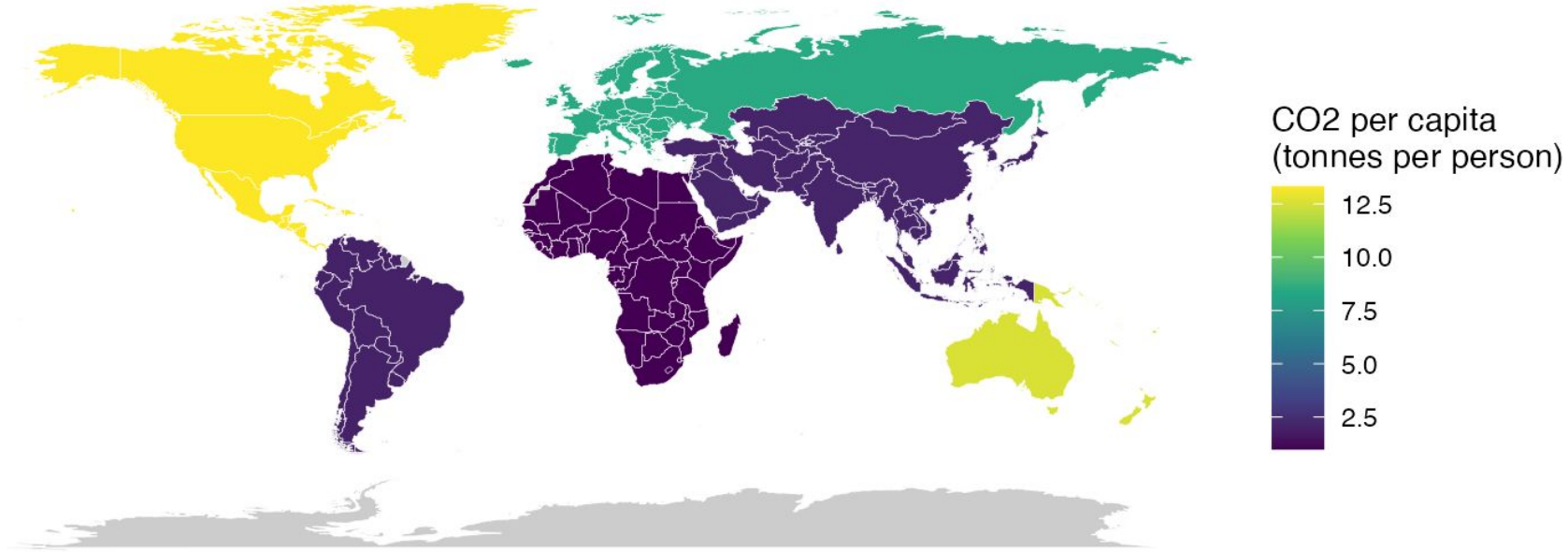
1950-2022	218 Countries and Territories

CO_2 per capita (Numerical): Annual CO_2 emissions from fossil fuels and industry (excluding land-use change) divided by population, in tonnes per person.
GDP per capita (Numerical): Total inflation and cost-of-living-adjusted GDP (international $, 2011 prices) divided by population.
Continents (Categorical): Africa, Asia, Europe, North America, South America, Oceania.
Regions (Categorical): Countries grouped by sub-continental geographic areas (e.g. East Asia, Caribbean, Western Europe).

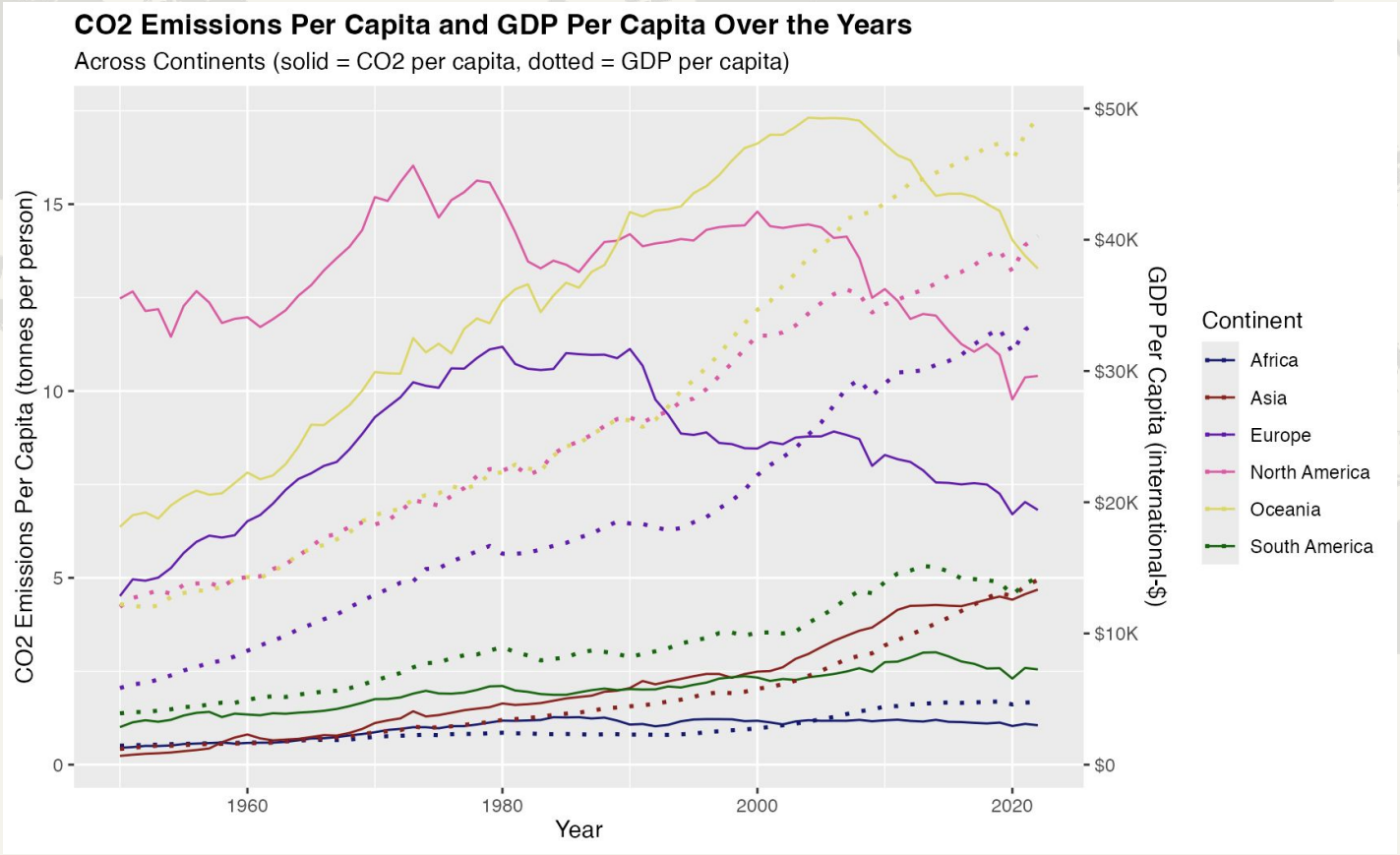
Our World in Data

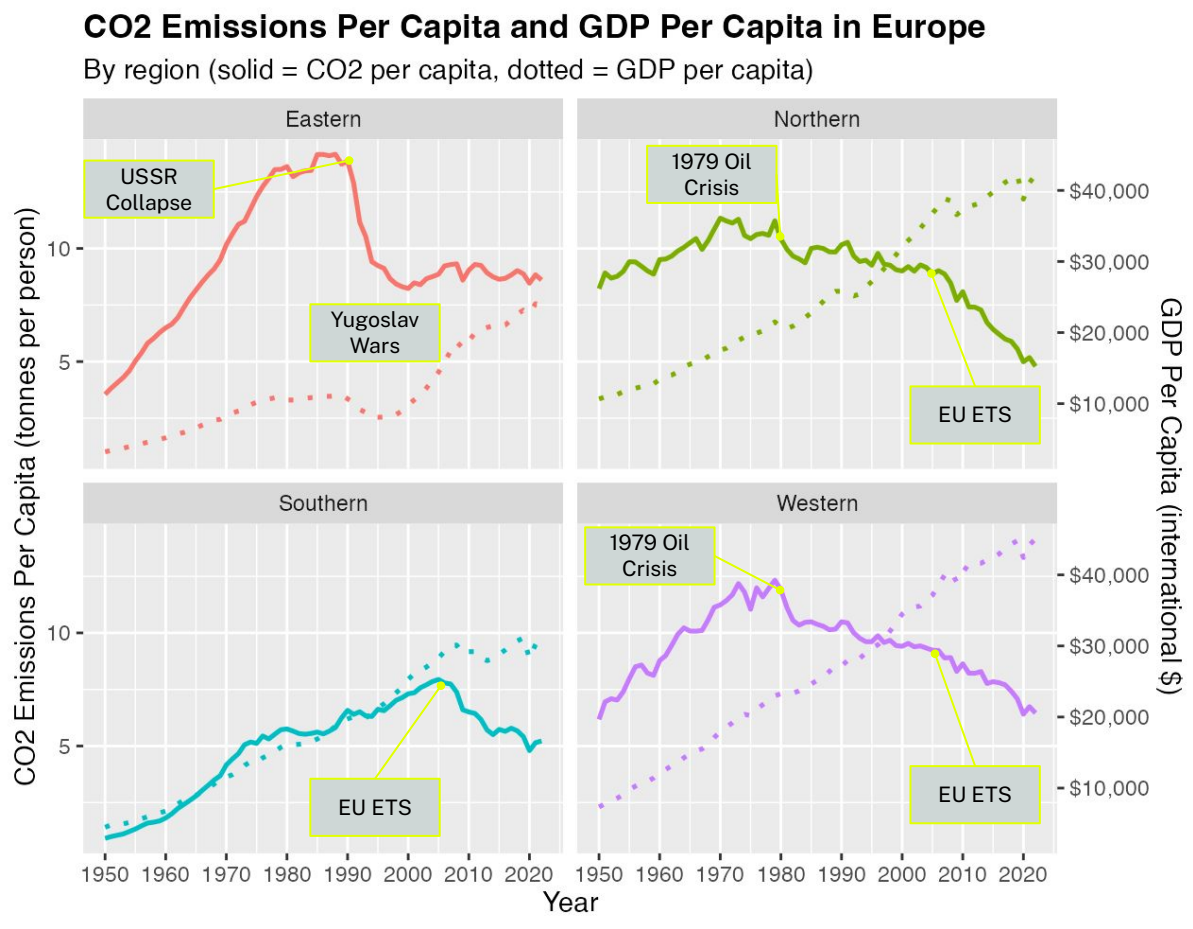
Rosado et al. (2026)

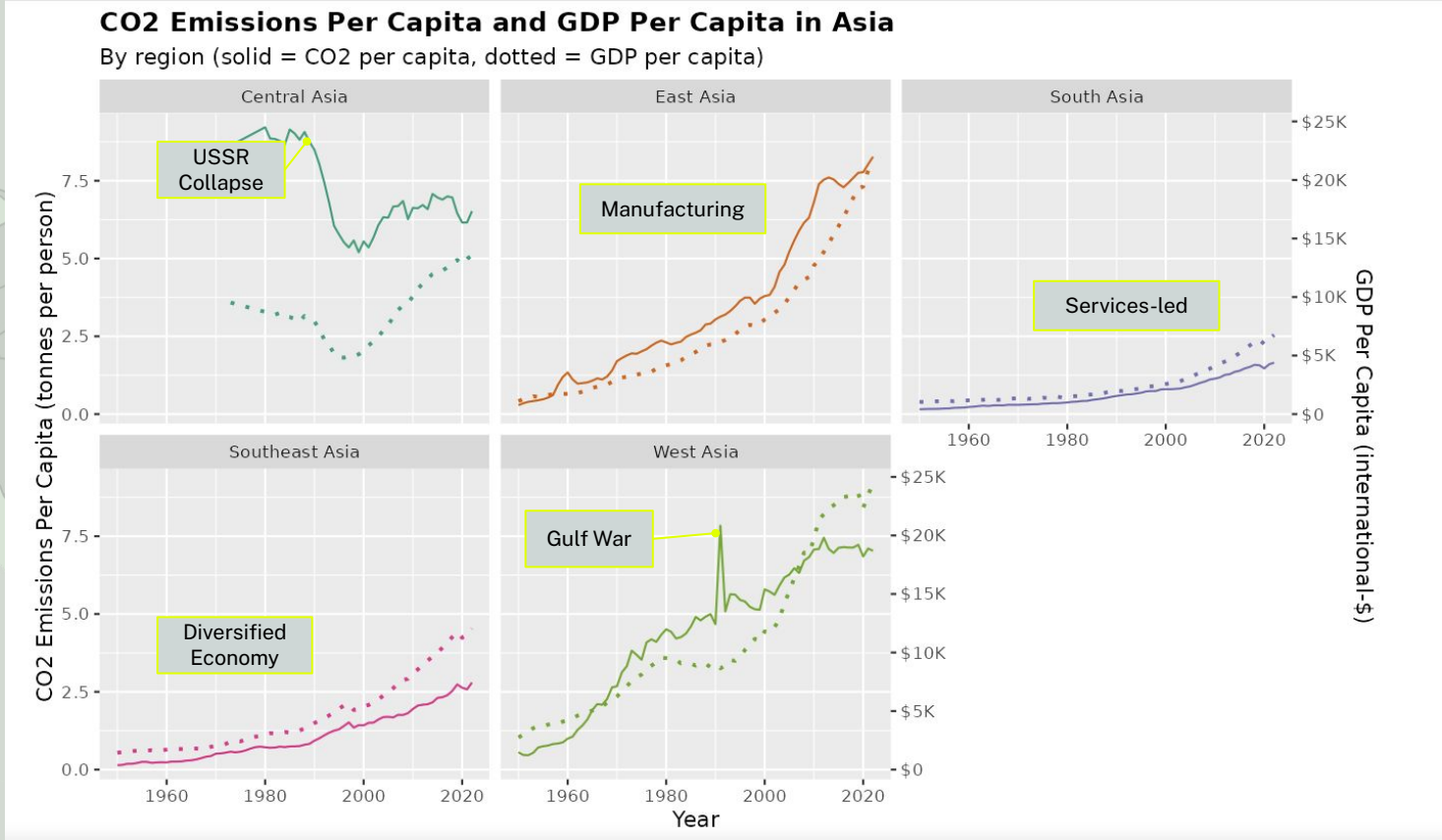
Average CO2 Emissions by Continent (1950-2022)

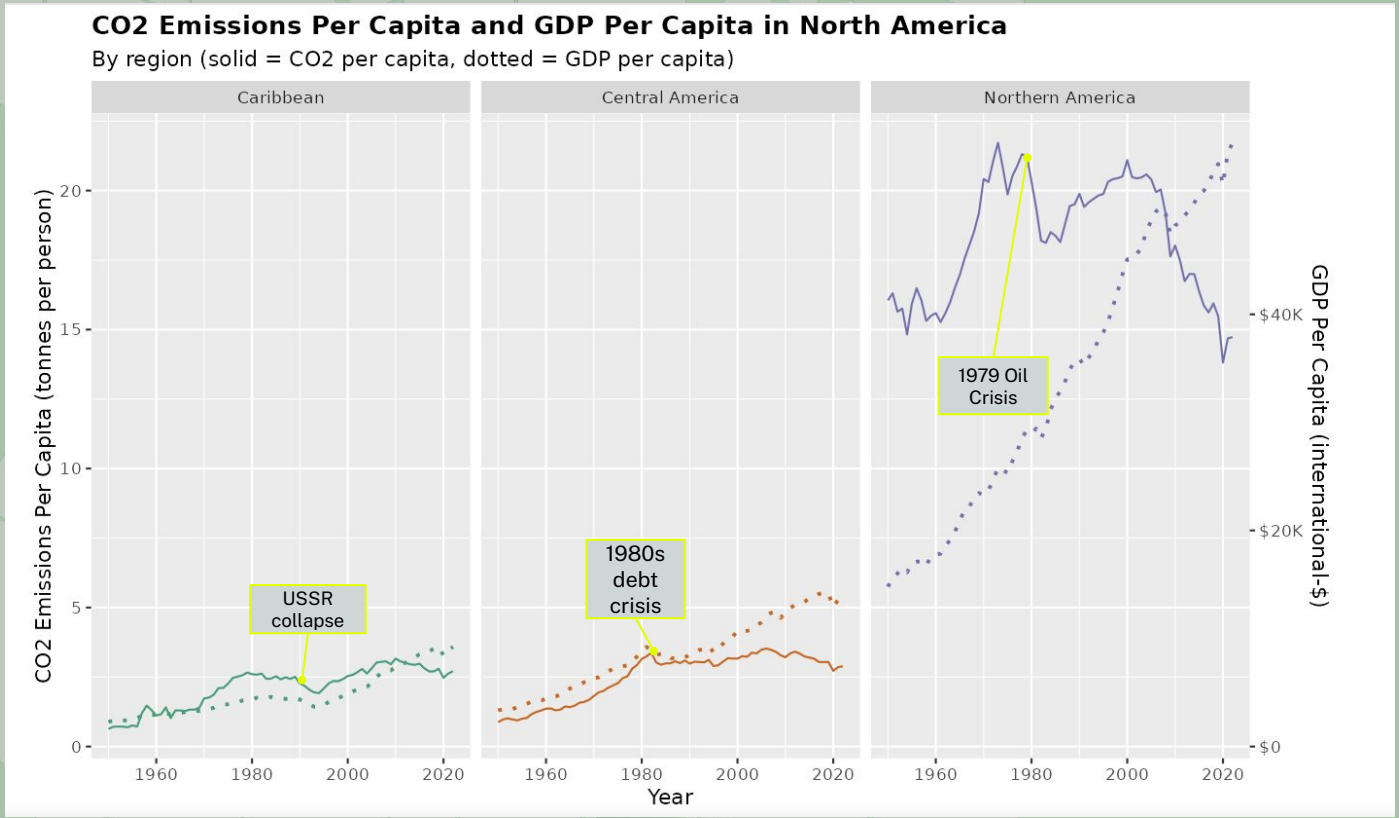


North America and Oceania have the highest mean CO2 emissions per capita, then Europe, with South America and Asia being relatively lower; Africa has the lowest while Antarctica has no available data.


CO2 Emissions Per Capita and GDP Per Capita Over the Years
Across Continents (solid = CO2 per capita, dotted = GDP per capita)
CO2 Emissions Per Capita (tonnes per person)
0
5
10
15
1960
1980
2000
2020
Year
$0
$10K
$20K
$30K
$40K
$50K
GDP Per Capita (international-$)
Continent
Africa
Asia
Europe
North America
Oceania
South America


CO2 Emissions Per Capita and GDP Per Capita in Europe
By region (solid = CO2 per capita, dotted = GDP per capita)
Eastern
Northern
Southern
Western
USSR Collapse
Yugoslav Wars
1979 Oil Crisis
EU ETS
1979 Oil Crisis
EU ETS
CO2 Emissions Per Capita (tonnes per person)
GDP Per Capita (international $)
10
5
$40,000
$30,000
$20,000
$10,000
1950 1960 1970 1980 1990 2000 2010 2020
Year


CO2 Emissions Per Capita and GDP Per Capita in Asia
By region (solid = CO2 per capita, dotted = GDP per capita)
Central Asia
East Asia
South Asia
Southeast Asia
West Asia
USSR Collapse
Manufacturing
Services-led
Diversified Economy
Gulf War
CO2 Emissions Per Capita (tonnes per person)
GDP Per Capita (international-$)
Year
0.0
2.5
5.0
7.5
$0
$5K
$10K
$15K
$20K
$25K
1960
1980
2000
2020


CO2 Emissions Per Capita and GDP Per Capita in North America
By region (solid = CO2 per capita, dotted = GDP per capita)
Caribbean
Central America
Northern America
CO2 Emissions Per Capita (tonnes per person)
GDP Per Capita (international-$)
0
5
10
15
20
$0
$20K
$40K
1960
1980
2000
2020
Year
USSR collapse
1980s debt crisis
1979 Oil Crisis

Closing Remarks

Conclusion:

Emissions rise with GDP in Asia, but have fallen in Europe and North America while GDP kept growing.





Oceania and North America emit the most CO_2 per person while Africa emits the least.

Events like the USSR collapse and the 1979 oil crisis show up as dips.



Critique:

- **Geopolitical Events:** Temporary emissions spikes and dips can interfere with generalizations.
- **Regional Aggregation:** Regional averages can hide country-level disparities.
- **Wealth gap:** Wealthier countries often have greater access to clean energy, efficient technologies, service-based industries, outsourcing manufacturing.
- **GDP–CO_2 Relationship:** Economic growth does not necessarily correspond to increased emissions, particularly in developed economies.
- **Lack of Data:** For each year, not all variables are covered for each country and territory.