Biggest predictor of CO2 output

Introduction

To give an answer on the question, "What is the biggest predictor of a large co2 output per capita of a country?", a comparing is done on the three following components.

- Growth in GDP per capita.
- Growth of population.
- Growth in airline passengers.

The growth of these components is compared to the growth in co2 emissions worldwide, on an annual basis. Based on these findings, the GDP per capita has the highest correlation with the growth of co2, followed by the growth of population and then the growth in airline passengers.

Growth of annual co2 emissions

To be able to compare the components to the growth of the annual co2 emissions, the dataset "Annual CO2 emissions" was used (*link 1*). In the next figure the total growth of co2 emissions worldwide is pictured.

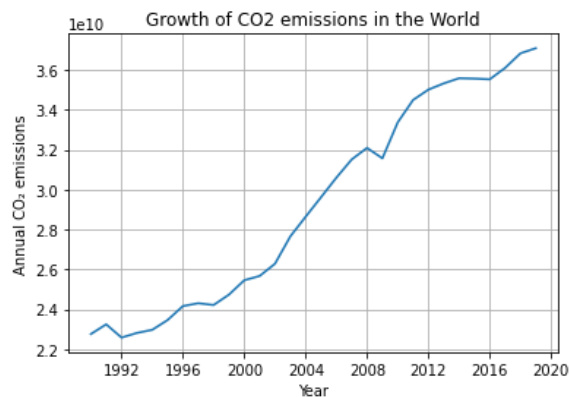*Figure 1: Growth of CO2 emissions in the World*

The correlation was measured with the datasets for:

- Air transport, passengers carried (*link 2*)
- GDP per capita (*link 3*)
- Population (*link 4*)

First, we visualize the 4 components based on 4 areas, we took out the year 2020 out of the data because of the big impact of the Corona virus on all components. Because it is not sure all the data are up to date in 2020, it is not possible to say if the correlation is still measurable.
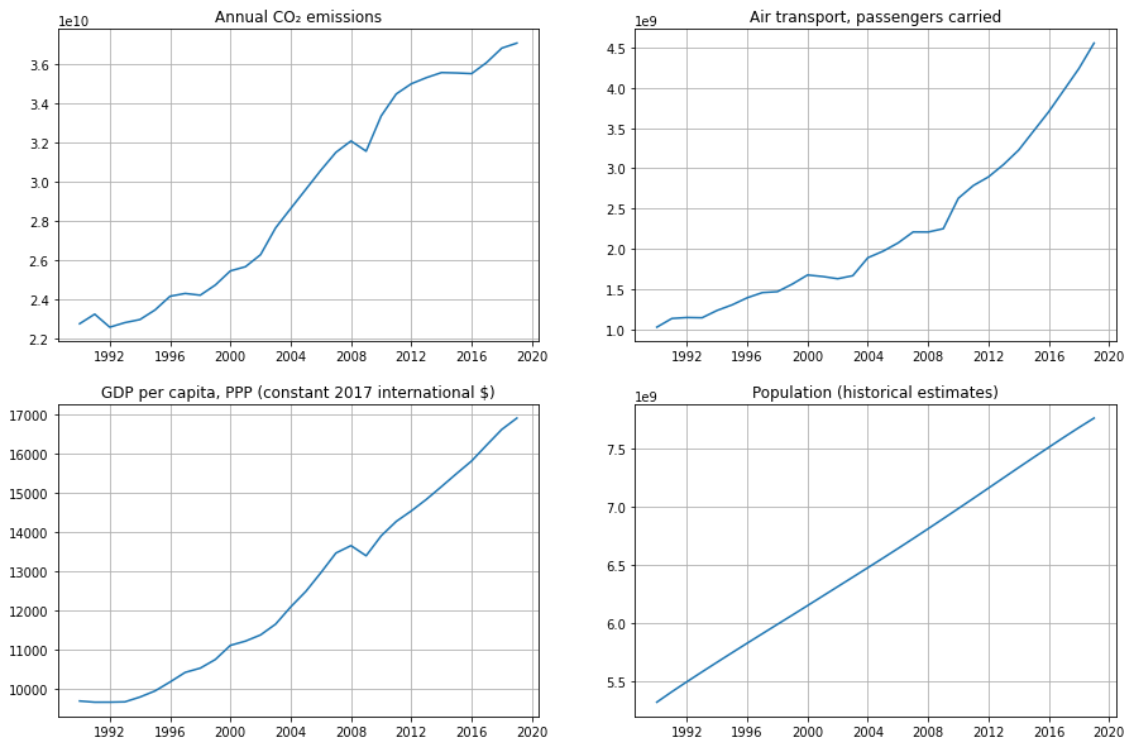
- World
- European Union
- China
- United States

World

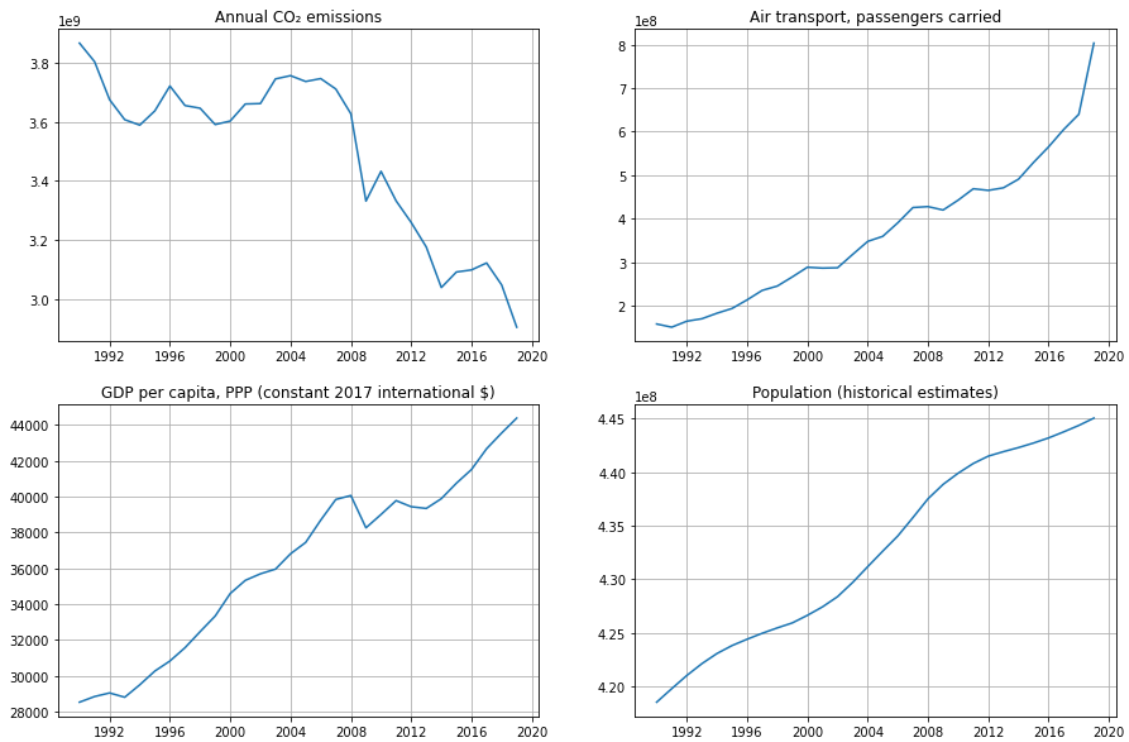Figure 2: growth of co2, air transport, GDP and population in the world.

European Union

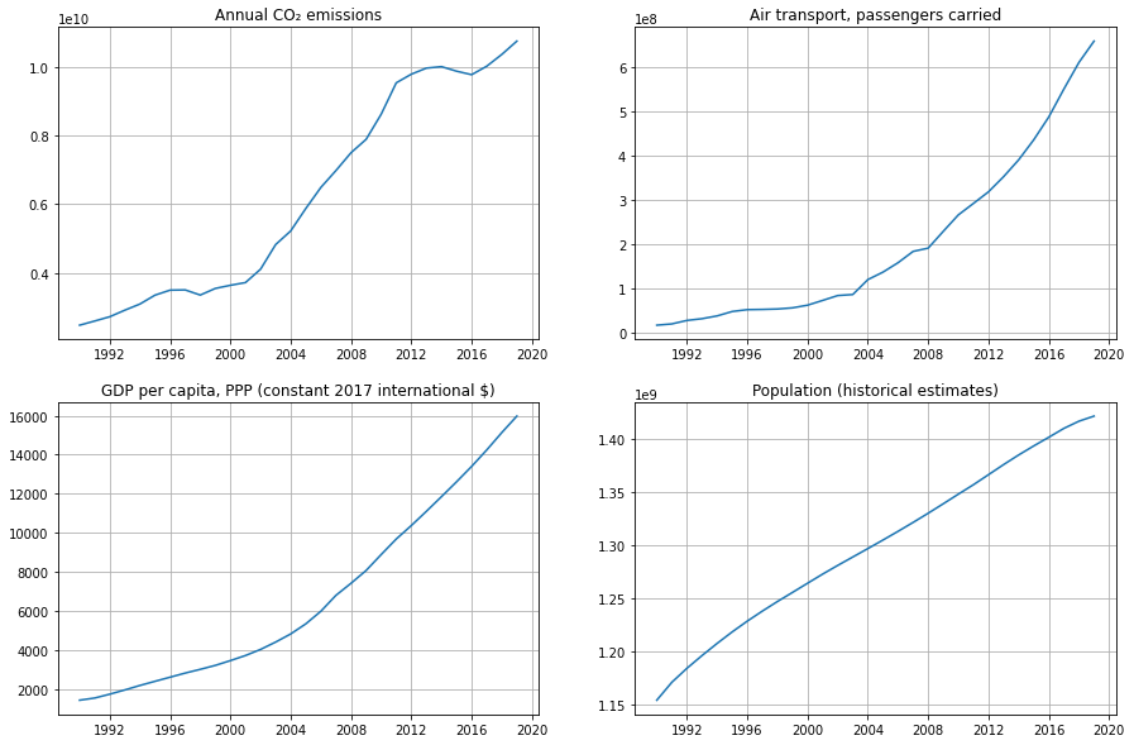Figure 3: growth of co2, air transport, GDP and population in the European Union.

China

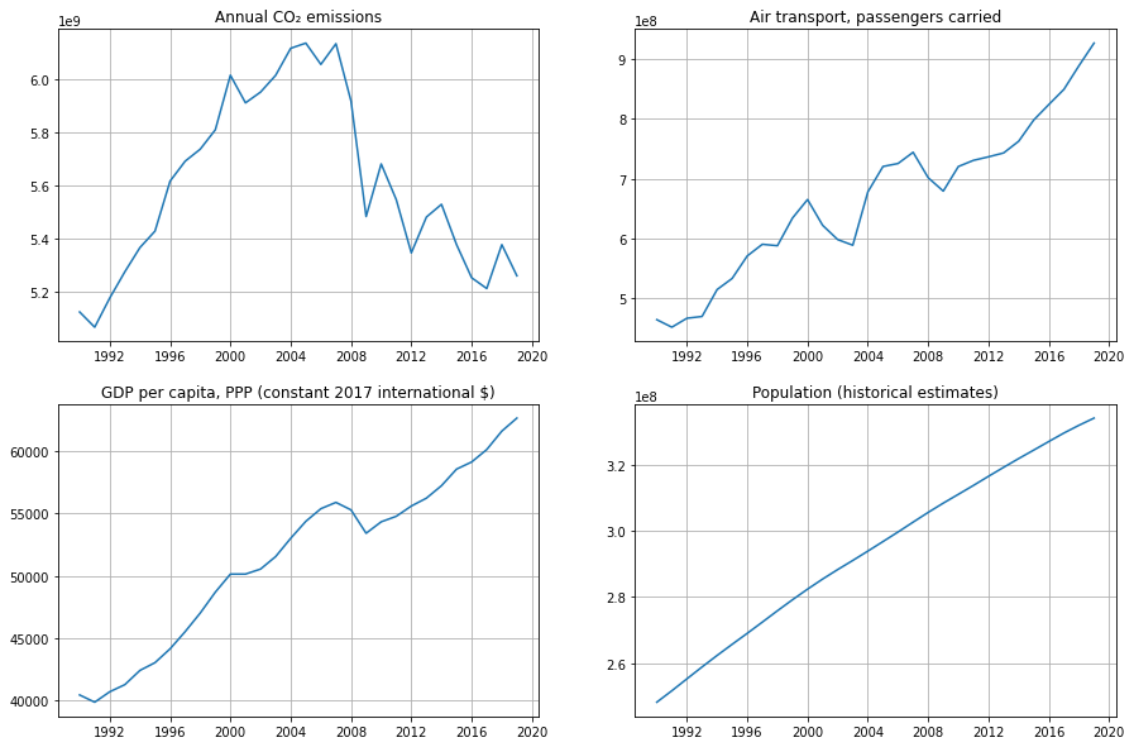Figure 4: growth of co2, air transport, GDP and population in China.

United States

Figure 5: growth of co2, air transport, GDP and population in the European Union.

Correlation

We took all the components and measured the correlation to the growth of co2. This gave us the following figure.
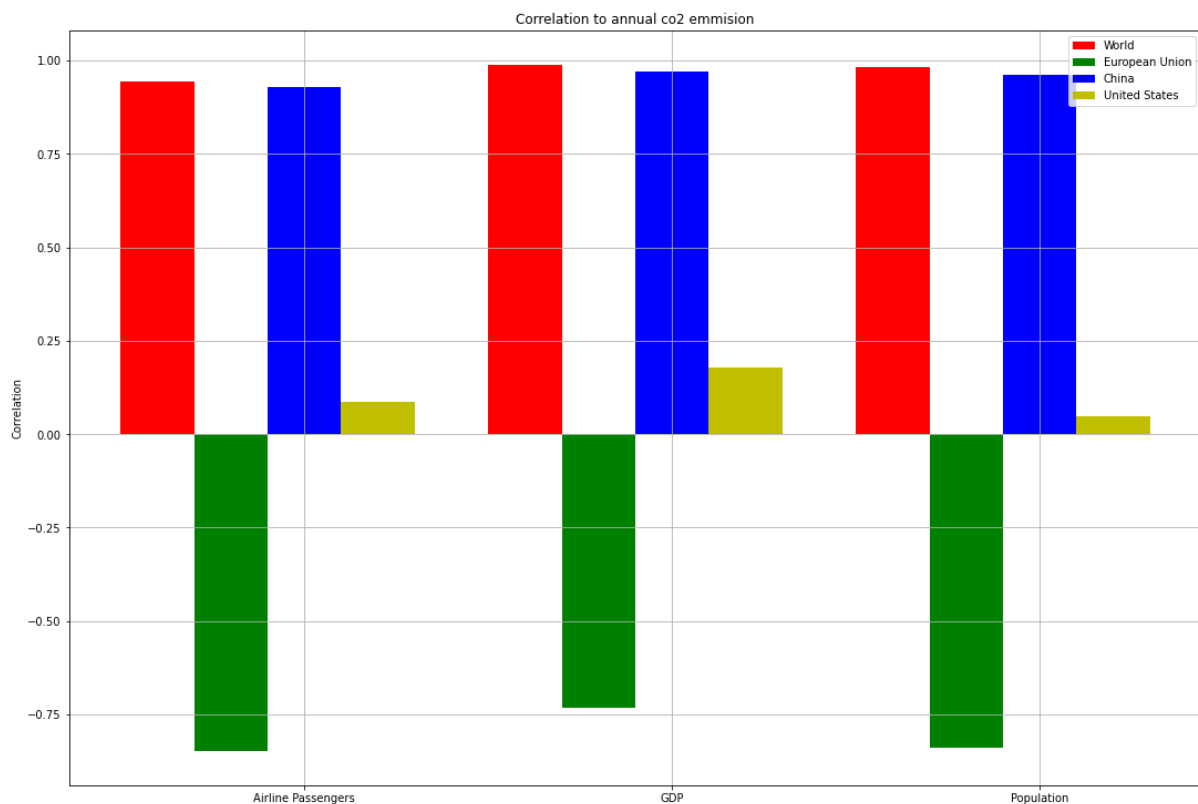

Figure 6: Correlation between co2 emission and airline passengers, GDP and Population.

Conclusion

Based on this data we can see there is a big correlation between transport, GDP and population on the growth of co2 emission per capita. But when looked up more specific by country or continent, the correlation can be way lower, or it can become negative linear. This happens in above case with Europe, where the co2 emissions are increasing, but the other components are still growing.

Appendix

Links to data sources:

1. https://ourworldindata.org/grapher/annual-co2-emissions-per-country
2. https://ourworldindata.org/grapher/air-passengers-carried
3. https://ourworldindata.org/grapher/gdp-per-capita-worldbank
4. https://ourworldindata.org/grapher/population-by-country