Worldwide Overproduction of Cars

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Computing Science

Introduction

CrudeOilPeak[1], a website that tracks global oil production and consumption as well as its impact on the economy, states that over the past decade, global car production has surged by 52%, predominantly driven by China's growth. In contrast, oil supplies have only increased by 16%[2]. This disparity highlights a significant challenge: the demand for cars is outpacing the available oil supply.
To further illustrate this issue, they have created a visualization that compares the growth in car production by country/region against the growth in global liquid supplies (Figure 1). We found the visualization to be severely lacking and messy, and believe that it can be improved to be more visually appealing and easier to digest.

Previous Visualization

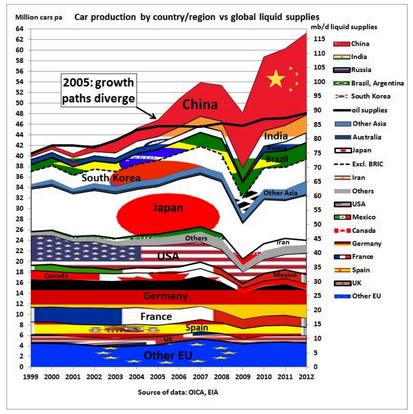

Figure 1: Car production by country/region vs global liquid supplies

Strengths

1. High amount of information shown on the graph. Users can pinpoint and gather data specific to each country.
2. Area filling with country flags make it possible to identity country in question without referencing the plot legends.
3. Data clearly shows the point in which car and oil production diverges.

Suggested Improvements

1. *Too much visual clutter* can make it difficult to interpret the data. Stick to a consistent color scheme and remove unnecessary elements.
2. *Do not add flags to the graph* as it adds significant amount of visual clutter due to the sheer number of countries
3. *The divergence* can be better emphasized, more contrasting colors can be chosen. Current graph uses black on black.
4. *Aggregate data.* The data illustrated are too fine-grained. A significant number of countries in the graph does not increase the amount of information gained from the illustration due to its negligible magnitude.
5. *Color Scheme.* Better color scheme can be chosen to fit the users natural bias. (i.e. Red for RBIC, Blue for Non-BRIC countries)

To make the graph more intuitive, we propose simplifying it to highlight the key points. The article focuses on three main points:

1. **Divergence** between car production and oil production starting from 2005.
2. **Sharp increase** in car production in BRIC countries after 2005.
3. Comparison between **BRIC** and **non-BRIC** countries.

To achieve this, we suggest creating two smaller visualisations:

1. The first graph will main the original format, but with fewer countries to reduce clutter.
2. The second graph will show the yearly precentage change in car production for both BRIC and non-BRIC countries, making it easier to see the rate of change.

Implementation

Data

- Car production data by country/region were obtained from the International Organization of Motor Vehicle Manufacturers (OICA) for the year 2023[3].
- Similarly, the oil production data were obtained from the U.S. Energy Information Administration[4]. However, the data was not bundled together initially, so we had to manually combine and summarize the data from the different sources.

Software

We used the Quarto publication framework and the R programming language, along with the following third-party packages:

- *readxl* for data import
- *tidyverse* for data transformation, including *ggplot2* for visualization based on the grammar of graphics
- *knitr* for dynamic document generation

Further Suggestions for Interactivity

Because our visualization was intended for a poster, we did not implement any interactive features, including the infotip. However, if the data is visualized in a HTML document, interactive features can be achieved using R packages such as `plotly`. In that case, we recommend implementing a tooltip that shows the actual label values on a mouse over event, offering additional info, if necessary, for the user.

[1]https://crudeoilpeak.info
[2]https://crudeoilpeak.info/world-car-production-grows-3-times-faster-than-global-oil-supplies
[3]https://www.oica.net/category/production-statistics/
[4]https://www.eia.gov/international/data/world#/?

Improved Visualization

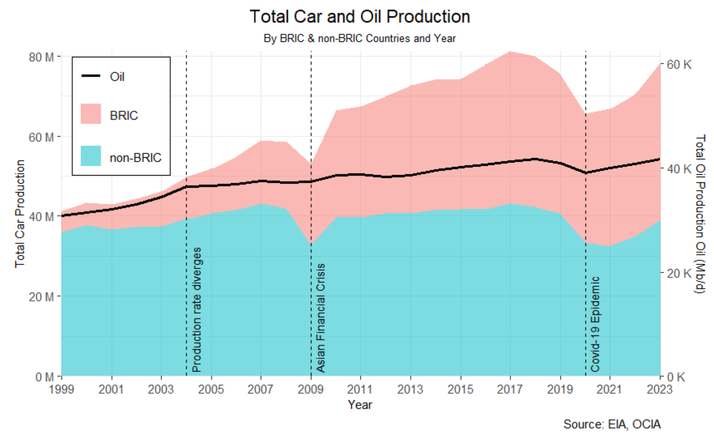

Figure 2: Revised visualization of car production by country/region vs global liquid supplies.

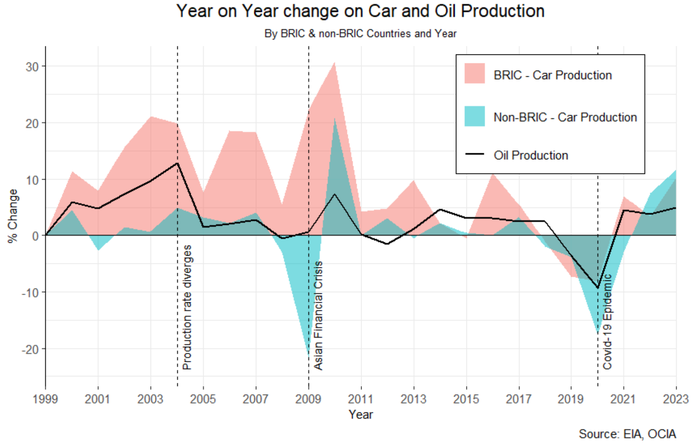

Figure 3: Revised visualization of car production by country/region vs global liquid supplies.

Conclusion

We successfully implemented all suggested improvements for the non-interactive visualization. The users can clearly see the divergence in production between oil and cars. The second graph fully supports this idea intuitively as the percentage change in car production is always higher than the change in oil production (i.e., the line drawn is always above).