Assignment 2: Misleading Visualization

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In this assignment, I would like to discuss issues related to the US economy with GDP data:
Has the US economy continuously grown over the past 30 years, and has it recovered after significant historical events?

The GDP open data is sourced from Federal Reserve Economic Data (FRED).

For this question, I use two figures to demonstrate different aspects: one represents honest visualization, while the other represents misleading visualization. Firstly, both figures have the x-axis representing the past 30 years (1994-2023) and the y-axis representing GDP (in millions). Significant events over this period include the Dot-com Bubble Burst in 2000, the Global Financial Crisis in 2008, and the COVID-19 Pandemic in 2020. Each of these major events had a notable impact on the U.S. economy, and thus, we have annotated them in the visualizations.

In Figure 1, to provide a different perspective, we also included the Personal Consumption Expenditures Price Index (PCE Index). PCE index offers insight into inflationary trends and helps illustrate how consumer prices have changed alongside the economic disruptions. By incorporating both GDP and the PCE Index, Figure 2 presents a more comprehensive view of the economic landscape, highlighting the effects of inflation.

Figure 1 suggests that the US economy has experienced continuous growth. The chart shows that even after major economic events GDP appears to grow more rapidly after each event.

However, Figure 2 presents a different view of the US economy. It shows that GDP declines during significant events such as the 2008 Global Financial Crisis and the 2020 COVID-19 Pandemic. Additionally, the PCE Index reveals another important dimension: while GDP does rise after these events, inflation also grows significantly. This indicates that the real economic recovery is not as strong as it might appear in nominal terms. The apparent growth in GDP is partially offset by rising prices, and thus cannot fully capture the actual economic recovery.

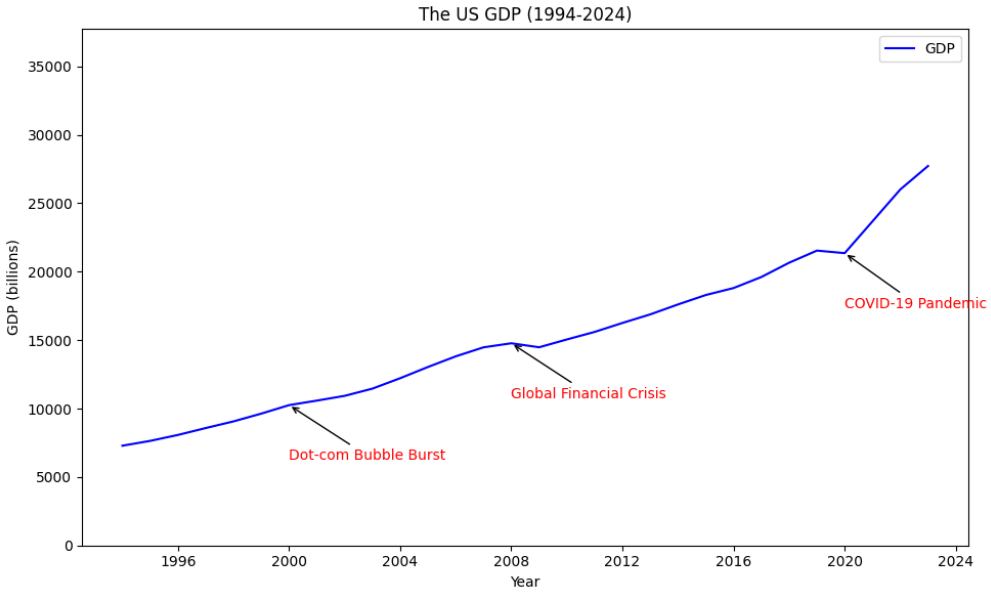

Figure 1: The first GDP plot

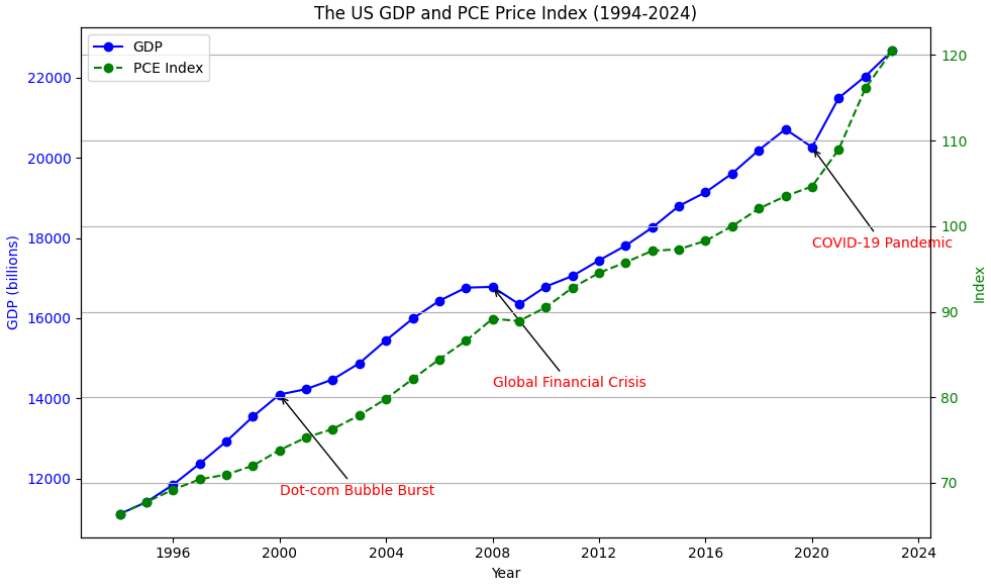

Figure 2: The second GDP plot with PCE Index

In fact, Figure 1 represents the misleading visualization, while Figure 2 is the honest one. To make Figure 1 deceptive, I chose a simplistic approach to the visualization, as presenting less information makes it easier to mislead viewers. I intentionally removed the gridlines and data points, making it harder for viewers to interpret the values accurately. Additionally, the data used in this plot is nominal GDP, which does not account for inflation, further contributing to the misleading nature of the visualization. Furthermore, I extended the range of the y-axis, making the declines during significant historical events appear less pronounced, thus giving the false impression that the economy remained relatively stable.

To make the information in the plot clearer, gridlines and data points are both added in Figure 2. With the inclusion of the PCE Index, we can assess the impact of inflation. In fact, to maximize the contrast between the two figures, the GDP data used in each is different: Figure 2 uses nominal GDP, while Figure 2 uses real GDP, which accounts for inflation. This allows us to accurately observe the true growth of the GDP.

Interestingly, I intentionally expressed this ambiguously, as both are referred to simply as "GDP". This subtle difference can easily confuse viewers, but it's crucial in understanding the actual economic growth.