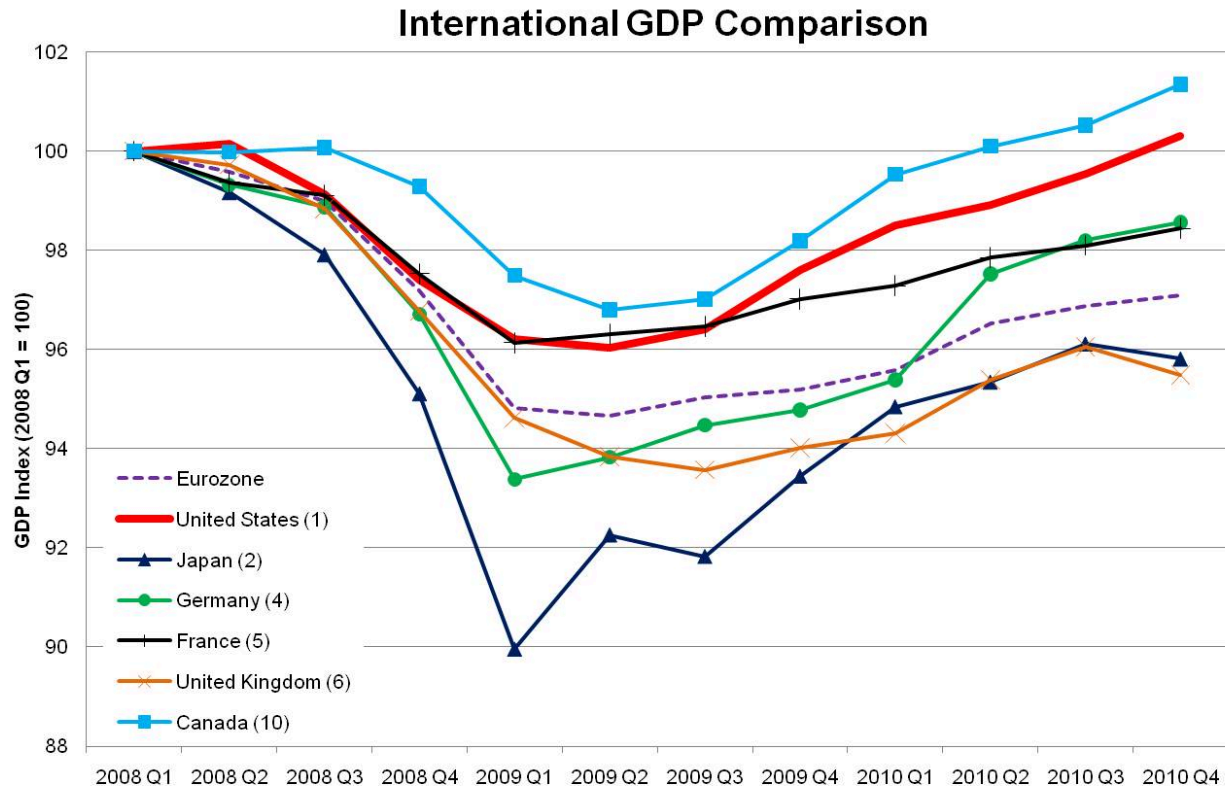


571 Process Book

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For our data visualization project, we wanted to show the percentage of world GDP for the United States, Russia/Soviet Union, and perhaps more countries over time. We thought that a line graph would be an effective method of showing this difference. Below is a line chart that is in the spirit of what we would be attempting to create



When it came to choosing the time span of our data. We wanted to choose a date that is early enough to give enough historical context to Russia and the U.S. economic history, while still having reliable records for that time period. This was a difficult task because the Soviet Union in particular did not keep good records on their population and GDP. We could have started our line chart in the year 1989, when the Soviet Union collapsed and the Russian Federation succeeded them, but that would undermine the long-term trend that we are hoping shines through in the final line chart.

Another roadblock in the data collection process was inflation and currency exchange rates. While GDP data for recent years were readily available in current (2025) US\$, the farther back you try to look, that data is harder to find. For example the Maddison Project has data going back until 1950, but their data is in 2011 U.S dollars, so we had to convert that into 2025 U.S. \$. Different data sets also disagree on exact figures for GDP and population. The discrepancy is minimal for recent years. But we have found major discrepancies between

multiple reputable sources. Especially around the time of the Soviet Union collapse. This has made it difficult to choose what data we are going to show on the graph, but we still aim to give a truthful representation of The U.S. and Soviet Union's GDP figures to our best ability.

Implementation and Coding Process

- **Technology Stack:** HTML5, CSS3, JavaScript, and Chart.js v4.
- **Workflow:**
 - We began with a thorough cleaning and preprocessing phase in Excel, where raw GDP per capita, population, and global GDP data were combined and transformed into structured, analysis-ready formats.
 - Metrics such as Total GDP, % of Global GDP, and GDP growth rates were calculated, and anomalous or missing data points were identified and handled through interpolation or exclusion.
 - Cleaned datasets were then manually converted into static JavaScript arrays, facilitating easy integration into the Chart.js library without requiring asynchronous file loading or external database calls.
- **Designing the Visualizations:**
 - Before coding, we sketched rough drafts of our visualizations to determine the most effective way to present each metric. Key priorities included maintaining clear comparative views, ensuring temporal trends were visible, and aligning visual elements consistently across charts.
 - We decided on a four-panel dashboard layout, each chart focused on one major economic indicator: % of Global GDP, GDP per Capita, GDP Growth Rate, and Inflation Rate.
 - Colors were carefully selected to maximize contrast between the USA (blue), Russia (red), and the World Average (gray), ensuring accessibility for users with visual impairments.
- **Coding the Visualizations:**
 - Each chart was embedded inside its own canvas element, enabling independent updates and responsiveness.
 - Chart.js configurations were heavily customized:
 - Axes were labeled clearly, with readable ticks and rotated labels where necessary.
 - Tooltips were fine-tuned to display exact values and corresponding years.
 - Animated transitions were configured for smoother visual feedback when switching between datasets.
 - Scales were adapted dynamically based on the data range, preventing misleading visual impressions.
 - We added interactive tooltips and hover effects, enhancing user engagement and data exploration without cluttering the charts.
- **Challenges Encountered:**

- Initial attempts at embedding annotations for major events (e.g., 1991 collapse, 2014 sanctions) were visually overwhelming. We iterated by simplifying these annotations or embedding them directly into tooltips instead of cluttering the charts.
- Fine-tuning the Y-axis domains proved critical for making sure relative trends were visible even when metric magnitudes varied greatly (e.g., comparing Russia's vs USA's GDP per capita).

Throughout the coding and design process, our focus remained on balancing clarity, aesthetic appeal, and storytelling. By iteratively refining both our data transformations and visual presentation, we ensured that users can quickly grasp the economic narratives behind the numbers