**Group 2**

* We picked Abigail’s dataset because it had more variables and a lot of trends we could collectively and individually explore as a group
* This is the link to the dataset - [*U.S. Gross Domestic Product (GDP) Attributed to For-Hire Transportation Services | Bureau of Transportation Statistics*](https://www.bts.gov/content/us-gross-domestic-product-gdp-attributed-hire-transportation-services-billions-current)

My findings from analysis of the dataset and reading Abigail’s past work -

**1. Steady Growth in For-Hire Transportation GDP:**

* The total **for-hire transportation services GDP** has shown steady growth from **$375.6 billion in 2005** to **$815.0 billion in 2022**.
* This indicates that the transportation sector, especially for-hire services, has become a significantly larger contributor to the U.S. economy over the years.

**2. Dominance of Truck Transportation:**

* **Truck transportation** consistently contributes the largest share to the for-hire transportation GDP, rising from **$116.9 billion in 2005** to **$226.1 billion in 2022**.
* As a percentage of total for-hire transportation, truck transportation accounts for around **27-31%** throughout the years, making it the dominant mode of transportation.

**3. Air Transportation’s Volatility:**

* **Air transportation** has been somewhat volatile, with peaks and dips.
* For example, it contributed **$61.7 billion in 2005**, growing to **$103.0 billion in 2015**, and then experiencing a sharp drop to **$60.4 billion in 2020** (likely due to the pandemic), before recovering to **$120.4 billion by 2022**.

**4. Significant Growth in Warehousing and Storage:**

* **Warehousing and storage** has seen one of the most significant increases, growing from **$38.1 billion in 2005** to **$112.6 billion in 2022**.
* This suggests an increasing reliance on storage and warehousing services, likely driven by factors such as e-commerce growth and supply chain demands.

**5. Pipeline Transportation's Small but Steady Growth:**

* Although **pipeline transportation** contributes a smaller portion of the for-hire transportation GDP, it has seen steady growth from **$9.8 billion in 2005** to **$44.5 billion in 2022**.
* This reflects the importance of pipeline infrastructure for transporting resources like oil and natural gas.

**6. Water Transportation’s Low Contribution:**

* **Water transportation** consistently contributes the smallest share to the GDP, hovering around **$7-9 billion** per year, despite its critical role in global shipping and trade.

**7. Impact of External Events on the Sector:**

* There’s a notable **dip in 2020**, which is visible across various transportation sectors. This corresponds with the **COVID-19 pandemic**, where disruptions in transportation services, particularly air travel, had a large economic impact.
* The sharp recovery in 2022 in many sectors (especially air transportation and trucking) reflects the rebound in demand post-pandemic.

**8. For-Hire Transportation as a Percent of Total U.S. GDP:**

* The contribution of for-hire transportation services to the total U.S. GDP has remained **relatively stable**, around **2.88% to 3.2%** between 2005 and 2022.
* This suggests that while the transportation sector is growing, it is doing so in line with the broader economy.

**Our tentative deliverables- needing your approval**

**Student 1 (Abigail): Exploring Historical Trends and Growth Patterns**

**Research Focus:**

* Investigate the **overall growth trend** of for-hire transportation GDP from 2005 to 2022.
* Identify key **years of significant change** and relate them to external events (e.g., economic recessions, pandemics, technological advancements).

**Steps to Follow:**

1. **Time-Series Visualization**: Create a **line chart** showing the total GDP contribution of for-hire transportation services over the years. Use different colors for major transportation sectors (e.g., air, rail, truck).
2. **Highlight Key Events**: Annotate the chart with major **global/national events** (e.g., the 2008 financial crisis, COVID-19 in 2020) that could explain dips or surges.
3. **Trend Analysis**: Use **linear regression** to fit a trendline and highlight the overall direction of change, providing a clear view of long-term trends in the data.

**Deliverables:**

* Line charts with annotations.
* Summary analysis of how key historical events influenced transportation services GDP.

**Student 2 (Derrick): Sector-by-Sector Contribution**

**Research Focus:**

* Dive deep into the **breakdown of GDP contributions** by different transportation sectors: air, rail, truck, water, pipeline, etc.
* Analyze which sectors have grown the most and how their importance has shifted over time.

**Steps to Follow:**

1. **Bar Chart Visualization**: Create **stacked bar charts** to show the contribution of each sector to the total for-hire transportation GDP for selected key years (e.g., 2005, 2010, 2015, 2020, 2022).
2. **Sector Growth Visualization**: Use **area charts** or **separate line charts** to visualize how the contribution of each sector (e.g., trucking, air, warehousing) has changed from 2005 to 2022.
3. **Comparison of Contributions**: Compare the **percent share** of each sector to the total for-hire transportation GDP in different years.

**Deliverables:**

* Stacked bar charts and line charts comparing sector growth.
* Sector-by-sector analysis report explaining the importance of each transportation mode.

**Student 3 (Caleb): Correlation and Economic Impact Analysis**

**Research Focus:**

* Investigate how **for-hire transportation GDP** correlates with other **economic indicators** like total U.S. GDP, industrial output, or specific industries (e.g., retail, manufacturing).
* Explore the **relationship between transportation services** and economic growth.

**Steps to Follow:**

1. **Correlation Analysis**: Conduct a **correlation analysis** to determine the relationship between for-hire transportation GDP and the total U.S. GDP. Include specific transportation modes like trucking or air transportation.
2. **Scatter Plots and Regression**: Create **scatter plots** showing the correlation between transportation services GDP and overall U.S. GDP, with **regression lines** to demonstrate the strength of the relationship.
3. **Economic Impact Visuals**: Explore how **transportation services impact specific industries** (e.g., how increased trucking services relate to growth in the retail sector). Use sector-specific charts.

**Deliverables:**

* Scatter plots and correlation matrices.
* Summary of findings on the relationship between transportation services and economic growth.

**Student 4 (Toluwanimi): External Factors and Policy Analysis**

**Research Focus:**

* Analyze **external factors** (e.g., fuel prices, technological innovations, government policies, infrastructure development) that impacted the for-hire transportation services GDP.
* Investigate **policy changes** (e.g., regulations on emissions, transportation infrastructure funding) and how they shaped the growth or decline of certain sectors.

**Steps to Follow:**

1. **Timeline Visualization**: Create a **timeline chart** with major **economic, policy, or technological events** that have influenced the transportation industry over the years.
2. **Impact Analysis**: Analyze the **impact of specific policies** (e.g., emissions regulations, transportation funding) on key sectors like air or trucking services. Using a **before-and-after comparison** for major events.
3. **Annotated Visuals**: Use **annotated charts** that highlight the years where major policy changes or fuel price shifts occurred and overlay them on top of the GDP growth chart.

**Deliverables:**

* Timeline chart of external events.
* Annotated charts and analysis explaining how external factors influenced the transportation industry.

**For the final presentation**

I was thinking we could organize the presentation into clear sections (Historical Trends, Sector Breakdown, Correlation Analysis, External Factors). Use a combination of **line charts, bar charts, correlation plots, timelines, and annotated visuals** to create a dynamic and engaging presentation. End the presentation with future projections and recommendations. Based on the trends uncovered, speculate on how the for-hire transportation sector might evolve and what policymakers or businesses should prioritize