Final Project

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Introduction

This project involves a comprehensive financial analysis of four main sectors: healthcare, financial, automobile, and semiconductor. The primary goal is to assess the financial health and investment potential of companies within these sectors by analysing ratios on the basis of balance sheets, cash flow statements, and income statements. By examining key financial metrics and ratios, the project aims to identify the best stocks for investment and highlight companies that are performing exceptionally well or poorly.

To conduct a comprehensive financial analysis of companies within the healthcare, financial, automobile, and semiconductor sectors, I collected data from yahoo finance, Kaggle and IMF GDP data. After collecting data, I compiled Financial Statements and gather balance sheets, cash flow statements, and income statements for at least three companies in each sector. Then I did data cleaning which ensured the data is clean, consistent, and formatted for analysis.

Particularly, in the automobile sector, I want to analyse the sales data of various Tesla models across different countries to gain deeper insights into Tesla's operational sales data. This analysis will help me understand Tesla's global footprint in car sales and gross profit. Additionally, it will enable me to determine if changes in the company's stock price are correlated with its sales performance. I also want to analyse the GDP, per capita income, and emission data of different countries alongside Tesla car sales. This comprehensive analysis will provide insights into how these economic factors relate to Tesla's market performance in various regions.

Ambitiousness of the Project

The project is highly ambitious as it involves a comprehensive financial analysis across four major sectors: healthcare, financial, automobile, and semiconductor. It requires collecting and cleaning extensive data from multiple sources such as Yahoo Finance, Kaggle, and IMF GDP data, and compiling financial statements for at least three companies in each sector. The project aims to evaluate the financial health and investment potential of these companies by analysing key financial metrics and ratios. Specifically, in the automobile sector, it delves into the operational sales data of Tesla across various countries to understand its global footprint and correlate sales performance with stock price changes. Additionally, the project integrates macroeconomic factors such as GDP, per capita income, and emission data to provide a holistic view of how these factors influence Tesla's market performance, showcasing a multifaceted approach to financial analysis and investment decision-making.

The analysis includes key financial metrics and ratios such as Earnings Per Share (EPS), Debt-to-Equity ratio (D/E), Return on Equity (ROE), Current Ratio, and Operating Cash Flow (OCF). These metrics are essential for investors and stakeholders to make informed decisions regarding stock investments.

Each Ratio’s quality:

Debt-to-Equity Ratio (D/E)

The Debt-to-Equity Ratio indicates how much a company is financing its operations through debt versus owned funds. A lower D/E ratio suggests financial stability and less reliance on borrowing, while a higher ratio indicates higher financial risk. Investors generally prefer companies with a lower D/E ratio, though acceptable levels vary by industry.

Return on Equity (ROE)

ROE measures a company's profitability by showing the profit generated from shareholders' investments. A higher ROE indicates more efficient use of equity financing. Investors typically favor companies with a higher ROE, as it signifies effective management and profitable use of equity.

Current Ratio

The Current Ratio measures a company's ability to pay off short-term liabilities with short-term assets. A ratio above 1 suggests good liquidity. Investors prefer companies with a current ratio slightly above 1, indicating sufficient liquidity without excessive asset hoarding.

Operating Cash Flow (OCF)

Operating Cash Flow (OCF) measures cash generated from normal business operations, reflecting a company's ability to cover short-term liabilities and operational costs without external financing. Strong OCF is crucial for investors as it indicates financial health, allowing companies to fund investments, pay dividends, and buy back shares internally. Investors prioritize companies with strong OCF for their financial stability and long-term viability.

The research questions:

- What are the key financial metrics and ratios that indicate the health and performance of companies within the healthcare, financial, automobile, and semiconductor sectors?
- What is the Average Current ratio, EPS, D/E, Operating cash flow by Industry?
- Average Gross Profit of Different models of tesla?
- What are the trends in average gross profit and average price for each country?
- What is Tesla model cars sales?
- Which is the most profitable tesla model?

- What type of visualization would effectively display emissions data for various countries?
- What type of visualization would best display the average closing prices of stocks?
- Provide a sector-specific visualization of the industry's average closing prices?
- Which sector shows the most promise for investment based on financial performance?
- Within each sector, which company demonstrates the strongest financial health and growth potential?

Methodology

The methodology of my project involves a structured approach to collecting, cleaning, and analysing financial data from multiple reliable sources. To begin, data was sourced from Yahoo Finance, Kaggle, and the International Monetary Fund (IMF) GDP data, providing comprehensive coverage of the healthcare, financial, automobile, and semiconductor sectors. Specifically, detailed financial statements such as balance sheets, income statements, and cash flow statements for at least three companies within each sector were compiled. For the automobile sector, operational sales data for various Tesla models across different countries was gathered to delve deeper into the company's financial health and market performance. The collected data underwent meticulous cleaning to ensure consistency, accuracy, and formatting suitability for detailed financial analysis.

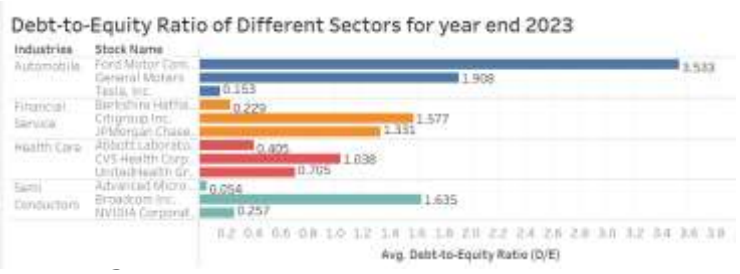
Further, the methodology extends to integrating macroeconomic indicators such as GDP, per capita income, and emissions data alongside the company-specific financial metrics to provide a holistic view of the market conditions influencing Tesla's sales and profitability in various regions. The analysis utilized financial ratios such as Earnings Per Share (EPS), Debt-to-Equity ratio (D/E), Return on Equity (ROE), Current Ratio, and Operating Cash Flow (OCF) to evaluate the financial stability and investment potential of the companies. These ratios were calculated based on the cleaned data, allowing for a robust assessment of each company's performance and the identification of trends or patterns that correlate with stock price movements and market behaviour. This comprehensive approach ensures that stakeholders and investors have a clear and detailed understanding of the financial health and potential of the companies analysed.

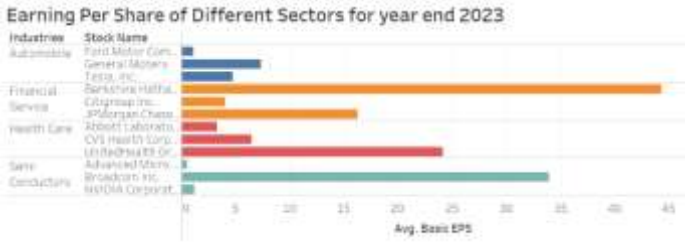
Analysis

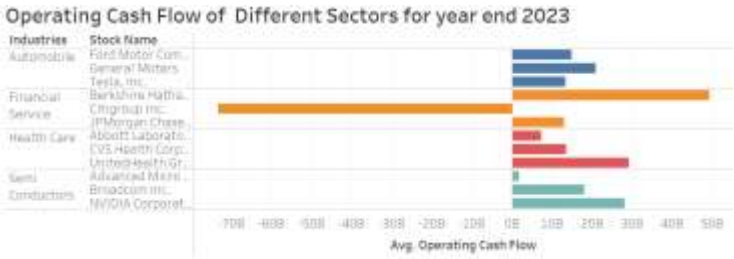
For data visualization, I select Tableau as the primary tool. This choice was made based on Tableau's robust capabilities to handle large datasets and its advanced visualization features. Tableau's user-friendly interface and dynamic visual capabilities allow for efficient

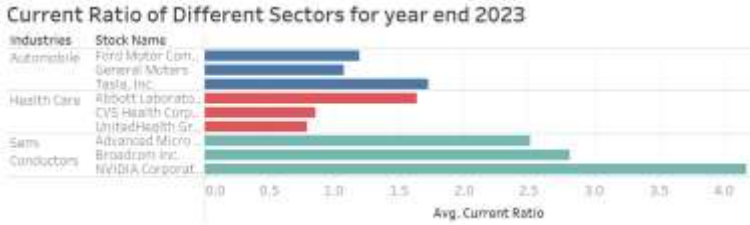
manipulation and display of complex financial data, facilitating deeper insights into financial health and performance trends.

What are the key financial metrics and ratios that indicate the health and performance of companies within the healthcare, financial, automobile, and semiconductor sectors?



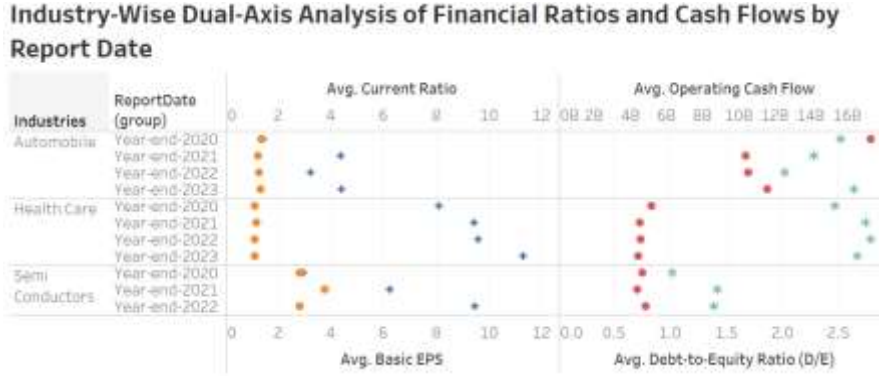






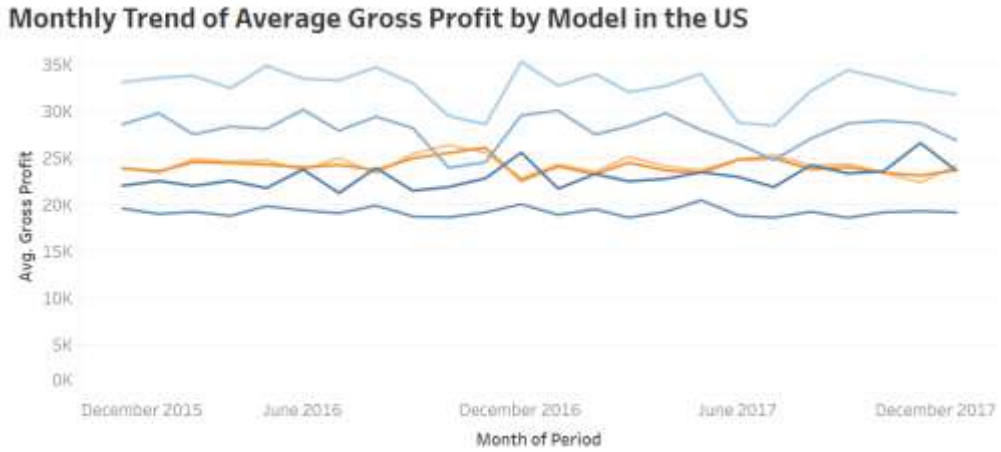
To answer my initial research question, I created 4 basic chart where I utilized data from the end of 2023 to conduct a detailed financial analysis of various stocks across different industries. I calculated the average values for key financial metrics—Debt-to-Equity Ratio (D/E), Basic Earnings Per Share (EPS), Operating Cash Flow, and Current Ratio—for each company within its respective sector. The results were visualized with color-coded charts that represented different industries, and I specifically labelled the average Debt-to-Equity Ratio for each stock to provide clear insights. This data was carefully filtered to only include non-null values from the year-end financial reports, ensuring the metrics reflected the most recent and pertinent financial data. This method allowed for an effective visual comparison of financial health and trends among the industries based on the data from 2023, directly addressing my research question using the collected metrics.

What is the Average Current ratio, EPS, D/E, Operating cash flow by Industry over last 5 years?



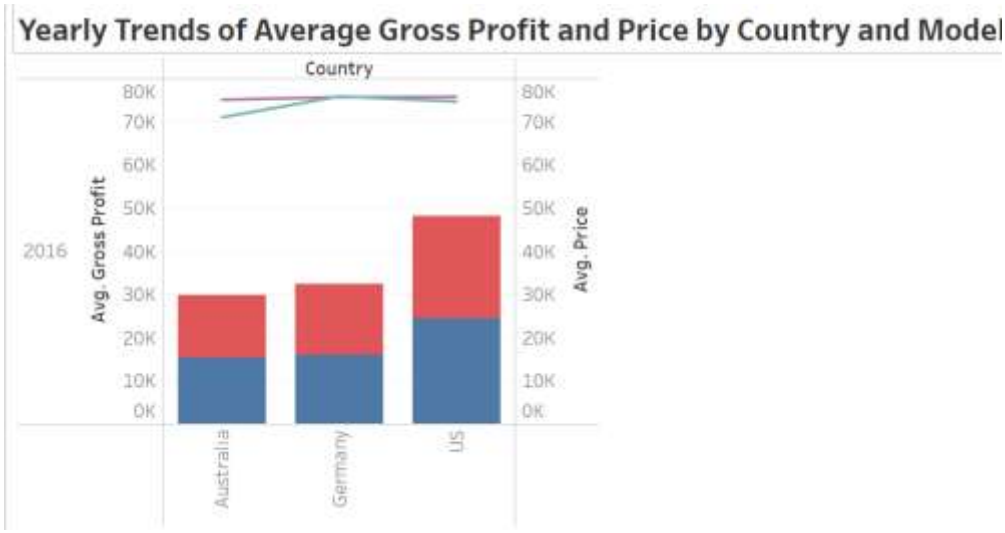
I created a dual-axis chart that displayed the average financial metrics for EPS, Current Ratio, Debt-to-Equity Ratio (D/E), and Operating Cash Flow for each stock, broken down by industries, using data from 2019-2023 . The chart was color-coded to provide detailed insights into these averages across different industries. I ensured the data was filtered to include only non-null values for Current Ratio. The visualization used a synchronized axis to represent the average Current Ratio and Basic EPS, while the averages for Operating Cash Flow and Debt-to-Equity Ratio were displayed on a separate, unsynchronized axis. Additionally, I incorporated a hierarchy that categorized the data by industry and grouped it by the report dates, allowing for a structured and clear presentation of the financial trends and health of the stocks.

Average Gross Profit of Different models of tesla in US?



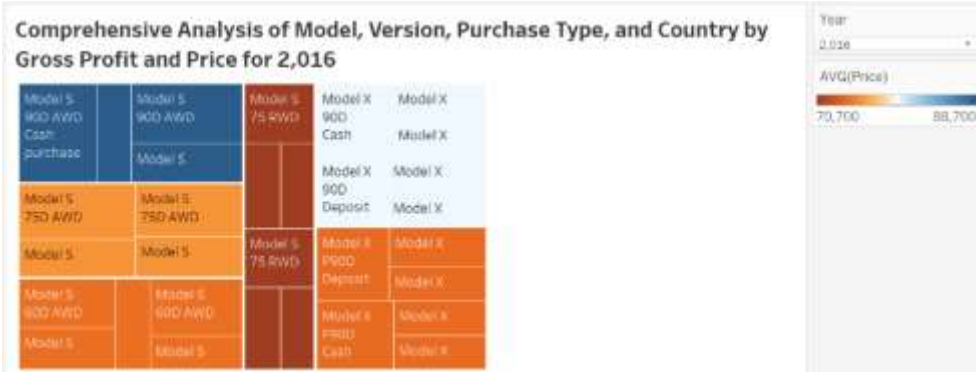
For this question, I created a visualization to show the monthly trend of average Gross Profit, with different colours used to distinguish between various Models and their versions. This visualizations allows me to identify how different models perform in the most profitable geographic area. The data was specifically filtered to include only entries from the US, ensuring a focused analysis on this geographic segment.

What are the trends in average gross profit and average price for each country?



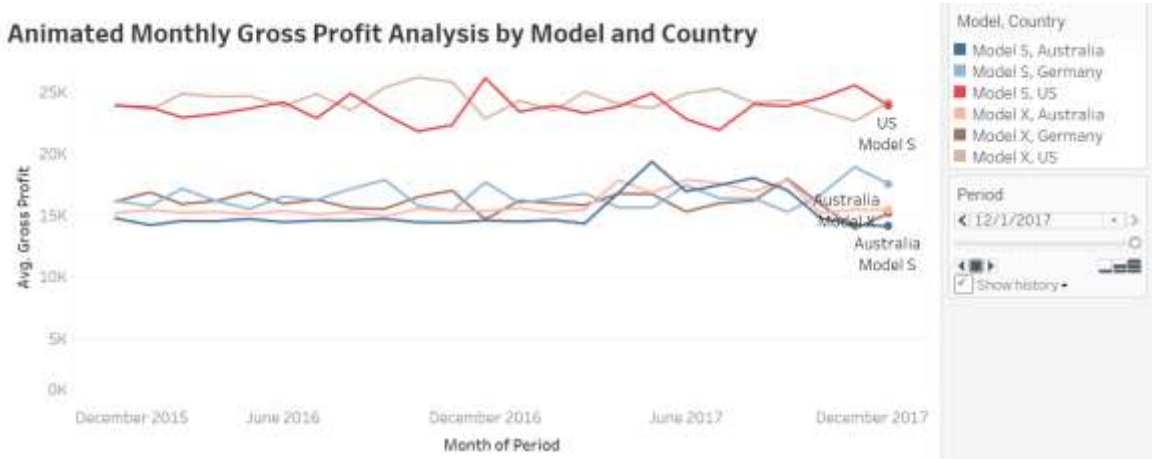
I displayed trends of average gross profit and average price for each country by year. I used colours to represent different model details. The data was filtered to show only the years 2016 or 2017, and I included only those entries where the values were true with the help of a parameter and a filter.

What is Tesla model cars sales?



I created a data visualization that displayed various attributes such as Model, Version, Purchase Type, and Country, focusing on the average Gross Profit and Price. I used color to represent the average Price and adjusted the size of the elements to indicate the average Gross Profit. Each element was labelled with the Model, Version, Purchase Type, Country, average Gross Profit, and average Price. To refine the data presented, I filtered it to include only selected years with the help of a parameter and excluded entries with null values for the country. This approach helped in providing a clear and concise overview of the data based on the specified criteria.

Which model do more profit in which country over time?



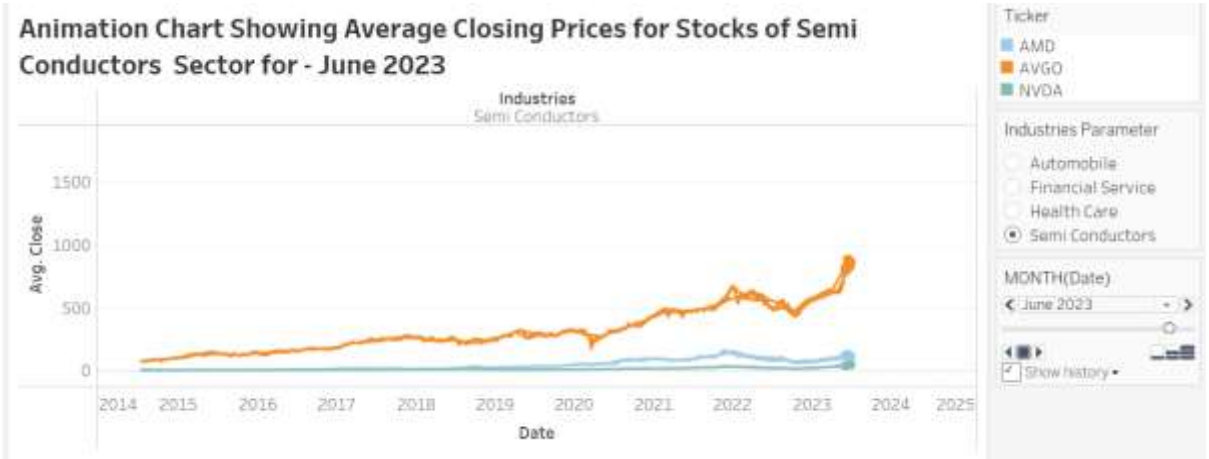
I created an animated chart that displayed the average Gross Profit by month. This would give me a timeline of how the profits increased or decreased over time in specific geographic locations. I used different colours to represent various Models and Countries. This chart was

interactive, allowing viewers to click and drill down into specific models to see more detailed information. For both the Country and the Model, I included labels and additional details to enhance understanding and provide more context.

What type of visualization would effectively display emissions data for various countries?

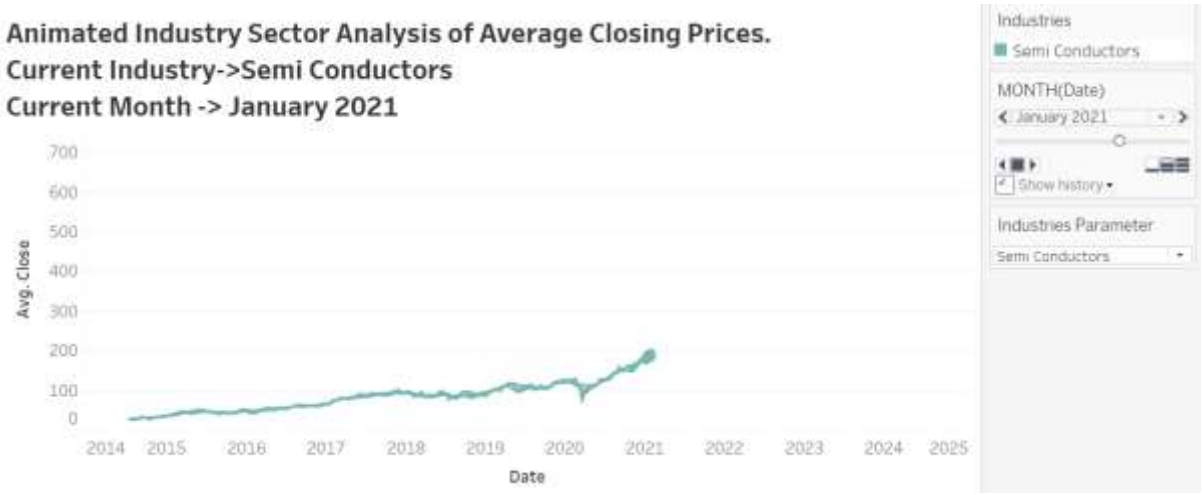
I created a map that used generated Longitude and Latitude coordinates to display Emissions Data for the year 2020. This would provide us a high-level overview of the countries which had higher emissions during the covid period as at this time all the vehicle emissions were at their bare minimum for all countries. This year can give us an overview of other factors that contribute to CO2 emissions. An electric vehicle will reduce emissions but there are emissions associated their battery which is difficult to identify. This map visually represented the data by using different colours and sizes for various emissions levels. It included details for each country's name and its emissions data, but I filtered it to show only the top 20 countries out of a total of 238. Additionally, I excluded the US from this view and only showed countries where the Latitude and Longitude values were not missing.

What type of visualization would best display the average closing prices of stocks?



I created a plot that displayed the average closing prices of stocks within the industry. In the plot, I used different colours to represent various stock tickers. Each point on the plot had a label showing the average closing price and the stock name. I added a feature to filter the data by the industry selected by the user. At the time, the plot was showing data specifically for the semiconductor sector.

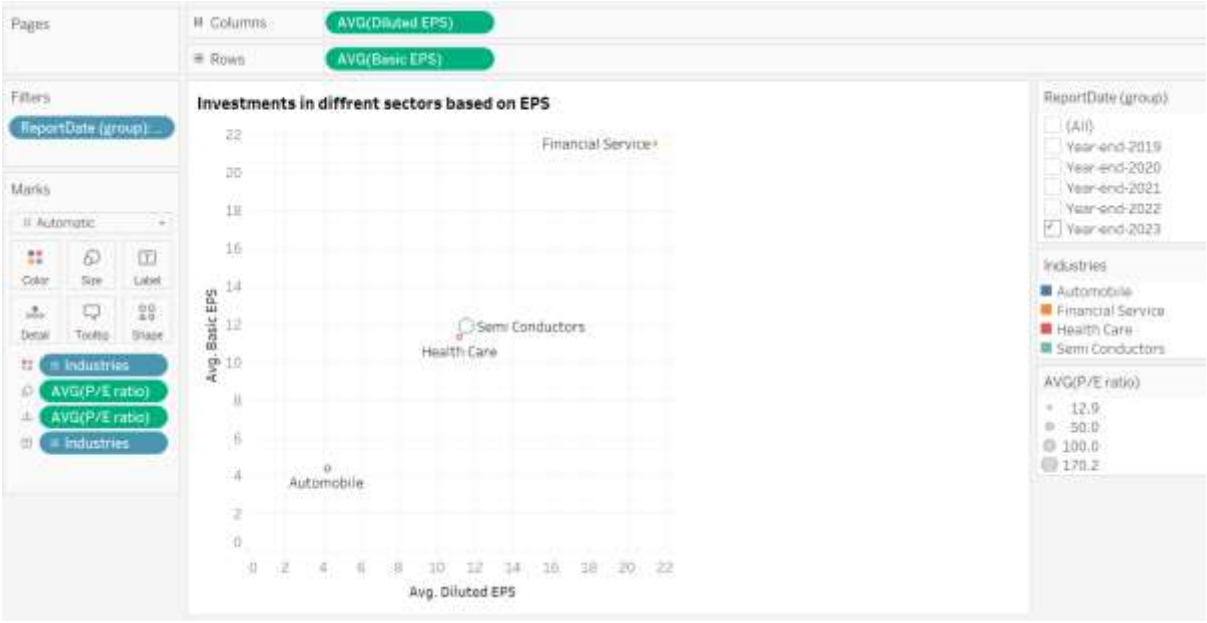
Provide a sector-specific visualization of the industry's average closing prices?



I created an animated chart that showed the average closing prices for different industry sectors. I used various colours to represent the different sectors and added labels to clearly identify each industry. The data was filtered by an industry parameter so that only selected sectors were included in the chart.

➔ **Which sector shows the most promise for investment based on financial performance?**

For 2023



For last 5 years

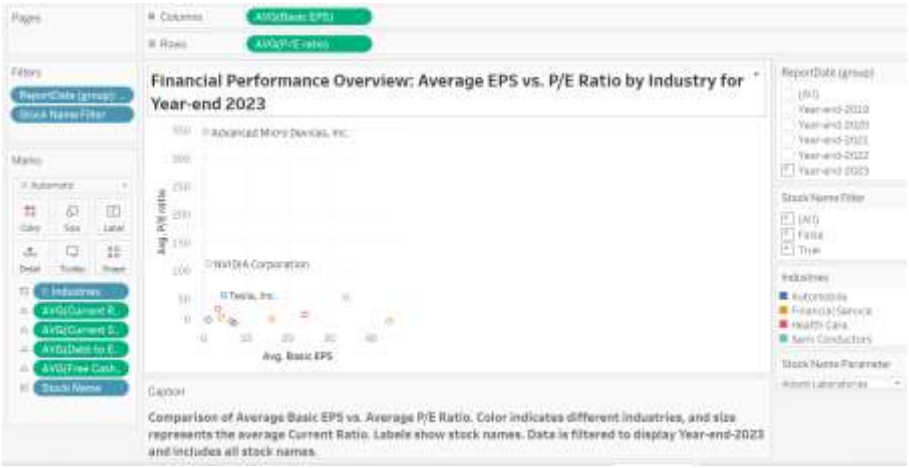
Over the past 5 years Based on the visualization, the sector that shows the most promise for investment based on financial performance can be determined by looking at the combination of higher EPS (both Diluted and Basic) and a reasonable P/E ratio. Here's an analysis of the sectors presented:

1. Financial Service:
    - Has the highest values for both Basic EPS and Diluted EPS.
    - The P/E ratio is not explicitly visible in the screenshot, but considering the large size of the bubble, it suggests a higher P/E ratio. A high P/E ratio may indicate higher growth expectations but also higher market valuation.
2. Health Care:
    - Has relatively high values for both Basic EPS and Diluted EPS.
    - The bubble size suggests a moderate P/E ratio.
3. Semi-Conductors:
    - Shows moderate values for Basic EPS and Diluted EPS.
    - The bubble size indicates a lower P/E ratio compared to Financial Service, suggesting a potentially undervalued sector.
4. Automobile:
    - Has the lowest values for Basic EPS and Diluted EPS.
    - The bubble size suggests a lower P/E ratio.

Financial Service sector shows the highest EPS values, which indicates strong financial performance. However, a high P/E ratio might suggest the sector is highly valued, potentially limiting upside potential. Health Care sector also shows strong EPS values with a more moderate P/E ratio, indicating a balance between performance and valuation. Semi-Conductors sector might be promising due to its moderate EPS values combined with a lower P/E ratio, suggesting it could be undervalued.

Given these factors, Health Care appears to be a balanced option with good financial performance and moderate valuation, making it a promising sector for investment. However, we are comparing a sample of data so more analysis is needed to analyse border data to make an informed decision.

Which company demonstrates the strongest financial health and growth potential?



We can perform a similar analysis for all stocks. However, based on the financial data from the year-end 2023, investments in the semiconductor and healthcare sectors appear most

attractive, depending on the investor's risk tolerance. This chart compares various metrics to provide a visualization that assists decision-makers in choosing the best investment option, considering EPS, D/E Ratio, Current Ratio, FCF, and P/E Ratio.

Conclusion

In conclusion, based on the financial analysis conducted using Tableau, the visualization and comparison of key financial metrics across the healthcare, financial, automobile, and semiconductor sectors revealed distinct patterns of financial health and performance. The Current Ratio, Basic Earnings Per Share (EPS), Debt-to-Equity Ratio (D/E), and Operating Cash Flow served as critical indicators, with the data showing varied strengths and vulnerabilities in each sector. For instance, sectors with lower Debt-to-Equity ratios may exhibit more stable financial structures, while those with higher EPS may reflect better profitability.

I have also analysed tesla car sales over a two-year period over multiple geographic locations. Analysing CO2 emissions data for the covid year 2020, I found that oil producing nations and mining nations have the highest number of emissions as in the covid year vehicle emissions were minimum.

This detailed comparison, facilitated by dynamic and structured visualizations, enabled an effective assessment of sector-specific financial stability and growth potential, highlighting the unique economic landscapes faced by each industry as they navigated the end of the year. This approach not only clarified the financial standings but also provided actionable insights into which sectors may offer better investment opportunities based on the calculated averages and trends.

From this foundation, further investigations could explore deeper into causal factors behind these financial trends or extend the analysis to predict future financial performances based on historical data trends. Additional research questions that emerge include:

- What are the key drivers behind the varying Debt-to-Equity Ratios across different sectors?
- How do economic fluctuations impact the Operating Cash Flow and Current Ratios in these industries?
- What predictive models can be developed to forecast sector-specific financial health based on historical financial data?