

STA141B Final Project

Stock Price Trends

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Introduction:

Our group decided to create a shiny application on company stocks. In particular, our goal was to create an application that a user could use to view the performance of a stock of the user's choice. We decided that displaying a time series plot of the stock's price would be a great representation of the stock's past performance, helping the user see trends and make a decision to buy or sell that company's stock. We wanted the user to be able to view the stocks over a time range of their choosing rather than a set interval. We also wanted the user to be able to compare the performance of a stock with another stock, and so we included in our application the ability to view two plots side-by-side to help notice differences in trends of the stock price. We also decided to include links to current news headlines relating to the stock market, business, and finance, as we thought these would be influential in helping someone determine whether or not he or she would like to invest at all in stocks. To achieve these goals for the application, we utilized data sourced from an API and information obtained from web scraping.

The Source of Data:

We sourced our data from the Financial Modeling Prep website (<https://financialmodelingprep.com/>). This website has a free-to-use API with no required key to access the data. The API provides a lot of data, such as company valuation, stock time series, market indexes, and so on. After reading over the API documentation (<https://financialmodelingprep.com/developer/docs/>), the first API we decided to make use of was the Symbols List API. This was essential as it lists out all the symbols or abbreviations used to represent each company. We also utilized the Company Profile API. This API contains the image URL for the companies in the symbols list. Not all companies have an image, and so in its place is a default image. Lastly, we utilized the Historical daily price with change and volume API. This provided us with the information necessary to construct our time series plots. The information includes the daily opening, closing, high, and low prices by date, along with the percentage change in price. We decided to use daily price since the other options were shorter intervals of time (every hour, every 30 minutes, etc.), which are harder to interpret compared to daily.

We also scraped news headlines from this same website. These news headlines are related to the stock market world and link to articles about various finance subjects. These news articles seem to update fairly quickly (within a few hours), delivering up-to-date information.

Retrieval and Processing of the Data:

Using the Symbols List API, we retrieved all the provided company symbols. We utilized the functions in the library "httr" to get the information from the API URL and convert the information from JSON format to R objects. We first noticed that we needed to create a column

that combined the company name with the respective symbol in one string, since this is what should appear when a user is selecting a company. Just the symbol itself would be confusing to the user. Since there are several thousand company symbols (13,854), we decided to use the companies with the highest current stock price (the top 500). Out of these selected 500, we noticed that a few of the company stocks had some missing data or created error messages when publishing the app. Therefore, we decided to exclude these companies from the dropdown select list. From the Historical Price API, we obtained the stock price data for each company in a data frame format. We had to convert the date column from character form to date form, and we had to filter this column based on the dates the user selected for the date range input (with the date in year-month-day format).

We scraped the top 10 news headlines that appeared on the financial modeling prep webpage. We utilized the functions in the library “rvest” to efficiently scrape the titles of the news headlines along with the underlying URL links to the news articles. We decided to keep the first ten news headlines that appeared on financial modeling prep, since adding more would make the application look cluttered and since the articles that appear are updated fairly quickly.

User Guide of the Application:

Upon opening the “Stock Price Trends” shiny application, the user sees a screen with a sidebar of inputs and three tabs on the main panel. The interface theme (color scheme and style) is defined by the shiny theme “flatly.” The default company stock selected is “Apple Inc. (AAPL).” The user can change the selected company stock by either typing in a stock of their choice or by scrolling down the dropdown menu to choose the company he or she would like to view. On the first tab panel, titled “Selected Companies”, the user can see the logo of the company. The API does not have images for certain companies, and therefore displays the following if the image is missing:



This designates the symbol for the financial modeling prep website.

The user can select a second company by checking the checkbox. Upon checking the checkbox, the user can see that a second dropdown list appears from which the user can select amongst the same list of companies as the first select input. The default second company is set as “Amazon.com Inc. (AMZN).” Upon checking the checkbox, a new box with the second company logo automatically appears, and the image changes based on the inputted company. If the checkbox is unchecked afterward, the image disappears.

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Choose a company:

Apple Inc. (AAPL)

☒ Add a second company for comparison

Choose a second company:

Amazon.com Inc. (AMZN)

Select date range:

2015-03-09 to 2020-03-20

Choose graph Y-axis variable:


Opening Price

Selected Companies


Time Series Plots

Top Market Headlines

Company 1 Logo

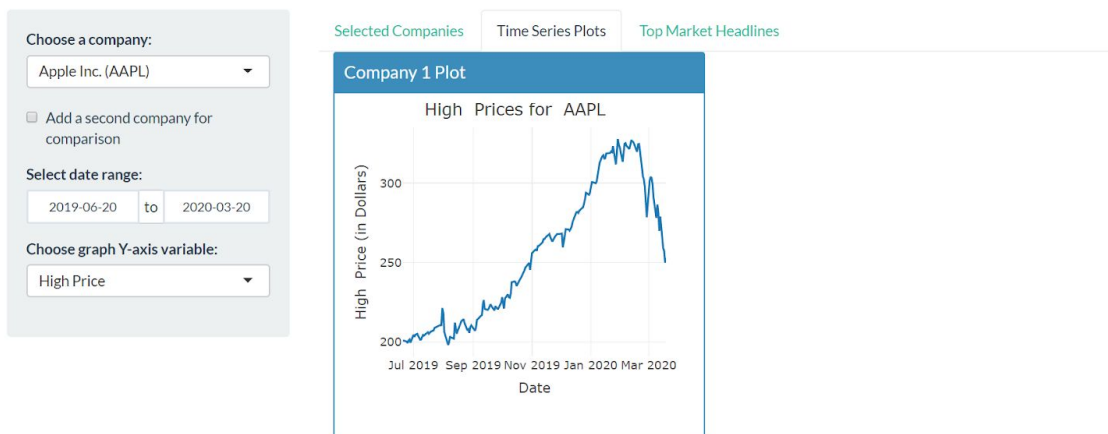


Company 2 Logo



When the user clicks on the second tab labeled “Time Series Plots,” he or she can see a time series plot of the opening prices of the selected stock. The user can adjust the date range (the range of the x-axis) by either typing in different dates on the sidebar under “Select date range;” or clicking the date on the calendar, which is prompted upon clicking one of the dates in the date range box. As the plot is a “plotly” time series plot, the user can hover over the trend line to see the date and associated stock price for that date. The user also has options to download the plot as a png, zoom in and out of specific areas of the plot, as well as pan across the graph. This can be seen as an alternative to entering the date range if the user prefers to view the plot in this manner. The user can also change the y-variable from opening prices to something else by selecting from the dropdown list under “Choose graph Y-axis variable.” The other options include “High Prices,” “Low Prices,” “Closing Prices,” and “Percentage Change.” Clicking on “Percentage Change” returns the percentage change in prices over a period of time, rather than stock prices themselves.

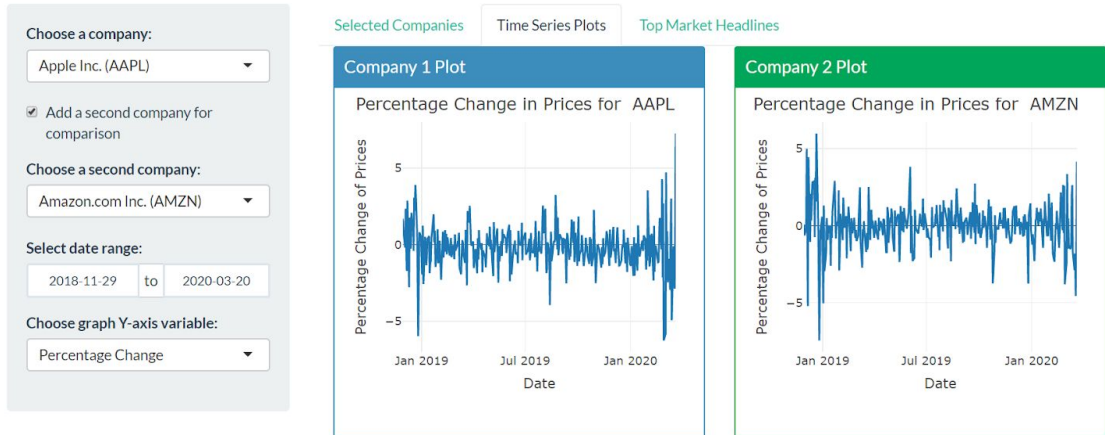
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If the user has the box “Add a second company for comparison” checked, then the user will see the time series plot for the second company to the right of the first plot. If the user decides to

change the date range or the y-axis variable, the same change will be applied to the plot of the second company, to aid in a comparison between the two companies. Again, if the user unchecks the checkbox, the second plot will disappear.

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When the user clicks on the last tab, called “Top Market Headlines,” the user sees 10 current news headlines relating to the market. By clicking on one of them, another tab is automatically opened, leading to the text of the news article from the financial modeling prep main website.

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