Tesla Inc. Performance

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CIS 3252.06

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December 1, 2021

Domain Frame: Electric Automotive Industry

The domain I decided to focus on is the financial domain in the automotive industry, specifically pertaining to electric vehicles. There are several reasons why I found this specific subject interesting. One of these reasons is due to the recent successes regarding Tesla, Inc. As the company, Tesla, continually became more valued, I wondered if this value is derived from their specific branded electric vehicles or the success of the co-owner, Elon Musk in general. I am personally a large endorser of Tesla, and other electric companies as a whole. I support their mission statements in preparing for a more resource efficient and cleaner planet. Another reason why I chose this domain is derived from the increasing gas prices in my area. I wondered if these prices are causing a demand shift from consumers' automotive desires

Problem Statement: Will Tesla Continue to Perform Similar to the Past Decade?

As some may know, Tesla is a popular electric car company. The main query I want to find is how successful Tesla has performed in the last decade, and whether it plans to continue to increase or decrease. The term successful however, can be an umbrella term for several different characteristics within a company. Therefore, for simplicity, I am going to look specifically at certain metrics and KPIs' (Key performance Indicators) for measurements. These measurements can include sales rates, market shares, and stock evaluations. Due to the unique amount of datasets available, I will only be conducting analysis on Tesla data from the years of 2011 to 2019.

Analytical Questions

Question 1. The first question I intend to ask is how, in general, are Tesla's electric car sales performing throughout the past couple of years. Specifically regarding increased/decreased sales rates. This question is significant because it can offer a basic foundation on how well their company is performing. It can also offer a more credible insight on how well the market is responding to Tesla's products.

Question 2. To additionally add insight on Tesla's success, I want to find how it is performing against their competitors. This question is important because it can provide a sense of placement of where Tesla is in terms of competition. It can also reveal how far ahead/behind Tesla is compared to their competitors in success.

Question 3. The last analytical question I wish to explore is about the stock of Tesla (TSLA). The question of interest is whether the price of TSLA will continue to grow (after 2019)? This question is important because it can give a sense of how the market evaluates the company. Since a company's stock can be a key reflection on the success of a company, analyzing its price and growth can find insight on the company's present/future performance.

Analytical Approaches

Approach for Question 1. To find insight about the performance of Tesla car sales, I approached this question in two different ways. I wanted to find the percentage changes/rates. From the dataset I filtered the dataframe to locate the total number of Tesla Car sales from 2011 to 2019. From there, I calculated the rates of sales for each available tesla model within the dataset by year. After this, I decided to find the average percentage changes for all tesla models cumulatively. I found this information by adding all of the sales rates for each car and dividing it

by the total number of tesla cars. I then included a chart to help visualize the amount of sales changes per year.

Approach for Question 2. The best way for me to analyze Tesla's performances compared to their competitors was to find their market shares in their electric vehicular industry. Similarly to the approach I took for the first question, I found the market shares for each vehicle sold by Tesla. To do this I found the total amount of sales for each Tesla modeled vehicle and divided it by the total number of electric vehicle sales, including all the other companies. and as well as the total market share of Tesla sales cumulatively throughout the years. To find the cumulative market share, I found the sum of the total sales of Tesla and divided it by the total sales of all electric vehicles. I also included a horizontal bar graph to illustrate the differences of the top selling electric vehicles from 2011 to 2019.

Approach for Question 3. To analyze Tesla's stock (TSLA) I first decided to visualize the stock's close prices. For greater consistency, I only analyzed the stock prices from the same years provided in the previous dataset, 2011 to 2019. I decided to specifically observe the adjusted close prices of the stock since a stock's close price is often used for a reference point for the performance of a stock over a specific time (Saint-Leger, 2019). After creating a graph representing the close prices, I found the average slope of the graph. I found this by simply adding a regression line to the graph and finding the slope formula that was formulated. Since the slope from the regression line formula represented the rate of change, I compared it to the sales rate that I found from my first analytical question.

Data

For my project I used two credible datasets to find my insights. The first dataset that I used recorded the amount of sales for each fully electric, or hybrid, vehicle by car model from 2011 to 2019. This dataset was an excel file directly sourced from the US Department of Energy (Maps and Data, n.d). This data included 12 unique columns and 56 rows, with a total of 550 instances.. These attributes can include the "vehicle name", "vehicle type", "sales in year *(x)*", and "total sales". The attribute types for the "vehicle" and "type" columns were qualitative, nominal variables. The attribute types for the "sales in year *(x)*" and "total sales" were qualitative, ratio variables. The target variable for the majority of this project was a combination of qualitative and quantitative data specifically about Tesla. For instance, the target variable for finding the market share per vehicle, were the total sales by each Tesla model.

While this dataset was sufficient for my needs, I did run into several problems when attempting to analyze it. The first challenge that I found was the formatting of the dataset. Due to the nature of the data format given, the following data frame was not formatted in a way of my knowledge. Therefore, I had to cut and reformat the data frame in a variety of ways for me to efficiently work with it. I did this by deleting and adding specific rows/columns to the original dataframe. Another problem I faced with this dataset were the missing values given. Thankfully from another class, I learned how to properly handle missing values, so that problem wasn't too harsh.

The other dataset that I used was from Yahoo Finance (Yahoo!). This source offered a free ".csv" file which had accurate and detailed data on Tesla's stock (TSLA). This data consisted of 7 columns and 108 rows, with a total of 648 instances. The dataset had data on

Tesla's stock from the years 2011 to 2019. The attributes provided included the stock's date (by month), open price, high price, low price, closing price, "adj close", and volume. The majority of the attribute types for these attributes were qualitative, ratio variables. However, "date" is an interval data type. The target variable of interest in this dataset was specifically the closing price of the stock. This is due to the significance of choosing the adjusted closing price relating to the performance of a stock. There weren't any specific challenges I came across when working with this dataset.

Key Stakeholders

The data found from my analysis can affect a variety of entities and individuals. The main stakeholders that come to mind are Tesla investors, general investors in the electric car industry, car consumers, owners/managers/employees of electric and gasoline car companies. The reason why investors are uniquely affected by this project is due to the value it can have in the stock market. My findings can offer insight to current and future investors of Tesla, on whether they should or shouldn't continue to invest in them. General investors in the car industry can be affected since they can see if the electric car industry is performing well. This can sway their opinions and investment choices. My project can also hold value to potential car customers. Since Tesla can be considered the leader for electric vehicles, their success can influence future consumers on what to buy. It can also influence consumers who are on edge about whether electric cars have a future. The workforces of the automotive industry can be impacted from my findings. Electric car employees and managers can find the insight useful for their future career plans. For instance, if my data resulted in Tesla not continuing to grow, their employees would want to leave. The same philosophy can apply for the employees/managers for gasoline car

companies. Lastly, the owners of electrical/gasoline car companies can be affected because they can see the performance of their competitor.

Findings

Truly identifying the success of a company can depend on several if not thousands of factors. For simplicity, I condensed the idea of success in smaller metrics and KPI's. One of these KPIs was the average growth rate of Tesla Sales. I also found the total rate of sales for each vehicle. The Tesla Model S had a growth rate of about 7 percent. The Model X had a 93 percent increase. Lastly, the Model 3 had a 78 percent increase. I found that the average growth sales rate for all Tesla car models was about 60 percent. This data indicates that Tesla has had a positive growth rate in sales from years 2011 to 2019. Another KPI that I found was the market share Tesla had per vehicle and against the entire electric vehicle industry. I found that Tesla's vehicles have the largest market share compared to their competitors. I also found that two, out of the three, models sold by Tesla (Model S and 3) are the most selling vehicles. Model X was placed at the 6th most selling model (figure 1). Tesla Inc as a whole, had around 38 percent control over the market. I also found that Tesla's stock has a positive linear relationship as the years continue. The growth rate of Tesla's stock was around 62% (figure 2). Ultimately, after finding these insights, I concluded that Tesla has performed excellently over the years 2011-2019. And that I will continue to grow in sales and stock evaluations.

Conclusion

This project as a whole was definitely an interesting experience. I would find some processes easy and simple, while some methods would take more than an hour. There were several

instances throughout this project that taught valuable lessons about data analytics. One of these lessons is how hard it is to find efficient, usable, and credible data sources. Surprisingly, this was actually the hardest step of the project. I found data sources everywhere, however it took a long time finding the data right for desires. Another key-takeaway from this project is the importance of properly formatted data. When importing one of my datasets, the original data frame looked unfamiliar and usable to what I learned. However, after learning how to readjust the data frame, It allowed me to work successfully. An additional key learning point that took away from this project was the difficulty to produce sufficient and clean visuals. I unfortunately had a lot of trouble finding ways to simply add a color to a bar graph. Lastly, a learning insight that I found was that hands-on work with coding helped me understand it more. While I understood the basic concepts, after creating dataframes and functions independently, I began to understand the syntax and nature of Pandas more thoroughly. While frustrated at times, I found that this project elevated my skills as a programmer and analyst in general.

Figure 1
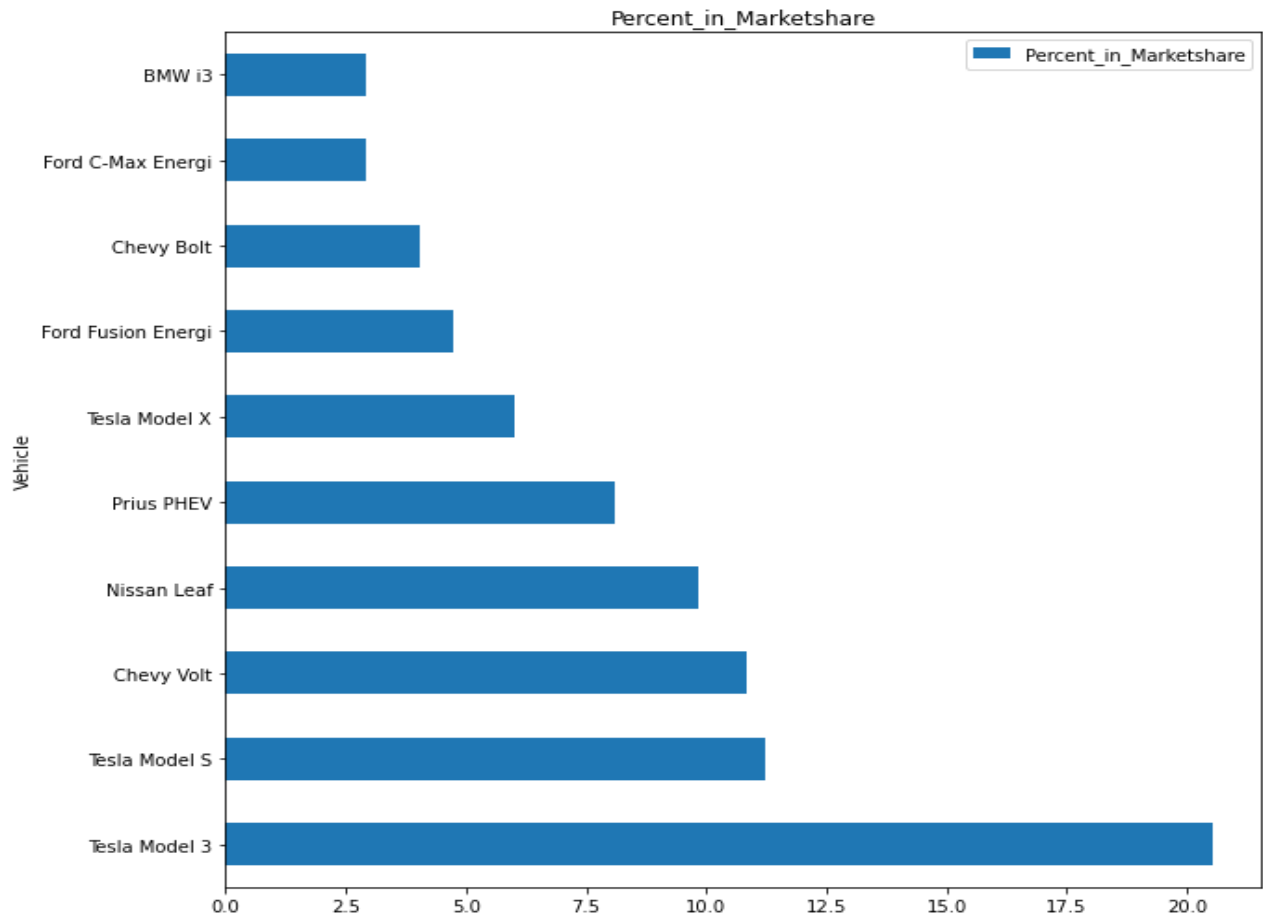
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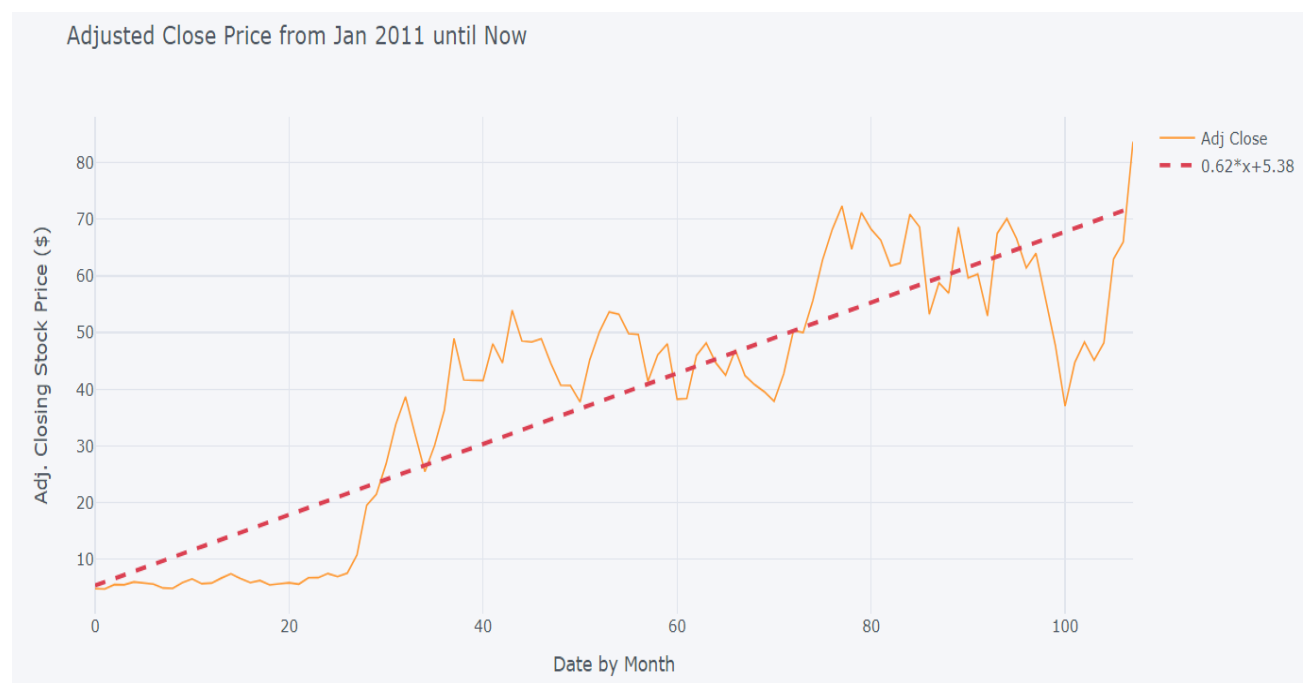
References

Maps and data - U.S. plug-in electric vehicle sales by model. Alternative Fuels Data

      Center: Maps and Data - U.S. Plug-in Electric Vehicle Sales by Model. (n.d.).

      Retrieved November 22, 2021, from https://afdc.energy.gov/data/

Saint-Leger, R. (2019, February 10). *What is the significance of a closing price on a*

      stock? Finance. Retrieved November 22, 2021, from

          https://finance.zacks.com/significance-closing-price-stock-3007.html.

Yahoo! (n.d) *Tesla, Inc. (TSLA) Stock Historical Prices & Data*. Yahoo! Finance.

      Retrieved November 22, 2021, from

      https://finance.yahoo.com/quote/TSLA/history?period1=1293840000&period2=157783

      800&interval=1mo&filter=history&frequency=1mo&includeAdjustedClose=true.