

Investment of Stocks in Cell phone Manufacturers

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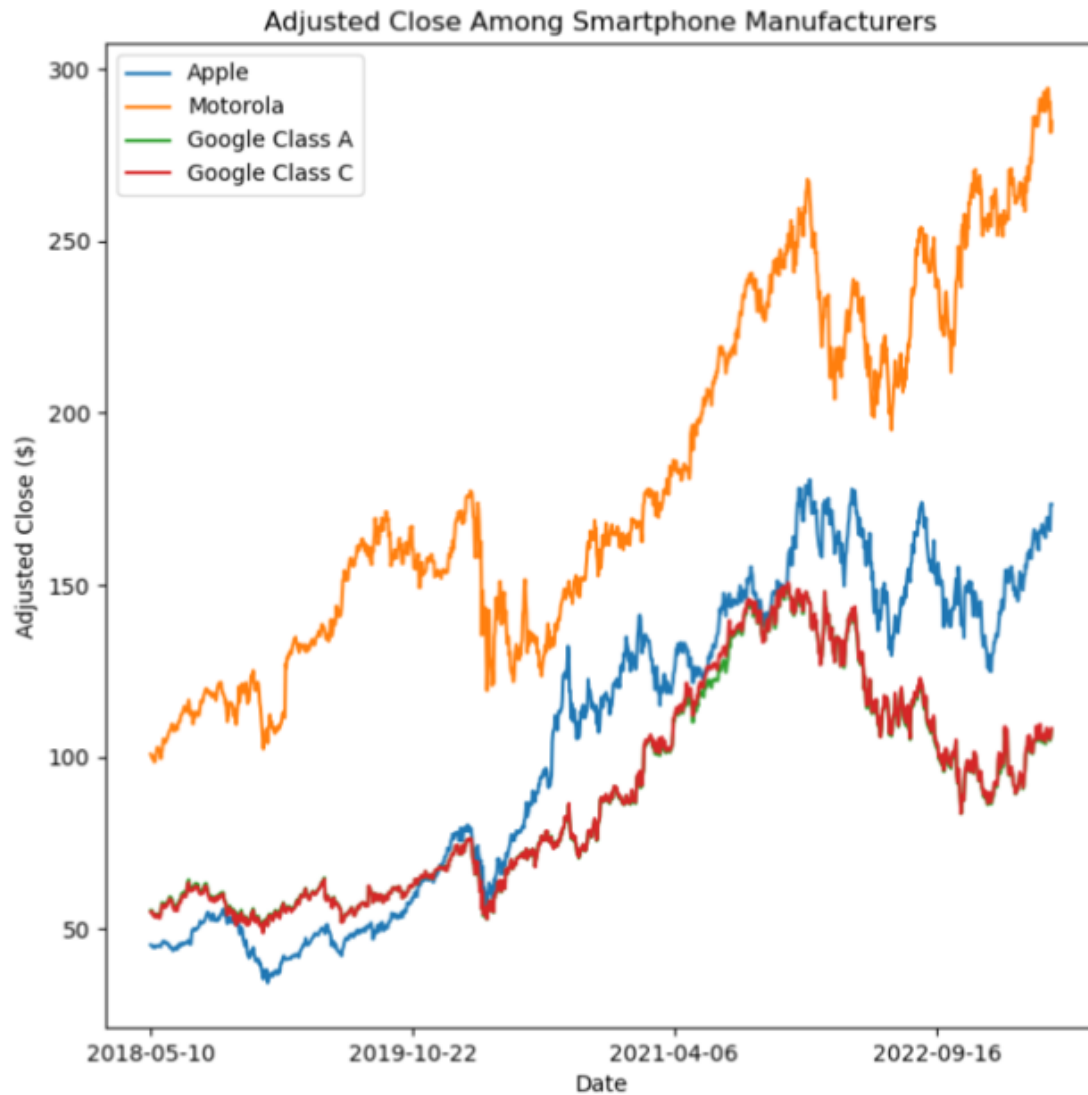
Our goal in this project was to examine three companies involved in the manufacturing of cell phones. We specified the following brands that would be our focus for this project: Apple, Motorola, and Google. The parent company of Google is Alphabet, and it is split into two ticker codes: GOOGL and GOOG. They represent Google class A stocks and Google class C stocks, respectively. The main difference in the two stocks is the voting power. Therefore, we analyzed four ticker codes (counting google twice). These four codes were chosen due to their influence and grasp on the North American market, which we wanted to focus on. When examining these brands our intention was to take into account two key factors: the brands net income of the company and the upward/downward trends in the stock market both over the past approximately five years. This data would be utilized to make our decision on what company we would have our hypothetical clients invest in.

When we looked at the data we had some interesting findings. Our first variable we examined in the stock upward/downward trends was the adjusted close. The adjusted closing price is defined as “anything that would affect the stock price after the market closes for the day” (Groww.in). Some of these factors may be the adjusted close definitely favored Motorola over the entirety of our data set. All of the companies did see variation in their closes over the years, but Motorola consistently had the higher adjusted close. We had to take into account that this was the adjusted close not the raw close data (adjusted close accounting for factors the companies may take after the market closes that day that could affect pricing for the following day). Apple, Google A, and Google C were much closer with Apple typically having an adjusted close above that of both Google A and Google C.

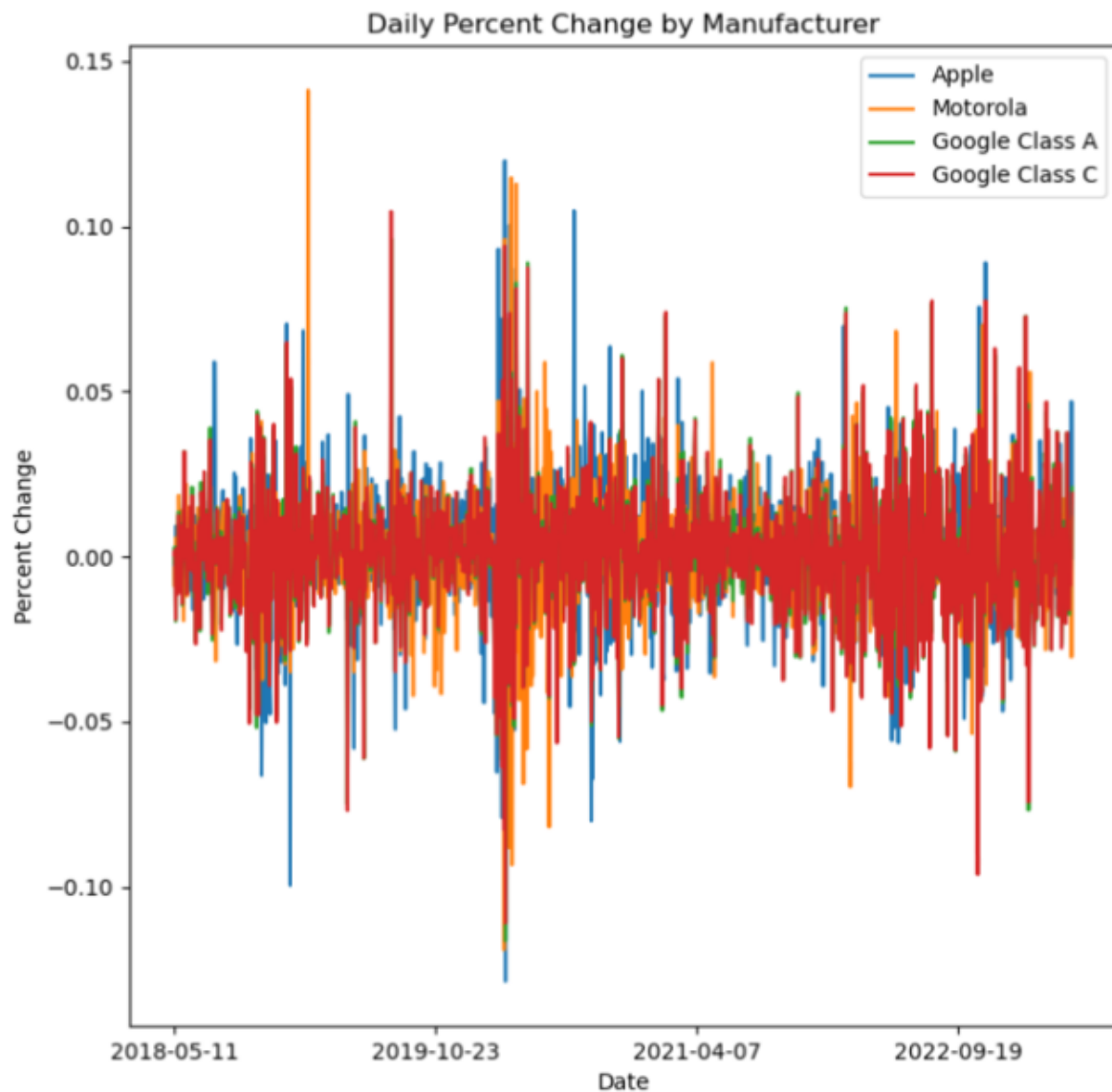
The daily percent change was another part of the upward/downward trends that would be important to monitor. When looking at these all four companies do see variation -0.05 to 0.05 frequently over the approximately 5 years. However, the larger -0.10 to 0.10 was a much less frequent change for all the companies monitored. Based on our data analysis Motorola and Apple have the largest changes, Motorola with the largest increase and Apple with the largest decrease. Further analysis of this change was done and the mean of percent change was identified for each company. This lined up with what we had seen on the percent change by day with Apple having the largest variation, Motorola second and both Google A and Google C having a lower, equal variation. Based on these two factors going toward our upward and downward trends Motorola appears to have the greatest adjusted close and daily percent positive change (although Apple does have the largest mean percent change).

Upon investigating the upward and downward trends it was identified that it would also be important to recognize the probability of gains for each company per day. We were hoping that this would help us differentiate more effectively between the different companies. Unfortunately, upon our analysis it was shown that all four companies' probability was ~ 0.5 with no significant difference between their probability for gains.

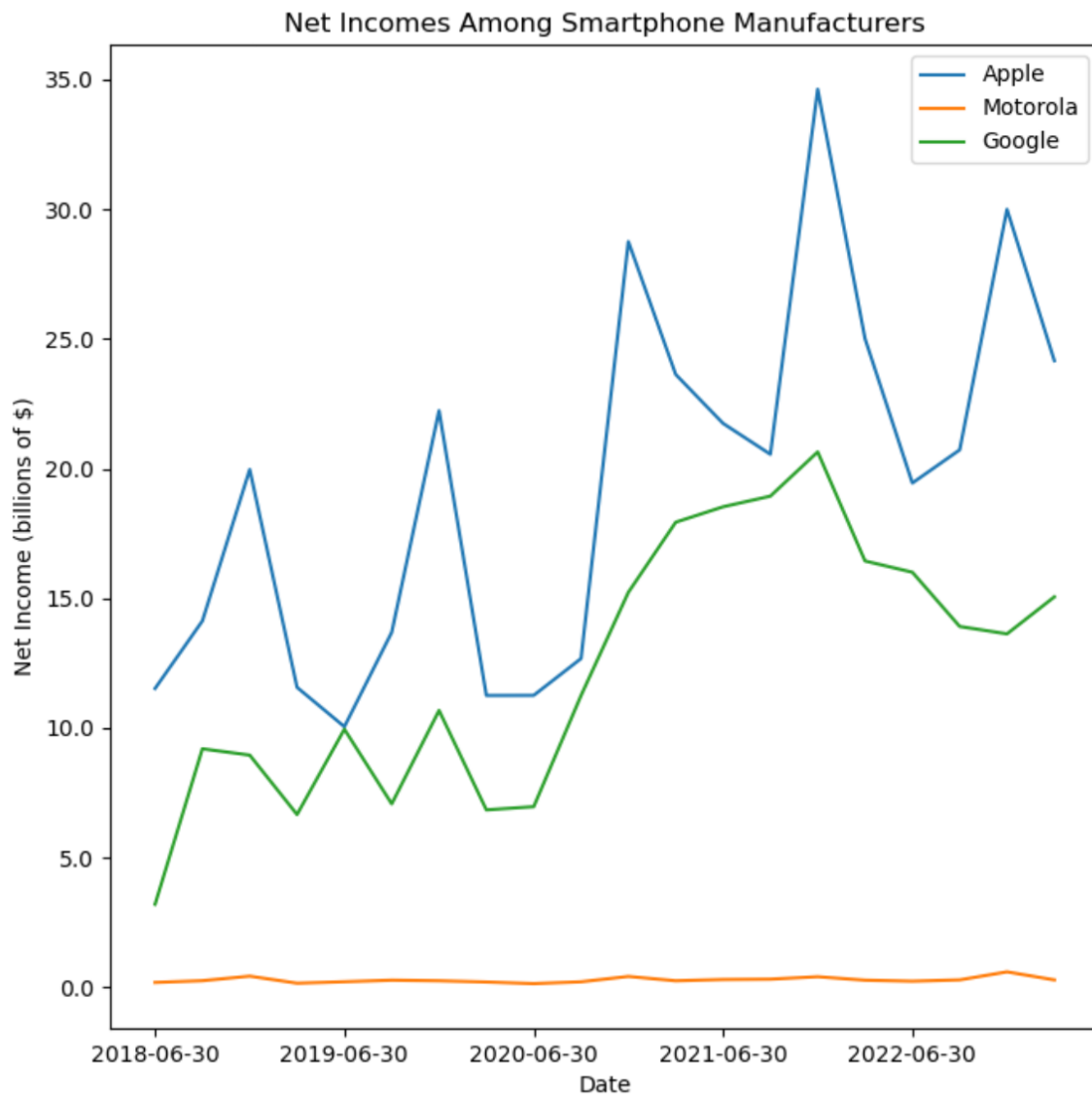
When looking at our next key factor of the net incomes among smartphone manufacturers, we saw a large variation between Motorola, Google (A and C) and Apple. Apple overwhelmingly had a much higher net income than either of the other companies. Even when there are dips in the incomes it seems to be dips that affected both Apple and Google (A and C). However, Motorola is significantly lower than Apple and Google (A and C). The initial net income graph made it difficult to identify any trends from Motorola on this graph due to their net income being significantly lower than the other companies. Once we were able to put Motorola's data on another scale which was more applicable to its data it was easier to see trends in their net income. It appears they also experienced dips in their income at similar times of the other companies (though on a much smaller scale). From this data we concluded that Apple very obviously has the largest net income, then Google (A and C), and then following far behind in net income is Motorola.



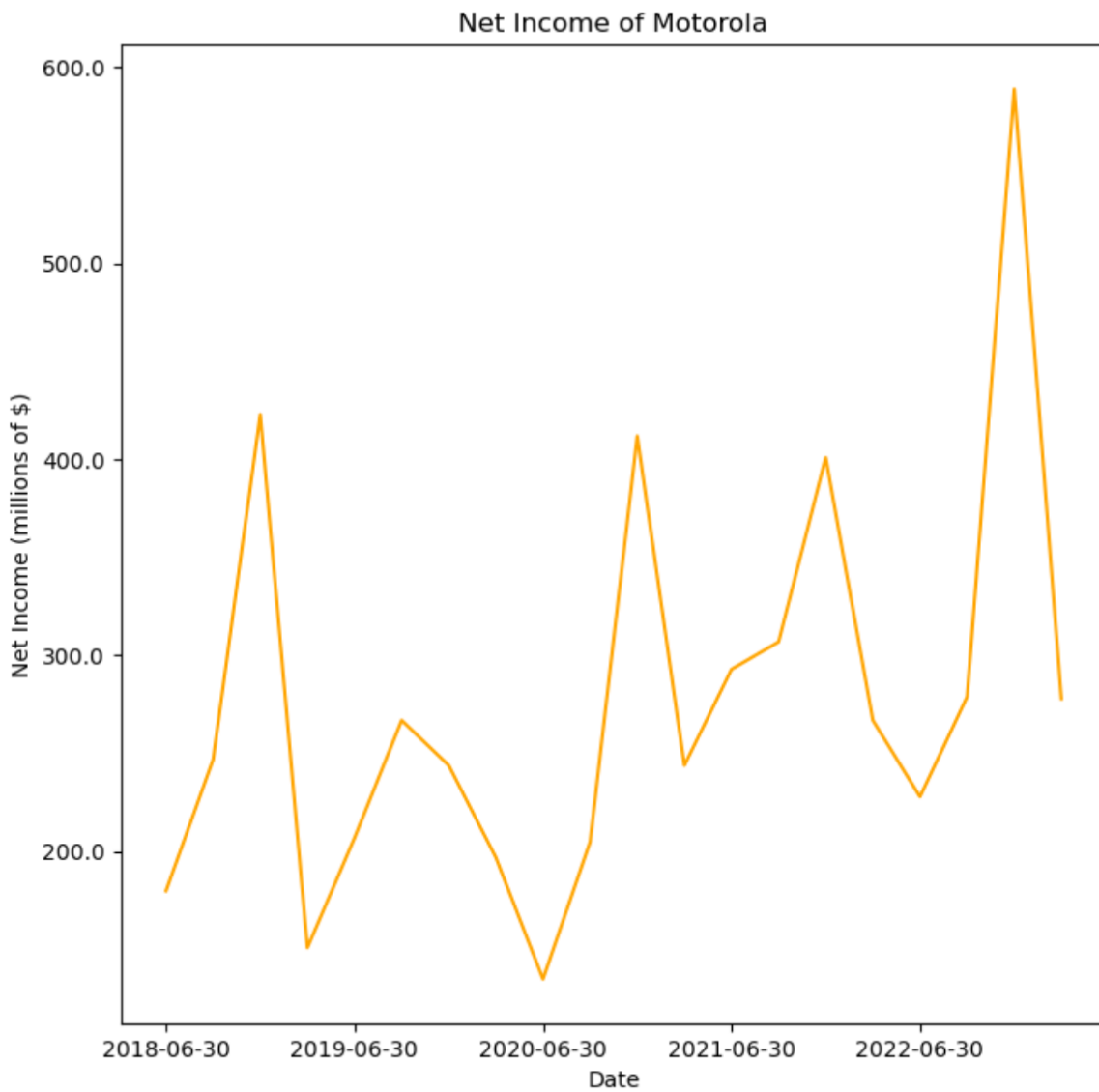
In this graph we illustrate the adjusted close among the Android manufacturers we examined and how they have experienced ebb and flow over a five year period. This graph shows that Motorola had the highest and most consistent growth in adjusted closes, while Google A and Google C had a steady climb from 2018-2021 but then saw a decline in their adjusted close by 2022.



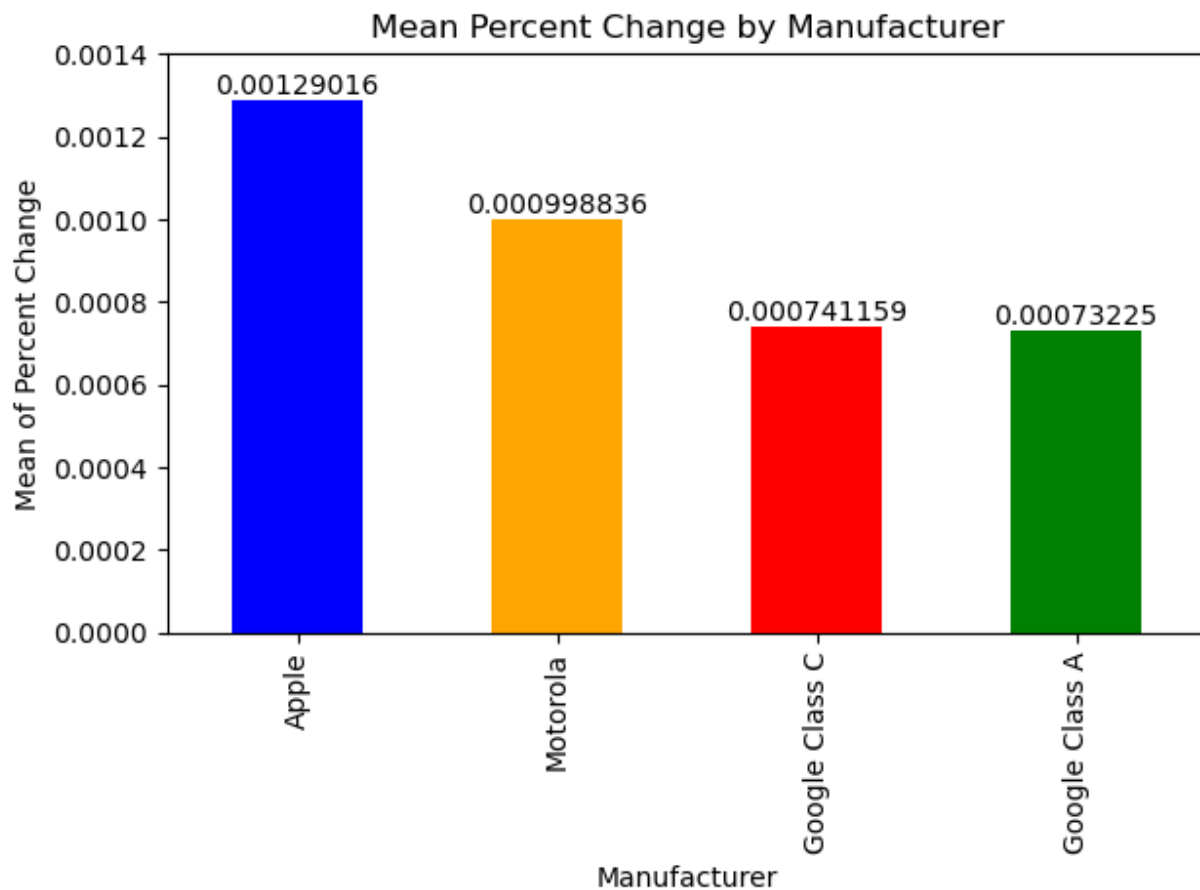
This visualization shows information we analyzed regarding the daily percent change each manufacturing company experienced within a 5 year period. In 2018 we see that Motorola had a large increase in their daily percent change, while Apple saw a larger decrease. In late 2019/early 2020 we see that all of the manufacturing companies experienced both high and low daily percent changes. By the time we examine 2022 most of the manufacturing companies' daily percent change levels off, while Apple and Google Class C experienced some spikes in high and low changes. As a whole, these findings are statistically insignificant, this was important for us to observe when determining which pieces of data inform us of the best investment option for our hypothetical client.



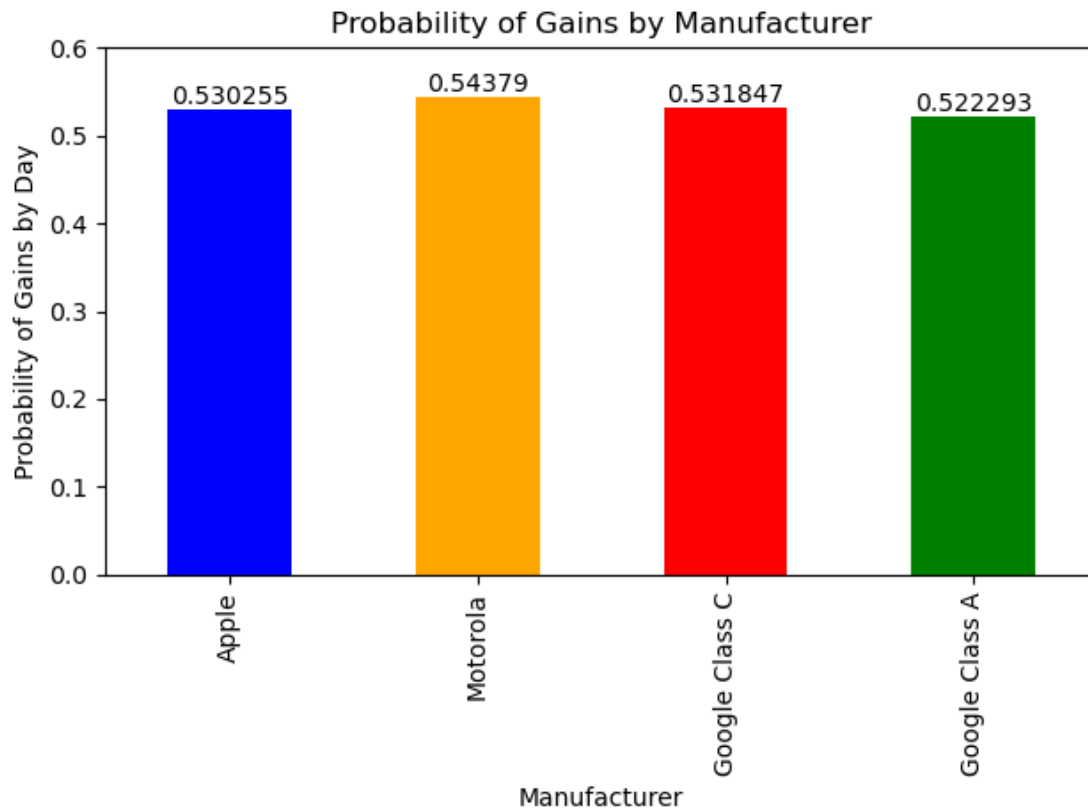
For our net income visualization we utilize a line graph to show the results of each companies' net income over the 5 years that we examined. Apple had the largest net income increases, followed by Google, while Motorola experienced the least amount of net income. Here we combined the net income information for both Google A and C since Google profited the entire amount from both models.



In this line graph we take a closer look at the net income for Motorola. Our previous graph did not give us detailed information on the trends that Motorola's net income experienced so we took a closer look. This graph illustrates that Motorola did experience dynamic trends in net growth, the highest achieved in early 2023.



The above bar graph gives shape to how we understand the mean percent changes our manufacturing companies experienced. The Google companies experienced the least amount of a percent change, while Motorola .10 for a percent change and Apple experienced the largest percent change at .12.



While this graph shows that there is not a major change between the companies in their probability of gains by day, it was important for us to understand this piece of data. We relied on previous visualizations to give us a full picture of the differences in manufacturing companies, which ultimately assisted us in our conclusion of which company would be best for our hypothetical client to invest in.

Resources:

<https://groww.in/p/adjusted-closing-price>