

Apple Research Project

Stock Statistical Analysis

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# Introduction

In this research project I applied multiple statistical methods in order to answer questions about the Apple stock dataset I was working with. The dataset I was working with was downloaded from the Nasdaq’s historical quotes. The Nasdaq provided the past 10 years of data concerning Apple stock. The dataset included many fields:

* The date of each trading day within the 10-year period. The dataset contains 2,517 trading days, spanning from 4/30/12 to 4/28/22.
* The volume of each trading day, which records the number of shares of stock that were traded on a given day
* The price that the stock opened and closed on each trading day
* The highest and lowest price that the stock hit on each trading day

In the research of this dataset, I wanted to mainly focus on Apple’s stock change of price on each trading day. Using the datasets open and close price fields I was able to also compute the change of price on each trading day by subtracting the open stock price from the stock’s closing price.

# Research Questions

Firstly, I wanted to figure out what percent of trading days resulted in a decrease of share price, and an increase of share price. In order to do this, I made use of the excel function COUNTIF, this function keeps a count of all cells within a range that fit the criteria. After computing this, I found that out of the 2,517 trading days, 1,343 of the trading days resulted in an increase of share price, and 1,174 days that resulted in a decrease of share price. Using these numbers, it was found that about 53.4% of the time, the share price resulted in an increase, and resulted in a decrease about 46.6% of the time.

Additionally, I found the average, median, mode, variance and standard deviation for the change of price.

* Average: 0.23
* Median: 0.03
* Mode: 0.1725
* Variance: 3.45
* Standard Deviation: 1.86

The second question I had pertained to permutations. If 3 people out of 50 people are randomly picked to get a free stock of Apple. Each one received the stock on a different day; therefore, they all got the stock at different prices. The first person got the stock at the largest price out of the 3, the second person got the stock at the second largest price, and the last person to receive the stock got it at the cheapest price. How many sample points are there? Using the formula for permutations:

sample points

The next question I wanted to solve concerned combinations. From 12/30/21 to 4/28/22, Apple stock has opened and closed for a positive gain 41 times. An individual claims to have bought at open and sold at close for a gain on 8 different occasions during this time period. How many possible combinations are there? Using the formula for combinations:

possible combinations

Next question: From 4/8/22 to 4/28/22, Apple stock opened and closed for a positive gain 6 out of the 14 trading days. Additionally, only 3 out of the 6 positive days did Apple stock increase by more than 1%. What is the probability that an individual who bought at open and sold at close made more than 1% on the investment, given that they made a positive gain? Using the conditional probability formula:

Next question: From 4/30/12 to 4/28/22 it is found that Apple stock opens and closes for a positive gain 53.4% of the time. If 50 trading days are randomly selected, what is the probability that we will observe at least 20 days with positive gains (Successes)? To find the answer to this question we use the binomial probability function:

The expected for this sample is E(Y) = 26.7, and the variance, V(Y) = 12.8

Graph of this distribution:

Next question: From 4/30/12 to 4/28/22 it is found that Apple stock opens and closes for a positive gain 53.4% of the time. An individual buys at open and sells at close for 5 days in a row, what is the probability that they make their first positive gain on the 4th day? To find the solution we can use the geometric probability function:

The expected for this sample is E(Y) = 1.87, and the variance, V(Y) = 1.63

Graph of this distribution:

Next question: From 4/30/12 to 4/28/22 it is found that Apple stock opens and closes for a positive gain 1,343 times. If 70 of these positive trading days are observed at random, what is the probability that out of the 70 selected, 5 or less of these days are among the 30 top gainers? To solve this, you use the hypergeometric probability function:

The expected for this sample is E(Y) = 1.6, and the variance, V(Y) = 1.48

Graph for this distribution:

Next question: Between 4/28/21 and 4/28/22, the average trading volume for Apple was found to be about 87 million per day. What is the probability that the volume is at least 100 million on a given day? To solve this, we use the Poisson probability function:

The expected for this sample is E(Y) = 87 million, and the variance, V(Y) = 87 million

Graph for this distribution:

The last question: Between 4/28/21 and 4/28/22, the lowest price that Apple dropped to was $122.25 and the highest price it was at was $182.94. Assuming that any value within this interval is equally likely, what is the probability that on a random day within this interval, an investor bought Apple stock valued less than or equal to $130? To solve this problem, we use the uniform probability function:

The expected for this sample is E(Y) = 152.6, and the variance, V(Y) = 306.94

Graph:

References

Wackerly, D. D., Mendenhall, W., &amp; Scheaffer, R. L. (2008). Mathematical Statistics with Applications (7th ed.). Thomson Brooks/Cole.

<https://www.nasdaq.com/market-activity/stocks/aapl/historical>