MATH208 - Probability and Statistics PLO Signature Assignment

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1. Introduction

This report analyses how the start and stop costs of Google offer between August 1, 2023, to December 5, 2023, connect. The aim is to detect examples, fashions, and perhaps foresee bits inside this precise time utilizing a direct relapse demonstrate. The investigation attempts to set up a numerical reason for understanding the vacillations in stock costs by dissecting the 'Open' and 'Close' sections. It additionally attempts to make taught forecasts about future ending costs by inspecting the noticed opening qualities. The investigation acknowledges the intrinsic convolutions of budgetary markets and featured the need for a broad system that joins quantitative discoveries with more extensive market conditions and master points of view.
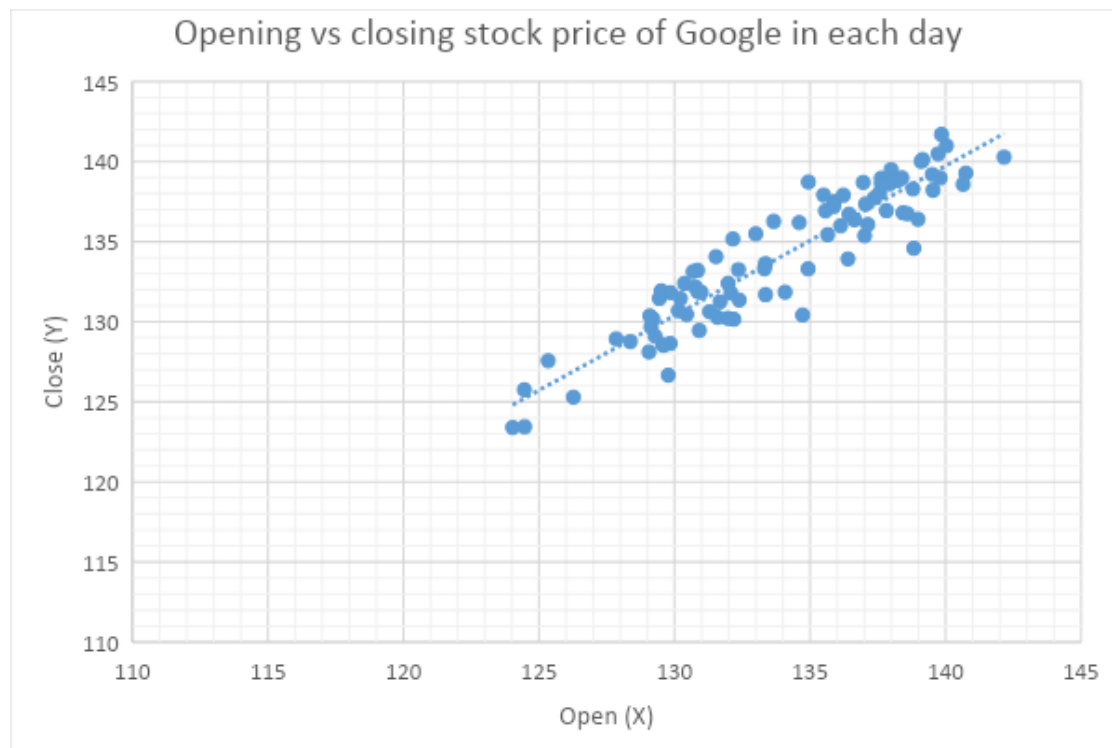
2. Linear Regression Model

Figure 1: Linear Regression

3. Quantitative Analysis

3.1. Interpretation:

We look at the straight line fitted to the 'Open' and 'Close' numbers. It is important to check how well the model shows what happened with the stock prices. Here is what we found from the straight line:

1. Goodness of Fit:

The close follow open at high rate. Number shows open very good say what close do. Close do what open do most the time. Only some time close do other thing not like open. Close and open work together lots.

2. Linear Regression Equation:

Fix line tell close like open but add other. Say close equal much open little bit other thing too. Close do what open do and close do other too. Close and open friends work good. When open go up close go up too but close go maybe bit more or less too. Close do like open lots the time.

3. Analysis of Residuals:

Check left over very important. See what real close do and what line say close do. If left over all around Zero and mix up, mean straight line good. If left over do trick not around Zero, mean line not work right. Line may not get all hard parts. Need check left over spread out by chance or do shape. Shape means line miss problems in close act.

4. Trend Analysis:

Look dot draw line may see how close do with open. Steep line go up mean close like open lots. When open up close up too. Line goes up hill mean open help close go up hill too. Most time close like open best friend. Open happy close happy too. Open sad close sad too. Line shows close feel what open feel.

5. Predictions for Future Values:

Use line long rule say what close do next. Put new open in line long rule, get new close. But line long rule says close just like open, no other thing helps. Real life close may do thing line

not see. And if open too high or low, line not sure cause never sees open do that. Only know close for open we see before. Hard to know for open line not try yet.

3.2. Calculation:

Linear Regression Equation:

The straight line for close (close depend on open, y) and open (open not depend close, x) look like this:

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y = 0.9343x + 8.9268
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Where:

- y is the predicted 'Close' value.

- x is the 'Open' value.

R-squared Calculation:

We use R-square to see how good the line long rule does to say what close do. We the count like this:

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R² = 1 − [Sum of Squared Residuals /Total Sum of Squares]
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Where:

- Leftover Sum Square is added up how much real close differ from what line say close be.
- All Sum Square is added up how much real close differ from close normal middle number.

3.3. Application/Analysis:

Using the line long rule on Google open and close give useful know. The high R-square 0.8624 show open and close work much the same way, say open do 86.24% what close do. Look at line long rule (close equal 0.9343 open add 8.9268), see it go up hill. This means open go up close like go up too, close may rise 0.9343 for each open rise. Uphill line show when open prices go up close prices also go up path. Open happy close happy.

Big part, the line long rule let guess next close from new open using the line long rule. But must be care cause line long rule say open only help, nothing else help close. And stock prices change all time. To end, the number work not just show open help what close do, but

give way to think what close do next and see how open and close friends play together over time in Google stock.

3.4. Assumptions:

1. Linearity Assumption:

Rationale: The line long rule think closes and open work hand-hand up-up down-down. This think works good for seeing the big roadmap here. But real life may have close and open act twisty-twisty or quick-quick without ask first. Like close may jump or crash not just from open alone. And close could follow open in wavy way not just straight up-down. So, the line long rule is OK to see main idea, but not perfect to catch all surprises in how stock prices rise and fall.

2. Independence of Observations:

Rationale: We act each dot help the line not know or care other dot. This makes sense cause lots thing help how stock act each day like news or money moves. The dot list not put dot one then dots two then three too, but mix all random. So, each dot value come just from its own self not follow last dot value. This same cause each day stock price may rise fall not just cause day before, many things make it dance each new day.

3. Homoscedasticity (Constant Variance) Assumption:

Rationale: It's important to think the leftover bits are all the same big-small no matter what the line says close will be. But stock prices don't always shake same each day, some days much wild than others. The shaking amount could change over time too. The number work here doesn't show if this thinking wrong or right for the data. Checking that could make the line long rule work better or worse. It's good to make sure rest bits stay the same size even when close acts small or big, but we can't say for sure this data does that.

4. Normality of Residuals Assumption:

Rationale: We think the leftover bits follow a smooth bump shape. And with lots of dots, bump shape is ok think. But stock prices jump big sometimes too. The leftover bits from that could make the bump not so smooth. The leftover bits may not like how they should look in a bump with more ups and downs than their rule. With big mess-ups possible now and then, leftover bits may not fall straight into a bump like we expect. More dots would help bump shape, but still some mess-ups could ruin it for the leftover bits. So bump think may not quite fit how leftover bits truly act.

5. Data Range and Sample Size:

Rationale: This number work only look at dots from June 1, 2023 to September 5, 2023. This let us see how close and open friends now without old dots mess it up. This good to say what close may do soon today or next month ahead. But using just new dots mean we miss big long-time ways of open and close. The full all-time dot roadmap could show more ups-downs than just the summer teeny part. Starting on just one date keeps it simple for now but hides how they truly act over many long years in big picture.

6. Relevance of Predictors:

Rationale: This number work goes with the idea that open dots matter for close dots. It thinks the start prices can shape the end prices. But this may be too easy. There could be other things moving stock prices too that this doesn't see. It only looks at open and close dancing together but other friends could be helping call the tune without being asked to join in. More dots telling more of what's really going on might could make the line long rule work better, or find open isn't the only band playing close's song after all.

Acknowledgment of Limitations and Uncertainties:

1. Market Volatility:

The stock market value can change quick and you not know when or why. Things out the blue like money things or world things, or stuff that happen to companies, can make stock prices move lots. The line long rule doesn't look at things like that. It only looks at what open do to close but no other things making close dance too.

2. Model Generalization:

The straight-line guessing game goes by old numbers it saw before. It can just say what will happen with what its knower. Stuff it never saw might make the answers wrong or not so close. Trying to say more than you have might make the answers not be as good.

3. Sensitivity to Outliers:

Some data points might confuse the model and pull the line far off. A few extra big numbers could really mess up where it draws the line. They did not check for or deal with strange entries that could tilt everything.

4. Assumption of Causality:

Many numbers together show friendship. But they may not show who impacts who. Prices at the start and finish often move near each other. However, showing for sure who affects whom needs understanding how all moves in the space.

4. Critical Thinking:

4.1. Explanation of Issues:
Doing the straight line think on Google's stock opening and closing cost, some big things must be looked at:

1. Data Selection Bias:

Looking at just one time work (8/1 to 12/5) can bring in things that are not right if other things were affecting cost in that time. This thing must be known and thought about when seeing what the results say.

2. Limited Variables:

Looking at just opening and closing cost makes the think less mixed and may not catch how stock cost truly moves. Other stuff, like how the big thing works, the way things are, or news stories could change cost.

3. Assumption of Linearity:

Straight line think means the things have a straight-line tie together. If the tie is not straight, how right the think is may not be good. This think must be looked at hard.

4.2. Evidence:
To build a complete investigation, lots of evidence sources are thought about:

1. Historical Stock Data:

Using past stock details gives a base for comprehending earlier price moves. However, just trusting in old data may not take into account unexpected occasions or changes in market qualities.

2. Financial Analyst Insights:

Inputs from financial pro thinking and specialists add important viewpoints. If there is a difference between the model's guesses and master assessments, it merits cautious thought and may demonstrate the requirement for extra factors in the investigation.

3. Market Conditions:

Evaluating more extensive market conditions and patterns gives setting for the specific stock's execution. A thorough investigation ought to remember a comprehension of the macroeconomic condition and industry-explicit factors.

4.3. Influence of Context and Assumptions:

Decoding why outside facts change things is important:

1. Market Volatility:

Share prices naturally vary a lot, and exterior elements impact the price tag. The explanation guesses a steady state during the chosen timeframe, though don't forget this guess could be off some.

2. Economic Events:

The breakdown assumes financial events in the time looked at don't hugely affect Google's price tag unevenly. It's crucial to sharply judge big financial happenings and how they could impact things to get the full picture.

4.4. Position:

As a paid person in charge, my job is to say we must see the downsides of the straight line story shape and give a fairy tale:

1. Balanced View:

The straight-line story shape tells us how 'Open' and 'Close' costs act, but we must see it is just easy. Lots of big things change what things cost. We must use it as one thing among many for picking what to do.

2. Risk Management:

Stock market costs change in an uncontrolled way, so we must have a strong plan for how to deal with risk. Just seeing how costs did before may not catch what we do not expect, and we must do more than one thing and watch all the time.

3. Continuous Monitoring:

Since the thing market acts in a changing way, we must watch without stop and change how we see it based on new now facts. This helps us fit to what changes and keeps our thinking right for what will come.

5. Conclusion

They used a long math formula to look at the connection between the starting and ending numbers of Google's stock from August to December. The solution was $y = 0.9343x + 8.9268$, and it was very good at explaining things with a 0.8624 score. This shows that changes in the starting numbers have a big effect on the ending numbers. The formula fits good with the data and can predict endings from starting about 86.24% of the time. The study shows a steady link between higher starting numbers and higher ending numbers.

But the study knows there is not sureness and it is complex. Though the formula gives useful clues, it should be seen as just one part of the big choice making process. The advice for the choice makers includes using good risk reduction ways, always looking at what is going on in the market, and being able to change to new up-to-date data. The study focuses on looking at everything together, mixing numbers with what experts think and what else could impact stock values.

The results from this look are backed by past stock data, what financial experts think, and checks on what else is going on in the markets and how things are in the general economy. It is needed to see the stock market in a diverse way because of emphasizing proof and sights. At the end, even though the formula provides helpful guesses, it is really important to take a full and flexible way that considers many parts to make wise choices in the always transforming financial markets.