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Stock Price Analysis

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I Introduction to Stock

1.1 Definition of Stock

Stock is a share in the ownership of a company. When more buyers want a stock than sellers, the price will go up. Conversely, when more sellers want to get rid of a stock than buyers, the price will go down.

1.2 Factors that Influence Stock Price

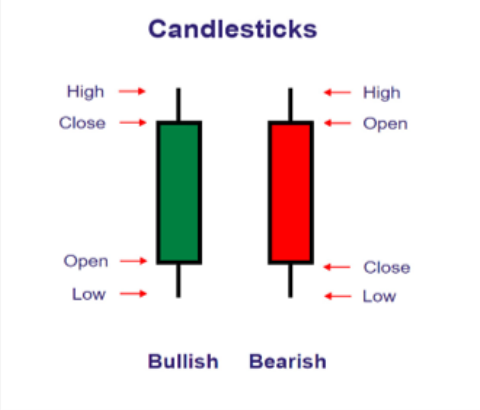
- Company performance: The profitability and future prospects of a company are major factors in determining its stock price. Companies with strong earnings and growth potential tend to have higher stock prices.
- Economic conditions: The overall health of the economy can also affect stock prices. During periods of economic growth, investors are more likely to be optimistic about the future, and stock prices tend to rise. Conversely, during economic downturns, investors may be more risk-averse, and stock prices may fall.
- Investor sentiment: The overall mood of investors can also affect stock prices. When investors are feeling confident, they may be more willing to buy stocks, which can drive up prices. Conversely, when investors are feeling fearful, they may be more likely to sell stocks, which can drive down prices.

1.3 How the Stock Market Work

Stocks are traded on stock exchanges, which are electronic marketplaces where buyers and sellers come together to negotiate prices. The most well-known stock exchanges in the world include the **New York Stock Exchange (NYSE)**. In Cambodia, stocks are traded on **CSX Trade** which opens from 8am to 3pm from Monday to Friday.
Buyers and sellers place orders through their brokers to purchase or sell a specific number of shares at a certain price.

II Candlestick Chart

A candlestick chart is a type of financial chart used to describe price movements of a security, derivative, or currency. There are two types of candlesticks: **Bullish** and **Bearish**.



- **Bullish :** It means that there are more buyers than sellers.
- **Bearish :** It means that there are more sellers than buyers.
- **High Price :** The highest price of the stock in the day.
- **Close Price :** The price of the stock at the end of the day.
- **Open Price :** The price of the stock at the start of the day.
- **Low Price :** The lowest price of the stock in the day.

III Data Preprocessing

3.1 Tools Used

In this project, we will be using Python Programming Language For the Analysis with libraries such as:

3.2 Data Collection

The data is collected from **csx.com.kh**. It's a data of **Acleda Stock Price** from 25 May 2020 to 25 May 2023.

3.3 Observation

```
df.describe()
```

	Closing Price	Trading Volume (shr)	Opening	High	Low
count	734.000000	734.000000	734.000000	734.000000	734.000000
mean	13322.929155	65794.072207	13325.217984	13390.899183	13238.910082
std	2988.290427	97632.140244	3002.179044	3027.991605	2955.859150
min	10180.000000	253.000000	10060.000000	10200.000000	9360.000000
25%	10800.000000	12500.000000	10785.000000	10840.000000	10740.000000
50%	11630.000000	40424.500000	11640.000000	11770.000000	11600.000000
75%	16780.000000	77800.250000	16800.000000	16840.000000	16700.000000
max	22600.000000	1161771.000000	22850.000000	23600.000000	22000.000000

The maximum value of **Trading Volume shr** is very far away from the minimum value. This indicates that there's something interesting about this data.

```
df[df['Trading Volume shr'] == 15342879]
```

	Date	Closing Price	Trading Volume (shr)	Opening	High	Low
272	2022-04-25 00:00:00	12360	15342879	12360	12480	12300

"*As a result of effective measure, the second Cambodia-Japan Business Matching can be jointly hosted by both ACLEDA Bank and JCA on 25 April 2022 at ACLEDA Bank Headquarters. More than 24 Japanese companies are confirmed to attend the business matching. This is an important event that could potentially attract more investments into different sectors, bring technical knowhow, and more employment opportunities into Cambodia.*" - **ACLEDA April 25, 2022**. Click **here** to read full article.
The cause of the trading volume to be so high that day might be due to this article.

3.4 Visualization

IV Investment Strategies

4.1 Lump Sum Strategy

4.1.1 Introduction

Lump sum investing is an investment that you invest all at once into a diversified portfolio. This approach lets you deploy your capital right away, you'll be gladly got in early because any money you added after that would purchase shares at a higher price, which often proves advantageous over longer periods and gives you bang for your buck. However, if the market goes down from day one, your entire investment will go downhill as well, that could take years to recoup, and you'll miss a lot of opportunities to buy in at a better price.

4.1.2 Advantages and Disadvantages

+ Advantages

- Potentially higher returns, the larger amount you invest, the higher return you earn.
- Simpler to manage, you only need one investment decision and let your money grow.

- Can take advantage of market downturns, if the market dips, you have a larger pool of capital to buy undervalued assets at a discount.
- If you're still paying brokerage fees or commissions, lump sum investing means only paying once.

+ Disadvantages

- **Market Timing Risk**: Predicting the perfect time to enter the market is notoriously difficult. Investing a large sum at the wrong time can lead to significant losses if the market experiences a downturn.
- **Cash flow impact**: Investing a lump sum may have a significant impact on your cash flow and liquidity. If you allocate a substantial portion of your available funds to an investment.
- **Missed Opportunity for Diversification**: Investing a lump sum into a single asset or a small portfolio increases your risk exposure. Diversification across different asset classes and sectors helps mitigate losses in case of economic downturns.
- **Psychological Pressure**: Managing a large amount of money can be stressful, especially during market fluctuations. Fear and greed can lead to impulsive investment decisions that may not be optimal in the long run.

4.1.3 Considerations Before Implementing

- **Investment Goals**: Clearly define your financial goals and the timeframe for achieving them. This helps determine the risk level you can afford and the suitable asset allocation.
- **Risk Tolerance**: Evaluate your ability to handle potential losses without jeopardizing your financial stability. A cautious investor might favor dollar-cost averaging to mitigate market volatility risks.
- **Market Conditions**: Consider the current market sentiment and potential for future economic turbulence. Investing during uncertain times might warrant a more cautious approach like dollar-cost averaging.
- **Professional Advice**: Consulting a financial advisor can be beneficial, especially for substantial lump sums. They can tailor an investment strategy aligned with your goals, risk tolerance, and financial situation.

4.2 Dollar-Cost Average Strategy (DCA)

4.2.1 Overview

Dollar-cost averaging (DCA) is an investment strategy in which an investor divides up the total amount to be invested across periodic purchases of a target asset. The periodic purchases occur regardless of the asset's price, and as a result, the investor buys more of the asset when prices are low and less when prices are high. This strategy aims to reduce the impact of market volatility on the overall purchase price of the asset. Dollar-cost averaging is often used in long-term investment plans, such as retirement savings, and is considered a disciplined and passive investment approach.

4.2.2 How DCA works

Let's say you invest $100 every month. When the market is up, your $100 will buy fewer shares, but when the market is down, your money will buy more. Over time, this strategy could lower your average cost per share—compared to what you would have paid if you'd bought all your shares at once when they were more expensive than the average. And here is example

How dollar cost averaging works

With dollar cost averaging

Timing	Amount	Share price	Share purchased
Month 1	$100	$5	20
Month 2	$100	$5	20
Month 3	$100	$2	50
Month 4	$100	$4	25
Month 5	$100	$5	20
	Total invested:	Average cost/share:	Total shares purchased:
	$500	$3.70	135

4.2.3 Advantages and Disadvantages

+ Advantages

- **Risk Mitigation**: DCA helps reduce the impact of market volatility on your investment, as you are not making all your purchases at a single, potentially unfavourable,

price point.

- **Disciplined Approach**: It encourages a disciplined investment approach, as investors commit to a regular investment schedule regardless of market conditions.
- **Reduced Emotional Decision-Making**: DCA minimizes the need to make emotional investment decisions based on short-term market movements.

+ Disadvantages

- **Potential Missed Opportunities**: In a rapidly rising market, DCA might result in missing out on potential gains that could have been achieved by investing a lump sum upfront.
- **Transaction Costs**: If each investment incurs transaction fees, the cumulative transaction costs over time may impact overall returns.
- **No Guarantees**: While DCA can be effective, it doesn't guarantee profits, and market conditions may vary.

V Statistical Computations

5.1 Point Estimation

We have n = 734, Then

For Closing Price $\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i = 13322.93$

For Opening Price $\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i = 13325.22$

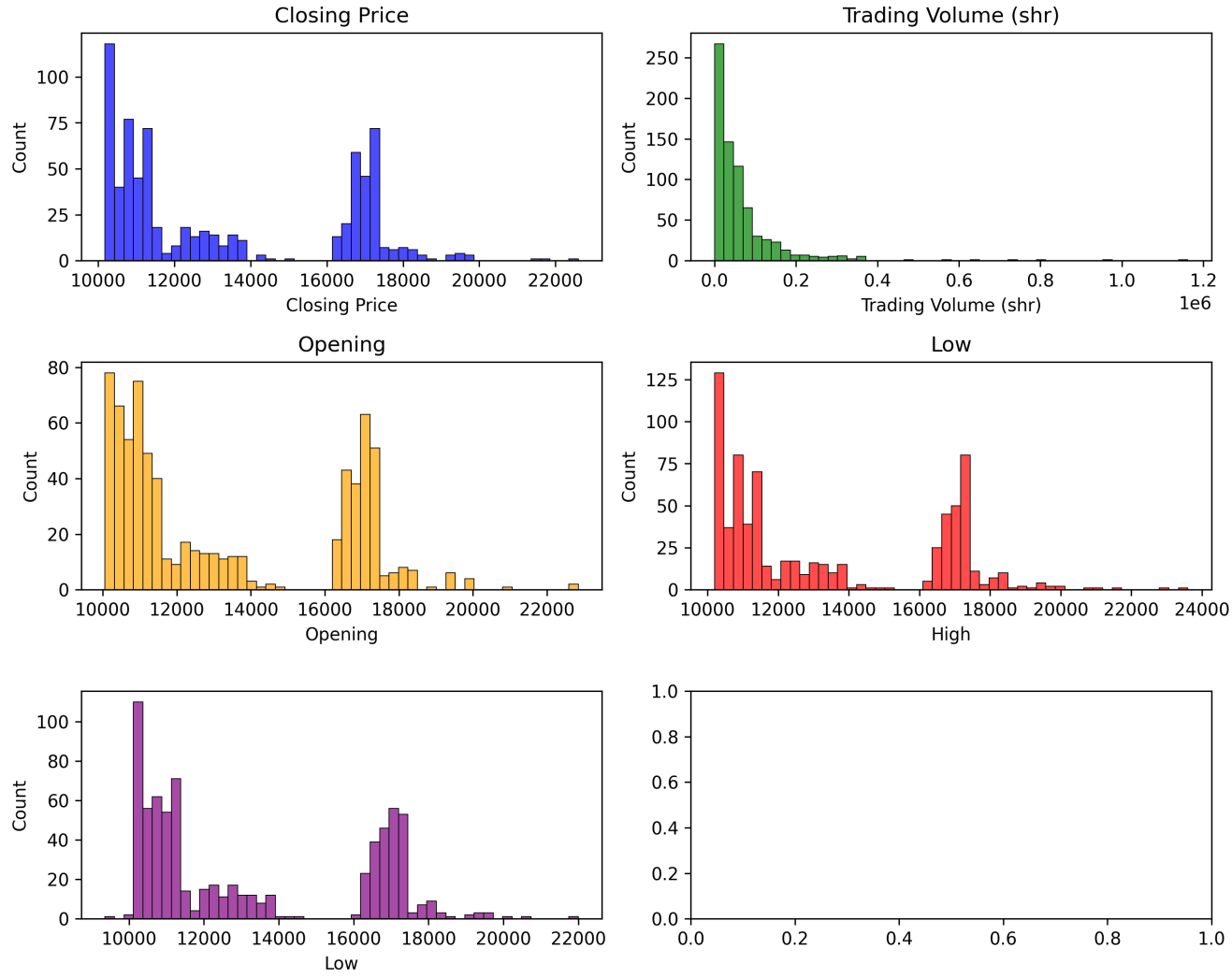
For High Price $\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i = 13390.9$

For Low Price $\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i = 13238.91$

For Trading Volume $\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i = 65794.07$

5.2 Confidence Interval

Check if any of the variables are normal.



Based on the plot, none of the variables are normal. Thus, we use

$$CI = \left[\bar{x} - z_{\alpha/2}\frac{s}{\sqrt{n}}, \bar{x} + z_{\alpha/2}\frac{s}{\sqrt{n}}\right]$$

we have $\alpha = 0.05$, $n = 734$, $z = 1.96$

For Closing Price $CI = [13306.96, 13338.88]$

For Opening Price $CI = [13309.18, 13341.25]$

For High Price $CI = [13374.72, 13407.07]$

For Low Price $CI = [13223.12, 13254.69]$

For Trading Volume $CI = [65272.65, 66315.48]$

5.3 Hypothesis Testing

1. Are there significant differences in the average annual returns between Investment Strategy A and Investment Strategy B?

+ **Method 1 : Critical Region**
Since σ_1, σ_2 are unknown and $n \geq 30$
Test $H_0 : \mu_1 - \mu_2 = 0$ vs $H_a : \mu_1 - \mu_2 \neq 0$

We have

significance level $\alpha = 0.05$

$\bar{X} = -0.1317$

$\bar{Y} = -0.0435$

$m = n = 735$

$s_1 = 0.133$

$s_2 = 0.0828$

$$\text{Test statistic Value } z = \frac{\bar{X} - \bar{Y} - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2}{m} + \frac{s_2^2}{n}}} = \frac{-0.1317 + 0.0435}{\sqrt{\frac{0.133^2}{735} + \frac{0.0828^2}{735}}} = -15.26$$

$z_{\frac{\alpha}{2}} = \phi^{-1}(1 - \frac{\alpha}{2}) = \phi^{-1}(0.975) = 1.96$

Critical Region $C = \{z : |z| \geq z_{\frac{\alpha}{2}} = 1.96\}$

Since $z \in C$, we decide to reject H_0 at $\alpha = 0.05$.

Thus, there is enough evidence to support the claim $\mu_1 \neq \mu_2$ and we can say there are significant differences in the average annual returns between Investment Strategy A and Investment Strategy B.

+ **Method 2 : Confidence Interval**

$$CI(\mu_1 - \mu_2) = \left[\bar{X} - \bar{Y} \pm z_{\frac{\alpha}{2}} \sqrt{\frac{s_1^2}{m} + \frac{s_2^2}{n}}\right] = [-0.11, -0.065]$$

Since $0 \notin CI$,
Therefore, we decide to reject the null hypothesis that $\mu_1 - \mu_2 = 0$

+ **Additional**

Test $H_0 : \mu_1 - \mu_2 = 0$ vs $H_a : \mu_1 - \mu_2 < 0$

we have $z = -15.26$

Critical Region $C = \{z : z \leq -z_\alpha\}$

$z_\alpha = z_{0.05} = \phi^{-1}(1 - \alpha) = \phi^{-1}(0.95) = 1.64$

Since $z \in C$, we decide to support the claim that $\mu_2 > \mu_1$

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2. Does the distribution of risk (standard deviation of returns) vary significantly between the two investment strategies?

+ **Method 1 : Critical Region**

Test $H_0 : \sigma_1^2 = \sigma_2^2$ vs $H_a : \sigma_1^2 \neq \sigma_2^2$

We have

significance level $\alpha = 0.05$

$s_1 = 0.133$

$s_2 = 0.0828$

$m = n = 735$

Test statistic value $f = \dfrac{s_1^2}{s_2^2} = \dfrac{0.133^2}{0.0828^2} = 2.58$

Critical Region $C = \{f : f \geq F_{\frac{\alpha}{2},m-1,n-1}$ or $f \leq F_{1-\frac{\alpha}{2},m-1,n-1}\}$

$F_{\frac{\alpha}{2},m-1,n-1} = F_{0.025,734,734} = 1.15$

$F_{1-\frac{\alpha}{2},m-1,n-1} = F_{0.975,734,734} = 0.86$

Since $f \in C$, then H_0 is rejected.

Thus, we could say the distribution of risk (standard deviation of returns) vary significantly between the two investment strategies.

+ **Method 2 : Confidence Interval**

$$CI\left(\frac{\sigma_1}{\sigma_2}\right) = \left[\frac{s_1}{s_2} \cdot \frac{1}{\sqrt{F_{\frac{\alpha}{2},m-1,n-1}}}, \frac{s_1}{s_2} \cdot \sqrt{F_{\frac{\alpha}{2},m-1,n-1}}\right] = [1.49, 1.72]$$

Since $1 \notin CI$,
Therefore, we decide to reject the null hypothesis that $\sigma_1^2 = \sigma_2^2$

+ **Additional**

Test $H_0 : \sigma_1^2 = \sigma_2^2$ vs $H_a : \sigma_1^2 - \sigma_2^2 > 0$

we have $f = 2.58$

Critical Region $C = \{f : f \geq F_{\alpha,m-1,n-1}\}$

$F_{\alpha,m-1,n-1} = F_{0.05,734,734} = 1.13$

Since $f \in C$, so we accept the claim that $\sigma_1^2 > \sigma_2^2$