Data Science

Nikkei 225 Index during COVID19

yahoo! finance

Time frame: 31st January 2020 - 30th September 2023 (44 months)

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Opening Question

If we are promised to achieve a compound rate of return of 0.8% monthly, how long does it take roughly to double our money?

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Based on Rule of 72, we have

$$t = 72 / r$$

t = period
r = rate of return (exclude %)

Opening Question

If we are promised to achieve a compound rate of return of 0.8% monthly, how long does it take roughly to double our money?

Plug the number in, we get

t = 72 /0.8 = 90

It takes roughly 90 months (7.5 years).
* 86.98 months

Research Question

Q1. On average, did the Nikkei 225 Index yield a positive monthly rate of return during 31st January 2020 - 30th September 2023 (44 months)?

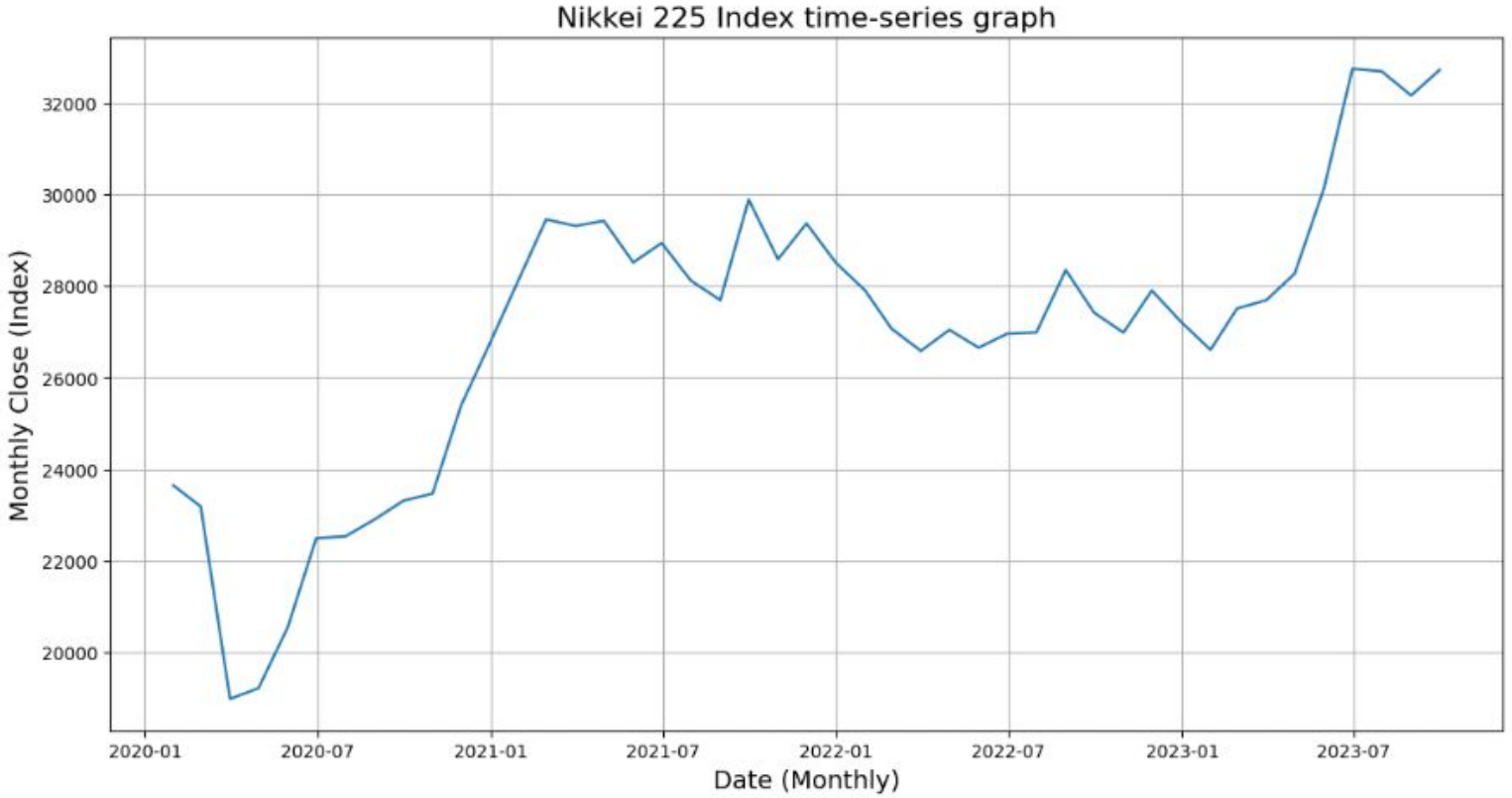
Q2. What was the Nikkei 225 Index Sharpe Ratio during 31st January 2020 - 30th September 2023 (44 months)?

Research Question Q1

Imported Libraries

```
1 import yfinance as yf
2 import pandas as pd
3 import matplotlib.pyplot as plt
4 import seaborn as sns
5 import numpy as np
```

Research Question Q1



Research Question Q1

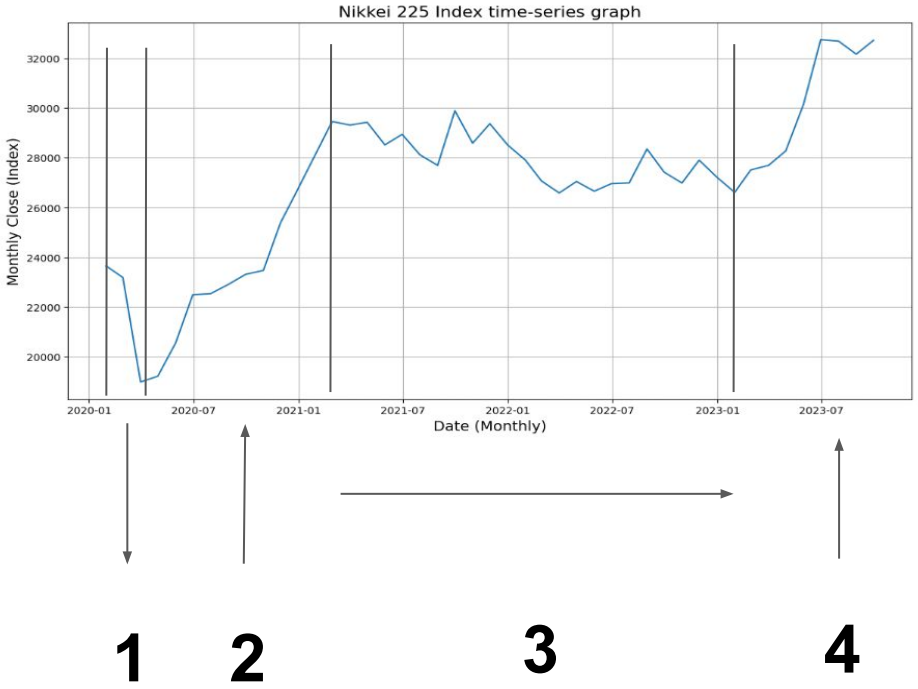
Q. What happened during

31st January - 31st March 2020 (2 months: drop),

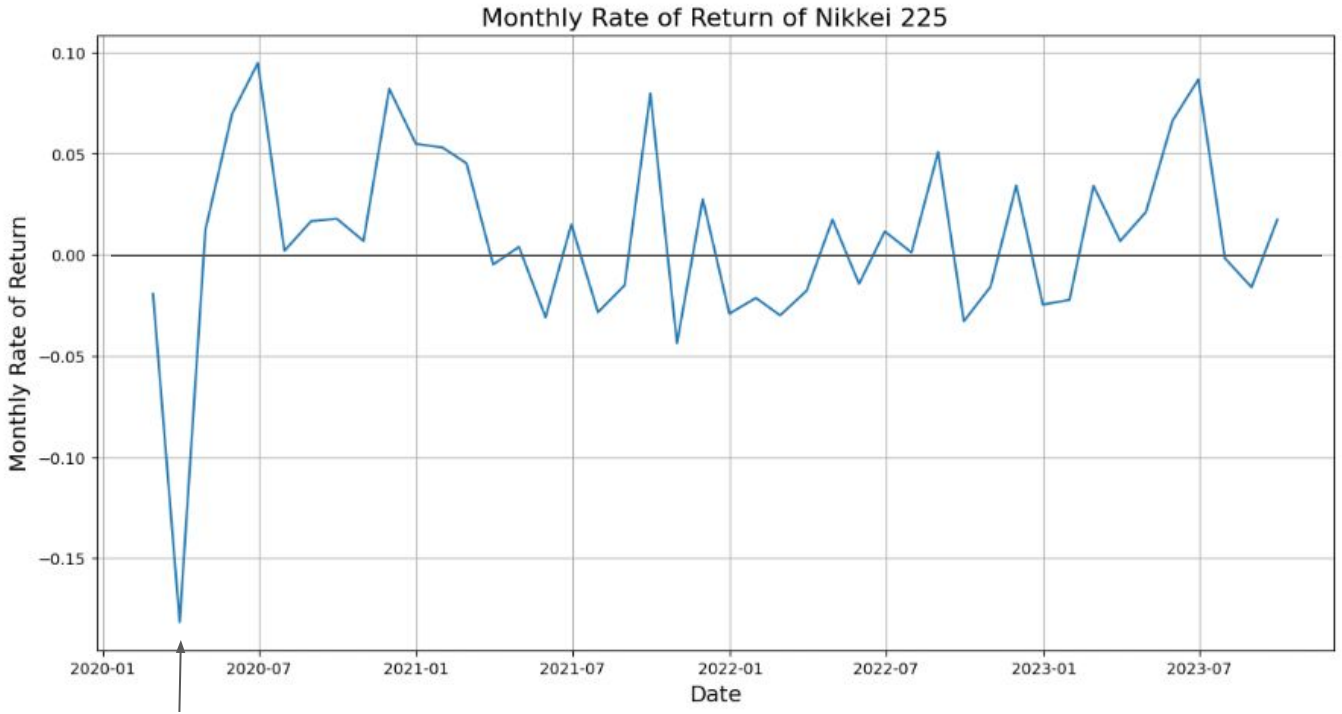
1st April 2020 - 28th February 2021 (11 months: surge),

1st March 2021 - 31st January 2023 (23 months: stagnant) and

1st February - 30th September 2023 (8 months: surge)?



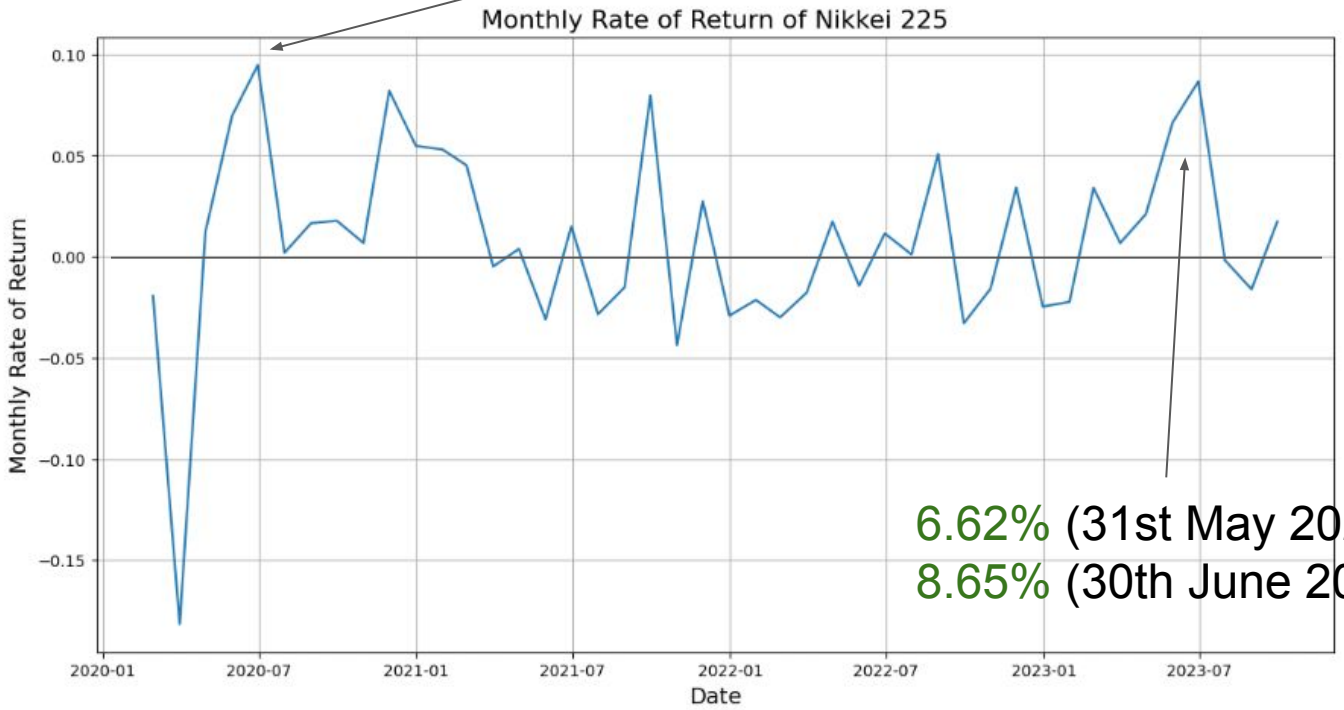
Research Question Q1



-18.15% (31st March 2020)

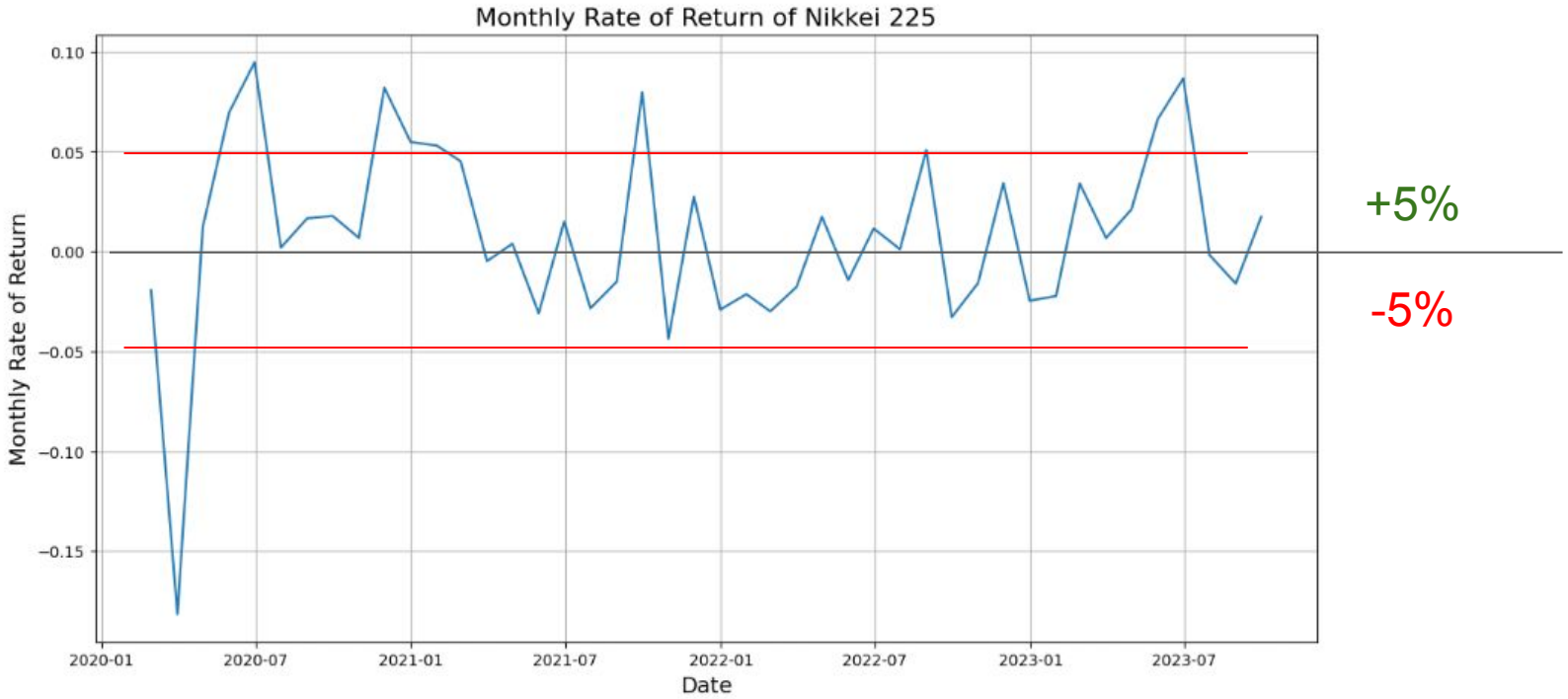
Research Question Q1

6.95% (31st May 2020)
9.46% (30th June 2020)

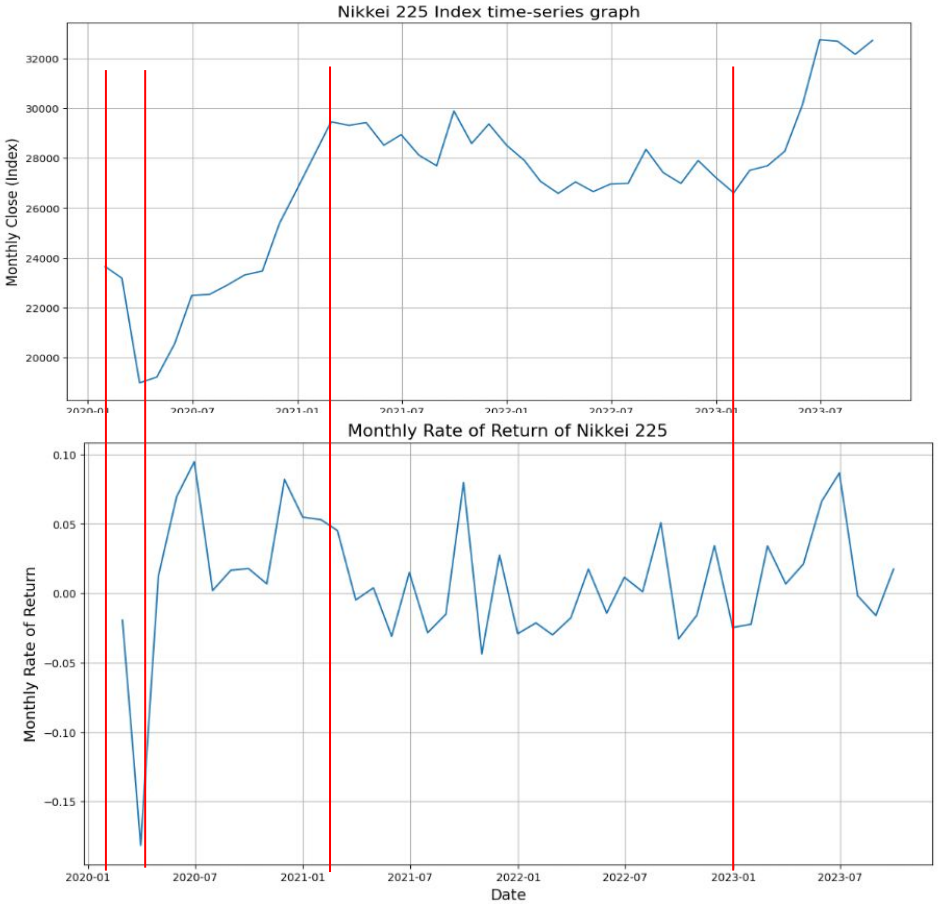


6.62% (31st May 2023)
8.65% (30th June 2023)

Research Question Q1



Research Question Q1



Research Question

Q1. On average, did the Nikkei 225 Index yield a positive monthly rate of return during 31st January 2020 - 30th September 2023 (44 months)?

Geometric mean of monthly rate of return
https://colab.research.google.com/drive/1YP_eLJa7i6GbztoJ8R_WbiQOM9Ab42I5#scrollTo=08oUTdwWuHiG&line=3&uniqifier=1

Research Question

Q1. On average, did the Nikkei 225 Index yield a positive monthly rate of return during 31st January 2020 - 30th September 2023 (44 months)?

Geometric mean of monthly rate of return

$$\left((1+R1)\times(1+R2)\times\cdots\times(1+RN)\right)^{\left(\frac{1}{N}\right)} - 1$$

Research Question

Q1. On average, did the Nikkei 225 Index yield a positive monthly rate of return during 31st January 2020 - 30th September 2023 (44 months)?

Geometric mean of monthly rate of return

$$\left((1+R1)\times(1+R2)\times\cdots\times(1+RN)\right)^{\left(\frac{1}{N}\right)} - 1 = \mathbf{0.74\%}$$

With this rate, it takes 94.01 months to double our money (7.8 years).

Research Question

Q2. What was the Nikkei 225 Index Sharpe Ratio during 31st January 2020 - 30th September 2023 (44 months)?

Research Question Q2

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$$\text{Sharpe Ratio} = \frac{(Rx - Rf)}{\text{StdDev Rx}}$$

Rx = expected return
Rf = risk free rate of return
StdDev Rx = standard deviation of return

Research Question Q2

Q2. What was the Nikkei 225 Index Sharpe Ratio during 31st January 2020 - 30th September 2023 (44 months)?

$$\text{Sharpe Ratio} = \frac{(Rx - Rf)}{\text{StdDev Rx}}$$

Rx = 0.74%
Rf = -0.0083%
Standard deviation = 4.67%

Sharpe Ratio = 0.1605
* return is 0.1605 units per unit of risk

Limitations

- Survivorship Bias
- No other periods
- No study of specific industries
- No official news
- No correlation between 74 industries that make up Nikkei 225 Index and Nikkei 225 Index