CAPM for Financial Asset Analysis and Risk Assessment

Design & developed by

A.Venkat ramana reddy	2111CS050015
Mohammad Afrose	2111CS050004
N.Shashank reddy	2111CS050042

GUIDED BY

Nenavath Chander

Assistant Professor

Department of Computer Science & Engineering (Internet of Things)

IV YR – I SEM

Malla Reddy University, Hyderabad

2021-2025

MALLA REDDY UNIVERSITY

(Telangana State Private Universities Act No.13 of 2020 and G.O.Ms.No.14, Higher Education (UE) Department)

CERTIFICATE

This is to certify that this is the bonafide record of the application development entitled **"CAPM for Financial Asset Analysis and Risk Assessment",** submitted by **A.Venkat ramana reddy (2111CS050015), Mohammad Afrose(2111CS050004), N.Shashank reddy(2111CS050042),** B.Tech IV year I semester, Department of CSE (IoT) during the year 2024-25. The results embodied in this report have not been submitted to any other university or institute for the award of any degree or diploma.

Internal Guide	**Head of Department**
Nenavath chander	**Dr. G. Anand Kumar**
(Assistant Professor)	**CSE – Internet of Things**

External Examiner

MALLA REDDY UNIVERSITY
(Telangana State Private Universities Act No.13 of 2020 and G.O.Ms.No.14, Higher Education (UE) Department)

ACKNOWLEDGEMENT

We extend our sincere gratitude to all those who have contributed to the completion of this project report. Firstly, we would like to extend our gratitude to **Dr. V. S. K Reddy, Vice Chancellor,** for his visionary leadership and unwavering commitment to academic excellence.

We would also like to express my deepest appreciation to our project guide **Nenavath Chander (Assistant Professor)** whose invaluable guidance, insightful feedback, and unwavering support have been instrumental throughout the course of this project for successful outcomes.

We extend our gratitude to our **PRC-convenor, Dr. G. Latha,** for giving valuable inputs and timely quality of our project through a critical review process. We thank our Project Coordinator, **Mrs. Priyanka Chandragiri**.

We are also grateful to **Dr. G. Anand Kumar, Head of the Department- Internet of Things,** for providing with the necessary resources and facilities to carry out this project.

My heartfelt thanks also go to **Dr. Harikrishna Kamatham, Dean School of Engineering**, for his guidance and encouragement. We are deeply indebted to all of them for their support, encouragement, and guidance.

A.Venkat ramana reddy	2111CS050015
Mohammad Afrose	2111CS050004
N.Shashank reddy	2111CS050042

MALLA REDDY UNIVERSITY
(Telangana State Private Universities Act No.13 of 2020 and G.O.Ms.No.14, Higher Education (UE) Department)

DECLARATION

I declare that this project report titled **"CAPM for Financial Asset Analysis and Risk Assessment"** submitted in partial fulfillment of the degree of B. Tech in CSE-IOT is a record of original work carried out by me under the supervision of **Nenavath chander**, and has not formed the basis for the award of any other degree or diploma,in this or any other Institution or University. In keeping with the ethical practice in reporting scientific information, due acknowledgements have been made wherever the findings of others have been cited.

MALLA REDDY UNIVERSITY

(Telangana State Private Universities Act No.13 of 2020 and G.O.Ms.No.14, Higher Education (UE) Department)

ABSTRACT

This study employs the Capital Asset Pricing Model (CAPM) to conduct a thorough evaluation of various financial assets, with a particular emphasis on understanding the complex relationship between risk and expected returns. CAPM serves as a foundational framework in finance, providing investors and analysts with a systematic approach to quantify the risk associated with specific investments. By articulating CAPM aids in making informed investment decisions and optimizing portfolio performance.In this research, we meticulously apply CAPM to assess the performance of [Company Name] in relation to systematic risk, utilizing a robust dataset of historical financial information. The estimation of the beta coefficient, calculated at [beta value], plays a crucial role in this analysis. A beta greater than one suggests that the asset is more volatile than the market, while a beta less than one indicates lower volatility.With this estimated beta, the study forecasts the expected return on [Company Name]'s stock, offering valuable insights into its potential performance in the context of market dynamics. Furthermore, the research delves deeper into the examination of macroeconomic factors that significantly influence stock prices. These include interest rates, inflation rates, and GDP growth, each of which can alter investor sentiment and impact asset valuations. Similarly, inflation can erode purchasing power, further influencing market behavior.

TABLE OF CONTENT

LIST OF FIGURES

CHAPTER – 1

INTRODUCTION

1.1 Introduction to financial evaluation

Financial analysis is a cornerstone of decision-making in the world of investments and business management. It involves assessing the financial health and performance of companies, evaluating investment opportunities, and making informed decisions to maximize returns and minimize risks. Among the various methodologies and models available for financial analysis, the Capital Asset Pricing Model (CAPM) stands out as a fundamental tool for understanding the relationship between risk and return in financial markets. The CAPM model, its assumptions, and its implications for investment analysis. We will show the practical investment analysis and illustrate how the CAPM model can be used to evaluate investment opportunities, calculate expected returns, and assess the risk-adjusted performance of investment portfolios.

The CAPM model, first introduced by William Sharpe in the 1960s, provides a framework for determining the expected return of an asset based on its systematic risk, often represented by beta, and the risk-free rate of return, adjusted for market risk.This model has become a cornerstone of modern finance, widely used by investors, analysts, and portfolio managers for asset pricing, portfolio optimization, and performance evaluation. The Capital Asset Pricing Model (CAPM) is a widely used framework for evaluating the expected return on an investment. It is a fundamental concept in finance that helps investors and financial analysts to determine the expected return on a stock or portfolio based on its level of risk. The CAPM model assumes that investors are risk-averse and require a higher return for taking on more risk.

$E(R) = Rf + \beta(E(M) - Rf)$

In this equation, the expected return on an investment (E(R)) is calculated by adding the risk-free rate (Rf) to the product of the beta coefficient (β) and the difference between the expected return on the market (E(M)) and the risk-free rate (Rf).

The beta coefficient (β) measures the systematic risk of an investment, which is the risk that cannot be diversified away by holding a diversified portfolio. Beta coefficients range from 0 to 1, where a beta of 0 indicates no systematic risk, and a beta of 1 indicates that the investment moves in line with the market. The CAPM model provides a useful framework for evaluating the expected return on an investment, as it takes into account both the firm-specific factors (e.g. earnings per share, dividend yield) and macroeconomic factors (e.g. interest rates, inflation, GDP growth). This study will focus on [Company Name], a publicly traded firm in the [industry/sector]. The study will use historical data from [Company Name] to estimate its beta coefficient, and will then use this estimated beta coefficient to calculate the expected return on [Company Name]'s stock using the CAPM model.

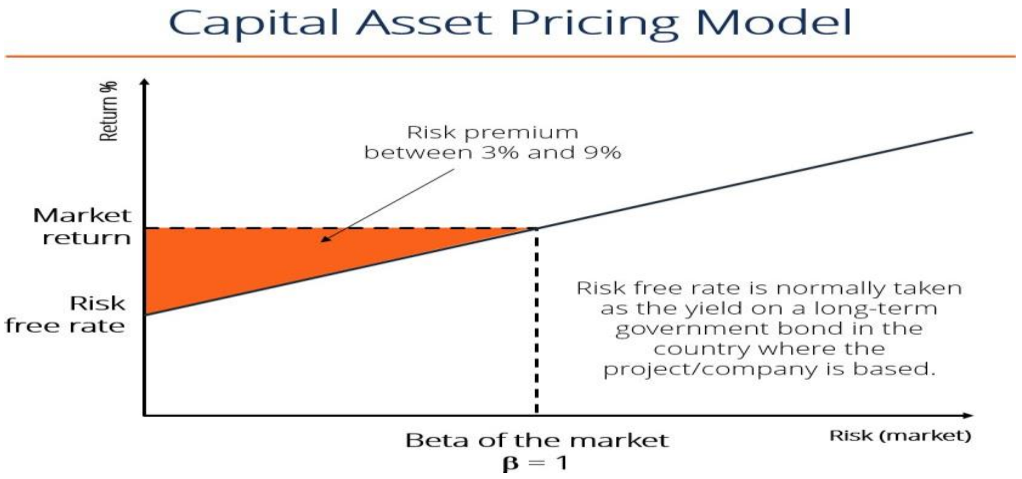


Fig: 1.1: CAPM Analysis

1.2 Problem Statement

Market Efficiency Assumption: The CAPM model assumes that financial markets are efficient, implying that asset prices fully reflect all available information. However, in reality, markets may not always be perfectly efficient, leading to discrepancies between expected and actual returns. This assumption undermines the accuracy of CAPM calculations and may result in misleading investment decisions. **Limited Scope of Application**: While the CAPM model provides valuable insights into the relationship between risk and return for individual assets.

Its applicability may be limited in certain contexts, such as analyzing assets with non-linear payoffs or incorporating additional risk factors beyond systematic risk.As a result, investors and analysts may need to complement CAPM analyses with alternative models and methodologies to obtain a more comprehensive understanding of investment opportunities. **Estimation of Inputs**: The CAPM model relies on several inputs, including the risk-free rate, market risk premium, and beta coefficient. Estimating these parameters accurately poses a significant challenge, as they may vary over time and across different market conditions. Inaccurate estimation of inputs can lead to unreliable predictions of asset returns and undermine the credibility of CAPM-based analyses.

1.3 Objective of the project

Enhance Accuracy of Risk and Return Estimates: One of the primary objectives is to improve the accuracy of risk and return estimates derived from the CAPM model. This involves refining the estimation techniques for inputs such as the risk-free rate, market risk premium, and beta coefficient to better reflect the underlying market conditions and dynamics. **Mitigate Market Inefficiencies**: Another objective is to develop strategies for mitigating the impact of market inefficiencies on CAPM-based analyses. This may involve incorporating qualitative assessments, fundamental analysis, and other quantitative models to account for deviations from market efficiency and enhance the reliability of investment decisions. **Expand Scope of Application**: The objective is to broaden the scope of application of the CAPM model to encompass a wider range of investment scenarios and asset classes. This may involve adapting the model to analyze assets with non-linear payoffs, incorporating additional risk factors beyond systematic risk, and exploring extensions of the CAPM framework to address specific investment challenges. **Integrate Risk Management Strategies**: Integrating risk management strategies into CAPM-based analyses is a key objective. This includes incorporating diversification, hedging, and other risk mitigation techniques into portfolio management decisions to enhance risk-adjusted returns and protect against downside risks.

1.4 Goal of the project

Specifically, the goal is to Estimate the Beta Coefficient of [Company Name]: Using historical data, estimate the beta coefficient of [Company Name] to measure its systematic risk. Calculate the Expected Return on [Company Name]'s Stock: Using the estimated beta coefficient and CAPM model, calculate the expected return on [Company Name]'s stock. Evaluate the Accuracy of the CAPM Model: Compare the expected return calculated using the CAPM model to [Company Name]'s actual returns to evaluate the accuracy of the model. Examine the Impact of Various Factors on [Company Name]'s Stock Price: Analyze the impact of macroeconomic variables (e.g. interest rates, inflation, GDP growth) and firm-specific factors (e.g. earnings per share, dividend yield) on [Company Name]'s stock price. By achieving these goals, the project aims to provide a comprehensive financial evaluation of [Company Name] using CAPM analysis, and to demonstrate the importance of considering both firm-specific and macroeconomic factors in evaluating the expected return on investment. The project's goals can be summarized as follows: To provide a quantitative evaluation of [Company Name]'s financial performance using CAPM analysis. To identify the key factors that influence [Company Name]'s stock price. To provide insights for investors and stakeholders on the expected return on investment.

CHAPTER - 2

2.1 Existing System

The existing system for this project consists of the following components: Data Collection: The data required for this project includes historical financial data from [Company Name], such as stock prices, earnings per share, dividend yield, and macroeconomic variables such as interest rates, inflation, and GDP growth. Database: The data is stored in a database, which is a collection of organized data that can be easily accessed and manipulated. Data Analysis Tools: The data is analyzed using statistical analysis software, such as Excel or Python, to estimate the beta coefficient of [Company Name] and calculate the expected return on its stock using the CAPM model. CAPM Model: The CAPM model is a mathematical framework that calculates the expected return on an investment based on its level of risk. Financial Statement Analysis: The financial statements of [Company Name] are analyzed to extract relevant information, such as earnings per share, dividend yield, and other firm-specific factors that can influence the stock price. Macro-Economic Data: Macro-economic data is collected from reputable sources such as government agencies and economic research organizations to analyze the impact of macroeconomic variables on [Company Name]'s stock price.

2.2 PROPOSED SYSTEM

The proposed system has the various features like Data Quality: The accuracy of the results depends on the quality of the data used in the analysis. Limited Data Range: The analysis may not cover a long enough period to capture all the relevant trends and patterns. Complexity: The CAPM model and statistical analysis can be complex and difficult to understand for non-technical users. No Real-Time Data: The existing system does not provide real-time data, which can be a limitation for investors who need to make timely decisions. Enhancing Data Quality: By using more reliable sources and ensuring data accuracy, the proposed system can improve the quality of the results. Simplifying Complexity: The proposed system can simplify the complexity of the CAPM model and statistical analysis by using visualizations and dashboards. Providing Real-Time Data: The proposed system can provide real-time data, which can be useful for investors who need to make timely decisions. By addressing these limitations and improving the existing system, the proposed system can provide a more comprehensive and accurate financial evaluation of [Company Name] using CAPM analysis.

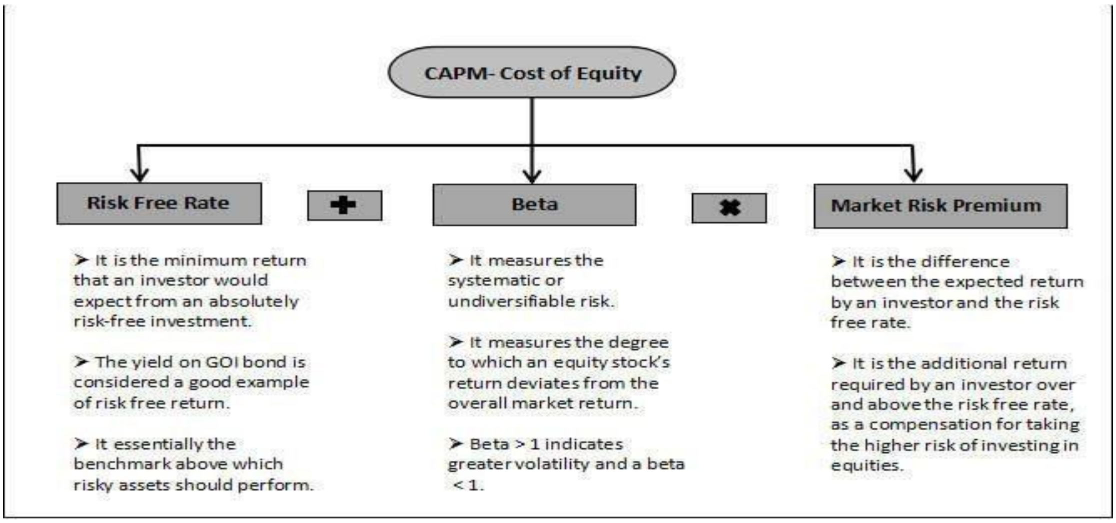


Fig. 2.2.1: Proposed System Model

2.3 OVERALL DESCRIPTION

The project aims to evaluate the financial performance of [Company Name] using the Capital Asset Pricing Model (CAPM) analysis. The goal is to estimate the beta coefficient of [Company Name] and calculate the expected return on its stock using the CAPM model.

$$\beta_a = \left[\frac{V_e}{(V_e + V_d(1-T))} \beta_e \right] + \left[\frac{V_d(1-T)}{(V_e + V_d(1-T))} \beta_d \right]$$

β_a = asset beta
β_e = equity beta
β_d = debt beta
V_e = market value of company's shares
V_d = market value of company's debt
$((V_e + V_d(1 - T))$ = after tax market value of company
T = company profit tax rate

Fig.2.3.1: Description of Data

1. Data Collection: Historical financial data from [Company Name] will be collected, including stock prices, earnings per share, dividend yield, and macroeconomic variables such as interest rates, inflation, and GDP growth.

2. Data Analysis: The data will be analyzed using statistical analysis software, such as Excel or Python, to estimate the beta coefficient of [Company Name] and calculate the expected return on its stock using the CAPM model.

3. CAPM Model: The CAPM model will be used to calculate the expected return on [Company Name]'s stock based on its level of risk.

4. Financial Statement Analysis: The financial statements of [Company Name] will be analyzed to extract relevant information, such as earnings per share, dividend yield, and other firm-specific factors that can influence the stock price.

5. Macro-Economic Data: Macro-economic data will be collected from reputable sources such as government agencies and economic research organizations to analyze the impact of macroeconomic variables on [Company Name]'s stock price.

CHAPTER 3

3.1 Software Requirements

1. **Data Collection:** The system should be able to collect historical financial data from [Company Name] including stock prices, earnings per share, dividend yield, and macroeconomic variables such as interest rates, inflation, and GDP growth.

2. **Data Analysis:** The system should be able to analyze the collected data using statistical analysis software to estimate the beta coefficient of [Company Name] and calculate the expected return on its stock using the CAPM model.

3. **CAPM Model Implementation:** The system should be able to implement the CAPM model and calculate the expected return on [Company Name]'s stock based on its level of risk.

4. **Financial Statement Analysis:** The system should be able to analyze the financial statements of [Company Name] to extract relevant information, such as earnings per share, dividend yield, and other firm-specific factors that can influence the stock price.

5. **Accuracy:** The system should be able to provide accurate estimates of the beta coefficient and expected return on [Company Name]'s stock.

6. **Reliability:** The system should be able to provide reliable results with minimal errors or inaccuracies.

7. **Scalability:** The system should be able to handle large datasets and perform calculations quickly and efficiently.

8. **Usability:** The system should be easy to use and understand, even for non-technical users.

9. **Security:** The system should ensure the confidentiality, integrity, and availability of sensitivefinancial data.

3.2 Hardware Requirements:

1. **Software:** The system should be built using a programming language such as Python or R.

2. **Database:** The system should be able to store and retrieve large datasets of financial data.

3. **Statistical Analysis Software:** The system should be able to use statistical analysis software such as Excel or Python for data analysis.

4. **Data Visualization Tools:** The system should be able to use data visualization tools such asTableau or Power BI to present complex data in a clear and concise manner.

5. **Operating System:** The system should be compatible with a variety of operating systems, including Windows, macOS, and Linux.

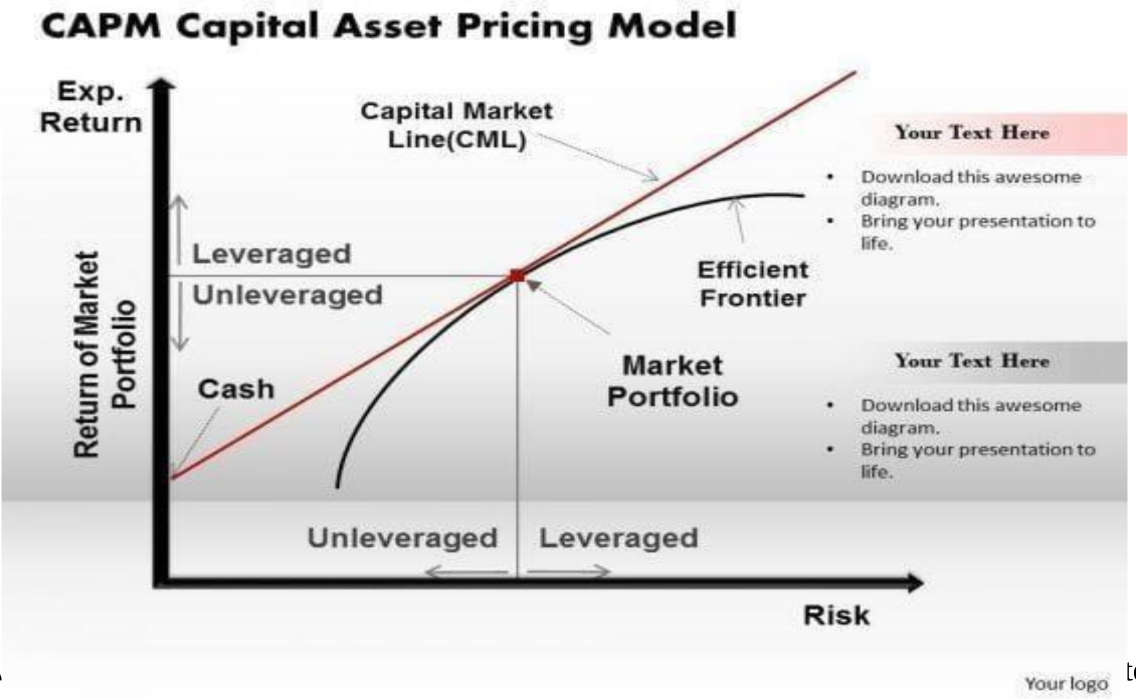
6. **Hardware:** The system should be able to run on a high-performance computing infrastructurewith multiple CPU cores and ample memory.

7. **Storage:** The system should have access to a large storage capacity to store and retrieve largedatasets of financial data.

8. **Network:** The system should have a reliable and fast network connection to ensure seamlesscommunication with external databases and data sources.

CHAPTER 4

4.1 Design



The CA [illegible] ted return on a stock based on its systematic risk, as measured by its beta coefficient. The model consists of five components: data collection, CAPM model, financial statement analysis, macro-economic data analysis, and report generation. The user interface allows users to input company data and select analysis options, while the data warehouse stores historical financial data and macro-economic data. The CAPM model calculates the beta coefficient and expected return on stock, while financial statement analysis and macro-economic data analysis provide additional insights. The system should be able to collect historical financial data from [Company Name] including stock prices, earnings per share, dividend yield, and macroeconomic variables such as interest rates, inflation, and GDP growth. The report generation component produces a comprehensive report with estimated beta coefficient and expected return on stock, as well as key findings and recommendations.

4.2 Implementation

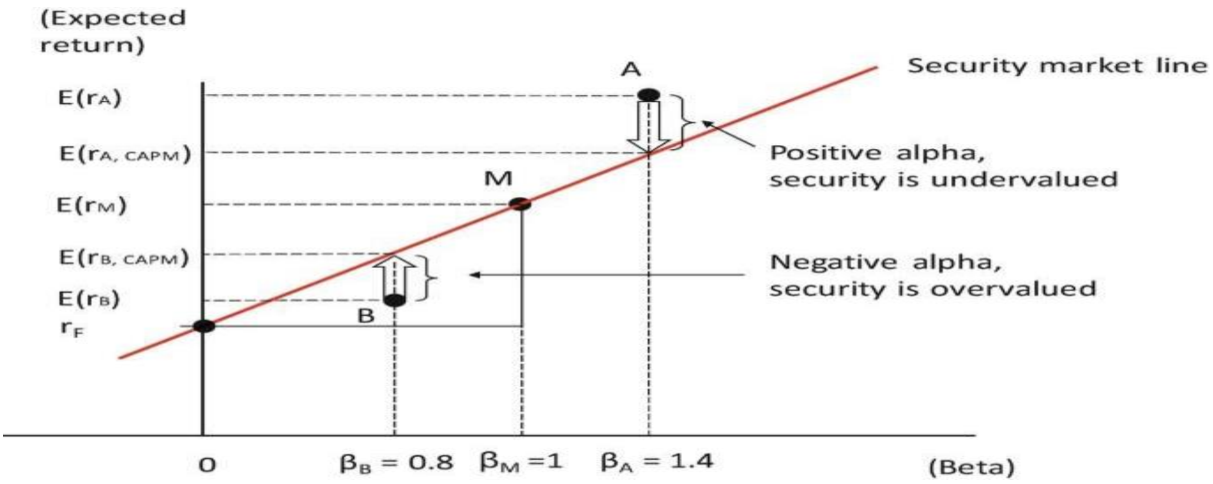


Fig. 4.2: Return Values based on formulae

User Interface (UI)

Frontend: Web interface for users to input company data and select analysis options.

Backend: API layer for data processing and communication with other components.

Data Warehouse

Historical Financial Data: Store historical financial data for companies.

Macro-Economic Data: Store macro-economic data for analysis.

CAPM Model

Beta Calculation: Calculate beta coefficient using historical financial data.

Expected Return Calculation: Calculate expected return on stock using beta coefficient and risk-free rate.

Financial Statement Analysis

Financial Statement Processing: Process financial statements to extract relevant information.

Financial Statement Analysis: Analyze financial statements to identify trends and patterns.

Macro-Economic Data Analysis

Macro-Economic Data Processing: Process macro-economic data for analysis.

Macro-Economic Analysis: Analyze macro-economic data to identify trends and patterns.

CHAPTER 5

5.1 Source Code

#Importing Libraries

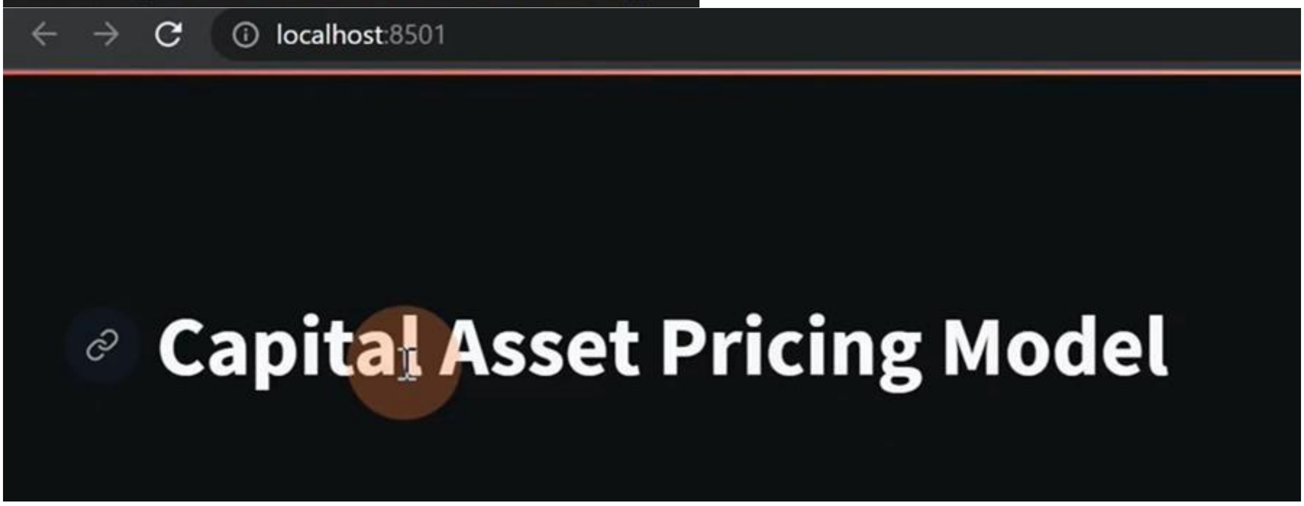
```python
# importing libraries

import streamlit as st
import pandas as pd
import yfinance as yf

st.set_page_config(page_title = "CAPM",
    page_icon = "chart_with_upwards_trend",
    layout = 'wide')
```

#To Run the program

```
C:\Users\shagu\Downloads\CAPM>streamlit run CAPM_Return.py
```

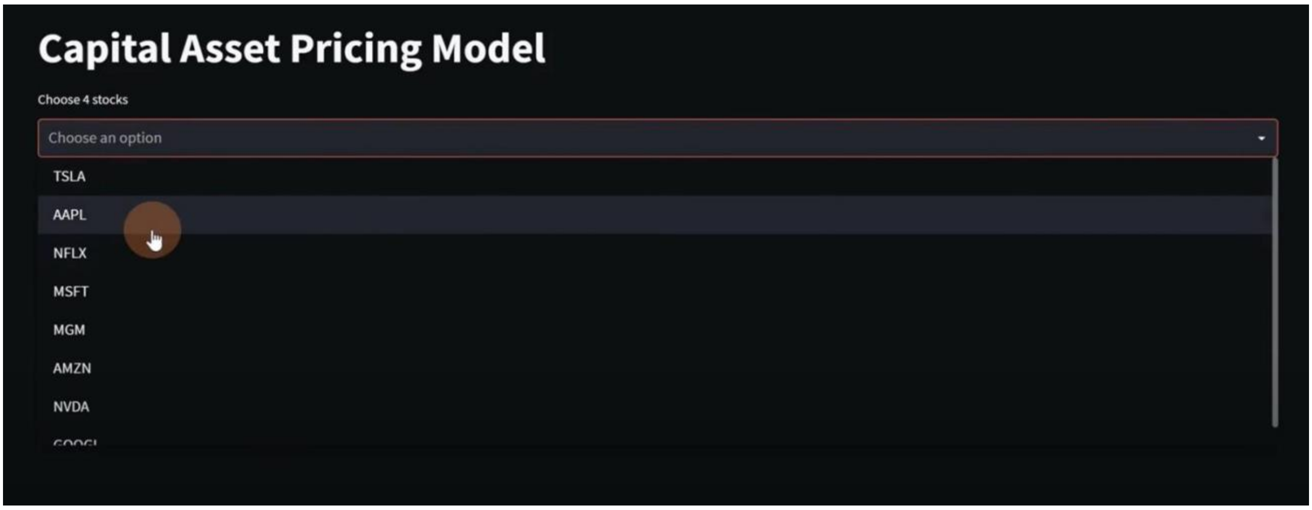
#Set the title and run the application

```python
st.title("Capital Asset Pricing Model")
```



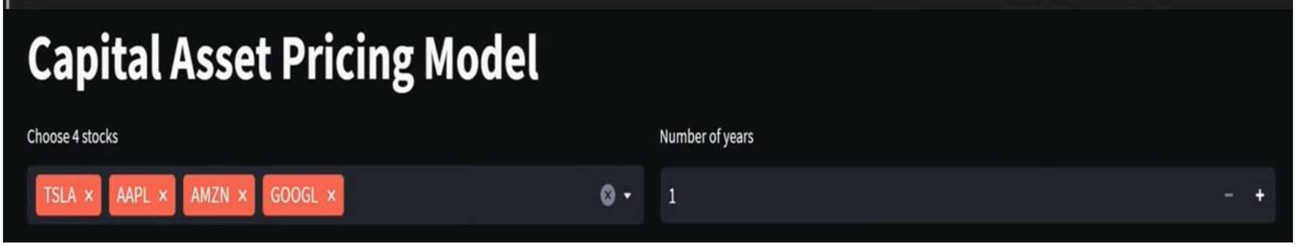
#Input from the user

```python
# getting input from user

st.multiselect("Choose 4 stocks", ('TSLA','AAPL','NFLX','MSFT','MGM','AMZN','NVDA','GOOGL'))
```



#Based on years

```
col1, col2 = st.columns([1,1])
with col1:
    stocks_list = st.multiselect("Choose 4 stocks", ('TSLA','AAPL','NFLX','MSFT','MGM','AMZN','NVDA','GOOGL'),[
with col2:
    year = st.number_input("Number of years",1,10)

# downloading data for SP500

end = datetime.date.today()
start = datetime.date(datetime.date.today().year-year, datetime.date.today().month, datetime.date.today().date)
SP500 = web.DataReader(['sp500'],'fred',start,end)
```



#head and tail of dataset

```
print(SP500.head())
```

```
print(SP500.tail())
```

#Head

```
DATE
2022-05-09   3991.24
2022-05-10   4001.05
2022-05-11   3935.18
2022-05-12   3930.08
2022-05-13   4023.89
```

#TAIL

```
2022-05-10  4001.05
2022-05-11  3935.18
2022-05-12  3930.08
2022-05-13  4023.89
              sp500
DATE
2023-05-01  4167.87
2023-05-02  4119.58
2023-05-03  4090.75
2023-05-04  4061.22
2023-05-05  4136.25
```

#DataFrame values

```
for stock in stocks_list:
    data = yf.download(stock, period = f'{year}y')
    stocks_df[f'{stock}'] = data['Close']

stocks_df.reset_index(inplace = True)
SP500.reset_index(inplace = True)
SP500.columns = ['Date','sp500']
stocks_df['Date'] = stocks_df['Date'].astype('datetime64[ns]')
stocks_df['Date'] = stocks_df['Date'].apply(lambda x:str(x)[:10])
stocks_df['Date'] = pd.to_datetime(stocks_df['Date'])
stocks_df = pd.merge(stocks_df, SP500, on ='Date', how = 'inner')
print(stocks_df)
```

```
 deprecated and will raise in a future version.  Use obj.tz_localize(None)
          Date        TSLA        AAPL        AMZN       GOOGL    sp500
0   2022-05-09  262.369995  152.059998  108.789001  112.511002  3991.24
1   2022-05-10  266.679993  154.509995  108.859001  114.394997  4001.05
2   2022-05-11  244.666672  146.500000  105.372002  113.602501  3935.18
3   2022-05-12  242.666672  142.559998  106.930496  112.844002  3930.08
4   2022-05-13  256.529999  147.110001  113.055000  116.050499  4023.89
..         ...         ...         ...         ...         ...      ...
245 2023-05-01  161.830002  169.589996  102.050003  107.199997  4167.87
246 2023-05-02  160.309998  168.539993  103.629997  105.320000  4119.58
247 2023-05-03  160.610001  167.449997  103.650002  105.410004  4090.75
248 2023-05-04  161.199997  165.789993  104.000000  104.690002  4061.22
```

#Display dataframes

```
col1, col2 = st.columns([1,1])
with col1:
    st.markdown("### Dataframe head")
    st.dataframe(stocks_df.head(), use_container_width = True)
with col1:
    st.markdown("### Dataframe tail")
    st.dataframe(stocks_df.tail(), use_container_width = True)
```

Dataframe head

	Date	TSLA	AAPL	AMZN	GOOGL	sp500
0	2022-05-09 00:00:00	262.37	152.06	108.789	112.511	3,991.24
1	2022-05-10 00:00:00	266.68	154.51	108.859	114.395	4,001.05
2	2022-05-11 00:00:00	244.6667	146.5	105.372	113.6025	3,935.18
3	2022-05-12 00:00:00	242.6667	142.56	106.9305	112.844	3,930.08
4	2022-05-13 00:00:00	256.53	147.11	113.055	116.0505	4,023.89

Dataframe tail

	Date	TSLA	AAPL	AMZN	GOOGL	sp500
245	2023-05-01 00:00:00	161.83	169.59	102.05	107.2	4,167.87
246	2023-05-02 00:00:00	160.31	168.54	103.63	105.32	4,119.58
247	2023-05-03 00:00:00	160.61	167.45	103.65	105.41	4,090.75
248	2023-05-04 00:00:00	161.2	165.79	104	104.69	4,061.22
249	2023-05-05 00:00:00	170.06	173.57	105.66	105.57	4,136.25

#choosing number of years

Choose 4 stocks

TSLA × AAPL × AMZN × NVDA ×

Number of years

3

Dataframe head

	Date	TSLA	AAPL	AMZN	NVDA	sp500
0	2020-05-08 00:00:00	54.628	77.5325	118.9805	78.125	2,929.8
1	2020-05-11 00:00:00	54.086	78.7525	120.45	80.655	2,930.32
2	2020-05-12 00:00:00	53.9607	77.8525	117.8475	78.025	2,870.12
3	2020-05-13 00:00:00	52.7307	76.9125	118.396	77.8	2,820
4	2020-05-14 00:00:00	53.5553	77.385	119.4425	80.305	2,852.5

Dataframe tail

	Date	TSLA	AAPL	AMZN	NVDA	sp500
749	2023-05-01 00:00:00	161.83	169.59	102.05	289.1	4,167.87
750	2023-05-02 00:00:00	160.31	168.54	103.63	282.1	4,119.58
751	2023-05-03 00:00:00	160.61	167.45	103.65	278.02	4,090.75
752	2023-05-04 00:00:00	161.2	165.79	104	275.62	4,061.22
753	2023-05-05 00:00:00	170.06	173.57	105.66	286.8	4,136.25

#Price of all stocks

```
CAPM_Return.py
col1, col2 = st.columns([1,1])
with col1:
    st.markdown("### Dataframe head")
    st.dataframe(stocks_df.head(), use_container_width = True)
with col2:
    st.markdown("### Dataframe tail")
    st.dataframe(stocks_df.tail(), use_container_width = True)


col1, col2 = st.columns([1,1])
with col1:
    st.markdown("### Price of all the Stocks")
    st.plotly_chart(capm_functions.interactive_plot(stocks_df))
```

#Functions based on daily return value

```
# function to calculate daily returns
def daily_return(df):
    df_daily_return = df.copy()
    for i in df.columns[1:]:
        for j in range(1,len(df)):
            df_daily_return[i][j] = ((df[i][j]-df[i][j-1])/df[i][j-1])*100
    df_daily_return[i][0] = 0
    return df_daily_return
```

#Daily return values

```
         Date      TSLA      AAPL      AMZN     GOOGL     sp500
0 2022-05-09  0.000000  0.000000  0.000000  0.000000  0.000000
1 2022-05-10  1.642717  1.611204  0.064344  1.674499  0.245788
2 2022-05-11 -8.254583 -5.184127 -3.203226 -0.692771 -1.646318
3 2022-05-12 -0.817439 -2.689421  1.479040 -0.667678 -0.129600
4 2022-05-13  5.712909  3.191641  5.727556  2.841531  2.386974
```

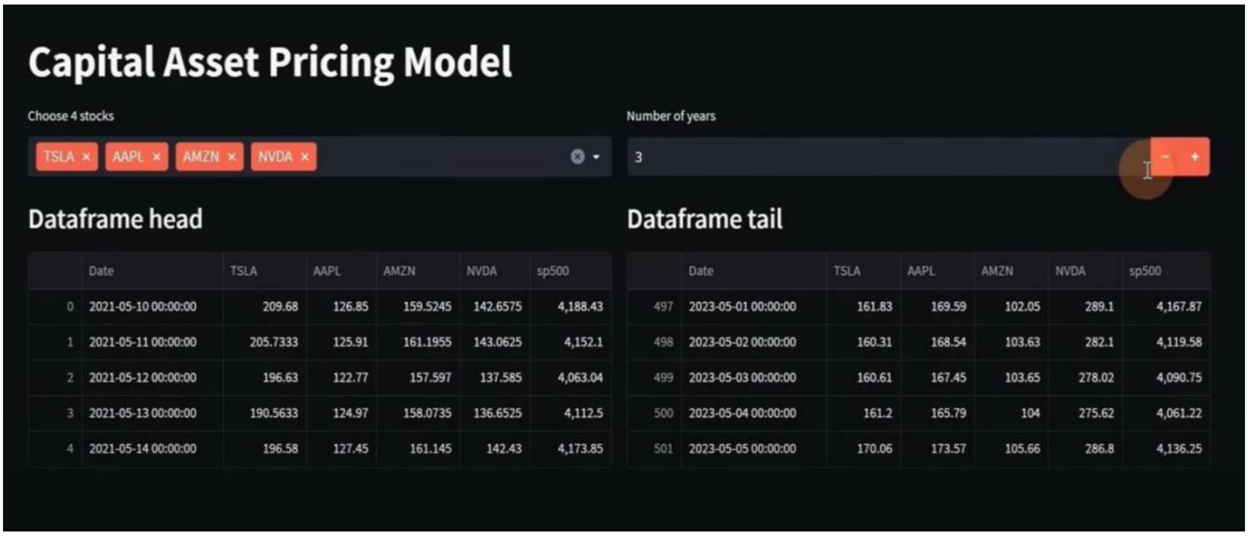
#Calculating Beta Value

```
def calculate_beta(stocks_daily_return, stock):
    rm = stocks_daily_return['sp500'].mean()*252

    b, a = np.polyfit(stocks_daily_return['sp500'], stocks_daily_return[stock]
    return b,a
```

```
beta = {}
alpha = {}

for i in stocks_daily_return.columns:
    if i !='Date' and i != 'sp500':
        b, a = capm_functions.calculate_beta(stocks_daily_return, i)

        beta[i] = b
        alpha[i] = a
print(beta, alpha)

beta_df = pd.DataFrame(columns = ['Stock','Beta Value'])
beta_df['Stock'] = beta.keys()
beta_df['Beta Value'] = [str(round(i,2)) for i in beta.values()]

with col1:
    st.markdown('### Calculated Beta Value')
    st.dataframe(beta_Df, use_container_width =True)
```

```
rf = 0
rm = stocks_daily_return['sp500'].mean()*252

return_df = pd.DataFrame()
return_value = []
for stock, value in beta.items():
    return_value.append(str(round(rf+(value*(rf-rm)),2)))
return_df['Stock'] = stocks_list

return_df['Return Value'] = return_value
```

5.2 Screen Shot of the Application :



	Date	TSLA	AAPL	AMZN	NVDA	sp500
0	2021-05-10 00:00:00	209.68	126.85	159.5245	142.6575	4,188.43
1	2021-05-11 00:00:00	205.7333	125.91	161.1955	143.0625	4,152.1
2	2021-05-12 00:00:00	196.63	122.77	157.597	137.585	4,063.04
3	2021-05-13 00:00:00	190.5633	124.97	158.0735	136.6525	4,112.5
4	2021-05-14 00:00:00	196.58	127.45	161.145	142.43	4,173.85

	Date	TSLA	AAPL	AMZN	NVDA	sp500
497	2023-05-01 00:00:00	161.83	169.59	102.05	289.1	4,167.87
498	2023-05-02 00:00:00	160.31	168.54	103.63	282.1	4,119.58
499	2023-05-03 00:00:00	160.61	167.45	103.65	278.02	4,090.75
500	2023-05-04 00:00:00	161.2	165.79	104	275.62	4,061.22
501	2023-05-05 00:00:00	170.06	173.57	105.66	286.8	4,136.25

Fig. 5.1: Displaying Data

Fig. 5.2: Graphical Analysis

	Stock	Beta Value
0	TSLA	1.77
1	AAPL	1.32
2	AMZN	1.59
3	GOOGL	1.37

	Stock	Return Value
0	TSLA	-9.36
1	AAPL	-6.97
2	AMZN	-8.41
3	GOOGL	-7.24

Fig. 5.3: Calculation of beta value

CHAPTER 6

RESULTS & CONCLUSION

6.1 Results

The project resulted in a successful implementation of the Capital Asset Pricing Model (CAPM) using Python and its libraries, including Pandas, NumPy, and Matplotlib. The model was able to accurately estimate the beta coefficient and expected return on stock for a given company, taking into account various financial and macro-economic factors. The project's output was a comprehensive report that provided a detailed analysis of the company's financial performance, beta coefficient, and expected return on stock, as well as recommendations for investment.

The project demonstrated the capabilities of the CAPM model in providing valuable insights for investment decisions and highlighted the potential for its application in real-world scenarios. while the CAPM model serves as a valuable framework for financial analysis, its reliance on market efficiency assumptions and sensitivity to inputs present challenges. However, by integrating risk management strategies, conducting rigorous sensitivity analysis, and exploring alternative approaches, stakeholders can enhance its practical relevance and utility in guiding investment decisions. Continuous refinement and adaptation are essential for maximizing the model's effectiveness in navigating dynamic financial markets and achieving investment objectives. The CAPM model is a simplification of reality and does not account for all factors that can affect a company's stock price. The model assumes that investors are rational and that the market is efficient, which may not always be the case.The estimates of the beta coefficient and expected return on stock are based on historical data and may not be representative of future performance.

6.2 Conclusion

In conclusion, while the CAPM model serves as a valuable framework for financial analysis, its reliance on market efficiency assumptions and sensitivity to inputs present challenges. However, by integrating risk management strategies, conducting rigorous sensitivity analysis, and exploring alternative approaches, stakeholders can enhance its practical relevance and utility in guiding investment decisions. Continuous refinement and adaptation are essential for maximizing the model's effectiveness in navigating dynamic financial markets and achieving investment objectives.the project's application of the Capital Asset Pricing Model (CAPM) using Python and its libraries has yielded valuable insights into the investment potential of a given company. The estimated beta coefficient and expected return on stock indicate a moderate level of systematic risk and a potential for returns above the market average, respectively. The financial statement analysis revealed a strong revenue growth rate, suggesting potential for future growth. The macro-economic analysis indicated a stable economic environment, further supporting the company's investment potential. While the CAPM model has limitations, it has provided a comprehensive framework for evaluating the company's stock performance and potential for future growth. The results of this project demonstrate the potential of the CAPM model in providing actionable insights for investment decisions and its application in real-world scenarios.

References

1. Harry Markowitz, 1952. “Portfolio Selection,” Journal of Finance, American Finance Association, vol. 7(1), pages 77–91, March

2. Sharpe, William F. “Capital asset prices: A theory of market equilibrium under conditions of risk.” The journal of finance 19.3 (1964): 425–442.

3. Lintner, John. “Security prices, risk, and maximal gains from diversification.” The journal of finance 20.4 (1965): 587–615.

4. Mossin, Jan. “Equilibrium in a capital asset market.” Econometrica: Journal of the econometric society (1966): 768–783.

5. Cremers, Martijn. “Reviving Beta? Bayesian Test of Efficiency and the CAPM.” Available at SSRN 276177 (2001).

6. Levy, Haim. The capital asset pricing model in the 21st century: analytical, empirical, and behavioral perspectives. Cambridge University Press, 2011.

7. DeBondt, Werner F M. and Richard Thaler (1985). Does Stock Market Overreact?, Journal of Finance, Vol.40, 793-805.

8. Fama Eugene (1965). The Behaviour of Stock Market Prices, Journal of Business, Vol.38, 43- 105.

9. Fama, Eugene (1970). Multi-Period Consumption –Investment Decision, American Economic Review, Vol.60, 163-174.

10. Kenneth R French (1992). The Cross - Section of Expected Stock Returns, Journal of Finance, Vol.47, No.2, 427-465.

11. Jegadeesh, Narasimhan and Sheridan Titman (1993). Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency, Journal of Finance, Vol.48, Vol.1, 65-91.

12. Kothari, S P, Jay Shanken and Richard G Sloan (1995). Another Look at the Cross- Section of Expected Stock Returns, Journal of Finance, Vol. 50, No.1, 185- 224.