Application of Capital Asset Pricing Model on the Nifty 50 Stock Return

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Abstract:
In economics it has always been taught that money depreciates with time. From this we understand that money has some time value ascertained to it. Thus, to stop money from depreciating, we see there are many investing opportunities available in the market today. Though with investment opportunities, there are associated risks which often impact investment decision. Over the time, finance world has witnessed many theories that justify the return and risk relationship. One such model is the CAPM, or capital asset pricing model, proposed by Jack Treynor, William Sharpe, John Lintner, and Jan Mossin. The study will primarily focus on the application of this model and the risk-reward connection. It will also assist in determining the stock's correct price and determining whether the stock is under-priced, overpriced, or analysed and determined the correct price.
Keywords: Investment, CAPM, Risk-Return Relationship, Stocks, Price

I.   Introduction:

1.1.   Overview
The Indian stock exchange is the world's fastest growing market among the 23 trading exchanges. It is one of the world's largest and most advanced exchanges, with over 1016 businesses and 726 trading members *(An Empirical Study on CAPM with Respect to NSE NIFTY Stocks, Nagendra Marisetty and Sudha M)*. With these modern tools, the NSE Stock Exchange can handle about 6 million trades per day (An Empirical Study on CAPM with Respect to NSE NIFTY Stocks, Nagendra Marisetty and Sudha M).

Nifty 50 is a combination of the words National Stock Exchange and Fifty (50). The CNX Nifty is the name given to the Nifty 50 index. In simple terms, the Nifty 50 is a collection or basket of the NSE's 50 most dynamic stocks. The Nifty 50 serves as a barometer of the stock market's overall performance. The Nifty 50 list is commonly used by shared store companies as a benchmark for monitoring the presentation of well-managed common assets.

Terms and Terminologies:
- **Risk:**
Risk alludes to the likelihood that the real result of speculation will vary from its normal result. In other terms, the risk is communicated as far as changeability of return- sources of risk in a few forms like business risk, loan fee chance, and market risk. Risk can be estimated by Variance, Standard deviation, and Beta.

- **Return:**
The investor should make a choice about his risk resilience level, to get the normal return by the method of investment. The return from the stock incorporates both current income and capital gains brought about by the appreciation of the stock values. This income and capital gain is generally communicated in percentage and the return of the investment depends on the term period (holding time) of investment.

How is NIFTY 50 calculated?
The Nifty 50 was originally calculated using the entire market capitalization. However, beginning June 26, 2009 (An Empirical Study on CAPM with Respect to NSE NIFTY Stocks, Nagendra Marisetty and Sudha M), the Nifty 50 has been determined on the basis of free-float market capitalization. This means that the equities owned by the promoters of these 50 companies are omitted from Nifty 50 calculations. This is due to the fact that these equities are not traded freely.

Formula for calculating NIFTY 50 Index:
- **Price Index Calculations:**

The calculations of the companies that make up to the NIFTY 50 are based on the following formula:

> **NIFTY 50 = (Current Market Value/ Base Market Capital) *100**

The NIFTY 50 equities account for around 65 percent of the NSE's total float-adjusted market capitalisation (An Empirical Study on CAPM with respect to NSE NIFTY Stocks, Nagendra Marisetty and Sudha M).

The market impact cost is the most accurate indicator of a stock's liquidity. It correctly depicts the fees incurred while trading an index in the real world. When conducting NIFTY 50 trades of Rupees (Rs) 10 crores, a stock must have a market effect cost of less than 0.50 percent to qualify for inclusion in the NIFTY 50.

- **Total Return Index Calculations:**

The price index measures only capital gains and losses as a result of price fluctuation. The dividends earned from index constituent equities must also be included in the index movement to get a true picture of results. The term "total return index" refers to an index that incorporates dividends earned. The total return index takes into account the index's returns from stock price fluctuations as well as dividend payments made by component index stocks.

Total Returns Index (TR) is a separate index series that reflects the returns on the Index portfolio, including dividends.

$$TR\ Index = Previous\ TR\ index * \left[1 + \left(\frac{(Today's\ PR\ Index + Indexed\ Dividend)}{Previous\ PR\ Index} - 1\right)\right]$$

1.2.   Need for the Paper

As a fundamental piece of the Financial System, Capital Market assumes a huge part in the advancement of an economy. In any case, how protections are estimated, in a Capital Market, is yet a Pandora's Box. Numerous Researchers have attempted to recognize different variables that influence Stock Prices. By and large, Investment choices are directed by the Risk-Return relationship of protections, and to comprehend this relationship, examining the variables that influence this relationship is vital. Throughout recent many years, Economists, Financial Experts, and Statisticians have been distinctly creating Models of Stock Price Behaviour.

The spearheading Capital Asset Pricing Model (CAPM) created by Sharpe (1964), and Lintner (1965) to foresee Cross-Sectional Security and Portfolio Returns has been the best and every now and again involved instrument for research. There are a few specialists who contended against CAPM and presumed that Beta (β) alone isn't an adequate component to decide Expected Stock Return. The Asset Pricing Model of standard money is getting away from the CAPM where Beta (β) is the main trademark that decides Expected Stock Return.

1.3.   Objectives:

- To study the risk and return of selected NIFTY 50 stocks and calculate their market risk.
- To analyse, study and compare the CAPM return with stock return.
- To find if CAPM is a qualitative tool for over and under-priced stock selection.

1.4.   Significance of the Paper:

The study had taken into consideration the stocks in Nifty 50 for three years from January 2018 to December 2021. This study was tried to construct an optimum portfolio using the concepts of abnormal return based on CAPM.

1.5.   Limitations of the Paper:

The paper investigates only the companies that are listed on the NIFTY 50 indices rather than covering up all the stocks. The Model used is CAPM which aims to only determine an appropriate rate of return of individuals stocks that are in the NIFTY 50 index. The calculated stocks are from taken from the NIFTY 50 index from January 2018 to December 2021. There is a possibility that projections can vary from the original

data depending on various market conditions or corrections done in the market; butthe data in the paper is valid and may be used for reference for profile allocation by investors, brokers, researchers etc.

II.   REVIEW OF LITERATURE

2.1.   What is Nifty 50: List of NIFTY 50 Companies: Deepika Khude

The paper deals with the basics of Nifty and its methods of calculations. It explains that, Nifty 50 is an Indian benchmark index. It represents the weighted average of 50 largest companies listed on the National Stock Exchange (NSE). The term Nifty 50 is a combination of National Stock Exchange and Fifty (50). Nifty 50 is also known as CNX Nifty. In simple terms, Nifty 50 is a collection or a basket of the 50 most active stocks on the NSE. Nifty 50 acts as a barometer for the overall movement of the stock market. Nifty 50 index is widely used by mutual fund companies as a benchmark to track the performance of actively managed mutual funds.

2.2.   On April 22nd, 1996, the NSE introduced the Nifty 50 index. Index and Services and Products Ltd

owns and manages it (IISL). NSE Strategic Investment Corporation Ltd is a completely owned subsidiary of IISL. The Nifty 50 firms have a combined market capitalization of Rs 1,27,83,812 crores. One of the most actively traded contracts in the world is the Nifty 50.

2.3.   A Study on Optimum Portfolio Using Abnormal Return With Special Reference to Nifty: Seema Balan, Dr. B. Balaji Srinivasan

Out of the different investment avenues, security market is one of the risky one. All investors want to earn more return from their investment. They always prefer for happy situations and want to stay away from the unfavourable ones. The affection to be happy always has given birth to the term risk. To reduce the risk, the investor has to select the strong share in terms of profitability. The hope of the investors regarding the future cash flows is reflected on the share prices. Investment in equity has the advantage of liquidity as well as profitability. In general equity investment attracts dividend and capital appreciation because of higher market price.

The paper also talks on the fundamental findings by experts like Markowitz and William Sharpe. The paper also discusses about SML and explain the model that works in the functional form of market structure. The Beta in the paper also discusses the facts about market power of money and talks about the major money swindling process. It shows the volatility of the scrip when assumed with beta variable.

2.4.   An Empirical Investigation of the CAPM and the Fama – French Three Factor Model in Indian Stock Market:ZankhanaAtodaria, Drashti Shah, JinalNandaniya

The study intended to offer a detailed check of two asset pricing models used in the Indian equity market: the Capital Asset Pricing Model and the Fama-French Three Factor Model. The data of the NIFTY 50 firms was used for this empirical study, which spanned a five-year period from April 2014 to March 2019. The asset pricing models were tested by putting together portfolios depending on market capitalization and book-to-market equity ratio. The Fama-French Three Factor Model outperformed the Capital Asset Pricing Model, according to the findings. In the sample 5 years, investors who used any of these models for investment purposes earned more than the risk-free rate, as well as returns from fixed deposits, post office deposits, and other sources. The equity returns are affected by beta, value and size & investor can use these parameters for framing their portfolios. Double sorted as well single sorted portfolio provides positive monthly returns for all formed portfolios. The high beta portfolios provided higher returns compared to low beta portfolios & big stocks provided more return than small stocks during sampled five years.

Low-value stocks also outperform neutral and high-value stocks in terms of returns. The problem of designing a desired investment for a given collection of assets is addressed by portfolio theory. Several asset characteristics, such as the amount of value an asset generates on average over time and the riskiness of reaping returns comparable to the average, might be considered. The types of portfolios that are regarded suitable are selected based on the investor's financial objectives and risk tolerance.

The Capital Asset Pricing Model was established by three researchers in the mid-1960s: William Sharpe, John Lintner, and Jan Mossin. Sharpe – Lintner – Mossin Capital Asset Pricing Model is the common name for the model. The Capital Asset Pricing Model is a follow-up to Markowitz's portfolio theory. The Capital Asset Pricing Model is based on the securities market line's basic linear positive relationship between risk and return. The higher the beta value, the higher the security's risk and, as a result, the larger the predicted return for investors.The Fama-French three-factor model was created by Eugene Fama and Kenneth French as an expansion of the Capital Asset Pricing Model (CAPM). The Fama-French model seeks to describe stock returns using three factors: (1) market risk, (2) small-cap outperformance against large-cap outperformance, and (3) high book-to-market outperformance versus low book-to-market outperformance.

2.5.   An Application of CAPM on selected stocks of CNX Nifty 50: Dr. Kinjal Jethwani, Prof. Kumar Ramchandani

Using CAPM, this article studies the impact of Market Portfolio Excess Return on Stock Portfolio Excess Return (Capital Asset Pricing Model). Furthermore, the research examines the impact of Adjusted Closing Price on Stock Volatility. Economists, financial experts, and statisticians have been working hard to construct stock price behaviour models during the last few decades. Sharpe (1964) and Lintner (1965) created the pioneering Capital Asset Pricing Model (CAPM) to anticipate cross-sectional security and portfolio returns, which has proven to be a highly successful and widely used research tool. Some scholars have suggested that CAPM is insufficient in determining expected stock returns since Beta () is not a sufficient factor. The CAPM, in which Beta () is the only criterion for determining Expected Stock Return, is being phased out of mainstream finance's Asset Pricing Model.
The CAPM is applied to a sample of equities from the CNX Nifty 50 index in this study.

This focus of this paper is to apply CAPM (Capital Asset Pricing Model) in selected stocks of Indian Stock Market. The study is based on 31 Stocks Nifty-50 (Index of NSE- National Stock Exchange). The daily data of 31 stocks were taken from 1st Jan 2006 to 31st Dec 2012. The results of CAPM suggest that for all the 31 Stocks, Excess Return on Market Portfolio (Rm-Rf), significantly affect Excess Stock Return (Ri-Rf). Hence, Excess Return on Market Portfolio is still very relevant and important parameter for Excess Stock Return.

2.6.   An Empirical Study on CAPM with respect to NSE NIFTY Stocks: Nagendra Marisetty and Sudha M

A security's absolute risk can be divided into two categories: systematic and unsystematic risk. Diversification is eradicating the latter. The systematic risk, on the other hand, is unavoidable and cannot be associated with the market. If there isn't any unsystematic risk, a stock is efficient. As a result, the only impact a security has on market risk is through its systematic risk; nevertheless, assessing systematic risk does not allow one to determine whether securities are accurately priced. CAPM assists in identifying undervalued or overvalued qualitative assets. As a result, picking a stock to earn the promised return has become a difficult task for investors. This analysis is done with the help of CAPM with respect to NSE NIFTY stocks in order to assist investors in selecting right-priced equities. NSE NIFTY, CAPM, Beta, Risk, and Return are some of the key terms used in this article.

The paper also discusses that, investors are well aware of the risk involved in the stock market. To invest in the stock market, they should analyse the relationship between stock and the market condition. With this research work, by applying the CAPM model, the investor can identify the under and overpriced stocks. Concerning the research analysis, the investor can select the quality nifty stocks based on the under-price value for maximizing the return. In all the aspect, 17 under-priced stocks are better than other for investing. Thus, the study concludes CAPM is one of the qualitative tools for investment in the nifty stock for maximizing the return. The investor has to find out the under-priced and overpriced stock for betterment.

III.   Research Methodology

3.1 Overview of the chapter
This portion of the report covers the methodologies that were used for this research and the way they were carried out throughout the report. This research is centred on the usage of CAPM method for enhancing the performance of Nifty stock index. For this subject, experimental study has been conducted and relevant data has been gathered. A detailed conversation has been held in order to prove certain arguments and to provide a clear picture of the subject matter at hand. It is described in this chapter how the methodologies and processes were employed for this study inquiry, which was pertinent to a topic that could be trusted.

3.2 Research philosophy
The research philosophy of positivism has been taken into consideration in order to effectively handle the goal of this study. In the course of the study, the philosophical influences the researcher's thinking and ensures that the research relies on the specific philosophy that can answer the needed inquiry in return to the subject matter. The study of epistemology may aid in gaining a better grasp of a current topic of discussion. As a result, it might be either subjective or objective (Newman and Gough, 2020). In this research, positivism will take precedence over interpretive in the epistemology phase. In order to arrive at its prior research and make use of outcomes that has been positively interpreted, whether via personal experience or scientific experimentation. In this

research study the inclusion of positivism research philosophy has enabled the researcher to critically evaluate the operational efficiency of the firm in an effective manner.

Research design

In this research study the researcher decided to utilize an experimental mode of research design in order to address the purpose of the study in an effective manner. Experimentation is a kind of study in which two variables in the study are used in a scientific manner (Mohajan, 2018). In order to be scientifically valid, each study must use some kind of experimentation. In experiments, researchers must prove that a variable changes purely because of the modification of the continuous parameter. There should be a significant link between the study and the findings. Since the research study has aimed to measure the performance of Nifty, because of this, it is justified to modify this research design in order to improve the study's result in a statistically meaningful way.

Research approach

The deductive method of research approach has been taken into consideration in order to adequately answer the prospective questions of this research study in a substantial way. Apart from that, since the study has incorporated the positivist research philosophy, hence it will be more convenient for the researcher to utilize deductive format of research approach to perform the hypothesis test of the study (Dźwigoł and Dźwigoł-Barosz, 2018). In addition to that, the adaption of deductive research approaches can also enable a researcher to take essential insights which can be utilized for addressing the strategic objectives of the study in a sufficient way. It has been expected that the utilization of deductive research approaches will create more opportunities for the researcher to address the research questions and objectives in a succinct manner.

Data collection and analysis method

The research plan is developed in line with the research philosophy, deductive technique, and empirical method of data analysis used in the study. Insights on the data engagement may be gained via the use of a research approach. According to the words of Snyder (2019), there are generally two types of data collection method that can be detected such as primary and secondary method of data collection. Nevertheless, in order to answer the strategic goals of the research in a brief way, a secondary mode of research data gathering technique has been used in this research study to get the data needed. A secondary quantitative technique is a research methodology in which both qualitative and quantitative data are employed to investigate a topic in more depth. It enables the researcher to examine a variety of different facets of the subject. On the other hand, in this research study, a quantitative method of data collection has been applied to gather solid information regarding subject matter consideration. In this regard, the data will be obtained from the stock performance of Nifty in the last 3 years. However, once the data has been obtained the researcher has decided to perform a statistical analysis based on the information that has been obtained regarding the purpose of this study. On this note, the further part of the study has performed a statistical analysis by using Ms Excel to address the objectives and questions of the study in a more compatible manner.

IV. Data Analysis and Predictions

4.1. Overview of the chapter

This part of the research study has tried to provide a positive overview regarding the performance of the Nifty stock market after utilizing the CAPM. Apart from that, this part of the research study has performed secondary quantitative analysis based on the information that has been obtained through the utilization of secondary methods of data collection. In addition to that, the researcher has also performed statistical analysis in this part of the research study through the utilization of MS Excel software based on the information that has been obtained through the usage of secondary data collection. However, the further part of the chapter has been developed based on these factors.

4.2. Secondary quantitative analysis
Share performance of ADANIPORTS

In this research firstly the ADANI PORTS share prices have been taken into account for understanding the way the utilization of CAPM can enable the firm to increase its financial performance. According to the reports, for the first time in Bengal, Adani Ports will operate a berth at Haldia. It is estimated that the corporation would spend roughly Rs 298.26 core in Berth No. 2, which has an annual capacity of 3.744 million metric tonnes. Beginning in the fourth quarter of fiscal year 2024-25, the project is projected to be completed. Apart from that, the stock market data of the company has been collected from the FY2018 to FY2021. The further part of the study has discussed the share market performance of this company through the inception of statistical analysis.

Descriptive analysis

In descriptive statistics, a characteristic or set of independent variables for a subset of population is summarized and described. Apart from that, the utilization of descriptive statistics can also enable a researcher to measure the mean, Standard deviation and the frequency variable that may be summarized to gain a better understanding regarding the impact of IV on the DV (Mishra *et al.* 2019). In addition to that, it also helps in the detection of anomalies such as the typos and outlets that allow an individual to discover commonalities among various variables, preparing for the future statistical analysis. However, the findings of the descriptive statistics have been listed below:

High	
Mean	403.6146233
Standard Error	4.220091643
Median	375.9
Mode	372
Standard Deviation	109.8035083
Sample Variance	12056.81044
Kurtosis	4.705313956
Skewness	2.200804661
Range	649.2
Minimum	235.8
Maximum	885
Sum	273247.1
Count	677
Confidence Level (95.0%)	8.286063034

Table 1: Descriptive statistics
(Source: MS Excel)

According to the information shown in the preceding table, the mean value of data is 403.6146233. On the other hand, the median and mode value is 375.9 and 372. Therefore, it can be stated that the highest share price of ADANI PORTS from 2018 to 2021 was 403.6146233; additionally, the average value of its share price is 372.

Regression statistics
Model Summary

Regression Statistics	
Multiple R	0.965786
R Square	0.932742
Adjusted R Square	0.931263
Standard Error	11372.28
Observations	677

Table 2: Model Summary
(Source: Developed in MS Excel)

The model summary analysis has been performed in the preceding table, and the R square value of the research has been calculated to be 0.932742, indicating that the study is quite dependable in this regard (Kaliyadan, 2019). As an additional point of reference, the adjusted R square value of this research study is 0.931262775, which indicates that there is a high degree of consistency across the variables in this research study. Therefore, it can be stated that the share prices of ADANI PORTS are increasing in a succinct manner.

ANOVA statistics

ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1.00	1212438359875.17	1212438359875.17	9374.86	0.00
Residual	676.00	87426206879.83	129328708.40		
Total	677.00	1299864566755.00			

Table 3: Anova statistics
(Source: Developed in MS Excel)

According to the above table, the study's sig value is 0.00, indicating that the information used for this research study is highly credible. Aside from that, the total value of the study is 677.00, indicating that the research is highly sufficient for effectively addressing the purpose of this study.

Share performance of BAJAJ Finance
Bajaj Finance has declared equity dividends of Rs 10 per share for the fiscal year ending March 2021, which would be paid to shareholders. In the current stock price of Rs 7040.25, the dividend yield is 0.14 percent, which is the result of the stock's current price. Following a thorough assessment of Bajaj FinservLtd's financial record over the previous decade, Moneyworks4me determined that the company is of good quality. During the course of a year, the stock price of Bajaj Finance Limited might climb from 7276.150 rupees to 8800.050 rupees.

Descriptive Statistics

High	
Mean	6791.034
Standard Error	54.18738
Median	6454.95
Mode	5285
Standard Deviation	1409.913
Sample Variance	1987856
Kurtosis	-0.69246
Skewness	0.537092
Range	5673.05
Minimum	4276.95
Maximum	9950
Sum	4597530
Count	677
Confidence Level (95.0%)	106.3958

Table 4: Descriptive statistics
(Source: Developed in MS Excel)

It can be seen in the above table that the company's stock price reached its highest point at one point was 6791.034 INR, whereas from 2018 to 2021 the average share price of the company is 6454.95 INR. On the other hand, the minimum share price of the company was 5285 INR.

Regression analysis
Model summary

SUMMARY OUTPUT	
Regression Statistics	
Multiple R	0.979609
R Square	0.959634
Adjusted R Square	0.958154
Standard Error	8766.833
Observations	677

Table 5: Model summary
(Source: Developed through MS Excel)

The study's R square value is 0.959634, which indicates that it is quite dependable, as seen in the model summary analysis in the above table. In addition, the adjusted R square value of this study is 0.958154, which indicates that the variables in this research study have a high degree of consistency. In other words, the price of Bajaj Finance shares has been steadily rising.

ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1.00	1235146804289.22	1235146804289.22	16070.64	0.00
Residual	676.00	51955576651.78	76857361.91		
Total	677.00	1287102380941.00			

Table 6: Anova Statistics
(Source: MS Excel)

The sig value of this study is 0.00, which indicates that the information used in this research study is extremely trustworthy. In addition, the study's overall value is $677.00, which indicates that the research is enough to accomplish the study's objectives.

Share performance of Axis Bank
Descriptive statistics

High	
Mean	621.5885
Standard Error	4.13176
Median	631.65
Mode	633
Standard Deviation	118.5318
Sample Variance	14049.8
Kurtosis	-0.99942
Skewness	-0.3148
Range	490.25
Minimum	337.5
Maximum	827.75
Sum	511567.4
Count	823
Confidence Level(95.0%)	8.110042

Figure 1: Descriptive statistics of Axis Bank share price
(Source: Performed in Ms Excel Software)

In the above table it can be seen that the highest share price of 633, whereas the minimum share price of the company was 621.58. On the other hand, the average share price of the company is 631.65. Apart from that, the STD deviation value of the data set is above than 1, which reflects that the information of this study is highly credible.

Regression Statistics	
Multiple R	0.00217408
R Square	4.72662E-06
Adjusted R Square	-0.001213294
Standard Error	352.0759573
Observations	823

Table 7: Regression statistics of Axis bank Share price
(Source: Performed in MS Excel)

The above table has outlined that the R square value of the findings is higher than 0.5, which reflects that the research is highly reliable. Additionally, it has been expected that the CAPM method can be taken into account for enhancing the share price of Axis Bank.

NIFTY
Descriptive statistics

High	
Mean	11494.46
Standard Error	28.81069
Median	11588.5
Mode	11398.15
Standard Deviation	450.9586
Sample Variance	203363.7
Kurtosis	-1.29347
Skewness	-0.1123
Range	1603.55
Minimum	10690.35
Maximum	12293.9
Sum	2816143
Count	245
Confidence Level(95.0%)	56.7494

Figure 2: Descriptive statistics
(Source: Developed in MS Excel)

In the above table it can be seen that the highest share price of NIFTI was 11494.46, whereas the minimum share price of the company was 11398.15. On the other hand, the average share price of the company is 115888.5.

V.   Conclusion

CAPM is an effective method of tool that can be taken into account for addressing the strategic objectives of a firm in a more credible manner. Apart from that, it has been discovered that the utilization of CAPM gives a better discount rate than other rates for an investor's investment assessment. This model clearly demonstrates the relationship between risk and return. There has been no major and systematic outperformance by large-cap actively managed funds since late 2017/early 2018 when the Securities and Exchange Board of India (SEBI) reformed the sector. In addition to that, the UTI Nifty index fund and 18 large cap equities mutual funds rebase on the end of 2017 performance. Over the last year, most actively managed funds have lagged behind their index counterparts. The "active return," often known as alpha, is a metric used to compare a fund's results to those of a benchmark. However, it has been expected that the utilization of CAPM can be more beneficial for these companies to enhance its monetary performance in an effective manner.

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