A STUDY ON TESTING THE APPLICATION OF CAPM AND COMPARING THE EXPECTED AND ACTUAL RETURNS OF THE COMPANIES IN INDIAN BANK NIFTY INDEX

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Abstract: The objective of this paper is to apply CAPM in order to forecast the expected returns and hence compare the same with actual returns checking the viability of the model in the Banking Industry within the Bank Nifty Index. It is assumed that if the model does justice to most of the stocks in this index, it will be applicable to most of the companies throughout the industry as the market of this industry is assumed to be in align with the Bank Nifty Index. The 12 stocks within the Bank Nifty Index have been open to large variations and have been highly volatile in the selected period and have findings related to the market performance and investors' investing behaviors during the period between 1st April 2015 to 31st March 2020. This index represents the most liquid banks within the banking industry that are basically large cap companies that form as a basis for investors with respect to their investment decision in the other banks within the industry.

Index Terms – Bank Nifty, CAPM, Risk-return, Expected return, Index, Traditional CAPM, Shapre's CAPM.

I. INTRODUCTION

1. CAPM

The Capital Asset Pricing Model is known to be the key tool that is known to provide the investors with the framework that would be useful for the purpose of analyzing the relationship between the stocks and the systematic risk of the market and the returns that go along with the amount of risk that is borne by the investors. But the question is whether this test would be valid is all the industries between all time periods or whether it would depend on certain factors that play in the market at a given time. Since there is no adequate amount of research gap as there are many studies in relation to CAPM, this paper only checks its validity in the Indian Banking sector through the analysis of the Bank Nifty Index. The CAP-Model is mainly used for the purpose of investments in order for the investors to analyze whether they will be getting adequate amount of returns for the risk that is observed by them for that particular stock and the model is in line with this purpose. It can be further open for testing whether the model would be applicable in other industries within the Indian Stock Market if the study proves that it is not applicable in the context of the Bank Nifty Index. It can also be open to analysis with using tools other than the ones used in this study. It is possible that due to the sudden downward market shift due to the Covid-19 pandemic that hit the Indian market and affected it drastically in the month of march,2020 could have affected the results of the study. Hence the researches can choose a different time-series set in order to re-evaluate the results of the study. The understanding between the risk-return trade-off is a study that has been of utmost importance in the industry and hence there is scope to analyze this relationship through the advanced CAP-Models and whether they would be applicable in this growing industry.

The topic of this paper is " A Study on Testing the application of CAPM and comparing the expected and actual returns of the companies in Indian Bank Nifty Index". Capital Asset Pricing model is often used to analyze the relationship between systematic or market risk of a particular industry with the expected returns of the stocks within that industry. But the traditional model has often been open to testing ranging in different fields, industries and time periods to check its validity in that particular period of that particular industry and how well it proves to align with the market assumptions. It has been observed based on the previous published papers that this model does not always do justice to the selected data. It might be applicable to some and not all stocks even if it is of the same period of data study. Some research has shown that the model is not applicable in certain conditions which this study reaches to analyze whether this is applicable in this particular study as well. The scope extends to the fact that researches can further analyze this model in other periods which would deliver different results. On the basis of the calculated expected returns, the study analyses stocks that are undervalued an overvalued in the given time period which is used to explain whether to buy-sell or hold a stock and the correlation between the Bank Nifty Index and Individual securities within that index. Since the Indian Stock Market, just like all the other stock markets is a platform that is known for its risky nature of investments, investors must be careful to analyze this trade-off between risk and return. This could either be done using the traditional CAP-Model that was defined by Sharpe in 1964 or using any other tools which is not the purpose of this paper. This paper only analyses whether the traditional Sharpe's Model is applicable

for all the stocks listed under the Bank Nifty Index for the selected time period and this model relies on the main assumption that the returns of the individual stocks completely depend on the returns of the market, in this case the Bank Nifty Index.

1.2 The Indian Stock Market

The Indian Stock Market is broadly classified into two exchanges that follow the same trading mechanisms, trading hours and settlement processes, namely, the Bombay Stock Exchange(established and running since the year 1875) and the National Stock Exchange(established in the year 1992 and running since the year 1994). With the help of these markets being available on an online platform, trading has been made an efficient practice and is now widely carried out by most of the investors throughout the country.

Trading Mechanism:

Since this market is now digitally open, there is no need for the open knowledge of the sellers and buyers to be known to each other which has made the entire process anonymous. Due to the same reason now the orders are placed online and the buyer is associated with the most suitable option available at that particular time that has led to complete transparency of the prices and orders available and carried out.

Investing Process:

1. Investing in the Primary Market: This type of investment can be carried out by investing in IPO(Initial Public Offering) through a process called ASBA(Application supported by blocking accounts). Through this process the investor can apply for a certain amount of shares and have that amount blocked for the purpose of payment. Once the allotment of the shares is carried out by the companies, the amount worth of the allotted shares is taken from the account as payment and the remaining is given back to the investor if shares have not been allotted for the complete amount blocked in the bank.

2. Investment in the Secondary Market: The following steps are followed for the purpose of such an investment by the investor:
   - Open a demat as well as a trading account that is linked to the investor's bank account.
   - Log in to the trading account and purchase the share listed in the NSE or BSE.
   - Determine the price at which you will be able to purchase the stock at.
   - The trade is carried out digitally in case if it available.
   - The trade is made and the transaction is carried out with the completion of the amount at which the stock is worth by transfer of the amount from the buyers account to the sellers account.
   - In case of sale, the seller will receive the profit amount (if any) in T+2 days in case of equity stock market.

Settlement and Trading hours
- Since the time the trades are being done on a digital platform it has been made more easier to carry out the trades and efficiently settle the payments in time.
- The transfer of shares is done in a dematerialized format hence the shares can be transfers from one person's demat account to the other on the completion of a sale or purchase of the shares.
- The settlement period for the equity trade carried out in the market has a T+2 days period.
- The trading hours for the Indian Stock Market is from Monday to Friday between 9:55am and 3:30pm based on the Indian Standard Time.

Market Regulation

The Indian Stock Market is regulated and monitored by the Securities and Exchange Board of India, SEBI that was established in the year 1992, it was formed for with its main objective being to guard the interests of the investors of the Indian Stock Market. SEBI is headquartered in Mumbai and was introduced to promote transparency in the Indian Stock Market that in line with protecting the investor interests.

The Securities and Exchange Board of India has the following powers and also carries out the following roles and responsibilities:

Powers:
- Quasi-judicial powers which explains that SEBI has the power to pass judgements in case of unethical or fraudulent activities.
- Quasi-executive powers which means that SEBI can call for the books of accounts of any company and choose to examine the same if the doubt any unethical practices that could have been carried out by the company and thereby take legal actions in the mentioned case.
- Quasi-legislative powers is termed that SEBI has the power to formulates rules and regulations such that protect the interest on the investors which is inclusive of rules against insider trading, listing obligation, etc.

Roles and Responsibilities:
- The body that protects the interests of the Indian investors that invest in the securities exchange markets.
- Mainly promotes development of these markets and monitors its efficient functioning of the securities markets.
- Forms as a regulatory body of all the operations that are carried out in the same market.
- Provides guidelines that help govern the markets in a uniform manner.
- Provides education to investors with respect to the securities market and its intermediaries.
- Prohibits and fraudulent or unfair trade practices with the exchanges and in relation to the same.
- Ensures timely update and keeps the market efficiently running with the help of timely research and development strategies.

1.3 NIFTY 50

Market Indexes are of two types in the Indian Stock Market namely, Sensex and Nifty. Sensex is known to be the oldest market index for the equity market and was created in 1986 with data that goes way before its time from 1979 onwards. It is inclusive of about 30 listed firms on BSE that form 47% of free-float market capitalization of the index. On the other hand, Nifty was created in 1996 with data that goes back to the year 1990 onwards. It has about 50 listed shares that form 66.8% of the same free-float market capitalization as of March 2019. It is explained that in terms of investment, risk and performance go hand in hand and understanding this risk is part of the financial education required to carry out these investments, this can be understood through indices and index-linked investments.

NIFTY 50 is owned and managed by National Stock Exchange Indices Ltd and is specialized in index as their core product. It formulates 50 diversified stock in 13 sectors of the Indian economy and is known to be ideal for the purpose of derivative trading that is also used for purposes such as index based derivatives and index funds along with benchmarking fund based portfolios. The impact cost is 0.02% of this portfolio worth Rs.50 lakh as of March 2019.

Key Indices of NIFTY

Broad Market	Sectoral Indices	Thematic Indices	Strategy Indices	Fixed Income
NIFTY 100	NIFTY PSU Bank	NIFTY Energy	NIFTY50 PR 2x Leverage	NIFTY 4-8 yr G-Sec
NIFTY 200	NIFTY FMCG	NIFTY Shariah 25	NIFTY50 Value 20	NIFTY 11-15 yr G-Sec
NIFTY 50	NIFTY Bank	NIFTY CPSE	NIFTY100 Equal Weight	NIFTY 10 yr Benchmark G-Sec
NIFTY 500	NIFTY Private Bank	NIFTY 100 Liquid15	NIFTY100 Quality 30	NIFTY 15 yr and above G-Sec
NIFTY Midcap 100	NIFTY Financial Services	NIFTY Corporate Group	NIFTY Alpha 50	NIFTY 1D Rate
NIFTY Midcap 50	NIFTY Metal	NIFTY Infrastructure	NIFTY Low Volatility 50	NIFTY Composite G-Sec
NIFTY Next 50	NIFTY IT	NIFTY Commodities	NIFTY50 PR 1x Inverse	NIFTY 8-13 yr G-Sec

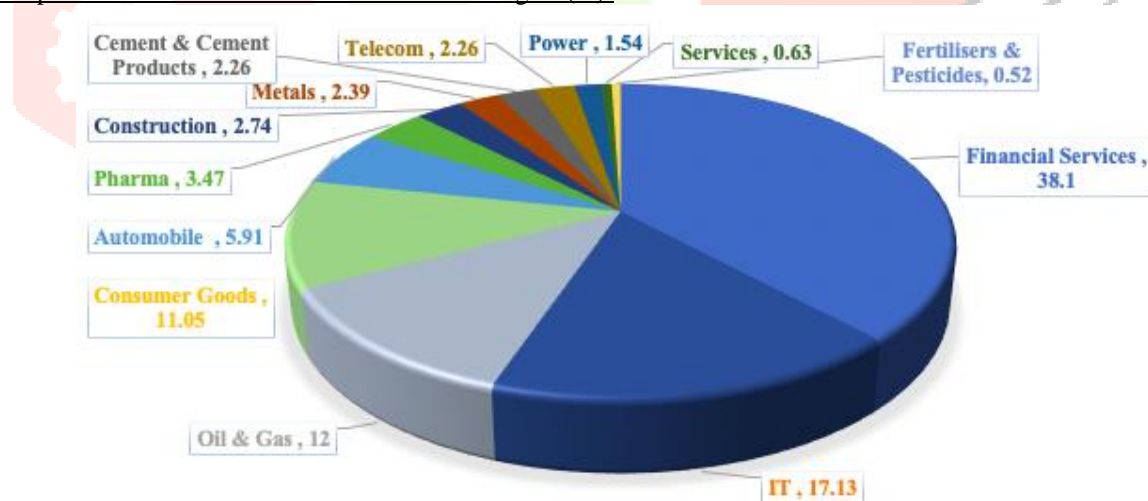(Table 1.4.1: Key Indices. Source: NSE India)
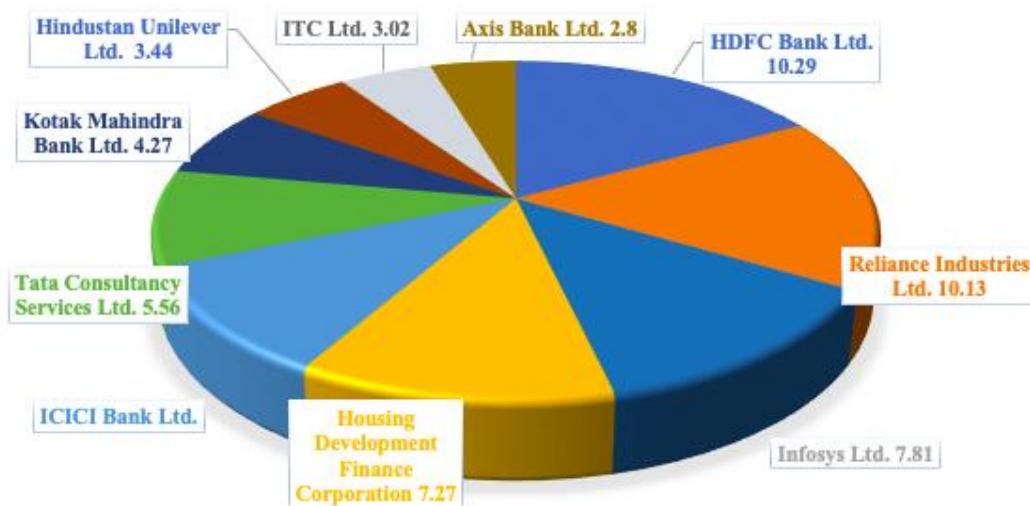
The NIFTY 50 chart since its inception:

(Figure 1.3.1: NIFTY 50 chart, Source: NSE India, 2021)

Sector Representation of NIFTY 50 on the basis of weights (%):

(Figure 1.3.2: Sector Representation. Source: NSE India, 2021)

Top Constituents of NIFTY 50 in terms of weightage (%)

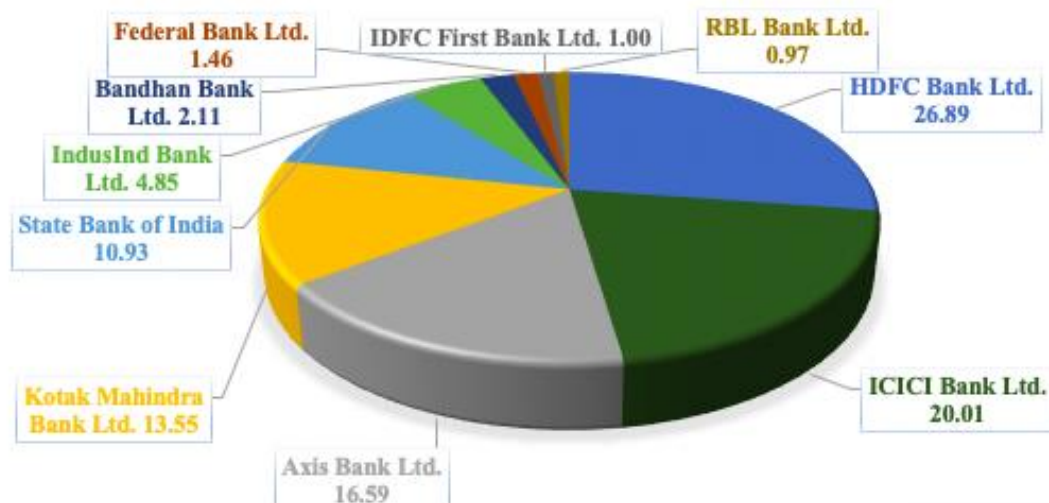(Figure 1.3.3: Top Constituents. Source: NSE India, 2021)

Eligibility Criteria for selection of Constituent Stocks under NIFTY 50

- The impact cost of companies to be included in the NIFTY 50 must by 0.5 percent or less in the last six months at the basket size of Rs.100Million.
- There must be historical listing data of the company for the last 6 months.
- Companies that are allowed to trade in the segment of futures and options will only have the eligibility to be a part of the index.
- If a company that has published an initial public offering and has fulfilled the norms of the eligibility criteria for 3 months instead of 6 months for the index as well would be eligible to be a part of the index.
  (NSE India, 2021)

1.4 THE BANK NIFTY INDEX

The Nifty 50 comprises of the Auto Index, Bank Index, Financial Services Index, Financial Services 25/50 Index, FMCG Index, Healthcare Index, IT Index, Media Index, Metal Index, Pharma Index, Private Bank Index, Realty Index, Consumer Durables Index and Oil and Gas Index. The NIFTY Bank Index comprises of 12 banks that are the most liquid and large scale stocks of the Indian Banking Sector which are listed in the NSE. It acts as the base that provides investors along with the market intermediaries the benchmark which captures the performance of the capital performance of the Banks in the Indian Banking sector.

Top Constituents of the Bank Nifty Index based on weights (%)

(Figure 1.4.1: Top Constituents of the Bank Nifty Index, Source: NSE India, 2021)

Eligibility Criteria for selection of Constituent Stocks under the Bank Nifty Index

- Companies must be a part of the NIFTY 500 and should be eligible under the same. If the number of stocks that are eligible are less than 10 in a particular sector of NIFTY 500, then the deficit number of stocks will be chosen from stocks that have a rank under the top 800 stocks on the basis of average daily turnover along with average daily full market capitalization which is based on the last 6 months data that is used for the purpose of index rebalancing of NIFTY 500.
- The companies that would be considered must be a part of the Indian Banking Sector.
- Their trading frequency must at least be 90 percent in the past 6 months.
- The company must have historical listing data of 6 months and in case a company has made an Initial public offering then the company would be eligible even if they fulfill the norms for 3 months instead of 6 months.
- Only those companies would be eligible that are also eligible to trade in the futures and options segment of the market.
- The free float market capitalization of the company forms a part of the final step for selection in the index.

- On the basis of this free float market capitalization, no stock of a company must weigh exceeding 33 percent nor shall the top 3 stocks together weigh exceed 62 percent while rebalancing.

The Bank Nifty Index chart since its inception:

(Figure 1.4.2: The Bank Nifty Index chart since its inception, Source: NSE India, 2021)

Index Governance:

The three-tier governance structure is comprised of the Board of Directors of NSE Indices Ltd, Index Advisory Committee(Equity) and Index Maintenance Sub-Committee.

(NSE India, 2021)

II. SWOT ANALYSIS OF THE INDIAN STOCK MARKET

Strengths:

- Regulation and Control: The Securities and Exchange Board(SEBI) is an established body that formulates guidelines that favors the protection of the investors interest.
- Diversification: The Indian stock market just like all the other stock exchanges is not limited to one industry or a single sector. There is an availability of a large number of securities, which provide the investment medium needed for trading.
- Intermediary: There are many large brokerage websites that play a key role as an investment facilitator such as zerodha, etc.
- Historical data: The Senex and NIFTY Historical data that is inclusive of past performance of various companies since the early 90's is a strong base for reliable information that helps investors in making their investment decision.
- Investment decision: More individuals are looking for investment opportunities and have realized that even though stocks are a risky investment, there are certain stocks that can be invested in long term into value based companies that provide adequate returns.
- Growth and expansion: With government initiates and promotion of Indian based companies, more IPOs will be realized in the future based on the same policies.

Weakness:

- Behavioralist Investors: Not all the investors investing in the Indian Stock Market invest based on technical, fundamental or both analysis, they invest based on how the market reacts to first hand news. Due to such investors, the entire markets performance gets affected.
- Risk and Return relationship: it is assumed that high risk stock provide high returns as well but due to external factors that affect the market, this often gets tampered.
- Management and technical issues: Due to technical issues within the Indian Stock Exchanges of NSE or BSE the entire trading practice of the investors. Such an issue happened on the 23rd of February, 2021 when NSE faced technical issues and had to halt trades after 11:00am. Due to this many futures and options investors faced issues. The trading time had to be extended till 5:00pm on the same day for a market that generally closes at 3:30pm.
- Full Disclosure: it is important that all the companies listed in the stock market have complete financial disclosure and should not refrain from sharing information that should be shared on the basis of the regulation on full disclosure issued by SEBI and under the Companies Act 2013.

Opportunity:

- Investment: The stock market in terms of investment plays a key role in terms of raising capital for companies through the means of IPOs.(Initial public offering).
- Growth and expansion: The entire system is established online and with proper management it can only grow more.
- Government initiatives: With the government going ahead with their disinvestment plan and promoting more companies that are Indian based, more companies will soon get listed in the NSE and BSE.
- Economic value: If companies get listed and raise capital through this platform, it will only lead to the increase in the GDP of the country which in turn will lead to increase in the value of the Indian rupee when compared to the other currencies.

Threats:

- Political: Due to political concerns between Indian and other countries, often the stock market of India gets affected. Studies show that the relationship between India and China and Indian and the USA have affected the market in India when stocks were created in either of the mentioned countries stock market. (Kumar, 2016)
- New Businesses: a few new businesses and innovation in the present businesses act as a threat to the stock prices of the existing businesses. Such as the establishment of payment banks have led to a direct effect on the revenue of the Indian commercial banks as well as their stock prices. (Reddy, 2018)
- Regulation and control: Even though the Securities and Exchange Board protects the interest of investors, it tightens the growth of the companies and leave very few means for their growth.
- Investor behavior: The large amount of volatility in the Indian stock exchange has been observed to be because of the investors investment behavior. This mass psychology of the investors investment in the market in based on the main players often leads to a shift in the volatility of the market. (Bhaskar, 2002)

III. LITERATURE RIVIEW

(Joel M. Vanden , 2004) This is an empirical study based on the stock options index which explains the returns that one receives on the options helps determine and explaining the returns of certain risky asset portfolios. The study was analyzed using time series analysis that considered regression and CAP-Model for the returns of 25 portfolios that distinguish between AMEX,NYSE and NASDAQ on the basis of stock to book value along with considering the S&P 500 for the period between 1993 and 2000. The study concluding that the market returns and the options returns are interrelated and influence one another.

(Eugene F Fama & Kenneth R French, 2004) The paper explains the importance of CAPM and how it has developed over a period of time. CAP-Model can be used to forecast the risk and expected returns of the stocks of the US common stocks using empirical data. It also explained the difference between Sharpe's CAP-Model and Markowitz Mean-variance model. Based on the paper, there is evidence that researchers have called this called as flat since it only explains the relationship between beta and average return. The reason as to why the model might fail is due to behavioralists. Investors who leads decrease in prices of the stocks during though times and increase in stock value during good times and it could also fail due to unrealistic assumptions in the CAP-Model. It explains that funds to are based on low beta stocks, small or value stock are said to give abnormal returns that align with the expected returns of Sharpe-Lintner CAP-Model.

(Orazio P Attanasio & Monica Paiella, 2006) The empirical performance of the C-CAPM (Consumption based Capital asset pricing model) was evaluated using the data collected from the US Consumer Expenditure survey. The C-CAPM is said to be an extension of the CAPM model in an intertemporal setting. The analysis was based on the equity premium with respect to correlation of consumption with asset returns along with rationalizing empirical evidence. The risk aversion has been found to be lesser that that's been calculated. This misclassification cause be because of including data of non-shareholders in the measure of IMRS and excluding few shareholders that could have led to upward bias. This has led to play a significant role and have thereby affected the risk aversion of the selected data

(Soumitra K Mallick, Amitava Sarkar, Kalyan K Roy, Anjan Chakraborty & Tamal Duttachaudhuri, 2007) Apart from CAPM, this study implies other mathematical pricing models that are based on statistics. It analysis the application of ARIMA and Goof fit statistical testing based on stock market data from various sectors. It is observed that the stock market cannot be set in the same model setting of the money or blue chip market. Given this, the model acts differently in each of the industrial portfolios in terms of market structure and application.

(Manuel Ammann & Michael Steiner, 2008) Fama and French introduced a multi factor model that was an extension of their CAPM in the year 1993. It explained the relationship between risk and other factors namely market, size and value. This study tests this application in the Swiss Stock market considering data collected between 1988 and 2005. The Carhart model that was introduced in 1995 has been widely used but wasn't used in the Swiss market and this paper thereby filled this gap. It was hence observed that there was less correlation in most of the factors identified and further study is required to explain the factor relationships.

(Jiri Novak & Dalibor Petr, 2010) The study on measuring risk in the context of the Stockholm Stock Exchange assesses one of the major challenges of finance. Researchers consider the volatility of the market using the market returns known as beta, the size of the market, the ratio of market value of equity to the boom value of the same along with short term stock returns. The paper is analyzed using empirical studies pertaining to the Capital Pricing asset model which depends on the expected market return, expected stock return and its covariance. The data collected is between the period of 1979 and 2005 using the three factor, four factor and two factor model. The study concluded with the result of further empirical analysis with respect to the asset pricing model.

(Yash Pal Taneja, 2010) Based on this study, the researchers have evidence based on previously written papers that the Two factor CAPM that considered beta did not have the ability to explain certain cross-functional returns in the Indian Stock Market lead to the introduction of the factors of size and value in order to predict the expected returns. This study considered 187 companies data that showed continued presence in the S&P CNX 500 index between June 2004 and June 2009. Since globalization, the Indian Stock market has showcased many significant changes. As a result the three factor model has depicted better applicability of the CAPM. The two factor model can be used as well provided it is considering only small and medium sized stocks in their portfolio.

(Tienyu Hwang, Simon Gao & Heather Owen, 2012) The paper had the aim of assessing the excess return on portfolio returns by divided the risk into systematic and idiosyncratic risk with also checking the applicability of CAPM in the analysis. CAPM is based on empirical studies but it has been proven that the returns of a portfolio cannot be determined through a single factor such as beta. The idiosyncratic risk is basically investing without diversification and can be eliminated through diversification in the investor's

portfolio. With the help of descriptive statistics and the Fama and French model it has been proven that beta that is the measure used to analyze systematic risk cannot be used to predict stock returns. It further explains that based on security market line there is a nonlinear relationship between beta and return calculated and concluding that CAPM cannot do complete justice in forecasting returns.

*(Saban Celik, 2012)*This study examines the theoretical application of not only CAPM but all types of asset pricing models. It was written in order to bridge the literature gap since the review of all models hadn't been done for a significant amount of time. By classifying the assets to more neoclassical finance group, it was able to divide the models into absolute (that is used for academic purposes and is inclusive of CCAPM and CAPM) and relative (that is used by deriving the price of the assets by comparing it with related assets) asset pricing models.

(Sohail Rizwan, Saahar Jabeen Shaikh & Mehwish Shehzadi, 2013) The objective of this study was to prove that CAPM is an effective model that support linear sturture of expected returns pertaining to the cement companies under the Karachi Stock exchange, Pakistan. The data ranged between January 2004 and December 2009.The stock that are more risky are said to give the highest expected returns this has to be analysed using efficient models. Even though the study was done to prove that CAPM is effective they failed to do so in the time period collected for six years data. The empirical results explained that CAPM does not provide accurate expected returns as out of the 90 observations only 12 were results close to the CAPM found.

(Octavio Portolano Machado, Adriana Bruscato Bortoluzzo, Sérgio Ricardo Martins & Antonio Zoratto Sanvicente, 2013) The study was done in order to test the empirical validity of ICAPM (inter-temporal Capital Asset Pricing Model) in the Brazilian Stock market. The analysis was done for two sets of data, which considered data before the 2008 market recession and post the period. Namely, (March 1988 to September 2008) and post-crisis (October 2008 to September 2012). It was hence shown that since the recession there has been evidence of considerable expected rates. The interest rate and gold price had said to not be relevant state variables, as the respective risk premiums were not considered significant and the exchange rate was hence significate with a negative risk premium.

(Stefan Koch & Christian Westheide, 2013) The objective of this study was to understand the role of beta affecting the stock returns. The Fama- Macbeth test that is a widely used CAPM has been taken to test by the model used by Pettengill, Sundaram, and Mathur (1995) along with testing the risk and return relation. Even with the inclusion of different additional factors, the significant relation between the three Fama-French beta and return factors. The concluded with explain that in order to have a more clear understanding of Fama-Macbeth, further research into the topic while considering that when an investor looks for investing into the market they must look at the right time to invest along with investigating the asset pricing at that particular time.

(Marie-Claude Beaulieu, Jean-Marie Dufour & Lynda Khalaf, 2013) This empirical study is based on the New York Stock Exchange depicting the study of certain invariance to a portfolio. It considers testing the of zero beta that is where risk free rate is not observable. By doing this study on monthly returns of the NYSE, it was concluded that by not considering beta, the model faced statistical issues which lead to uncertain identification.

(Yi-cheng Shih, Sheng-syan Chen, Cheng-few Lee & Po-jung Chen, 2014) The objective of this study was to analyze the interrelationships among the capital asset models along with suggesting directions for further research. It explains the critical drawback of CAPM is said to be the assumption that the investors have a homogenous belief with respect to expected returns and the variance-covariance matrix.

(Sreenu & Nenavath, 2016) The CAPM that was initially introduced by Sharpe has said to give promising forecasts of expected returns of equities. But based on this study, the Fama and French model of CAPM has said to be one step forward of the Shapre's model. The assumptions made for this model are more advance and critical in nature. The data was collected for 550 companies from the France Stock Market and the time period was from January 2005 to December 2015. The findings of the study was to find the reliability of the model and concludes that there is no linear relation between the stocks beta and return.

(Amit Kundu & C.K. Mukhopadhyay, 2016) The study is based on the stock performance of a few stocks that were listed in the Bombay Stock exchange (2014-2015). The main object of the study was to analyze and study the CAPM's applicability in the BSE at the time. The methodology used for this was Sharpe's model to analyze the degree of correlation of the stock returns with the market. The research concluded with the finding that the CAPM did justice only to 13 stocks and was not seen to be applicable to all the stocks that was considered in the study as all those stocks were observed to be undervalued. They have also explained how these findings can be applied by readers through investing in these undervalued stock to generate higher actual rate of returns than expected.

(Huang Xian Yu, 2017) The paper suggests testing and application of CAPM through analyzing its equity premium portion. That is what can be taken as the risk free rate in the calculations of the Capital asset pricing model and the relation of expected and actual return. The model uses regression and matlab in regression and the data is collected from DataStream from the US stock market between the period of march 1990 and January 2015. The study that was done to find the relation of the equity premium with respect to the stocks considered was concluded to be considered only in the government bond yield and return on gold. The robust nature of the model was found using linear regression of two stocks of Bank of America and General Electric. It further explained that the risk free rate can be taken on large government bonds or return on gold.

(Rathnasekara & Ravi Dilantha, 2017) The objective of this study was to assess the validity of the theory of Efficient Market Hypothesis along with the accuracy of CAPM. The data used for this study is pertaining to the Columbo Stock Exchange, Sri Lanka between the time period 2004 and 2013.The hypothesis taken was based on whether CAPM is an inefficient model and/or capital markets are inefficient. The study suggested that abnormal returns could either be because of market forces acting against the market or due to the lack of computation of effective CAPM. It concluded with findings that explain that the efficient market theory is promising given that the CAPM used to measure the returns is done effectively such as it was done with the semi-strong stock market form of Sri Lanka.

(Semen Son-Turan & Erdem Kilic, 2018) This study is based on the number of investors who believe in the mathematical and statistical application of the Capital Asset Pricing Model that is based on past data over those who would prefer relying on the present data analysis. With the help of empirical studies and theoretical framework, the study was based on the US equity market but has shown findings and implications with respect to global markets and financial instruments as well. The targeted audience in order to analyze this behavior was the US equity market which is broadly held by institutional investors. Hence the researchers used their data from Sentix that differentiates between institutional and individual investors along with S&P 500. The study concluded with explaining that the CAPM has to be further developed in order to find liquidity, asset price volatility and regimes switching issues pertaining to the asset.

(Khurshid Khudoykulov, 2020) The paper explained the rather inferior performance of the single market factor while describing certain variations in the calculation of mean or average stock returns in the Indian Stock market. The data was collected ranging between 2009 and 2018 and was used to compare these returns with respect to the Fama-French three and five-factor model and CAPM. It explains the role of the size, profitability, value, investment, and market factors in relation to the average equity returns at the Indian Stock Market. CAPM has proved to be invalid and the three factor model as inferior in terms of the Indian context when compared to the Fama-French five-factor model.

IV. OBJECTIVES OF THE STUDY

The following are the objectives of the study titled- " A Study on Testing the application of CAPM and comparing the expected and actual returns of the companies in Indian Bank Nifty Index":

1. To calculate and asses the CAPM of each of the individual stocks under the Bank Nifty Index.
2. To check whether the CAPM calculated is valid for the selected data that is, the Bank Nifty Index as the market factor and the individual stocks of the companies within the index.
3. To analyze the deviation or difference between the actual returns and the expected returns that have been calculated through CAPM.
4. To analyze whether the beta value calculated and the value that has been stated as the latest 1 year beta value collected from Ace Analyzer is equal.
5. To check whether the shift in returns is due to the Covid-19 pandemic that affected all the stock markets throughout the world.
6. To check whether the individual stocks are overvalued or undervalued on the basis of the calculated CAPM and the mean of the individual stocks.
7. Whether there is a significant amount of correlation between the returns of the individual stocks (The companies within the Bank Nifty Index) and the market (Bank Nifty Index).
8. To check whether the time series data of the actual returns of the individual securities, Bank Nifty Index returns and the Rf calculated based on the 91 T-bill is stationary.

4.1 Statement of Problem

The Capital Asset Pricing Model is known to be the key tool that is known to provide the investors with the framework that would be useful for the purpose of analyzing the relationship between the stocks and the systematic risk of the market and the returns that go along with the amount of risk that is borne by the investors. But the question is whether this test would be valid is all the industries between all time periods or whether it would depend on certain factors that play in the market at a given time. Since there is no adequate amount of research gap as there are many studies in relation to CAPM, this paper only checks its validity in the Indian Banking sector through the analysis of the Bank Nifty Index.

Sometimes it has also been observed in previous studies that it is not important that the CAP-Model would be applicable for all the stocks in the industry at a particular time as well. It is possible that a few stocks within the selected index could show that the CAPM calculated is valid for them in those market conditions but not valid for the others. This could be either because of the factors that would affect only that particular company, policy shifts of the same, or because of time period selected (Amit, 2016).

Since the Indian Stock Market, just like all the other stock markets is a platform that is known for its risky nature of investments, investors must be careful to analyze this trade-off between risk and return. This could either be done using the traditional CAP-Model that was defined by Sharpe in 1964 or using any other tools which is not the purpose of this paper. This paper only analyses whether the traditional Sharpe's Model is applicable for all the stocks listed under the Bank Nifty Index for the selected time period and this model relies on the main assumption that the returns of the individual stocks completely depend on the returns of the market, in this case the Bank Nifty Index.

4.2 Scope of Study

The CAP-Model is mainly used for the purpose of investments in order for the investors to analyze whether they will be getting adequate amount of returns for the risk that is observed by them for that particular stock and the model is in line with this purpose. It can be further open for testing whether the model would be applicable in other industries within the Indian Stock Market if the study proves that it is not applicable in the context of the Bank Nifty Index.

It can also be open to analysis with using tools other than the ones used in this study. It is possible that due to the sudden downward market shift due to the Covid-19 pandemic that hit the Indian market and affected it drastically in the month of march,2020 could have affected the results of the study. Hence the researches can choose a different time-series set in order to re-evaluate the results of the study.

The understanding between the risk-return trade-off is a study that has been of utmost importance in the industry and hence there is scope to analyze this relationship through the advanced CAP-Models and whether they would be applicable in this growing industry.

V. RESEARCH METHODOLOGY

5.1 Method of Data Collection

The secondary data collected for this study is based on the last five years data dated from 1st April 2015 till 31st March 2020. The Bank Nifty Index data was collected from NSE India for the purposes of calculating the market returns based on the close price for the mentioned time period. All the 12 companies data that are listed under the Bank Nifty Index is collected from Ace Analyzer in order to calculate the returns with respect to them following by the calculation of CAPM and expected return and empirical studies based on the same. The 91 days T-bill data is collected from the website of the Reserve Bank of India in order to calculate the risk free rate of return for the purpose of calculation of CAPM for the selected companies.

5.2 Sampling Type and Size

Sampling Type:

The data considered for the testing the validity of CAPM in the Indian Stock Market is secondary data collected from verifiable, reliable sources of NSE India, Ace Analyzer and the Reserve Bank of India website. The industry selected from the study is the Indian Banking sector and further narrowed the data pertaining to the 12 most liquid companies within the industry with respect to the Bank Nifty Index.

Sampling Size:

The sample size for carrying out the analysis are the 12 companies within the Bank Nifty Index namely, HDFC Bank Ltd., ICICI Bank Ltd. Axis Bank Ltd., State Bank of India , Kotak Mahindra Bank Ltd., IndusInd Bank Ltd., Bandhan Bank Ltd., Federal Bank Ltd., IDFC First Bank Ltd. and RBL Bank Ltd. as the individual securities and the Bank Nifty Index as the Market for these securities along with the 91 days T-Bill yield as the risk free rate. It is assumed that if the CAP-Model is valid for most of the companies within the index, it would be valid for most of the banks in the Indian Banking sector as well as these are the most liquid banks in the industry.

Time Period:

The time series considered for this study is based on the past 5 years prices of the Bank Nifty Index and the individual securities within the index in order to calculate the returns from 1st April 2015 till 31st March 2020 and the yield rates in order to calculate the rate of risk free return of the 91 days T-bill for the same period for the CAP-Model analysis.

5.3 Research Instrument Design

The Capital Asset Pricing Model has been used by many investors in order to calculate expected returns of the securities by the investors who believe that the market is the only factor influencing the price, risk and returns of the individual securities.

The key question for this research is to analyze whether CAPM is a valid test in order to generate the expected returns with consideration of systematic risk on the basis of the market. Since it is not possible to analyze all the companies of all the industries, the study considers a sample size of the Bank Nifty Index and the companies that are listed under this Index. It is assumed that if the model is valid for this sample size, it will also be valid for similar companies that are affected by the same factors that influence the Bank Nifty Index and its companies.
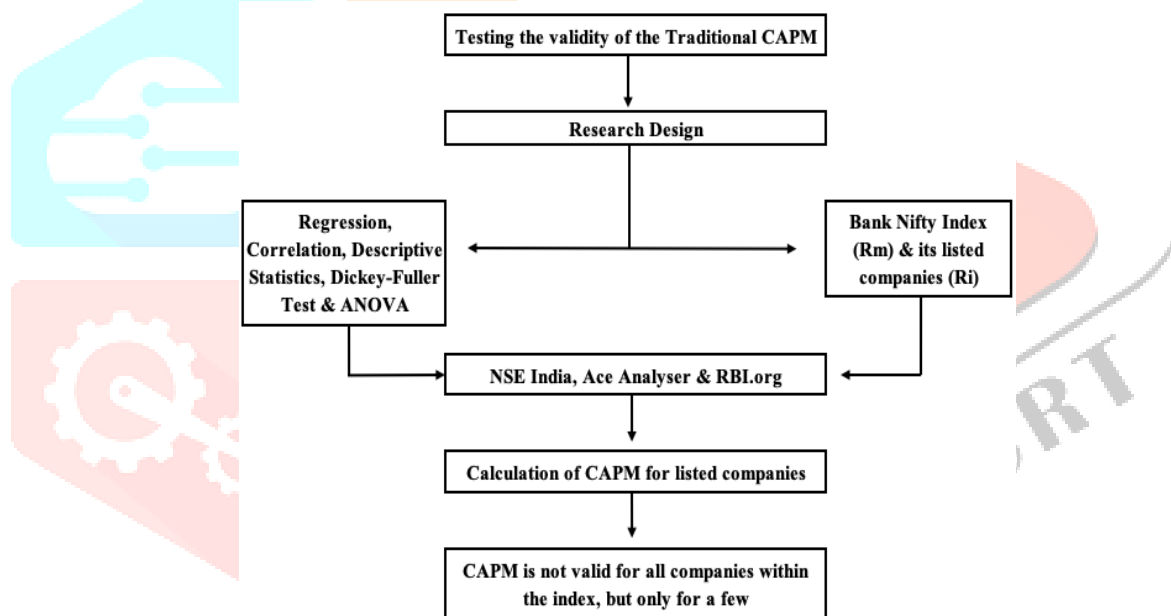
(Figure: 3.6.1: Research Instrument Design)

5.4 Hypothesis

1. To check the level of stationarity of Market Return

H0: The mean of the market return is closer or equal to the value 0-zero and is stationary.

H1: The mean of the market return is not closer or equal to the value 0-zero and is not stationary.

2. To check the level of stationarity of Individual Security Return

H0: The mean of the individual security return is closer or equal to the value 0-zero and is stationary.

H1: The mean of the individual security return is not closer or equal to the value 0-zero and is not stationary.

3. To check the level of stationarity Rf (91 days T-bill)

H0: The mean of Rf calculated is closer or equal to the value 0-zero and is stationary.

H1: The mean of Rf calculated is not closer or equal to the value 0-zero and is not stationary.

4. To check whether the CAPM calculated is valid

H0: There is no significant amount of deviation between the expected returns(CAPM) calculated and actual returns

H1: There is a significant amount of deviation between the expected returns(CAPM) calculated and actual returns

5. To check the correlation between the market returns and the individual security

H0: Bank Nifty Index and the individual security are significantly positively correlated

H1: Bank Nifty Index and the individual security are not significantly positively correlated

6. To check the beta calculated and the Latest 1 year beta collected are equal

H0: The beta calculated for the time period is equal to the latest 1 year beta collected.

H1: The beta calculated for the time period is not equal to the latest 1 year beta collected.

7. To check whether the stocks are undervalued or overvalued

H0: Significant number of stocks within the Bank Nifty Index are overvalued

H1: Significant number of stocks within the Bank Nifty Index are undervalued.

8. To check the relation between the individual stocks

H0: The individual securities move along the same line as each other.

H1: The individual securities do not move along the same line as each other.

9. To check the level of variance of the Individual stocks on the market

H0: There is a significant level of variance between the dependent individual stocks and the market(Bank Nifty Index)

H1: There is no a significant level of variance between the dependent individual stocks and the market(Bank Nifty Index)

10. To check whether the symmetricity of the data

H0: Most of the individual securities are positively skewed

H1: Most of the individual securities are negatively skewed

5.5 Statistical tools

Correlation:

In order to understand whether the individual securities within the Bank Nifty Index rely on the market and move along with the market, correlation of the two variables is to be done for the purpose of understanding the relationship between the two variables.

Regression:

By finding regression of the time series data, r square calculated can help analyze the amount of proportion of variance in the dependent variable (the individual securities within the Bank Nifty Index) which can be predicted from the independent variables, in this case the Bank Nifty Index.

Dickey-Fuller test:

In order to forecast or predict any values for a time series data, it is necessary to analyze whether the data of the selected time series is stationary or not or whether it has unit root or not. In order to check the stationarity of the data, mean of the time series is check but for a better reliable test, the Dickey Fuller test is carried out. Since non-stationarity leads to unreliable forecasted values, it is required to have a stationary data set. A unit root is when the future performance of the variables is reliable on the previous realizations with the coefficient of 1 or close to 1. If the t-stat values are significantly negative, then there is no unit root and hence the data is stationary.

(Davies, 2003)

Descriptive Statistics:

The statistical analysis done though descriptive statistics helps resulting in basic statistical outputs such that the mean, median, and mode of the selected series only with the variability metrics that basically include the variance, standard deviation, minimum and maximum variables along with skewness and kurtosis of the same series. It gives the descriptive coefficient results that is the summary of the data set.

One-Way ANOVA Test:

This test is carried out in order to analyze whether there is some level of deviation in the data set that has been considered in the study. This test has been done for the purpose of analyzing whether there is a significant amount of deviation between the actual returns and the expected returns that have been calculated using CAP-Model.

5.6 Limitations of the study

The selected sample size doesn't consider all the banks in the banking industry and is limited to the Bank Nifty Index. As it is assumed that if most of the banks have CAPM proven to be valid, then CAPM would be valid for even the banks that align with the factors that influence these banks with them.Not all investors prefer using CAPM to calculate the expected return on the investment as the model chosen for the purpose of this study is based on the traditional approach that considers that the only factor that influences the returns of the individual securities is the market that the security falls in. In this case the individual securities are the 12 companies under the bank nifty index and the market is the Bank Nifty Index.

The market was highly volatile in the period between November 2019 and march 2020 due to the COVID 19 Pandemic which might cause deviations in the results as it has drastically lead to a decrease in returns during that period. The effect of NPA's during that period would have caused prices of the stocks to fluctuate, thereby affecting its returns.The number of observations of the trading days for a few banks under the bank nifty index are less than others namely, RBL Bank (885), IDFC First Bank (1085), Bandhan Bank (496) whereas State Bank of India, PNB, BOB , Federal Bank, Kotak Mahindra Bank, IndusInd Bank, ICICI Bank, HDFC Bank and Axis Bank have 1235 observed traded days in the selected time period.

5.7 Analysis and Interpretation

To Check the stationarity of the Market, that is the Bank Nifty Index:

H0: The mean of the market return is closer or equal to the value 0-zero and is stationary.

H1: The mean of the market return is not closer or equal to the value 0-zero and is not stationary.

Basis	Bank Nifty (Rm)
Dickey-Fuller Unit Root Test	
Coefficient	-0.9639
Standard error	0.0285
T-stat	-33.8406
Descriptive Statistics	
Standard Deviation	0.0137
Mean	0.0001

(Table 5.1: Testing the Stationarity of the Bank Nifty Index, Rm)

The T-stat value of the Bank Nifty Index is -33.84 which is significantly less than 1. The Dickey Fuller Unit Root test explains that if the T-stat value is significantly negative, then there is no unit root in the selected data and hence the data is stationary (Davies, 2003). The other way to check the stationarity of the data is the check whether the mean is less than or almost equal to 0. Since the standard deviation is less than 0.05 and its mean are almost equal to 0, H0 is accepted and H1 is rejected, hence the data of the market Bank Nifty Index is stationary , therefore reliable and valid.

To Check the stationarity of the Individual securities within the Bank Nifty Index:

H0: The mean of the individual security return is closer or equal to the value 0-zero and is stationary.

H1: The mean of the individual security return is not closer or equal to the value 0-zero and is not stationary.

Basis	Dickey-Fuller Unit Root Test			Descriptive Statistics	
	Coefficient	Standard error	T-stat	Standard Deviation	Mean
The State Bank of India	-1.0081	0.0285	-35.4161	0.0232	0.0000
Punjab National Bank	-0.9493	0.0284	-33.3976	0.0298	-0.0008
Bank of Baroda	-1.0487	0.0284	-36.8831	0.0288	-0.0005
Federal Bank	-0.9859	0.0285	-34.6444	0.0279	-0.0005
RBL Bank	-0.9231	0.0335	-27.5355	0.0279	-0.0005
Kotak Mahindra Bank	-1.0150	0.0284	-35.6831	0.0217	0.0003
IndusInd Bank	-0.9377	0.0284	-33.0070	0.0254	-0.0005
IDFC First Bank	-0.9352	0.0303	-30.9159	0.0241	-0.0008
ICICI Bank	-1.0033	0.0285	-35.2442	0.0212	0.0002
Bandhan Bank	-0.8783	0.0446	-19.6902	0.0392	-0.0010
Basis	Dickey-Fuller Unit Root Test			Descriptive Statistics	
	Coefficient	Standard error	T-Stat	Standard Deviation	Mean
HDFC Bank	-1.0789	0.0284	-38.0200	0.0190	0.0001
Axis Bank	-0.9681	0.0285	-34.0238	0.0211	-0.0001

(Table 5.2: Testing the stationarity of the individual securities within the Bank Nifty Index)

The T-stat value of all the 12 securities within the Bank Nifty index is significantly less than 1. The Dickey Fuller Unit Root test explains that if the T-stat value is significantly negative, then there is no unit root in the selected data and hence the data is stationary (Davies, 2003). The other way to check the stationarity of the data is the check whether the mean is less than or almost equal to 0. Since the standard deviation is less than 0.05 and its mean are almost equal to 0, H0 is accepted and H1 is rejected, hence the data of the market Bank Nifty Index is stationary , therefore reliable and valid.

To Check the stationarity of the Rf calculated, based on the 91 T-Bill yield:

H0: The mean of Rf calculated is closer or equal to the value 0-zero and is stationary.

H1: The mean of Rf calculated is not closer or equal to the value 0-zero and is not stationary.

Basis	Rf (91days T-bill)
Descriptive Statistics	
Standard Deviation	0.0054
Mean	0.0721

(Table 5.3: Testing the stationarity of Rf Calculated)

Since the Standard deviation is less than 0.05 and the mean of the Rf calculated is also less than 0, hence the data collected for the purpose of calculation of the Risk free rate of return using the 91 days T-bill yield is stationary. H0 is accepted and H1 is rejected as the data is stationary and therefore it is reliable.

To Check the validity of CAPM:

Since the previous tests have proved that the data collected for the time period between 1st April 2015 and 31st March 2020 is stationary with respect to the individual securities within the Bank Nifty Index, the market (Bank Nifty Index) and the Risk free rate calculated, it was possible to calculate the Capital Asset Pricing Model for the selected data, using the closing prices of the market and the individual securities.

H0: There is no significant amount of deviation between the expected returns(CAPM) calculated and actual returns

H1: There is a significant amount of deviation between the expected returns(CAPM) calculated and actual returns

Banks in Bank Nifty Index	Actual Return (Mean)	Expected Return (CAPM)	Deviation
HDFC Bank	0.0001	0.0171	-0.0170
Kotak Mahindra Bank	0.0003	0.0110	-0.0107
IDFC First Bank	-0.0008	0.0004	-0.0012
RBL Bank	-0.0005	-0.0069	0.0064
Punjab National Bank	-0.0008	-0.0089	0.0081
Federal Bank	-0.0005	-0.0099	0.0094
IndusInd Bank	-0.0005	-0.0105	0.0100
Axis Bank	-0.0001	-0.0117	0.0116
Bank Of Baroda	-0.0005	-0.0165	0.0159
ICICI Bank	0.0002	-0.0173	0.0175
State Bank of India	0.0000	-0.0177	0.0177
Bandhan Bank	-0.0010	-0.0192	0.0182

(Table 5.4: The actual and expected return of the individual securities)

On the basis of the CAPM calculated using the Bank Nifty Index as the market return, beta calculated using the Covariance of Rm and Ri with the Variance of Rm, it is observed that the model is not valid for all the individual securities but for only a few. As seen in the above table (Table 4.4), it is observed that RBL Bank (0.0064), IDFC First Bank (-0.0012), Federal Bank (0.0094), HDFC Bank (-0.017), Kotak Mahindra Bank (-0.0107) and the Punjab National Bank(0.0081) have the least amount of deviation from actual returns and expected returns. Hence H0 is rejected and H1 is accepted as there is significant amount of deviation between actual and expected returns.

To Check the correlation between the Bank Nifty Index and the individual securities within the index:
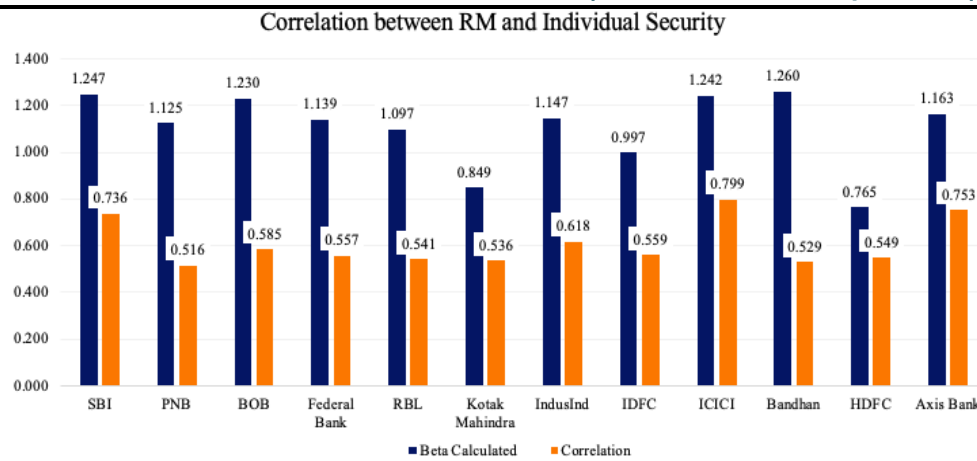
H0: Bank Nifty Index and the individual security are significantly positively correlated

H1: Bank Nifty Index and the individual security are not significantly positively correlated

Basis	Beta Calculated	Correlation
Punjab National Bank	1.125	0.516
Bandhan Bank	1.260	0.529
Kotak Mahindra Bank	0.849	0.536
RBL Bank	1.097	0.541
HDFC Bank	0.765	0.549
Federal Bank	1.139	0.557
IDFC First Bank	0.997	0.559
Bank Of Baroda	1.230	0.585
IndusInd Bank	1.147	0.618
State Bank of India	1.247	0.736
Axis Bank	1.163	0.753
ICICI Bank	1.242	0.799

(Table 5.5: Correlation Between Rm (Bank Nifty Index) and individual securities)

As seen in the above table and chart below (Figure 4.1), there is positive correlation between the Bank Nifty Index and the individual securities within the index. The security that is most correlated (closest to 1) is ICICI Bank and hence is the most correlated to the Bank Nifty Index. The calculation of beta explains by how much more or less the individual security moves along with the market and the correlation explains the relationship between the two variables. Hence H0 is accepted and H1 is rejected.

(Figure 5.1: Correlation Between Rm (Bank Nifty Index) and individual securities)

To check the beta calculated and the Latest 1 year beta collected are equal

H0: The beta calculated for the time period is equal to the latest 1 year beta collected.

H1: The beta calculated for the time period is not equal to the latest 1 year beta collected.

Basis	BetaNSEBankNifty_Latest_1Y	Beta Calculated
State Bank of India	0.920	1.247
Punjab National Bank	0.600	1.125
Bank Of Baroda	0.800	1.230
Federal Bank	1.110	1.139
RBL Bank	1.080	1.097
Kotak Mahindra Bank	0.830	0.849
IndusInd Bank	1.410	1.147
IDFC First Bank	0.920	0.997
ICICI Bank	1.170	1.242
Bandhan Bank	1.200	1.260
HDFC Bank	0.840	0.765
Axis Bank	1.270	1.163

(Table 5.6: Comparative Table of Beta Calculated and Beta Collected from Ace Analyzer)

The Latest 1 year beta value has been collected from Ace Analyzer and the beta calculated is calculated for the time period specific to the analysis which may or may not be equal. Hence based on the table below (Table 4.6), the latest 1 year beta value is more or less equal to the beta calculated but it is not exactly equal to each other. Hence H0 is rejected and H1 is accepted.

To check whether the stocks are undervalued or overvalued

H0: Significant number of stocks within the Bank Nifty Index are overvalued

H1: Significant number of stocks within the Bank Nifty Index are undervalued.

Based on the previous studies, it is observed that stocks that have negative mean values are said to be overvalued and the means that have a positive value are said to be undervalued. That is if the Bank Nifty Index has beta greater than 1, then the stocks that are overvalued, will have greater returns when compared to the ones that are undervalued (Amit, 2016).

Banks in Bank Nifty Index	Actual Return (Mean)	Under/ Overvalued
HDFC Bank	0.0001	undervalued
Kotak Mahindra Bank	0.0003	undervalued
IDFC First Bank	-0.0008	overvalued
RBL Bank	-0.0005	overvalued
Punjab National Bank	-0.0008	overvalued
Federal Bank	-0.0005	overvalued
IndusInd Bank	-0.0005	overvalued
Axis Bank	-0.0001	overvalued
Bank Of Baroda	-0.0005	overvalued
ICICI Bank	0.0002	undervalued
State Bank of India	0.0000	undervalued
Bandhan Bank	-0.0010	overvalued

(Table 5.7: Individual securities based on valuation)

Based on the table above, a significant number of securities are overvalued. Since 4 out of 12 stocks under the Bank Nifty Index are undervalued, H0 is accepted and H1 is rejected.

To check the relation between the individual stocks

H0: The individual securities move along the same line as each other.

H1: The individual securities do not move along the same line as each other.

On the basis of the table 4.7, the means of the individual securities are not equal to each other and the stocks valuation with respect to the market have a different valuation with respect to each one of them. Based on the ANOVA calculated, the *p-value*s of the individual securities is significantly more than 0.05. Hence all the securities in the Bank Nifty Index have different internal factors influencing them apart from the market. Therefore H0 is rejected and H1 is accepted. Since the means are almost equal it can be considered that they don't entirely move along the same line, but definitely move close to each other with a significant amount of volatility.

To check the level of variance of the Individual stocks on the market

H0: There is a significant level of variance between the dependent individual stocks and the market (Bank Nifty Index)

H1: There is no a significant level of variance between the dependent individual stocks and the market (Bank Nifty Index)

Regression Statistics	Multiple R	R Square	Adjusted R Square	Standard Error	Observations
ICICI Bank	0.799	0.638	0.638	0.013	1235
Axis Bank	0.753	0.568	0.567	0.014	1235
State Bank of India	0.736	0.542	0.541	0.016	1235
IndusInd Bank	0.618	0.382	0.381	0.020	1235
Bank Of Baroda	0.585	0.342	0.341	0.023	1235
IDFC First Bank	0.559	0.313	0.312	0.020	1085
Federal Bank	0.557	0.311	0.310	0.023	1235
HDFC Bank	0.549	0.302	0.301	0.016	1235
RBL Bank	0.541	0.292	0.291	0.023	885
Kotak Mahindra Bank	0.536	0.287	0.287	0.018	1235
Regression Statistics	Multiple R	R Square	Adjusted R Square	Standard Error	Observations
Bandhan Bank	0.529	0.280	0.278	0.033	496
Punjab National Bank	0.516	0.266	0.265	0.026	1235

(Table 5.8: Level of Variance of Individual stocks within the Bank Nifty Index)

R Square is used to understand the proportion of the variance of the dependent variable as seen in the independent variable, as seen in the above table, all the securities have a significant amount of r-square variations, mostly seen in the ICICI Bank, Axis Bank, State Bank of India, IndusInd Bank and Bank of Baroda. Hence H0 is accepted and H1 is rejected. The most amount of variation is seen in ICICI Bank at 0.638 that is 63%. Since an r-square value of even 0.5 is considered relatively strong, the first three securities in the above table are relatively strong as they move along with the Index (Bank Nifty Index).

To check whether the symmetricity of the data

H0: Most of the individual securities are positively skewed

H1: Most of the individual securities are negatively skewed

| Basis	Standard Deviation	Sample Variance	Kurtosis	Skewness	Range
HDFC Returns	0.0190	0.0004	380.5144	-14.6261	0.6127
Kotak Mahindra Returns	0.0217	0.0005	240.4704	-10.3807	0.6230
Federal Returns	0.0279	0.0008	96.6337	-5.1593	0.7006
Axis Bank Returns	0.0211	0.0004	27.1843	-2.0165	0.3712
Bank Nifty (Rm)	0.0137	0.0002	24.4827	-1.7351	0.2505
RBL Returns	0.0279	0.0008	11.6793	-1.3722	0.3649
IDFC Returns	0.0241	0.0006	6.0991	-0.3125	0.2733
ICICI Returns	0.0212	0.0005	8.1042	-0.0249	0.3254
Bandhan Returns	0.0392	0.0015	26.3880	1.4491	0.6434
SBI Returns	0.0232	0.0005	20.1412	1.4533	0.4115
BOB Returns	0.0288	0.0008	18.4891	1.5451	0.4781
IndusInd Returns	0.0254	0.0006	92.7768	2.6014	0.6840
PNB Returns	0.0298	0.0009	47.9369	2.8466	0.5842

(Table 5.9: Symmetricity of the returns)

Skewness and kurtosis is a test used to check the amount of risk that the investors might incur through the investment in the particular stock. Most of the securities in the Bank Nifty Index are negatively skewed, hence H0 is rejected and H1 is accepted. Stocks that are negatively skewed generate frequent small positive returns and few extreme or significant amount of losses. The ones that are positively skewed generate higher returns are termed to be known as more risky when compared to others. Positive skewness along with low kurtosis depicts stocks that have a better probability of giving more returns, which is seen in Bandhan Bank, State Bank of India and IndusInd Bank.

VI. RESULTS AND DISCUSSION

The traditional Sharpe's Capital Asset Pricing model has proven to be valid for 6 companies out of the 12 listed companies under the Bank Nifty Index of the Indian Stock Market. It is not important that the model would be valid for all the securities that fall under the index as it has been proven if previous published articles that it is possible for it to be applicable for a few instead of all the securities under the index (Sohail, 2013). In other studies, it has also been concluded that the model is not valid and applicable in the Indian context as it did not do justice in analyzing the cross sectional returns of the Indian stock market with respect to even the NSE 500 index. (Pankaj, 2016)
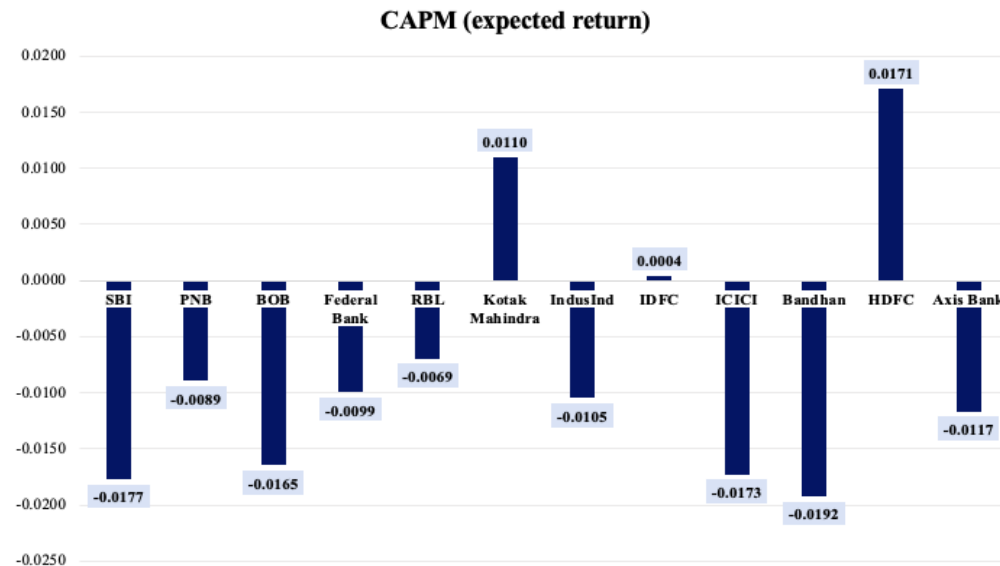
(Figure 6.1: CAPM Calculated)

Even though it was proven in favor of the Bank Nifty index, this was not seen when favorable while analyzing whether all the 12 securities within the index influence each other the way the Bank Nifty Index influences the 12 securities. The ANOVA tables concluded that the p-value for all the 12 securities are significantly more than 0.05 and hence the shift in the prices of one security in the index will not impact any of the other 11 securities within the index unless they share the similar factors that could influence them. There is a slight amount of deviation between the actual returns and the expected returns that have been calculated. This could be either be due to investors that are behaviouralists, that is the one who would lead the downward shift in prices of the stocks during though times and increase in stock value during good times and it the model could also fail due to unrealistic assumptions in the CAP-Model (Fama, 2004).

Since there is no way to control the biasness of behviouralists it is important for the investors in the stock market to think rationally in order to create an efficient market concern. On the basis of the correlation calculated in order to understand whether the individual stocks are positively correlated to the Bank Nifty Index, it was proven that they are positively correlated and a shift in the Bank Nifty Index would lead to a shift in the stocks of the individual securities. All the beta values calculated for the period from 1st April 2015 till 31st March 2020 that are greater than 1 indicate that those securities, namely the State Bank of India (1.247), Punjab National Bank(1.125) Bank Of Baroda(1.230), Federal Bank(1.139) RBL Bank (1.097) IndusInd Bank(1.147), ICICI Bank (1.242), Bandhan Bank (1.260) and Axis Bank (1.163) move along the same direction of the Bank Nifty Index but give greater amount than the market returns and are also highly affected by new information and are more risky in terms of investment. Securities with Beta lesser than 1 also move along the same direction as the Bank Nifty Index in this case namely, Kotak Mahindra Bank(0..849) IDFC First Bank(0.997) and HDFC Bank(0.765) but these securities are less volatile as they generate less returns alongside the shift in the Index.

As seen in the Table 5.9, most of the securities within the index and the Bank Nifty Index itself are negatively skewed with varied kurtosis, it is due the large shift in the market returns during the period between November 2019 and march 2020 due to the COVID 19 Pandemic that led to negative returns with respect to many industries and not only with respect to the Indian Banking sector. The amount of skewness of a security is said to add to the portfolio as the market moves that leads to a higher moment in CAPM. Apart from using skewness and kurtosis as told to analyze the amount of risk that is associated with a particular security, investors also use standard deviation and variance calculations. Low standard deviation indicates low volatility as seen in the Table 5.2. The R square seen in the correlation charts attached in the appendix will help understand the exact amount of variation in the particular security when there is a shift in the index along with the linearity of the returns of the individual securities.

6.1 RECOMMENDATIONS

The Traditional Capital Asset Pricing Model considers that all the securities are only influenced by increase or decrease in the prices caused due to shift in the market alone, it does not factor in individual factors or even considers risk into account. There have been modifications seen to this model and has also been analyzed but investors still choose this method as it is easier to calculate. Instead of using the traditional method, investors can consider the modified models such as Fama-French five factor model that considers momentum, quality and low volatility among the other factors or the three factor model that considers size risk and value risk factors to the market risk factors. The Fama-French three factor model formula is as follows:

Formula: $R_{it} - R_{ft} = \alpha_{it} + \beta_1 \times (RM_t - R_{ft}) + \beta_2 SMB_t + \beta_3 HML_t + \epsilon_{it}$

where: R_{it} = total return of a stock or portfolio i at time t

R_{ft} = risk free rate of return at time t

RM_t = total market portfolio return at time t

$R_{it} - R_{ft}$ = expected excess return

$RM_t - R_{ft}$ = excess return on the market portfolio (index)

SMB_t = size premium (small minus big)

HML_t = value premium (high minus low)

$\beta_{1,2,3}$ = factor coefficients

Since studies have expressed the CAPM is not valid in the Indian Stock Market (Pankaj, 2016) and the concern about how the Indian investors are highly influenced by behaviouralists (Fama, 2004) that cause shifts in the stock market, it is important to have established a study that would consider such patterns of these investors. Maybe the investor can analyse the expected return by associating weights with respect to the factors such as risk and volatility of the market with the expected return calculated, by doing this, the investor would have considered risk as a factor that is not considered in the traditional Capital asset pricing model.

Apart from the type of analysis that is done to generate the expected returns, the time period that is taken for the analysis is equally very important as the shift in data could be highly influenced by the economic conditions of the nation at the time of analysis or at any time between the period considered. Such as the time period considered for the purpose of this study was influenced by the fall in not only the Indian Stock Market but all the stock markets throughout the world that was caused to the Covid-19 pandemic. Hence the investors should have expected that the expected returns would be significantly less due to the drastic fall in the returns of the securities within the index due to external factors.

VII CONCLUSION

The Capital Asset pricing Model is not valid or applicable for all the 12 securities within the Bank Nifty Index but only for 6 securities with a deviation between the actual returns and expected returns less than 1 namely, HDFC Bank, Kotak Mahindra Bank, IDFC First Bank, RBL Bank, Punjab National Bank and Federal Bank. It was not applicable for the other 6 securities which could either be because of internal factors that affected the returns and growth of the companies or because of the assumptions considered in the calculation of CAPM. Hence the companies that align with the companies that have proven CAPM to be valid in their context could also have CAPM applicable to them, the companies could be any of the banks under the Indian Banking sector that are listed in the Indian stock exchange as the study shows that the sample of the securities within the Bank Nifty Index are positively correlated to the Bank Nifty Index. Therefore with consideration to the sample, it can be concluded that all the other listed securities would also move in the same direction as the market concern under the listed companies of the Indian Banking sector.

REFERENCES

Amit Kundu C.K. Mukhopadhyay (January - June 2016) "*Capital Asset Pricing Model and India Stock Market with Autoregressive Integrated Moving Average Model*" Delhi Business Review Vol. 17, No. 1

Joel M. Vanden (2004) "*Options Trading and the CAPM*" The Review of Financial Studies, Volume 17, Issue 1, January 2004, Pages 207–238

Marie-Claude Beaulieu, Jean-Marie Dufour, Lynda Khalaf (2013) *"Identification-Robust Estimation and Testing of the Zero-Beta CAPM"* The Review of Economic Studies, Volume 80, Issue 3, July 2013, Pages 892–924.

Mallick, Soumitra K; Sarkar, Amitava; Roy, Kalyan K; Chakraborty, Anjan; Duttachaudhuri, Tamal (2007) "*A mathematical statistical pricing model for emerging stock markets*" Journal of Asset Management; London Vol. 7, Iss. 5, (Jan 2007): 335.

Khurshid Khudoykulov (2020) "*Asset-pricing models: A case of Indian capital market*" Cogent Economics & Finance; London Vol. 8, Iss. 1, (Jan 2020).

Koch, Stefan; Westheide, Christian (2013) "*The Conditional Relation Between Fama-French Betas and Return*" Schmalenbach Business Review : ZFBF; Düsseldorf Vol. 65, Iss. 4, (Oct 2013): 334-358.

Celik, Saban (2012) "*Theoretical and Empirical Review of Asset Pricing Models: A Structural Synthesis*" International Journal of Economics and Financial Issues; Mersin Vol. 2, Iss. 2, (2012)

Taneja, Yash Pal (2010) "*Revisiting Fama French Three-Factor Model In Indian Stock Market*" Vision; Gurgaon Vol. 14, Iss. 4, (Oct-Dec 2010): 267-274.

Attanasio, Orazio P; Paiella, Monica (2006) "*Intertemporal Consumption Choices, Transaction Costs and Limited Participation to Financial Markets: Reconciling Data and Theory*" NBER Working Paper Series; Cambridge, Aug 2006.

Machado, Octavio Portolano; Bortoluzzo, Adriana Bruscato; Martins, Sérgio Ricardo; Sanvicente, Antonio Zoratto.Revista Brasileira de Finanças (2013) "*Inter-temporal CAPM: An Empirical Test with Brazilian Market Data (CAPM Intertemporal: Um Teste Empírico Utilizando Dados Brasileiros)*" Rio de Janeiro Vol. 11, Iss. 2, (Jun 2013): 149-180.

Rizwan, Sohail; Shaikh, Saahar Jabeen; Shehzadi, Mehwish (2013) "*Validity Of Capital Assets Pricing Model (Capm): Evidence From Cement Sector Of Pakistan Listed Under Karachi Stock Exchange*" Kuwait Chapter of the Arabian Journal of Business and Management Review; Kuwait City Vol. 2, Iss. 6, (Feb 2013): 66-81.

Hwang, Tienyu; Gao, Simon; Owen, Heather. (2012) *"A two-pass model study of the CAPM: evidence from the UK stock market"* Studies in Economics and Finance; Bradford Vol. 29, Iss. 2, (2012): 89-104.

Rathnasekara, Ravi Dilantha (2017) "*Testing Stock Market Efficiency And The Asset Pricing Model: Some Evidence From Sri Lanka*" The Journal of Developing Areas; Nashville Vol. 51, Iss. 4, (Fall 2017): 317-330.

Sreenu, Nenavath (2016) "*A Study of Advance Capital Assets Pricing Model (CAPM) and Three Factor Model of FAMA*": The France Context IPE Journal of Management; Hyderabad Vol. 6, Iss. 2, (Jul/Dec 2016): 1-19.

Shih, Yi-cheng; Chen, Sheng-syan; Lee, Cheng-few; Chen, Po-jung. (2014) "*The evolution of capital asset pricing models*" Review of Quantitative Finance and Accounting; New York Vol. 42, Iss. 3, (Apr 2014): 415-448. DOI:10.1007/s11156-013-0348-x

Son-Turan, Semen Kilic, Erdem (2018) *"X-CAPM Revisited: The Institutional Extrapolative Capital Asset Pricing Model (I-X-CAPM)"* MEF University, Turkey . Eurasian Journal of Business and Management ; Istanbul Vol. 6, Iss. 3, (2018): 1-9.

Novak, Jiri; Petr, Dalibor (2010) "*CAPM Beta, Size, Book-to-Market, and Momentum in Realized Stock Returns*" Finance a Uver ; Prague Vol. 60, Iss. 5, (2010): 447-460.

Yu, Huang Xian (2017) "*Capital Asset Pricing Model – investigation and Testing*" Department of Finance, Chu Hai College of Higher Education, Hong Kong . Journal of Applied Finance and Banking ; Athens Vol. 7, Iss. 6, (2017): 85-97.

Fama, Eugene F; French, Kenneth R. (2004) "*The Capital Asset Pricing Model: Theory and Evidence*" The Journal of Economic Perspectives; Nashville Vol. 18, Iss. 3, (Summer 2004): 25-46.

Ammann, Manuel; Steiner, Michael (2008) "*Risk Factors for the Swiss Stock Market*" Swiss Journal of Economics and Statistics; Lausanne Vol. 144, Iss. 1, (Jan 2008): 1-35.

Aruna R. Shet (2015) *"Technological Innovations in Indian Banking Sector"* (International Journal of Scientific Engineering and Research (IJSER), Impact Factor (2015): 3.791

Bakshi, Avijit; Mitra, Somen. (2020) "*ROLE OF IBC IN NPA RESOLUTION IN INDIA*" Prestige International Journal of Management and Research; Indore Vol. 11, Iss. 3: 106-112.

Bindlish, Mohit; Pooja. (2013) "*CHALLENGES FACED BY INDIAN BANKING INDUSTRY*" International Journal of Management Research and Reviews; Meerut Vol. 3, Iss. 7: 3168-3177.

Kumar, Mohit; Singh, Amit Kumr. (2016) "*US Subprime Crisis, Contagion and Inter-linkages between Indian Stock Market and Stock Markets of China and USA: An Empirical Analysis*" Splint International Journal of Professionals: A Quarterly Peer Reviewed Multi-Disciplinary International Journal; Bhubaneswar Vol. 3, Iss. 4: 136-142.

Reddy, Sriharsha K; Babu, Sarat A (2018) "*ANNOUNCEMENT OF PAYMENT BANKS AND STOCK PERFORMANCE OF COMMERCIAL BANKS IN INDIA*" Journal of Internet Banking and Commerce; Ottawa Vol. 23, Iss. 1: 1-12.

S Balaji Iyer; Bhaskar, R Kumar. (2002) "*Investor's psychology: A study of investor behaviour in the Indian capital market*" Finance India; Delhi Vol. 16, Iss. 4: 1357-1375.

Sudha, S. (2015) "*Risk-return and Volatility analysis of Sustainability Index in India Environment, Development and Sustainability*"; Dordrecht Vol. 17, Iss. 6: 1329-1342.

Pankaj Chaudhary (2016) "*TESTING OF CAPM IN INDIAN CONTEXT*" Business Analyst, ISSN 0973-211X, 37(1) 1-18, SRCC

Davies, Pl; Krämer, W. (2003) *"THE DICKEY-FULLER TEST FOR EXPONENTIAL RANDOM WALKS"* Econometric Theory; Cambridge Vol. 19, Iss. 5: 865-877.