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An Empirical Study of Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT) in Determining the Expected Return Accuracy Level

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ABSTRACT
This study covers the two important models of pricing of securities: CAPM and APT which provides information to the investor the securities is beneficial or not from investment point of view. This study aims to examine the accuracy levels of the CAPM and APT approaches, as well as identify the suitable stocks to be chosen based on each approach. Additionally, it uses Mean Absolut Deviation (MAD) to ascertain the accuracy level of the projected return of the stock. From the calculation of expected return in CAPM and APT, there are 5 eligible stocks to be selected either based on CAPM and APT methods such as: TCS.NS, ASIANPAINT.NS, HCLTECH.NS. INFS, WIT.NS MAD APT method is more accurate than MAD CAPM in determining the expected return. Comparative analysis reveals no discernible difference between the accuracy of the APT and CAPM approaches for predicting a company's stock return on the National Stock Exchange (NSE) of India. The selection of sample size of the study is top 15 companies listed in Nifty-50 index on the basis of market Capitalization. These companies are represents the various segment of Indian economy.
Keywords: CAPM, APT, NSE, Security Market, Portfolio

JEL CLASSIFICATION: G1, G120, G120, G110

I. Introduction

The CAPM was introduced by Jack Treynor (1961, 1962), William F. Sharpe (1964), John Lintner (1965) and Jan Mossin (1966) independently, building on the earlier work of Harry Markowitz on diversification and modern portfolio theory. For their combined contributions to the field of financial economics, Sharpe, Markowitz, and Merton Miller were awarded the 1990 Nobel Memorial Prize in Economics. Another type of CAPM, known as Black CAPM or zero-beta CAPM, was created by Fischer Black in 1972 and does not include the assumption that there is a riskless asset. This version was more resilient to empirical testing and played a significant role in the CAPM's broad adoption. The Capital Asset Pricing Model (CAPM) refers to the model that explains the relationship between expected return and risk of investing in security (asset). This model is widely used throughout finance for pricing risky securities and producing expected returns for assets given the risk of those assets and cost of capital. According to the CAPM, the investor needs to make up for risk and time value of money. According to the time value of money, money has a greater current value than it will have in the future. As a result, an investor receives compensation for allocating a particular sum of money over time to a particular investment. Another part of the formula consists of a risk. The additional risk that an investor takes on by placing his money in a specific investment needs to be compensated for. The systematic risk is represented by beta (β).

The amount of risk that a prospective investment will add to a portfolio that mimics the market is indicated by its beta. A stock will have a beta greater than one if it is riskier than the market. The formula assumes that a stock will lower portfolio risk if its beta is less than one. The market risk premium, or the anticipated return from the market above the risk-free rate, is then multiplied by the beta of a stock. The product of the market risk premium and the stock's beta is then increased by the risk-free rate. An investor should be able to determine the asset's value using the required return or discount rate obtained from the outcome.

The Capital Asset Pricing Model, or CAPM, is a widely used model for calculating equity cost. According to the CAPM, security returns are correlated with market portfolio returns in the following ways:

$$Ri = Rf + \beta i(Rm - Rf)$$

Ri = the return on the security;
Rf = the risk free rate of return;
βi = the sensitivity of the security to the returns on the market portfolio;
Rm = return on the market portfolio.

However many anomalies of the CAPM have been reported. Basu (1977) reported that firms with low price-earnings ratio yielded higher sample return and firms with higher price-earnings ratio produced lower returns than that justified by beta. Banz (1981) found that average returns on low market equity stocks are too high given their beta estimates.
Arbitrage is the use of securities mispricing to generate gains without taking any risks. This indicates that arbitraging actions generate a profit by purchasing and selling assets that are overvalued or undervalued when the market is inefficient, but they do not result in increased risk or excessive investment. If arbitraging is permitted in the real world, its effects will lead to market balancing once more, eliminating the opportunity for arbitrage and causing the pricing of securities to regress to an equilibrium that is consistent with the core ideas of capital market theory. (Bodie, Kane & Marcus, 2009, p.319).

A straightforward illustration of an arbitrage opportunity is when a single stock trades on two separate stock exchanges, resulting in a price discrepancy for the same stock. Investors may profit if they exploit this point to purchase and sell the stock on the two stock exchanges; this is known as arbitrage. Investors cease arbitrage when the disparate prices approach parity. (Bodie, Kane & Marcus, 2009, p.325). Stephen A. Ross introduced Arbitrage Pricing Theory (APT) in 1976. According to the arbitrage approach, the market mean and variance are not the only macroeconomic factors that determine an asset's expected return; rather, the change sensitivity of each factor indicates that, in the context of arbitrage pricing theory, an asset's expected return is derived from a multifactor or index that includes various sources of risk. The APT model won't result in arbitrage and can offer a more accurate expected return value. The APT model's equation is represented by a linear function against the subsequent factors:

$$Ri = Rf + \beta 1\ (R1-Rf) + \beta 2\ (R2-Rf) + \ldots + \beta n\ (Rn-Rf)$$

Ri = Expected Return of Stock
Rf = Risk Free Return
Ri-n = Expected Return of factors that affecting stocks
βin = Return sensitivity of stock I to stock n to the factors that influence it

Even though the CAPM serves as the basis for asset pricing, some researchers consistently criticize it because they believe there are a few key reasons why it should not be used. One such reason is that it demands the market portfolio to encompass all assets, including those that incorporate both financial and non-financial companies. But in empirical financial tests just only a part of them is observed and calculated (Keith, 1998, p.164); and the CAPM just tests a single period, for a wide range of observation period especially multi-period, it cannot hold (Roll & Ross, 1980, p.1074). So in 1976 Ross built the Arbitrage Pricing Theory (APT) to overcome the drawbacks of CAPM. The APT model does not require that the market portfolio be mean variance efficient; and it can hold in both the multi-period and single period cases (Roll & Ross, 1980, p.1074). Amanulla and Kamaiah (1997) conducted an empirical test of the APT in India. This work will henceforth be referred to in this paper as AK1997.). The money supply, call money rate, wholesale price index, and index of industrial production were all taken into consideration by the study as common elements in the APT model. The test was run using monthly return data from 53 stocks that were traded from 1987:1 to 1994:5 on The Stock Exchange in Mumbai. Additionally, a subsample period of 1991:1 and 1994:5 was used to test the APT model in order to see if it still holds true during the most recent phase of economic liberalization.

II. REVIEW OF LITERATURE

Chen (1983) performed a direct comparison of the APT and the CAPM. Through his research, he demonstrated that although APT could account for a statistically significant percentage of the variance in the CAPM residual, the CAPM was unable to explain the APT residuals. This is compelling evidence that the cross-sectional variation in asset returns can be better explained by the APT.

Akella and Srinivas (1992) refers to research on the role of interest rates in pricing stock and focuses on bank stock returns, innovation in interest rates, and market value. Since Ross created the Arbitrage Pricing Theory (APT), it has been empirically tested in numerous nations to examine how stock market returns behave. The APT is tested using the statistical method known as factor analysis. Morelli in 1999 attempts to ascertain how factor analysis can be used to examine the hypothesis of structural change in stock market returns. 257 monthly security returns that were listed on the London Stock Exchange between January 1976 and December 1993 were utilized in total.

A 1992 empirical examination of beta conducted by Professors Fama and French seriously questioned the validity of the basic prediction of the CAPM: .average stock returns are positively related to market betas.. They found that the size of a firms market equity (ME). A stock's price times shares outstanding- and book to market equity (BE/ME) .provide a simple and powerful characterization of average stock returns for the 1963-1990 period. Fama and French concluded that the .proper inference seems to be that there is a relation between size and average return, but controlling for size there is no relation between beta and average return. They also found a strong relationship between average returns and book to market equity.

Gupta and Sehgal (1993) have concluded from their studies that the CAPM did not seem to be a good descriptor of security returns in the Indian scenario. Madhusoodanan (1997) tested a sample of 120 scrips traded on the BSE for the period January 1987 to March 1995 and did not find any positive relationship between beta and return. Sehgal (1997) inferred from his study that the CAPM was not a suitable descriptor of asset pricing on the Indian capital market. In his study he found the slope negative but insignificant implying absence of any significant relationship between beta and average return.

It was the observation of **Barua et al., (1994)** that studies on the Indian Capital Market, in general, and asset pricing theories like CAPM and APT, in particular, are either too little or non-existent. Srinivasan (1988) found the CAPM relationship to be valid but reported that a much larger sample was required to draw inferences. His study had covered the period from 1982-1985. Yalawar (1988) studied a sample of 1922 stocks for the period 1963-1982 and found the CAPM to be a good descriptor of security return.

Basu (1977) reported that firms with low price-earnings ratio yielded higher sample return and firms with higher price-earnings ratio produced lower returns than that justified by beta. Banz (1981) found that average returns on low market equity stocks are too high given their beta estimates.

McKiernan (1997) tested the economic importance of income uncertainty in the context of a measured factor arbitrage pricing theory model. He studied the implications of the effect of income uncertainty in the investment climate, importance of generalized autoregressive conditional heteroskedasticity (GARCH) measure of income uncertainty and macro factors of Arbitrage pricing theory.

Su-Jane Chen et al. (1997) in their study used two empirical models to implement the arbitrage pricing theory: the factor loading model (FLM) and the macro variable model (MVM). They compared the ability of these two models to explain real estate returns using equity REIT returns as a proxy. Two tests are performed: a comparison of cross-sectional adjusted-R2's and the Davidson and Mackinnon test. The results show that while the two models perform equally well during the period 1974-1979, the MVM outperforms the FLM over the periods 1980-1985 and 1986-1991. In addition, both models suggest superior financial performance for EREITs relative to other investments in the market during the period 1980-1985.

Mazzariello and Roma (1999) estimated the arbitrage pricing theory (APT) on the Italian Stock Market using the reducedrank regression technique recently proposed by Bekker et al. (1996) they also investigated using the bootstrap method.

Diwani (2010) examined the validity of the CAPM for the Bombay stock exchange. The study has used weekly stock returns from 28 companies listed on the Bombay stock exchange from November 2004 to October 2009. Dividing the data in to 5 subsamples and arrived a better results but still not supportive in favor of the CAPM in the BSE.

Alam et al (2015) this study justify the applicability of CAPM in Chittagong stock exchange. Closing returns of top 30 companies for 5 years have been considered and it is found that the difference between expectation and actual return is very significant at normal risk level. So, any result may mislead the investors to forecast future movement of stocks. The intensity of differences implies that CAPM has no applicability in CSE.

Zeeshan et al (2016) this study states an empirical testing of CAPM in Karachi Stock Exchange (KSE). CAPM does not predict expected return accurately through only measure of one risk factor because there have some other factors in market that affect the expected return. CAPM is sufficient for Pakistani equity market and it has important role to define the expected return empirically. Therefore this study finds the CAPM is valid in case of Karachi Stock Exchange.

Harris et al (2003) estimated ex-ante expected returns for a sample of S&P 500 firms over the period 1983-1998. The ex-ante estimates show a better overall fit with the domestic version of the single-factor CAPM than with the global version, but the difference is small. This finding has no trend in time and is consistent across groups formed on the basis of relative foreign sales. The findings suggest that for estimating the cost of equity, the choice between the domestic and global CAPM may not be a material issue for many large US firm.

III. Methodology of the Study

The population of this research is all stocks listed in the National Stock Exchange, India. Meanwhile, the research samples are selected stocks registered in Nifty Index year 2020 which have the completeness of the data in March 2015 to March 2020. This research is using secondary data that obtained through the website www.yahoofinance.com. The data period used is weekly data for the last 6 years i.e. from March 2015 to March 2020: Reliance Industries Ltd. (RELIANCE.NS), Tata Consultancy Services (TCS.NS), HDFC Bank Ltd. (HDFCBANK.NS), Infosys Ltd. (INFY), Hindustan Unilever Ltd. (HINDUNILVR.NS), ICICI Bank Ltd. (IBN.NS), Housing Development Finance Corporation (HDFC.NS), State Bank of India (SBIN.NS), Bajaj Finance Ltd. (BAJFINANCE.NS), Kotak Mahindra Bank (KOTAKBANK.NS), Wipro Ltd. (WIT.NS), Bharti Airtel Ltd. (BHARTIARTL.NS), Asian Paints Ltd. (ASIANPAINT.NS), HCL Technologies Ltd. (HCLTECH.NS), ITC Ltd. (ITC.NS). The factors that is used in APT Model is Inflation, Exchange Rate and GDP Rate.

3.1 Research Steps

First Step

Calculating Stock Expected Return by using CAPM model: $E(Ri) = Rf + \beta i [(E(Rm) - Rf)]$

Second Step

Calculating Stock Expected Return by using APT model: $Ri = Rf + \beta 1 (R1-Rf) + \beta 2 (R2-Rf) + \ldots + \beta n (Rn-Rf)$

Third Step

Mean Absolute Deviation (MAD) Mean Absolute Deviation is a measure of overall forecasting errors for a model. The MAD value is calculated by taking the sum of the absolute values of each forecasting error divided by the number of data periods (n). Calculating Mean Absolute Deviation (MAD):

$$\text{MAD} = \frac{\sum (\text{Actual} - \text{Prediction})}{\text{N}}$$

Forth Step

Using the Independent Sample t-Test to calculate the difference between CAPM and APT Finding out whether there are variations in the average (mean) between two populations in order to ascertain the average of two samples is the aim of this test.

3.2 Objective of the Study

The objective of this study is to examine the empirical relevance of Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Theory (APT) in determining the Expected return and accuracy level in selected companies which is listed in Nifty 50 index (NSE).

3.3 Hypothesis of the Study

H_0 =There is no significant difference between CAPM expected return accuracy and APT expected return accuracy.
H_1 = There is significant difference between CAPM expected return accuracy and APT expected return accuracy.
The basis for decision making is as follows:

- If the probability is > 0.05, H0 is accepted, if the probability is < 0.05, H0 is rejected.

IV. Data Analysis and Interpretation

Table 4.1 Actual Returns and Beta of the Securities

Serial No.	Company's Name	Actual Return	Beta (β)
1.	RELIANCE.NS	-0.697939656	1.0537
2.	TCS.NS	0.014363523	0.6671
3.	HDFCBANK.NS	0.014256771	1.0667
4.	INFS	0.014557036	0.7296
5.	HINDUNILVR.NS	0.014125456	0.8244
6.	IBN.NS	0.006125549	1.4255
7.	HDFC.NS	0.010589647	1.1386
8.	SBIN.NS	-0.005214125	1.4769
9.	BAJFINANCE.NS	0.03149176	1.7731
10.	KOTAKBANK.NS	0.016223838	0.9679
11.	WIT.NS	0.0156026517	0.4438
12.	BHARTIARTL.NS	0.003122305	0.7666
13.	ASIANPAINT.NS	0.017938887	0.5811
14.	HCLTECH.NS	0.014238489	0.7326
15.	ITC.NS	-0.003637978	0.7811

Table shows the actual return value between - 0.6979 up to 0.0315. The highest actual return value is BAJFINANCE.NS stock while the lowest actual return is RELIANCE.NS stock. The beta company stocks are between 0.4438 and 1.7731. The greater the beta value of the stock, more volatile stock than the market changes. The lowest beta value is WIT.NS stock while the highest beta value is BAJFINANCE.NS stock.

Table 4.2 Expected Return Capital Asset Pricing Model (CAPM)

Serial No.	Company's Name	Actual Return	Beta (β)	Market Return	Risk Free Rate	Expected Return	Alfa(α)
1.	RELIANCE.NS	-0.6979	1.0537	0.7838	0.035	0.5381	-0.15982
2.	TCS.NS	0.0143	0.0671	0.7838	0.035	0.01337	-0.8223

3.	HDFCBANK.NS	0.0142	1.0667	0.7838	0.035	0.5064	-0.4921
4.	INFS	0.0145	0.0296	0.7838	0.035	0.0120	-0.2034
5.	HINDUNILVR.NS	0.0141	0.0244	0.7838	0.035	1.1020	-1.0879
6.	IBN	0.0061	1.425	0.7838	0.035	0.8875	-0.8814
7.	HDFC.NS	0.0105	1.1386	0.7838	0.035	1.1409	-1.1303
8.	SBIN.NS	-0.0052	1.4769	0.7838	0.035	1.362	-1.3679
9.	BAJFINANCE.NS	0.0314	1.7731	0.7838	0.035	0.7597	-0.7282
10.	KOTAKBANK.NS	0.0162	0.9679	0.7838	0.035	0.3673	-0.3510
11.	WIT	0.0156	0.0438	0.7838	0.035	0.0139	-0.603
12.	BHARTIARTL.NS	0.0031	0.7666	0.7838	0.035	0.4701	-0.4670
13.	ASIANPAINT.NS	0.0179	0.0811	0.7838	0.035	0.0135	-0.5656
14.	HCLTECH.NS	0.0142	0.0326	0.7838	0.035	0.1190	-0.6048
15.	ITC.NS	-0.0036	0.78	0.7838	0.035	0.035	0.0313

Under this research study, methodology used to find out the expected returns is by calculating beta (β) through slope. And then expected returns are calculated, and compared with actual returns to find out the differences between actual return and expected return. The sample for the study is top 15 companies listed at NSE based on market capitalization for the time period 2015 to 2020. All computational and analysis work is done on Microsoft Excel 2016. The formula used for finding out the expected rate of return is given as;

$ERp = Rf + \beta p\ (Rm - Rf)$

The stock price or the share prices of the companies, considered for this study, have been taken from the website of NSE. Then CAPM is applied for calculating expected return by using above mentioned formula. The actual return is also calculated by taking the closing prices, subtracting the closing price from the opening price and dividing it by the opening price. The formula is given below:

$$\frac{\text{Closing Price} - \text{Opening Price}}{\text{Opening Price}}$$

Beta was calculated by applying slope (β) = slope (Y, X), where Y represents the company's returns and X represents the market returns. The risk free rate used in the analysis was the rate of Treasury bill taken from website of Reserve Bank of India (RBI).

Table 4.3 Expected Return Arbitrage pricing Theory (APT)

S. No.	R Ex.	R Infla.	R GDP	Rf	Alfa Value	B REx	B Infla	B GDP	Rex -Rf	Infla -Rf	GDP -Rf	E(Ri)
RELIANCE.NS	0.0073	0.018	0.0043	0.035	-0.6393	0.0341	-0.0923	-0.7465	-0.0277	-0.017	-0.0307	0.0585

TCS.NS	0.0073	0.018	0.0043	0.035	0.00716	-0.5208	0.5007	1.1959	-0.0277	-0.017	-0.0307	0.0042
HDFCBANK.NS	0.0073	0.018	0.0043	0.035	-0.0222	-0.1042	-0.0501	0.0742	-0.0277	-0.017	-0.0307	0.0364
INFS	0.0073	0.018	0.0043	0.035	-0.0345	0.0962	-0.1753	-0.4507	-0.0277	-0.017	-0.0307	0.0121
HINDUNILVR.NS	0.0073	0.018	0.0043	0.035	-0.0358	-0.0161	-0.0751	-0.4307	-0.0277	-0.017	-0.0307	0.0499
IBN	0.0073	0.018	0.0043	0.035	-0.0465	-0.0481	-0.4507	-0.2817	-0.0277	-0.017	-0.0307	0.0526
HDFC.NS	0.0073	0.018	0.0043	0.035	-0.0431	0.2885	-0.1502	-0.7887	-0.0277	-0.017	-0.0307	0.0537
SBIN.NS	0.0073	0.018	0.0043	0.035	0.0488	-0.0404	-0.0404	-0.5634	-0.0277	-0.017	-0.0307	0.0541
BAJFINANCE.NS	0.0073	0.018	0.0043	0.035	-0.0456	1.2619	-1.2519	-1.8169	-0.0277	-0.017	-0.0307	0.0771
KOTAKBANK.NS	0.0073	0.018	0.0043	0.035	-0.0384	0.1522	-0.0814	-0.7323	-0.0277	-0.017	-0.0307	0.0546
WIT	0.0073	0.018	0.0043	0.035	-0.0513	0.2083	-0.0251	-0.9014	-0.0277	-0.017	-0.0307	0.0133
BHARTIARTL.NS	0.0073	0.018	0.0043	0.035	-0.5826	0.0641	-1002	0.2817	-0.0277	-0.017	-0.0307	0.5857
ASIANPAINT.NS	0.0073	0.018	0.0043	0.035	0.0156	-0.1923	0.2003	1.1267	-0.0277	-0.017	-0.0307	0.0023
HCLTECH.NS	0.0073	0.018	0.0043	0.035	0.0090	0.0321	0.2745	0.7887	-0.0277	-0.017	-0.0307	0.0052
ITC.NS	0.0073	0.018	0.0043	0.035	0.0241	0.1603	0.1252	0.00197	-0.0277	-0.017	-0.0307	0.0278

From Table 4.3 Exchange rate, Inflation rate, GDP rate and Treasury bill rate values were obtained from the average returns of each factor during the study period. The expected return value based on APT calculation is 0.0042 to 0.0771. The highest expected return value in APT is BAJFINANCE.NS while the lowest expected return value in APT is TCS.NS. There are 3 stocks that have actual return value > expected return in APT: TCS.NS, ASIANPAINT.NS, HCLTECH.NS INFS and WIT. These stocks are eligible stocks to be purchased in APT method because the actual return value of the stocks is greater than the expected value in APT. From the calculation of expected return in CAPM and APT, there are 5 eligible stocks to be selected either based on CAPM and APT methods such as: TCS.NS, ASIANPAINT.NS, HCLTECH.NS. INFS, WIT. Calculating Stock Expected Return by using APT model:

$Ri = Rf + \beta 1\ (R1-Rf) + \beta 2\ (R2-Rf) + \ldots + \beta n\ (Rn-Rf)$

Table 4.4 Mean Absolute Deviation (MAD) CAPM and APT

Company's Name	Actual Return	Eri CAPM	Eri APT	MAD CAPM	MAD APT
RELIANCE.NS	-0.697939656	0.52811872	0.05854208	0.081737225	0.05043212
TCS.NS	0.011363523	0.83374446	0.00420013	0.054825396	0.00047756
HDFCBANK.NS	0.014256771	0.50644448	0.0364601	0.032812514	0.00148022
INFS	0.014557036	0.21800672	0.04915185	0.013563312	0.00230632
HINDUNILVR.NS	0.014125456	1.10204	0.04994516	0.072527636	0.00238798
IBN.NS	0.006125549	0.88758368	0.05264246	0.058763875	0.00310113
HDFC.NS	0.010589647	1.14090272	0.05377504	0.075354205	0.00287903
SBIN.NS	-0.005214125	1.36269728	0.05410226	0.091194094	0.00395443
BAJFINANCE.NS	0.03149176	0.75976352	0.0771065	0.048551451	0.00304098
KOTAKBANK.NS	0.016223838	0.36731744	0.05464947	0.02340624	0.00256171
WIT.NS	0.006026517	0.60903008	0.05732977	0.040200238	0.00342022
BHARTIARTL.NS	0.003122305	0.47012768	0.05857628	0.031133692	0.00369693
ASIANPAINT.NS	0.017938887	0.58357088	0.00233192	0.0377088	0.001040464
HCLTECH.NS	0.014238489	0.619064	0.00523124	0.040321701	0.000600483
ITC.NS	-0.003637978	0.035	0.0278265	0.002575865	0.00209763
Total				0.08431309	0.05252975

From Table 4.4, MAD value based on the CAPM calculation is between 0.002575865 and 0.091194094. The highest MAD value in CAPM is SBIN.NS stock while the lowest MAD value in CAPM is ITC.NS stock. MAD value based on APT calculation is between 0.00047756 and 0.05043212. The highest MAD value in APT is RELIANCE.NS stock while the lowest MAD value in APT is TCS.NS stock. The average of the smallest MAD value is APT; therefore, APT accuracy level is higher than CAPM because APT has the smallest MAD value.

Table 4.5 T-Test: Two-Sample Assuming Equal Variances

	Variable 1	Variable 2
Mean	0.668227444	0.042791384
Variance	0.126439559	0.000518933
Observations	15	15
Pooled Variance	0.063479246	
Hypothesized Mean Difference	0	
Df	28	
t Stat	6.798258424	
P(T<=t) one-tail	1.09935E-07	
t Critical one-tail	1.701130934	
P(T<=t) two-tail	2.19869E-07	
t Critical two-tail	2.048407142	
Mean	0.668227444	
Variance	0.126439559	

From Table 4.5, it can be seen that the significance value (Sig. 2 tailed) is 2.19869E-07. This value is less than P-Value 0.05. Therefore, H_1 is accepted and it can be concluded that there is significant difference between the CAPM and APT models in estimating the expected return of stocks listed in the National stock market (NSE) India.

V. Conclusion and Recommendation

Based on the expected return value using CAPM method, there are 15 eligible stocks to be included in the investment portfolio: RELIANCE.NS, TCS.NS, HDFCBANK.NS, INFS, HINDUNILVR.NS, IBN.NS, HDFC.NS, BAJFINANCE.NS, KOTAKBANK.NS, WIT.NS, BHARTIARTL.NS, ASIANPAINT.NS, HCLTECH.NS and ITC.NS. The research result on the comparative test shows that there is significant difference between the accuracy of CAPM and APT methods in estimating the stock return of the company in Indian Stock Market Nifty 50 index (NSE) for the March 2015-March 2020 period. The basic difference between APT and CAPM is in the way systematic investment risk is defined. CAPM advocates a single, market-wide risk factor for CAPM while APT considers several factors which capture

market-wide risks. In an environment of single factor market, the APT leads to CAPM. There are a number of risk return models. Mean–variance optimization is a quantitative tool for allocation of assets based on the trade-off between risk and return. Capital asset pricing model (CAPM) is the most important risk return model widely used in the industry. Efficient frontier represents the set of portfolios which has the maximum return for any given level of risk or minimum risk for every level of return. Modern portfolio theory represents a theory of finance which attempts to maximize portfolio's expected return for a given portfolio risk or equivalently minimize the risk for a given level of expected return.

Investors can use both the CAPM and APT methods to estimate stock returns. However, the more accurate method relevant to this study is the APT method, which has higher accuracy than CAPM.

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