

Pricing Anomaly in Indian Stock Market: A Study on Selected Stocks

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ABSTRACT

Investment in stock market is not only risky, but also tedious. Investors look at the stock price movements carefully to take wise decisions on investments. The implication of an upward or downward movement in stock price usually depends upon the true value of the stocks. The true value of a stock is generally represented by its intrinsic value. It is the actual value of the stock and constitutes the true worth of it. Intrinsic value can be calculated based on the fundamentals of the stocks. As the market is expected to be efficient and at the same time risky, the expected return estimated through Capital Asset Pricing Model (CAPM) can be represented as the benchmark for analysing the market return. Theoretically, stock prices should reflect the fundamental value of the stock, in such situations where investors behave rationally. However, the stock prices do deviate from the fundamental or intrinsic value. The stock prices tend to be either more than intrinsic value or less than intrinsic value leading to overvaluation or undervaluation of stocks respectively, which denotes mispricing. This mispricing proves the irrational behavior in the market and hence is a behavioral anomaly. But in the present study, an attempt is made to analyse the mispricing of stocks based on comparing the expected rate of return as per CAPM and the actual market return. The study was carried out with the market returns of the top actively traded twenty stocks listed in BSE. The results revealed that there is mispricing in the Indian stock market.

Keywords: Expected rate of return, Market rate of return, Mispricing, Overvaluation of stocks, and Undervaluation of stocks

1. INTRODUCTION

Investment decision in stocks calls for due diligence and effort from the part of investors, as the stock market investment is highly risky. If investors make any wrong decision, that can lead them to heavy losses. The question that concerns the investors is on how to decide upon buying or selling or holding stocks. Theoretically, it is possible to systematise all the information that is available publicly for reaching at a valuation framework, in order to decide upon a buy, sell or hold (Fischer & Jordan, 1996). The broad approaches that the finance theories put forward for investment decision are fundamental analysis, technical analysis and efficient market hypothesis. While the fundamentalists use intrinsic value as benchmark for investment decision, technical analysts discern patterns in price based on past behavioral patterns of stock to predict future prices of stocks for deciding upon which stock to invest. Efficient market hypothesis propounded by Fama (1970) assume a random walk for the returns from stock that makes it unpredictable.

The widely used fundamental analysis is based on the intrinsic value of a stock. The intrinsic value is the true worth of a security and it will be the present value of the future streams of income from that particular stock discounted at an appropriate rate of risk (Bhalla, 1997). The current market price of a stock should reflect its intrinsic or fundamental value (Friedman, 1953). This happens when there is rational behavior in the market and the market is in equilibrium. Any deviation in

market price from the intrinsic value is the result of the irrational behavior in the market. This leads to mispricing in the market. A security is said to be mispriced when its market price is not what it ought to be and is deviated from its intrinsic value. Thus, investors can make investment decision based on this mispricing.

Reilly and Brown (2013) opined that the investment decision process is similar to any other investment like corporate investment or in cases of purchasing automobiles, clothes and so on. It is because a customer examines an item to decide how much it is worth to him/her (Reilly & Brown, 2013). If the price is same or less than the expected worth, he would buy it, otherwise not. This very simple logic is behind the stock investment decision also. If the market price of a stock is more than the intrinsic value that is estimated, then the investor should not buy such stock and rather should sell them if it is owned. It is due to the fact that the mispricing would fade in future and the market price will come down to the intrinsic value. The temporary deviation of the market price from its theoretical value is due to the incomplete dissemination of information in the market (Fischer & Jordan, 1993). Once the information disseminates and arbitragers play their role, the deviation reduces. On the contrary, if the market price is less than the intrinsic value, it would be better to buy such shares or hold them if they are owned.

The question that now arises before investors is regarding the calculation of intrinsic value. For the estimating intrinsic value, the future streams of earnings need to be known and should be discounted with an appropriate discount rate. It is possible, but there are more viable models like Capital Asset Pricing Model (CAPM), Fama and French Five-Factor model and Fama and French Three-Factor model, that gives expected return from the stocks that can be used for analysing mispricing. Most significant studies on mispricing are made by relying on CAPM (Khan, 2008).

The CAPM was developed by Sharpe (1963) as a simplified model for asset pricing and the model estimates the expected return from a capital asset as the sum of risk free rate and a risk premium. The model stresses that, one investor would get a minimum return (risk free return) and a higher return in commensurate with the risk that he undertakes (risk premium). However, the actual return may not be the same as expected. In case, the actual return is more than the expected return, it means the stock is overpriced, which in turn implies undervaluation of stocks. On the contrary, if the actual return is less than the expected return, the security is underpriced implying overvaluation of stock.

2. REVIEW OF LITERATURE

Evidence for the prevalence of mispricing in the stock markets was revealed in various literature. One of the notable works include the work of Sloan (1996), who pointed out that there existed mispricing when he analysed stock prices based on CAPM. The fact that, mispricing in stocks was closely related with its liquidity, was also proved in a study (Sadka & Scherbina, 2007). The evidence of mispricing was revealed not only in stock market, but was also in the mutual funds, in a persistent manner (Redding, 2006). Even though CAPM was the widely used model for analysing mispricing there were studies that applied similar other models. Campbell and Vuolteenaho (2004) proposed a two-beta model for studying anomalies in the returns. Khan (2008) used a four factor model based on Intertemporal CAPM for analysing the mispricing in the stocks. Chiao, Hung and Lee (2008) studied the mispricing in the Research and Development investment in Taiwan market using a cross-sectional model involving firm size, R&D, Book-to-market and Market equity. Residual Income model was used by Warr et al. (2012) for analysing equity mispricing.

The mispricing in the market usually do not stay long due to the presence of arbitrageurs in the market. The active participation of arbitrageurs makes the undervalued and overvalued stocks to their right value. However, studies reveal that there lack active arbitrage in the market leading to prolongation of mispricing of the stocks. Li and Sullivan (2011) proved that there are limits to arbitrage and the asset anomalies do prevail in the market. Another significant study revealed that the private information availed through trading enabled the managers to enhance their fundamental values. It was also pointed out that this feedback effect led to asymmetric trading and thereby limiting the arbitrage in the market (Edmans, Goldstein, & Jiang, 2015). Evidence from a study on 45 countries confirms that there is widespread mispricing in the market globally (Jacobs, 2016).

The varying impacts of mispricing were also addressed by the academicians and practitioners. Chen, Lung and Wang (2009) analysed the stock mispricing based on money illusion hypothesis (Modigliani and Cohn (1979)) and the resale option hypothesis (Scheinkman and Xiong (2003)) and found that both theories complement each other in explaining the mispricing. Another significant finding on mispricing was that “there was strong empirical evidence for the effect of mispricing return premium on the cross section of security returns” (Brennan & Wang, 2010). In another study, it was found that equity mispricing was a significant factor that can alter the cost of making adjustments in capital structure (Warr, Elliott, Koeter-Kant, & Öztekin, 2012). These studies contribute investors to make mispricing analysis in more meaningful way and take a wise investment decision.

Even though studies supported the existence of mispricing in various global stock markets, it would be relevant to study the mispricing in Indian stock market, as it is one of the significant emerging stock markets of the world. The presence of mispricing in the stock market implies that the market is subject to irrational behavior and that there is lack of proper arbitrage and therefore the stocks are not at their right value. Thus, whether the Indian stock market is subject to such irrational behavior is a matter of concern for the investors. Moreover, how to make an investment decision in Indian stock market in the presence of mispricing, in case if there is, is a vital question for which the investors look forward for an answer. In this situation, an attempt is made to analyse the mispricing in the Indian stock market.

3. STATEMENT OF THE PROBLEM

Investors in stock market are always concerned about making right investment decision. In the ambience of uncertainty, making a decision to buy or sell or hold a security still remains as a problem for investors. A mispricing analysis can enable investors to make a better investment decision. Thus, whether the Indian stock market is mispriced or not and how to decide on stock market investment based on it which constitutes the problem addressed in the present study.

4. OBJECTIVE OF THE STUDY

The objective of the study is to analyse mispricing in the Indian Stock Market based on the selected stocks of Bombay Stock Exchange.

5. METHODOLOGY

Secondary data were collected and used for the study. For the study, the daily stock prices of 20 actively top traded stocks of BSE Sensex were collected along with that of daily index prices of BSE Sensex. The BSE Sensex is taken as the market proxy for the study. The data were collected for a period of ten years from 01/04/2009 to 31/03/2019. For the analysis, annual return and average annual returns of the selected stocks and the market were calculated. Based on that, summary statistics of returns, correlation with market, covariance with market and beta for the individual stocks were also measured. The expected return using Capital Asset Pricing Model (CAPM) for the stocks were found for analysing mispricing in the securities. The average annual rate of 91-days Treasury Bills in India for a period from 2009-10 to 2018-19 was taken as the risk free rate in the model for the study. The statistical package, E-Views 9.0 is used for the analysis of data.

6. FINDINGS AND DISCUSSIONS

The results of the empirical analysis on mispricing in stocks are presented as two sections. First section deals with the summary statistics of the stock returns of the selected stocks and the second section deals with the mispricing analysis of the stocks.

SUMMARY STATISTICS

The empirical analysis was done on the annual returns of the selected actively traded twenty stocks listed in BSE. Table 1 shows the summary statistics of the annual returns of the stocks and BSE Sensex, the market.

From the Table 1, it can be seen that the mean annual return of BSE Sensex, the market proxy, is 9.91%. Out of the 20 stocks, 12 stocks have a mean return less than the Market return (9.91%) while the remaining 8 stocks have return more than the market. This shows that most of the stocks are underperforming when compared with market in terms of return. However, the returns of all stocks, except SBIN (-8.64%) and INFY (-6.63%), are positive. Of the selected stocks, BAJFINANCE has the highest mean return of 56.14% and SBIN has the lowest mean return with -8.64%. In case of the range of the returns, all the stocks have wide range than that of Market (54.54%). The scrip with widest range is BAJFINANCE (211.80%) while RELIANCE has the least range (60.77%), but still higher than the Market. Similarly, all the stocks have a standard deviation higher than the market (16.76), wherein BAJFINANCE has the highest standard deviation (68.46) and RELIANCE has the lowest standard deviation. The wide range and high standard deviation denote that the stocks are volatile in general. BAJFINANCE can be said as the most volatile, as it has the widest range and high standard deviation simultaneously. In contrast, RELIANCE is the least volatile stock as it possesses least range and a comparatively lesser standard deviation.

SUMMARY STATISTICS OF ANNUAL RETURNS ^A OF THE STOCKS

SL. NO.	SCRIP	MEAN	RANGE	STANDARD DEVIATION	SKEWNESS	KURTOSIS	JARQUE-BERA STATISTIC	PROB.
1	MARUTI	23.63	124.02	43.31	0.31	-1.18	0.73	0.69
2	YES BANK	4.30	181.58	64.68	0.52	-0.98	0.82	0.66
3	RELIANCE	4.34	60.77	18.54	-0.98	0.88	1.15	0.56
4	ICICI BANK	1.67	133.99	38.67	-0.29	0.10	0.20	0.91
5	HDFC BANK	10.79	140.75	44.28	-1.10	0.91	1.44	0.49
6	TATA MOTORS	1.69	161.46	51.50	-0.26	-0.58	0.39	0.82
7	SBIN	-8.64	129.53	37.66	-0.52	0.33	0.38	0.83
8	HDFC	5.06	115.35	32.23	-1.59	3.74	4.03	0.13
9	ZEEL	6.85	134.57	40.78	0.51	0.27	0.37	0.83
10	BAJFINANCE	56.14	211.80	68.46	-1.00	0.56	1.21	0.54
11	INDUSINDBK	31.33	107.13	43.14	0.45	-1.65	1.16	0.56
12	LT	3.50	111.09	32.65	0.16	0.08	0.13	0.94
13	ASTRAL	30.77	193.48	63.07	1.72	2.20	3.73	0.16
14	TATA STEEL	2.21	137.90	42.59	0.84	0.24	0.91	0.63
15	BPCL	3.98	115.81	39.75	1.13	0.33	1.56	0.46
16	AXIS BANK	3.81	129.51	36.93	-0.15	0.40	0.07	0.97
17	KOTAK BANK	13.92	117.77	38.09	-0.30	-0.46	0.37	0.83
18	TCS	13.90	102.38	29.77	0.92	0.85	1.00	0.61
19	INFY	-6.63	94.74	32.17	0.51	-0.71	0.68	0.71
20	PHOENIXLTD	18.39	95.66	34.58	0.43	-1.42	0.97	0.62
	BSE SENSEX	9.91	54.54	16.76	-0.80	0.67	0.76	0.68

TABLE 1

Note. ^aThe analysis was done based on the stock return calculated. The stock returns were calculated using the historical stock prices by applying the formula: $\text{Return} = (P_1 - P_0)/P_0 * 100$, where P_1 is the price at the end of the year (price of 31st March every year) and P_0 is the price in the beginning of the year (price of 1st April every year)

The Market return is negatively skewed, while most of the stocks are positively skewed. As shown in Table 1, all the stocks except HDFC have a kurtosis less than 3. A series with kurtosis of 3 with no skewness is considered to be a normally distributed series. In that case, it seems that the return distributions of all the stocks are not normal. The Jarque-Bera statistic, that is used to test normality, is also shown in the Table 1. The chi-square probability, with the null hypothesis that the distribution is normal, is also given for the stocks. It can be viewed that the probability for all stocks are greater than 0.05. Thus, the results reveal that the returns of all the stocks are normal and the skewness and the deficit kurtosis found in the stock returns are not significant.

ANALYSIS OF MISPRICING IN STOCKS

Given the overall picture of the selected stocks and market through their descriptive statistics, whether there is mispricing in the returns or not is the question that is addressed next. The study uses Capital Asset Pricing Model (CAPM) of Sharpe (1963) as the benchmark for analysing the returns. The expected return from each stock is calculated using the model as given below:

$$\text{Expected Return} = \text{Risk-free rate} + \text{Beta} (\text{market return} - \text{risk-free rate}) \quad (1)$$

As in equation (1) (Fischer & Jordan, 1993), the expected return is the sum of risk free rate and beta times the market premium (risk premium). Market return is the return of the market, which is BSE Sensex in the study. From Table 1, it can be seen that the Market return is 9.91%. The next component required for estimating the model is beta coefficient, which is the measure of systematic risk. Beta measures the sensitivity of the individual stock return with the market return. A share's beta factor is the measure of its volatility in terms of market risk. The beta factor of the market as a whole is 1. The data required for the calculation of beta are the historical data of returns of the individual security and the returns of stock market index. Beta is calculated using the formula:

$$\beta = \frac{\text{Covariance}}{\sigma_m^2} \quad (2)$$

Where, β is the beta and σ_m^2 is the market variance. Covariance is a statistical measure of the relationship between two random variables. Closely related to covariance is the statistical measure known as correlation. In fact, the covariance between two random variables is equal to the correlation between the two random variables times the product of their standard deviations. i.e.

$$\text{Covariance} = r \sigma_s \sigma_m \quad (3)$$

Where, r is the correlation coefficient, σ_s is the standard deviation of the stock and σ_m is the standard deviation of the market. Table 2 shows the calculation of beta for the individual stocks based on the correlation of the individual stock return with the Market return and the covariance in returns.

From the Table 2, it can be seen that the returns of 10 stocks have a correlation of more than 50% with the Market return, while the remaining 10 stocks have less than 50% correlation with market. BAJFINANCE has the highest covariance with the market (804.52). While analysing the beta of the stocks, it can be inferred that, 12 out of the 20 stocks are aggressive shares with a beta greater than 1. It means that, a unit change in Market return will result in more than a unit change in the returns of the 12 stocks. Thus, they are more volatile and risky when compared to other stocks.

CALCULATION OF BETA FOR THE STOCKS

SL. NO.	SCRIP	CORRELATION (R)	COVARIANCE	BETA
1	MARUTI	0.73	530.01	1.89
2	YESBANK	0.31	336.81	1.20
3	RELIANCE	0.33	102.33	0.36
4	ICICIBANK	0.36	233.43	0.83
5	HDFCBANK	0.83	612.79	2.18
6	TATAMOTORS	0.71	610.39	2.17
7	SBIN	0.27	170.20	0.61
8	HDFC	0.32	172.41	0.61
9	ZEEL	0.46	311.58	1.11
10	BAJFINANCE	0.70	804.52	2.86
11	INDUSINDBK	0.74	534.20	1.90
12	LT	0.74	404.05	1.44
13	ASTRAL	0.59	619.52	2.21
14	TATASTEEL	0.61	435.83	1.55
15	BPCL	0.29	195.62	0.70
16	AXISBANK	0.38	232.94	0.83
17	KOTAKBANK	0.59	375.30	1.34
18	TCS	0.30	147.43	0.52
19	INFY	0.14	77.25	0.28
20	PHOENIXLTD	0.87	505.22	1.80

TABLE NO 2

Since the beta is estimated for all the stocks, the next required component of the model is the risk free rate of return (R_f). The best available approximation to risk free rate is the short term Treasury bill rate (Van Horne, 1970). The average annual 91-days Treasury bill rate (7.04%) is taken as risk free rate for the study. Thus, all the estimated components are put to Equation (1) for each stock and the result is shown in the Table 3.

The Table 3 shows the expected return from stocks calculated based on CAPM and the actual return. It can be seen that there is difference between the expected return and the actual return of the stocks. The actual return of the stocks MARUTI, BAJFINANCE, INDUSINDBK, ASTRAL, KOTAKBANK, TCS and PHOENIXLTD are higher than their expected return. Expected return is the return that we can expect in accordance with the risk involved in the stock. It is the benchmark return based on which it can be inferred whether the actual return is adequate or not. Here, as the actual return is higher than the expected return for these seven stocks, it means that the present high return is temporary and it may go down in the future. Thus, these stocks are undervalued.

UNDERVALUATION AND OVERVALUATION OF STOCKS

SL. NO	SCRIP	RISK PREMIUM ($R_M^A - R_F^B$)	EXPECTED RETURN (ER)	ACTUAL RETURN (AR)	DIFFERENCE (AR – ER)	UNDERVALUED (UV)/ OVERVALUED (OV)
1	MARUTI	2.87	12.46	23.63	11.17	Undervalued
2	YESBANK	2.87	10.49	4.30	-6.19	Overvalued
3	RELIANCE	2.87	8.09	4.34	-3.75	Overvalued
4	ICICIBANK	2.87	9.43	1.67	-7.76	Overvalued
5	HDFCBANK	2.87	13.31	10.79	-2.52	Overvalued
6	TATAMOTOR S	2.87	13.29	1.69	-11.59	Overvalued
7	SBIN	2.87	8.78	-8.64	-17.42	Overvalued
8	HDFC	2.87	8.80	5.06	-3.74	Overvalued
9	ZEEL	2.87	10.23	6.85	-3.38	Overvalued
10	BAJFINANCE	2.87	15.27	56.14	40.87	Undervalued
11	INDUSINDBK	2.87	12.51	31.33	18.83	Undervalued
12	LT	2.87	11.17	3.50	-7.67	Overvalued
13	ASTRAL	2.87	13.38	30.77	17.40	Undervalued
14	TATASTEEL	2.87	11.50	2.21	-9.29	Overvalued
15	BPCL	2.87	9.04	3.98	-5.07	Overvalued
16	AXISBANK	2.87	9.42	3.81	-5.62	Overvalued
17	KOTAKBANK	2.87	10.88	13.92	3.04	Undervalued
18	TCS	2.87	8.55	13.90	5.35	Undervalued
19	INFY	2.87	7.83	-6.63	-14.46	Overvalued
20	PHOENIXLTD	2.87	12.21	18.39	6.18	Undervalued

TABLE NO 3

Note. ^a R_m is the Market return, 9.91%. ^b The average annual 91-days Treasury bills rate from 2009-10 to 2018-19 is taken as the risk free rate (7.04%), source is the Annual Reports of RBI from 2009-10 to 2018-19 taken from the official website of RBI.

The remaining 13 stocks have an expected return greater than their actual return (see Table 3). It means that the return is less for the time being and in future it can reach at the expected return. So now, these stocks are overvalued. The expected return based on CAPM and the actual return are plotted in Figure 1.

UNDERVALUATION AND OVERVALUATION OF STOCKS

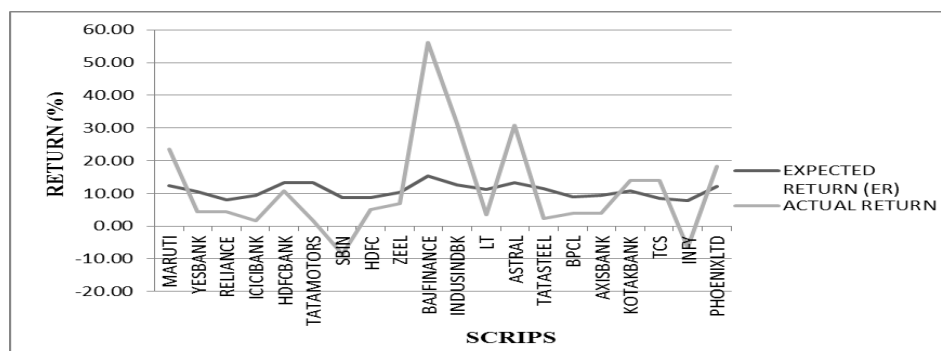


FIG 1

From the figure it can be clearly seen that all the scrip whose return that lies above the expected return line are undervalued, while all those scrip return that lies below are overvalued. Most of the stocks (65%) selected for the study are found overvalued, while the remaining stocks (35%) are undervalued. The undervaluation and overvaluation in stocks point out that there is mispricing in the Indian stock market. It is also to be noted that all the stocks selected are found to be undervalued or overvalued rather than rightly valued.

7. CONCLUSION

Taking stock market investment decision is a risky task for the investors. The risk increases when there is mispricing in the market as it is a manifestation of irrational behavior in the market. Mispricing occurs when the stock prices are either more than or less than their intrinsic value. In such cases, the stocks will be either overvalued or undervalued. The present study aimed to analyse whether there is mispricing in the Indian stock market or not. For that the CAPM was used to calculate the expected return from the selected twenty stocks listed in BSE. This expected return was compared with the actual return in order to find the mispricing in stocks. It was found that most of the stocks were overvalued. The study put forward strong evidence of mispricing in the Indian stock market, as all the stocks considered under the study were either undervalued or overvalued.

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