



**OPTIMAL PORTFOLIO CONSTRUCTION USING SHARPE'S SINGLE INDEX MODEL:
EVIDENCE FROM DHAKA STOCK EXCHANGE IN BANGLADESH**

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ABSTRACT

For taking wise investment decisions, every rational investor needs the knowledge about portfolio management. Every rational investor aims to maximize his returns and minimize the risk. The ultimate objective of portfolio construction would be to make a portfolio that provides maximum returns minimum risk. To get the advantage of diversification, it is essential for an investor to construct a portfolio by using fundamental method or by using the techniques of Sharpe's Single Index Model. The Sharpe's Single Index Model is the easiest and the most widely used model in constructing an optimal portfolio. In this paper an attempt is made to construct an optimal portfolio by using Sharpe's single-index model. For this purpose, the monthly closing prices of 30 companies listed under DSE-30 Index in Dhaka Stock Exchange (DSE) and DSE-X index for the period of January 2013 to June 2017 have been considered. Sharpe's Single Index Model is used to construct an optimal portfolio. The cut-off point (cut-off rate of return) is calculated based on the highest value and cut-off point should be used to calculate the segmentation of fund to be invested in each stocks. In this study, twenty-five companies out of thirty companies are taken on basis of cut-off point to construct an optimal portfolio. Out of thirty sample companies, twenty-five companies have been taken for the optimal portfolio construction using single Index Model. 21.37% of investment may be obtained from IFAD Autos Limited % (which indicates majority of the funds is to be invested on this company's stock), followed by 15.25 % in Pubali Bank Ltd. The highest return on portfolio is from IFAD Autos Limited i.e. 2.608% and the lowest is Unique Hotel & Resorts Limited i.e. 0.00003%. Total return from the optimal portfolio is 5.887%. The researcher found that IFAD Autos Limited and Pubali Bank Ltd's security returns were higher than the portfolio return.

Key words: Portfolio, diversification, cut-off rate, beta, excess return to beta ratio

INTRODUCTION

Investment is the allotment of fund with the purpose of obtaining return. Risk is as a ginger and return is as a jam. If the investor doesn't have a real knowledge on investment and portfolio management they can't make suitable decisions regarding their investments. So a portfolio is built to meet the requirements of the investor (Poornima and *et al.* 2017). Markowitz (1952) focused investors on determining the risk and return of individual securities when constructing portfolios. Chasanah *et al.* (2017) said that in stock investments, investors need to consider the expected return and variance to make diversification in invest. Diversification means that investors need to form a portfolio by the selection of a number of assets, thus the risks can be minimized without reducing the level of expected returns. A rational investor wants to attain maximum return with minimum risk to construct a portfolio using either of the two popular methods: traditional and modern. In the traditional method,

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in terms of return and capital appreciation are evaluated and appropriate securities are selected to fulfill the needs of the investor. In the modern method, Markowitz model is used in selection of securities based on to the risk and return analysis encouraging investors to put resources into different securities despite put all investments tied up on one place in light of the fact that effective lengthening of the portfolio includes consolidating securities with short of what positive association so as to reduce chance in the portfolio without relinquishing any of the portfolio return (Ravichandra, 2014). He has invented analytical tools for analysis and selection of optimal portfolio. But, William Sharpe extended the work done by Markowitz. He took market index while analyzing the portfolio. He made the plentiful and complex computations easy which were necessary to construct the optimal portfolio. He developed the Single Index Model to make these computations easy and construct an optimal portfolio. For the purpose of portfolio construction, Sharpe's Single Index Model is one of the simplest models. With the introduction of free and open economic policies and advanced technologies, investors are finding easy access to stock markets around the world. The fact that stock markets in dices have become an indication of the health of the economy of a country indicates the importance of stock markets. According to Satyaprasad Anusha (2018) the performance of the stock market in any country is a strong indicator of general economic performance and is an integral part of the economy of any country. With the prologue of free and open economic policies and sophisticated technologies, investors are finding easy admittance to stock markets around the world. Casual observation of share prices reveals that when the market moves up, prices of most shares tend to uphill movement. Thus this research is fully based on Sharpe index model aiming at constructing an optimal portfolio of Bangladesh Security and Exchange 30 stocks by choosing the best performing stocks in Bangladeshi economy. For taking the advantage of diversification, it is vital for an investor to make a portfolio of securities by constructing a portfolio either by using fundamental method or by using the techniques of Sharpe's Single Index Model. Dileep *et al.* (2013) performed their study on the applicability and utility of the Single Index Model in the Indian context and also measure the performance of the portfolio thus constructed in terms of its return. It was found that only four companies were taken in portfolio construction. The study concluded that William Sharpe's Single Index Model will be sustainable and useable to the Indian market where investors can construct a portfolio for obtaining the expected rate returns on their investment. Kumar *et al.* (2013) presented an approach to construct the portfolio based on Sharpe's Single Index Model. The securities which top on aggregate weighted average have been taken for the constructing portfolio. For analyzing the securities various statistical tools like weighted average, simple average, standard deviation, regression analysis, systematic and unsystematic risk are considered. Out of the fifty companies in S&P CNX Nifty only six securities were taken for the optimal portfolio construction. The proportion of investment to be made in the selected securities has been calculated using Sharpe's Single Index Model. The study finds that stock prices and market index move in the same direction. Gopalakrishna and Muthu (2014) discovered the investment alternatives available for rational investor. A comparison of traditional portfolio theory with that of modern portfolio theory is considered in this study. The objective of the study is to examine whether single index model offers an appropriate explanation of stock returns on IT stocks. The samples taken in this study consists of 13 actively traded scrip listed in the National Stock Exchange Limited, Bombay (NSE). The secondary data is taken for a period 2004-2008. By applying regression on the market return and excess security return it is discovered that IT index has a phenomenal amount of sensitiveness over S&P CNX Nifty. Poornima and *et al.* (2016) claimed there are different forms of financial products available in the market which gives different rates of return, investor invests his funds in a portfolio in order to get

highest return with less risk. Portfolio management is a difficult process which tries to make investment process more rewarding and less risky. The study found that there are four aggressive stocks having beta coefficient of more than one, suggested that among the sample companies all the stocks are undervalued but one stock and thus the investors can take these stocks to revise their portfolio. Desai *et al.* (2013) made an optimal portfolio using fifty companies which were listed on the NSE and the time duration of the study is three years. Among the fifty companies only ten companies were taken for the construction of optimal portfolio. The percentage of investment made in each security has been calculated using the Sharpe's Single Index Model. The instability of security has been considered. The study provides direction to investors regarding performance of securities. Once the performance is analyzed and optimum portfolio of securities is constructed, it makes the investor possible to take appropriate decisions. Debasish *et al.* (2012) measured a sample fourteen stocks from the various manufacturing sectors like automobiles, cement, paints, textiles oil & refineries and these are traded in the NSE. The daily data for all the stocks for the period Jan 2003 to November 2012 has been taken. Proportion of investment in each of selected stock is decided based on respective beta value, stock movement variance unsystematic risk and return on stock risk free return. Among the fourteen selected companies an optimal portfolio using Sharpe's Single Index Model taken only three stocks. The percentage of investment to be made was also calculated using Single Index Model. The Sharpe's Single Index Model is the most popularly used model in constructing an optimal portfolio. The objective of the study (i) to analyze the risk and return of companies securities and construct an optimal portfolio using Sharpe Single Index Model. (ii) to lead the investors to find out the company that gives the highest return with minimum risk. Mandal and Niranjana (2013) applied Sharpe's Single Index Model allowing for the daily prices of twenty-one securities for the period of ten years. After formulating the cut-off rate, those securities whose C_i values greater than the cut-off point were selected. Then to arrive at the optimal portfolio the proportion of investment in each of the selected securities in the optimal portfolio was computed on the basis of beta value, unsystematic risk, excess return to beta ratio and the cut off rate of the security concerned Scholz (2007) thought Sharpe's measure is a measure of portfolio performance that gives the risk premium per unit of total risk, which is calculated by the portfolio's standard deviation of return. The risk premium on a portfolio itself is the total portfolio return minus the risk-free rate. Varadharajan and Ganesh (2012) applied the SIM on equity portfolio of large caps companies of selected sectors in India. The main aim of this study is to find out the optimum portfolio from the selected companies in three major sectors like power sector, shipping sector and textile sector. Dileep and *et al.* (2013) studied the applicability and utility of the Single Index Model in the Indian context and also evaluated the performance of the portfolio thus constructed in terms of its rate of return. A sample of thirty companies belonging to various sectors was chosen for study and the data required for this study was collected from secondary sources. It was found that only four companies were included in portfolio construction. The study accomplished that William Sharpe's Single Index Model will be sustainable and applicable to the Indian market where investors can construct a portfolio for improving the expected returns on their investment. Markowitz (1952) formed a portfolio selection model that incorporated the principle of diversification.

MATERIALS AND METHODS

The purpose of the study is to make an optimal portfolio by using Sharpe's single-index model. For performing the study, monthly closing price of the shares, dividend information and monthly closing index value of the benchmark market index (DSE-X index) are taken for the period from January 2013 to June 2017. Secondary sources data were used collecting from Dhaka Stock Exchange. For

performing the study, 30 companies are taken which are listed under DSE-30 index in Dhaka Stock Exchange (DSE). For risk-free rate, auction of 91 days Treasury bill has been taken as proxy for risk-free rate sourced from “Bangladesh Bank” website. In this study Sharpe’s Single Index Model is used, which basically considers assets on the basis of excess return to beta ratio to construct the optimum portfolio. Monthly return is calculated for each of the 30 stocks for obtaining optimal portfolio the return. Then beta is calculated for each of the stocks by dividing the covariance of excess return on a stock with that of the index excess return by the variance of index return. Stock’s ranking is calculated on the basis of their excess return to beta. Then the cut-off point (C*) is calculated with the help of the following formula:

$$C_i = \frac{\sigma_m^2 \sum_{i=1}^n \frac{(R_i - R_f) \beta_i}{\sigma_{ei}^2}}{1 + \sigma_m^2 \sum_{i=1}^n \left(\frac{\beta_i^2}{\sigma_{ei}^2} \right)}$$

Where

σ_m^2 = the variance in the market index and

σ_{ei} = the variance of a stock’s movement that is not associated with the movement of the market index.

Thereafter stocks having excess return to beta ratio above unique cut off point were selected to be taken in the optimum portfolio and the rest with lower ratios were left out. After finding the securities to be selected into the optimum portfolio, the investors should find out how much of the total fund should be invested in each security. The proportion of funds to be invested in each security can be calculated as follows in the equations given below respectively.

$$Z_i = \frac{\beta_i}{\sigma_{ei}^2} \left(\frac{R_i - R_f}{\beta_i} - C^* \right)$$

$$X_i = \frac{Z_i}{\sum_{i=1}^N (Z_i)}$$

The first expression indicates the proportion on each security and they sum up to one. The second formula is used to find out the weight of individual stock compared to portfolio.

RESULTS AND DISCUSSION

As a sample, thirty companies listed under DSE-30 index were taken for constructing an optimal portfolio using Sharpe's Single Index Model and DSE-X Index is considered as benchmark return. As a first step, the mean returns of sample companies’ stocks were calculated and tabulated as under: In table 1 shows the mean returns of the thirty companies taken for the construction of an optimal portfolio using Sharpe's Single Index Model. This table finds out that IFAD Autos Limited has the highest return of 12.20% and Delta Life Insurance Limited has the lowest mean return of -0.61%. For considering the market risk face by each security, the beta values of sample companies’ stock returns were calculated and tabulated Table 1. In Table 1 presents the beta values of the thirty companies’ stock returns. A beta below 1 means either an investment in stocks with lower volatility than the market, or a volatile

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investment whose price movements are not highly correlated with the market. Titas Gas Transmission & Distribution Company Limited has the highest beta value of 1.6468 which means it is highly volatile. BSRM Steels Limited (1.2588), BEXIMCO Pharma (1.2264), The City Bank Limited (1.1324), Grameenphone Limited (1.3956), IDLC Finance Limited (1.0709), MJL Bangladesh Limited (1.0438), RAK Ceramics (Bangladesh) Limited (1.1179) and Summit Power Limited (1.3610) have the beta values greater than 1 which means they are volatile. Bangladesh Steel Re-Rolling Mills Limited has negative beta i.e.-0.4155 which represents lower volatility.

Table 1. Mean returns and beta value of sample companies' stocks

| Sl. No. | Company name | Mean Return | Beta Values |
|---------|---|-------------|-------------|
| 1 | ACI Limited | 4.44 | 0.5111 |
| 2 | British American Tobacco Bangladesh Company | 2.37 | 0.2392 |
| 3 | BEXIMCO Limited | 1.13 | 0.9125 |
| 4 | BRAC Bank Limited | 2.30 | 0.8541 |
| 5 | Bangladesh Submarine Cable Company Limited | 1.05 | 0.5564 |
| 6 | Bangladesh Steel Re-Rolling Mills Limited | 0.58 | -0.4155 |
| 7 | BSRM Steels Limited | 1.30 | 1.2588 |
| 8 | BEXIMCO Pharma | 2.12 | 1.2264 |
| 9 | The City Bank Limited | 2.50 | 1.1314 |
| 10 | Delta Life Insurance Limited | -0.61 | 0.9749 |
| 11 | Grameenphone Limited | 2.43 | 1.3956 |
| 12 | Heidelberg Cement Bangladesh Limited | 2.14 | 0.8934 |
| 13 | IDLC Finance Limited | 1.73 | 1.0709 |
| 14 | IFAD Autos Limited | 12.20 | 0.0130 |
| 15 | Islami Bank Limited | 1.28 | 0.6282 |
| 16 | Jamuna Oil Company Limited | 1.65 | 0.7920 |
| 17 | Lafarge Surma Cement Limited | 2.14 | 0.8659 |
| 18 | LankaBangla Finance Limited | 4.27 | 0.5399 |
| 19 | MJL Bangladesh Limited | 1.81 | 1.0438 |
| 20 | National Bank Limited | 0.62 | 0.8640 |
| 21 | Olympic Industries | 4.83 | 0.4583 |
| 22 | Orion Pharma Limited | 3.45 | 0.0911 |
| 23 | Padma Oil Company Limited | 1.96 | 0.8159 |
| 24 | Pubali Bank Limited | 8.83 | 0.0238 |
| 25 | RAK Ceramics (Bangladesh) Limited | 0.99 | 1.1179 |
| 26 | Renata Limited | 2.75 | 0.4273 |
| 27 | Square Pharmaceuticals Limited | 2.26 | 0.8224 |
| 28 | Summit Power Limited | 0.89 | 1.3610 |
| 29 | Titas Gas Transmission & Distribution Company Limited | 0.13 | 1.6468 |
| 30 | Unique Hotel & Resorts Limited | 0.56 | 0.3886 |

Source: Computed and compiled by the author

In Table 2 represents the C_i of sample companies. The β_i / σ_{ei}^2 and its cumulative are necessary for the calculation of C_i . The C_i value goes on increasing from 0.000002 to 0.016307 and thereafter, starts declining. Therefore, the value of 0.016307 is considered as the 'cut-off point'. The securities which come after the cut-off point will not be considered for the optimal portfolio construction. The C_i is calculated and tabulated as Table 3. In Table 3 represents the proportion of investment to be made in each security. The four securities ranking from 1 to 25 are selected for the optimal portfolio. The to be invested in each security is presented in figure 1: Out of thirty sample companies, twenty-five companies have been taken for the optimal portfolio construction using single Index Model. Once the

companies on which investment is to be made are known it is essential to know the percentage of investment to be made in each company's security. A look at the individual security returns from these stocks as well as their respective returns on portfolio is also presented Table 3. In Table 3 shows the weight of investment, individual security returns and the returns on portfolio.

| Sl. No. | Company name | $(R_i - R_f) / \beta_i$ | $[(R_i - R_f) * \beta_i] / \sigma_{2e_i}$ | Cumulative of $[(R_i - R_f) * \beta_i] / \sigma_{2e_i}$ | β_2 / σ_{2e_i} | Cumulative of β_2 / σ_{2e_i} | C_i |
|---------|--------------|-------------------------|---|---|---------------------------|---|------------------|
| 1 | IFADAUTOS | 36.4423 | 0.0008 | 0.0008 | 0.00002 | 0.00002 | 0.000002 |
| 2 | PUBALIBANK | 14.1468 | 0.0013 | 0.0021 | 0.00009 | 0.00011 | 0.000006 |
| 3 | ORIONPHARM | 1.3398 | 0.0188 | 0.0209 | 0.01401 | 0.01413 | 0.000057 |
| 4 | OLYMPIC | 0.3868 | 0.1969 | 0.2177 | 0.50903 | 0.52316 | 0.000599 |
| 5 | BATBC | 0.3308 | 0.2118 | 0.4296 | 0.64024 | 1.16340 | 0.001181 |
| 6 | ACI | 0.3161 | 0.2747 | 0.7042 | 0.86885 | 2.03225 | 0.001935 |
| 7 | LANKABAFIN | 0.2867 | 0.0986 | 0.8029 | 0.34407 | 2.37632 | 0.002209 |
| 8 | RENATA | 0.2201 | 0.1662 | 0.9691 | 0.75508 | 3.13139 | 0.002663 |
| 9 | SQURPHARMA | 0.0906 | 0.6277 | 1.5968 | 6.93062 | 10.06202 | 0.004315 |
| 10 | BRACBANK | 0.0891 | 0.3807 | 1.9775 | 4.27163 | 14.33365 | 0.005383 |
| 11 | LAFSURCEML | 0.0807 | 0.2343 | 2.2118 | 2.90447 | 17.23812 | 0.006043 |
| 12 | HEIDELBCEM | 0.0782 | 0.3323 | 2.5441 | 4.24882 | 21.48694 | 0.006926 |
| 13 | PADMAOIL | 0.0766 | 0.1626 | 2.7067 | 2.12277 | 23.60971 | 0.007411 |
| 14 | CITYBANK | 0.0745 | 0.4620 | 3.1687 | 6.19905 | 29.80876 | 0.008580 |
| 15 | JAMUNAOIL | 0.0635 | 0.2703 | 3.4391 | 4.25797 | 34.06673 | 0.009362 |
| 16 | GP | 0.0582 | 0.9341 | 4.3732 | 16.03875 | 50.10548 | 0.011535 |
| 17 | ISLAMIBANK | 0.0565 | 0.0749 | 4.4480 | 1.32420 | 51.42967 | 0.012206 |
| 18 | BXPBARMA | 0.0564 | 0.5502 | 4.9982 | 9.75715 | 61.18682 | 0.013405 |
| 19 | MJLBD | 0.0540 | 0.3247 | 5.3230 | 6.01290 | 67.19972 | 0.014421 |
| 20 | IDLC | 0.0499 | 0.1623 | 5.4853 | 3.25344 | 70.45315 | 0.014973 |
| 21 | BSCCL | 0.0471 | 0.0437 | 5.5290 | 0.92826 | 71.38141 | 0.015189 |
| 22 | BEXIMCO | 0.0323 | 0.0989 | 5.6279 | 3.05842 | 74.43983 | 0.015370 |
| 23 | BSRMSTEEL | 0.0287 | 0.1780 | 5.8060 | 6.20389 | 80.64372 | 0.015722 |
| 24 | RAKCERAMIC | 0.0212 | 0.1148 | 5.9208 | 5.40709 | 86.05082 | 0.016067 |
| 25 | UNIQUEHRL | 0.0166 | 0.0029 | 5.9237 | 0.17596 | 86.22677 | 0.016307* |
| 26 | SUMITPOWER | 0.0145 | 0.1129 | 6.0366 | 7.80554 | 94.03231 | 0.016275 |
| 27 | NBL | 0.0102 | 0.0351 | 6.0716 | 3.44586 | 97.47818 | 0.016565 |
| 28 | TITASGAS | -0.0065 | -0.2356 | 5.8360 | 36.30436 | 133.78253 | 0.014612 |
| 29 | BSRMLTD | -0.0180 | -0.0354 | 5.8006 | 1.96830 | 135.75084 | 0.015889 |
| 30 | DELTALIFE | -0.0413 | -0.1909 | 5.6097 | 4.62404 | 140.37487 | 0.015255 |

The returns on portfolio are calculated based on the weight of investment in each security. The highest return on portfolio is from IFAD Autos Limited i.e.2.608% and the lowest is Unique Hotel & Resorts Limited i.e. 0.00003%. Total return from the optimal portfolio is 5.887%. When one looks at the individual returns from the stocks in the above portfolio, it may be observed that IFAD Autos Limited and Pubali Bank Ltd's security returns are higher than the portfolio return. On the other hand, except these two securities' returns of others are less than the portfolio returns. Thus, the inclusion of stocks in a portfolio is useful to companies in spite of the fact that expected returns from individual stocks is less. The findings of this study are presented below: (i) IFAD Autos Limited have the highest return of 12.20% and Delta Life Insurance Limited has the lowest return of -0.61%. If the investor wants to earn a maximum return without considering the risk aspect, then investment can be made on those securities which yield high returns. Even though the return is high, the risk involved in the stock return should be considered while taking investment decisions. (ii) The risk can be reduced if the portfolio is diversified.

Table 3. Proportion of Investment Proposed and Return

| Sl. No. | Company name | C_i | Z_i | X_i | Weight of Securities (%) | Returns (%) | Return on portfolio (%) |
|---|--------------|------------------|---------|-----------|--------------------------|-------------|-------------------------|
| 1 | IFADAUTOS | 0.000002 | 42.8504 | 0.0260798 | 21.37% | 12.20% | 2.60798% |
| 2 | PUBALIBANK | 0.000006 | 30.5725 | 0.0134577 | 15.25% | 8.83% | 1.34577% |
| 3 | ACI | 0.000057 | 10.9443 | 0.0018817 | 5.46% | 3.45% | 0.18817% |
| 4 | BATBC | 0.000599 | 15.4108 | 0.0037103 | 7.69% | 4.83% | 0.37103% |
| 5 | ORIONPHARM | 0.001181 | 6.8302 | 0.0008090 | 3.41% | 2.37% | 0.08090% |
| 6 | OLYMPIC | 0.001935 | 13.9104 | 0.0030773 | 6.94% | 4.44% | 0.30773% |
| 7 | BRACBANK | 0.002209 | 13.2533 | 0.0028201 | 6.61% | 4.27% | 0.28201% |
| 8 | LANKABAFIN | 0.002663 | 7.9025 | 0.0010826 | 3.94% | 2.75% | 0.10826% |
| 9 | BEXIMCO | 0.004315 | 5.5441 | 0.0006244 | 2.77% | 2.26% | 0.06244% |
| 10 | RENATA | 0.005383 | 5.6450 | 0.0006473 | 2.82% | 2.30% | 0.06473% |
| 11 | BSCCL | 0.006043 | 5.0596 | 0.0005407 | 2.52% | 2.14% | 0.05407% |
| 12 | CITYBANK | 0.006926 | 5.0198 | 0.0005365 | 2.50% | 2.14% | 0.05365% |
| 13 | BXPHERMA | 0.007411 | 4.4672 | 0.0004365 | 2.23% | 1.96% | 0.04365% |
| 14 | HEIDELBCEM | 0.008580 | 5.9788 | 0.0007466 | 2.98% | 2.50% | 0.07466% |
| 15 | BSRMSTEEL | 0.009362 | 3.3920 | 0.0002797 | 1.69% | 1.65% | 0.02797% |
| 16 | LAFSURCEML | 0.011535 | 5.3124 | 0.0006433 | 2.65% | 2.43% | 0.06433% |
| 17 | GP | 0.012206 | 2.2948 | 0.0001470 | 1.14% | 1.28% | 0.01470% |
| 18 | JAMUNAOIL | 0.013405 | 4.4622 | 0.0004729 | 2.23% | 2.12% | 0.04729% |
| 19 | SQURPHARMA | 0.014421 | 3.5718 | 0.0003216 | 1.78% | 1.81% | 0.03216% |
| 20 | PADMAOIL | 0.014973 | 3.2647 | 0.0002820 | 1.63% | 1.73% | 0.02820% |
| 21 | ISLAMIBANK | 0.015189 | 1.5567 | 0.0000816 | 0.78% | 1.05% | 0.00816% |
| 22 | IDLC | 0.015370 | 1.3276 | 0.0000751 | 0.66% | 1.13% | 0.00751% |
| 23 | MJLBD | 0.015722 | 1.4160 | 0.0000918 | 0.71% | 1.30% | 0.00918% |
| 24 | RAKCERAMIC | 0.016067 | 0.5000 | 0.0000247 | 0.25% | 0.99% | 0.00247% |
| 25 | UNIQUEHRL | 0.016307* | 0.0101 | 0.0000003 | 0.01% | 0.56% | 0.00003% |
| $\Sigma Z_i = 1.00$ $\Sigma X_i = 1.00$ | | | | | Portfolio Return | 5.887% | |
| | | | | | Portfolio Risk | 10.303% | |

Source: Computed and compiled by the author

The point of diversity is to achieve a given level of expected return while bearing the least possible risk. (iii) The return from Titas Gas Transmission & Distribution Company Limited has the highest beta value of 1.6468 which means that it is highly volatile. The value of beta of BSRM Steels Limited, BEXIMCO Pharma, The City Bank Limited, Grameen phone Limited, IDLC Finance Limited, MJL Bangladesh Limited, RAK Ceramics (Bangladesh) Limited and Summit Power Limited are 1.2588, 1.2264, 1.1324, 1.3956, 1.0709, 1.0438, 1.1179 and 1.3610 respectively and those values greater than 1 which means that they are also volatile. But, they are less volatile compared to the Axis Bank security's return. (iv) The excess return to beta ratio measures the additional return on a security per unit of systematic risk. IFAD Autos Limited has the highest excess return to beta ratio of 36.443 while that of Delta Life Insurance Limited has the lowest of -0.0413. This ratio provides the relationship between potential risk and reward involved in a security's return. (v) The four securities ranking from 1 to 25 based on the C_i values were identified along with the proportion of investment to be made. The proportion of the investment to be made is 21.37% in IFAD Autos Limited %, 15.25 % in Pubali Bank limited and remaining 63.38% is invested among other 23 securities. This implies that the majority of funds may be invested on the security of IFAD Autos Limited. IFAD Autos Limited has high proportion of investment in the portfolio and it is about 21.37%. So, investors can invest more in IFAD Autos

Limited to get maximum return with minimum risk. Following that next choice will be Pubali Bank limited where investor can be advised to invest about 15.25% out of their investment. The number of 21 companies except Titas Gas Transmission & Distribution Company Limited (1.6468), BSRM Steels Limited (1.2588), BEXIMCO Pharma (1.2264), The City Bank Limited (1.1324), Grameen phone Limited (1.3956), IDLC Finance Limited (1.0709), MJL Bangladesh Limited (1.0438), RAK Ceramics (Bangladesh) Limited(1.1179) and Summit Power Limited (1.3610) have beta value less than one, which means risk is comparatively low so diversification of portfolio may help the investor to eliminate the controllable risk associated with all these companies stocks. The lower proportion of investment of about 0.01% has to be invested in Unique Hotel & Resorts Limited.

CONCLUSION

Sharpe Single index model is the simplest and widely used method of calculating optimum portfolio. The method needs less number of variables as compared to Markowitz model. It takes Single index for constructing the portfolio that's why it is known as Single index model. There are only three steps of Sharpe single index model: Ranking the stocks, finding cut off rate and finding the proportion to be invested. In present study, 30 stocks those listed under DSE-30 Index were used to construct an optimal portfolio. Out of these stocks, investors are suggested to invest in twenty-five stocks out of thirty stocks based on the Sharpe Single index model. So it is necessary that investors also revise their portfolios from time to time to get optimum return.

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