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Diversification and Portfolio Performance of the Pharmaceutical Sector of Bangladesh

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I. Introduction

Pharmaceutical sector is one of the success stories for the economy of Bangladesh. This is one of the thust sectors of the economy with it being a billion taka industry. But that does necessarily mean that all the companies present would do well, in terms of the value they provide to their shareholders, at the same time. The value to the shareholders is through capital appreciation and dividend gain. It is highly unlikely that all companies will show the same growth in earnings at the same time. The change in earnings impacts the value of firm; which in turn impacts the wealth of the shareholder.

A look at the earnings growth of the different companies in this sector specifies the claim above. While this year, ACI showed a growth in earnings of 34%, Beacon Pharma showed a decline in growth by 20% (EBL Securities, 2015). So, while in investing in a certain company can be beneficial; at the same time it can be sacrificial.

So, comes one of the basic concepts of finance: diversification. Diversification is a procedure of minimizing risk by investing in different stocks, preferably without sacrificing return. The aim of this is to lower the risk of the portfolio held by an investor.

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Diversification looks to nullify the firm-specific or unsystematic risk associated with a certain risk class. For a reasonably well-diversified portfolio, only market risk matters (Brealey, Myers, & Marcus, 2001). Thus, in a well diversified portfolio, one gets compensated for the market risk, not the unsystematic risk. As one adds new securities to the portfolio, he/she is coming up with the new portfolios. At the same time, one needs to look at the performance of the new portfolios. The performance evaluation of the portfolios can be based on Capital Asset Pricing Model (CAPM) or other multi factor models. Some of the common performance evaluation ratios based on CAPM are Sharp ratio, Treynor ratio, M-Squared (M^2) and Jensen's Alpha.

The main objective of this study is to check while adding new securities to the portfolio does the effects of diversification take place for the Pharmaceutical sector, and to check the performance of the new portfolios created along the way using Sharp ratio and Modigliani risk-adjusted performance (M^2).

II. Literature Review

a) Pharmaceutical Sector of Bangladesh

The pharmaceutical industry is one of the most technologically advanced sectors currently in existence.....local companies fulfilling 98% of the drug requirements , a picture contrary to that of 20 years ago, when 75% of the drugs were imported (EBL, 2015).

The top three companies in this sector are Square Pharmaceutical, Incepta Pharmaceutical and Beximco Pharmaceutical with companies combined holding around 40 percent of the market share. The domination of the local companies has ensured that none of multinationals is in the top 10 list when it comes to market share (Bangladesh's Corporate World, 2013).

b) Portfolio Return and Risk

i. Portfolio Return

The return on a portfolio is simply a weighted average of the returns on the individual securities. We can find the return of portfolio consisting of n securities by this:

$$Rp = W1R1 + W2R2 + \cdots \ldots \ldots + WnRn$$

Where:

$Rp =$ return on portfolio

$W1 =$ weight of security 1

$R1 =$ return on secutiy 1

$W2 =$ weight of security 2

$R2 =$ return on secutiy 2

$Wn =$ weight of security n

$Rn =$ return on secutiy n

The weight, W here means the percentage of investment in a certain security and return, R means the return on that security.

ii. *Types of Risk*

Investment risk depends on the dispersion or spread of possible outcomes and the standard measures are variance and standard deviation (Brealey, Myers, & Marcus, 2001). In finance, we divide total risk into two components: a systematic portion, called systematic risk, and the remainder, related to the firm or industry is called firm-specific or unsystematic risk. The distinction is expressed as: systematic risk, any risk that affects a large number of assets, each to a greater or lesser degree while unsystematic risk, risk that specifically affects a single asset or certain class of securities. While systematic risk is risk that is inherent in the overall market and affects the market as a whole; unsystematic risk is risk that is local or limited to a particular asset or industry and does not impact assets outside that asset class (CFA Institute, 2013). Example of systematic risk is change in interest rates; and example of unsystematic risk is failure of drug trial of a pharmaceutical company.

Total Risk = Systematic Risk + Unsystematic Risk

Standard deviation of an individual stock is the measure of total risk which comprises of both the systematic and unsystematic risk. In short, while unique or unsystematic risk arises because many of the perils that surround an individual company are peculiar to that company and perhaps its direct competitors: market risk or systematic risk stems from economy wide perils that threaten all businesses (Brealey et al., 2001).

iii. *Portfolio Risk*

The variance of the portfolio is dependent on standard deviation of individual stocks and covariance or correlation between stocks present in the portfolio.

While the variances of individual securities measure the variability of individual security's return.

Table 1 : The number of Variance and Covariance Terms as a Function of Number of Stocks

Number of Stocks in Portfolio	Total Number of Terms	Number of Variance Terms	Number of Covariance Terms
1	1	1	0
2	4	2	2
3	9	3	6
10	100	10	90
100	10,000	100	9900
-	-	-	-
N	N	N	N -N

In a large portfolio, the number of terms involving covariance between two securities is much greater than the number of terms involving variance of a single security (Ross et al. , 2003). Thus, variance plays the key role in determining the portfolio variance. To get the standard deviation of the portfolio, we have to square root the portfolio variance.

c) *Essence of Diversification*

While total risk of an individual stock is expressed by standard deviation of their returns, the..... securities present in portfolio. So, when two securities' returns move in the same direction at the same time, i.e. both.....we say they are perfectly positively correlated.

The total risk of a portfolio diminishes as we keep adding securities. The portfolio's variance can never drop to zero as only the unsystematic risk is falling, the systematic risk cannot be diversified away. If we plot a portfolio risk versus number of securities graph, as plotted below, we can see that the unsystematic risk decreases as we increase the number of securities in a portfolio. For a reasonably well-diversified portfolio, only market risk matters (Brealey et al., 2001).

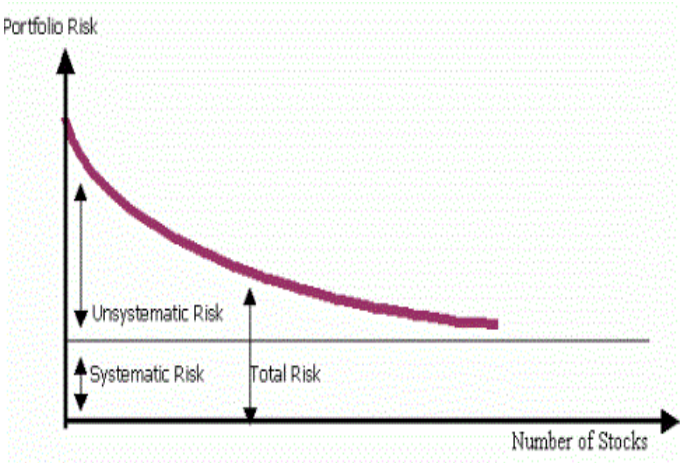

Figure 1 : Relationship between Portfolio Risk and Number of Securities in a Portfolio

Source:https://thelostprofit.wordpress.com/2011/12/11/diversification-analysis-for-the-diversifically-challenged-unfinished/

Investors holding diversified portfolios are mostly concerned with macroeconomic risks, not about microeconomic risks peculiar to a particular company or investment project as micro risks are washed out in diversified portfolios (Brealey et al., 2001).

i. *Capital Asset Pricing Model (CAPM)*

As we have already explained that only market or systematic risk exists in a well diversified portfolio so investors won't be compensated for the diversifiable risk in an efficient market. Therefore, investors would be compensated for the market risk involved with investing

in a portfolio of securities. The systematic risk of an asset/portfolio is measured by beta. Beta measures the responsiveness of a security/ portfolio to movements in the market portfolio (Ross et al. , 2003). Investors are compensated for the risk they are taking by this beta measurement.

The Capital Asset Pricing Model (CAPM) is an economic model for valuing stocks, securities and assets by relating risk and expected return. The CAPM is based on the idea that the investors demand additional required return called risk premium for taking additional risk (Sharpe, F.W., 2014). This can be said to be the simplest form of return generating model.

$$Re = Rf + \beta(Rm - Rf)$$

Where,

Re =expected return of a security/portfolio

Rf =risk free rate

β =beta of the security/portfolio

Rm-Rf = Difference between expected return on market and risk-free rate

This formula above, called the capital-asset-pricing model implies that the expected return on a security/portfolio is linearly related to its beta. Blume (1993) stated that the CAPM provides a model, not only explains the equilibrium risk/return relationship, but the linear relationship between the systematic risk and the expected returns.

d) Performance of Portfolio

Investors need to know whether it is worth investing in a certain sector or institutional stocks. This can be based on CAPM or multi factor models. Two of the commonly used ratios for portfolio performance evaluation are Sharpe ratio and M-Squared (M^2).

i. *Sharpe Ratio*

The Sharpe ratio is a measure that helps investors figure out how much return they're getting in exchange for the level of risk they're taking on (Marte, 2012). This ratio measures the return on investment for each unit of risk taken i.e. for each unit of total risk taken. Sharpe ratio is defined as risk premium of a portfolio divided by its standard deviation.

$$Sharpe\ ratio = Rp - Rf/\sigma p$$

Where,

$Rp =$ Return of the individual portfolio

$Rf =$ Risk free rate

σp = Standard Devation of the individual portfolio

It is also known as the reward to variability ratio and assumes that the investor does not own any other assets other than that in his portfolio. The portfolio with the highest Sharpe ratio has the worst performance while that with the highest Sharpe ratio has the best performance (CFAInstitute, 2013).

Sharpe ratios work best when figured over a period of at least three years and through looking at the fund's risk-adjusted performance over several years offers insight on how the fund weathered different market environments (Marte, 2012). It has two limitations: one being the use of total risk as the measure, and second: It can be difficult to interpret and use for comparisons in periods when some funds' returns are below the Treasury-bill return but can be telling when comparing two funds that compete in the same category (Marte, 2012).

ii. *Modigliani–Modigliani Measure (M-Squared)*

Adjusting returns for risk is essential and the methodology employed should be universally representative, M-Squared is an attempt to provide a risk-adjusted measure of performance (Baigent, 2015). It is derived from the widely used and is an extension of the Sharpe ratio in that it is based on total risk, not beta risk (CFAInstitute, 2013). The equation is:

$$M^2 = (Rp - Rf)\frac{\sigma m}{\sigma p} - (Rm - Rf)$$

Where:

$Rp =$ Return of the individual portfolio

$Rf =$ Risk free rate

$Rm =$ Return of market portfolio

σp = Standard Devation of the individual portfolio

σm = Standard Devation of the market portfolio

M^2 gives rankings which is similar to that of Sharpe ratio, but in percentage terms. A portfolio that has a positive M^2 value shows the portfolio is performing better than the market while a M^2 value of zero refers to the point that the portfolio matches the performance of the market.

III. Research Methodology

For this report, we collected our all information from secondary sources. For the analysis purpose, we collected data from DHAKA STOCK EXCHANGE. To conduct the research, we take the closing share price of the last date of every month from 2010-2013 of the four company from the trade information of DSE.

For the research purposes, we analyzed four pharmaceutical companies, namely, Square Pharmaceuticals, Ambee Pharmaceuticals, Renata Pharmaceuticals and Beximco Pharmaceuticals.

Using the closing prices of a company's stocks over two months we calculate the monthly return.

The monthly return is calculated using:

Return = (closing price of this month – closing price of the previous month) /closing price of the previous month.

Once we calculated the monthly returns over the four year period we estimated the average return

during this period using h the AVERAGE function of Excel. At the same time using the STANDARD DEVIATION function we found out the standard deviation of the return for every company.

Using the same return computations we calculate the co-variances between returns of any two companies. Once we get the standard deviation and co-variances we calculate the portfolio variance. Once we have the portfolio variance we can estimate the portfolio standard deviation for the different combinations of portfolios. Using these data, we check for the effects of diversification and performance of the portfolios.

a) Standard Deviation

Standard deviation is applied to the annual rate of return of an investment to measure the investment's volatility. Volatility is a measure of risk to determine the risk of a specific security. We use Excel Function to find out the SD.

Excel Function=STDEVP (Return of the four years)

b) Covariances

Covariance measures how two variables move together. It measures whether the two move in the same.... it measures between two company's variable. We have got 8 covariances of these four pharmaceuticals.

c) Portfolio Variances

The variance of a portfolio's return, σ_P^2 is a function of the variance of the component assets as well as the covariance between individual securities. It is worthwhile to bear in mind that the variance of the portfolio with an increasing number of securities is more dependent on the covariances between individual securities.

For the computation purposes, we assume that equal investments happening in the different stocks of a portfolio. Therefore when we are taking a case of two stock portfolio, we assume the weight,w assigned to be .5 each. In case of a three stock portfolio, we assume the weight assigned to each individual security to be .33 each.

The formula for calculating the portfolio variance:

For two stock portfolio: $$\sigma_P^2 = w_A^2*\sigma^2(R_A) + w^2_B*\sigma^2(R_B) + 2*(w_A)*(w_B)*Cov(R_A, R_B) \quad \{3.1\}$$

For three stock portfolio $$\sigma_P^2 = w^2_A*\sigma^2(R_A) + w^2_B*\sigma^2(R_B) + w^2_C*\sigma^2(R_C) + 2*(w_A)*(w_B)*Cov(R_A, R_B) + 2*(w_A)*(w_C)*Cov(R_A, R_C) + 2*(w_B)*(w_C)*Cov(R_B, R_C) \quad \{3.2\}$$

For four stock portfolio $$\sigma_P^2 = w^2_A*\sigma^2(R_A) + w^2_B*\sigma^2(R_B) + w^2_C*\sigma^2(R_C) + w^2_D*\sigma^2(R_D) + 2*(w_A)*(w_B)*Cov(R_A, R_B) + 2*(w_A)*(w_C)*Cov(R_A, R_C) + 2*(w_B)*(w_C)*Cov(R_B, R_C) + 2*(w_A)*(w_D)*Cov(R_A, R_D) + 2*(w_B)*(w_D)*Cov(R_B, R_D) + 2*(w_C)*(w_D)*Cov(R_C, R_D) \quad \{3.3\}$$

From these variances we calculate the standard deviation of the portfolio (σ_P) by using excel function SQRT.

d) Portfolio Return

Portfolio return is the actual return in monetary terms that the holder of the portfolio would make based on his/her proportional investment on the individual stocks on the portfolio. In actual terms, both dividends and capital appreciation are components of returns but here we use the capital appreciation/ depreciation to be the actual return. The weights assigned while calculating standard deviation of the portfolio is used here too i.e. the amount invested in each stock would be the same. For a two stock portfolio:

$$\text{Return on portfolio for A\& B: } w_A(\text{AVG Return}_A) + w_B(\text{AVG Return}_B) \quad \{3.4\}$$

For a three stock portfolio:

$$\text{Return on portfolio for A, B \& C: } w_A(\text{AVG Return}_A) + w_B(\text{AVG Return}_B) + w_C(\text{AVG Return}_C) \quad \{3.5\}$$

For a four stock portfolio:

$$\text{Return on portfolio for A, B, C and D: } w_A(\text{AVG Return}_A) + w_B(\text{AVG Return}_B) + w_C(\text{AVG Return}_C) + w_d(\text{AVG Return}_D) \quad \{3.6\}$$

Average return (AVG Return) comes from the company's return computation i.e. by summing the return over the period in computation divided by the number of observations and weight, w calculation is the same thing that we did for the portfolio variances.

e) Effects of Diversification

We want to look into whether the effects of diversification i.e. reduction of risk with investing in increasing number of different stocks in a portfolio. We look into the fact that when we invest in different stocks whether the unsystematic risk decreases. We plot a graph with total risk in the y-axis and investment in different stocks in the x-axis.

f) Portfolio Performance

For the analysis purpose, we take two commonly performance evaluation ratios: Sharpe ratio

and M-Squared (M^2). In both these measures, we take into consideration the total risk; not systematic risk. These measures can be extended to multi-factor models but we are using these simple ratios based on only CAPM in this report.

i. *Sharpe Ratio*

Sharp ratio is explained by portfolio's risk premium divided by portfolio risk. Here, we assume that the investor has invested only in the portfolio in question we take that the investor has the investor has invested in and in nothing else.

To calculate the Sharpe ratio, we need to estimate the monthly risk-free rate. This is calculated by taking the annual return from 10 year Treasury bond and converting to monthly return. This is done using the formula:

$$Rannual = (1 + Rmontly)^{12} - 1$$

Where,

$Rannual =$ Annual return of 10 year Treasury bond)

$Rmontly =$ monthly risk − free rate

Once we get the risk-free rate from this equation we can calculate the Sharpe ratio for each portfolio.

The formula for calculating the Sharpe ratio is presented below:

Sharpe ratio = (portfolio return − Risk-free rate)/Standard deviation of portfolio

ii. *Modigliani–Modigliani measure*

Modigliani–Modigliani measure, commonly known as M^2 measures the risk adjusted returns of the portfolio. For calculating this we need to calculate the return and risk profile of the market index. We took the market index and calculated the return the same way we did for individual stocks. For calculating the risk profile of the market we followed the same procedure we did for calculating the standard deviation of individual stock. The formula used: $M^2 = (R_p - R_f) * \sigma_M/\sigma_P - (R_m - R_f)$

The portfolio return and portfolio standard deviation of individual portfolio calculated above are used here to estimate the M^2. invested in portfolio consisting of Square Pharmaceuticals, Ambee Pharmaceuticals, Renata Pharmaceuticals and Beximco Pharmaceuticals shares; it means these are the only stocks in which the investor has invested in and in nothing else.

IV. Findings and Analysis

Four pharmaceutical companies are the targeted companies. These companies are: Square Pharmaceuticals, Beximco Pharmaceuticals, Renata Pharmaceuticals and Ambee Pharmaceuticals. The collected DSE indexes are used for the purpose of calculating the standard deviation, covariance and portfolio variance.

a) *Standard Deviation*

The standard deviation is the measure of total risk. Thus, the standard deviation is estimated to understand the riskiness of the companies. From our analysis the standard deviation for the four companies are calculated to be:

Table 2 : Total Risk of Individual Companies

Standard Deviation (Square Pharma.)	16.00%
Standard Deviation (Beximco Pharma.)	13.24%
Standard Deviation (Renata Pharma.)	16.03%
Standard Deviation (Ambee Pharma.)	23.77%

b) *Covariance*

As we know, covariance is a measure of the relation between the movements of the stocks' returns. Portfolio variance is more dependent on the stock covariance than on standard deviation of individual stocks. The covariances calculated are as follows:

Table 3 : Covariance between the Stocks Involved

Covariance (Square &Beximco)	0.004555
Covariance (Square &Renata)	0.018337
Covariance (Square &Ambee)	0.004407

Covariance (Beximco & Square)	0.004555
Covariance (Beximco &Renata)	0.008734
Covariance (Beximco & Ambee)	0.010446

Covariance (Renata & Square)	0.01834
Covariance (Renata & Beximco)	0.00873
Covariance (Renata & Ambee)	0.00459
Covariance (Ambee & Square)	0.00441
Covariance (A mbee& Beximco)	0.01045
Covariance (Ambee & Renata)	0.00459

c) *Portfolio Standard Deviation*

We know that portfolio standard deviation is.....Finally, we assumed equal investment to take place in all four stocks.

Table 4 : Portfolio Variance and Standard Deviation

	Variance	Standard Deviation
Portfolio of Square	0.026	16.00%

Portfolio of Square & Ambee	0.023	15.08%
Portfolio of Sqaure, Ambee & Renata	0.018	13.44%
Portfolio of Square, Beximco, Renata & Ambee	0.014	11.93%

d) Diversification

Diversification is a risk management skill which involves investing in different types of stocks. This is done to reduce the risk profile of the portfolio. This will mean that the negative performance of some stocks will be negated by the positive performance of other stocks. Thus, this in turn will lead to reduction of unsystematic risk.

Here, we can see that investment in portfolio of only square stocks is riskier than that of Square Pharmaceutical and Ambee Pharmaceutical. This holds true, in spite of the fact that total risk of Ambee Pharmaceutical stocks is greater. The diversification effects due to the covariance between the two sets of stocks. Here, we see that as investment in increasing number of firms take place, the total risks involved decreases. This in turn means we are diversifying away the firm specific or unsystematic risks. Thus, the effects of diversification hold for the pharmaceutical sector.

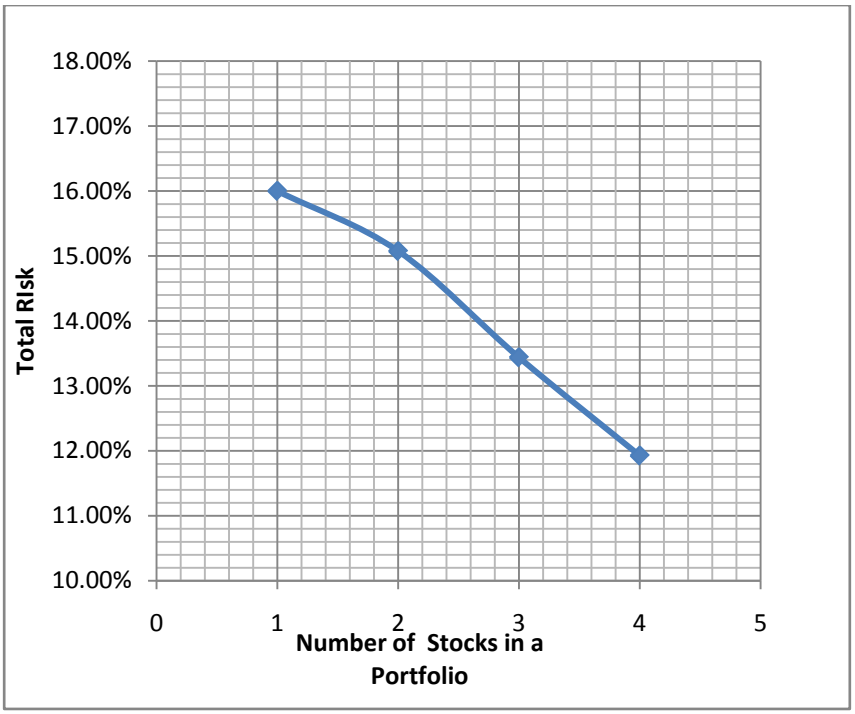

Figure 2 : Portfolio Risk vs. Number of Stocks in a Portfolio for the Pharmaceutical Sector

e) Performance of Portfolio

To estimate the performance of portfolio we need the risk and return profile of the individual stocks as well as that of the market. Thus, we need to find the return as well as the standard deviation of the market. Using all these information, we calculate the Sharp Ratio and M Squared of the portfolios.

Below, the risk-return profiles are presented. All the stocks, with the exception of Ambee Pharmaceutical performed poorly with respect to the market. All the stocks show high volatility when compared to the volatility of the market.

To make matter complex, it is observed that the monthly return of a 10 year Treasury bond is greater than that of market.

Table 5 : Monthly Return and Standard Deviation of Individual Stock

	Monthly Return	Standard Deviation
Square	-2.71%	16.00%
Ambee	2%	23.77%
Renata	-3%	16.05%
Beximco	-1.87%	13.24%
Market	0.56%	9.64%
Risk free Rate	0.78%	

i. *Sharp ratio and M Squared for the Portfolio*

To calculate the Sharpe Ratio and M-Squared we first estimate the risk- return profile of the portfolio.

Using the same assumption that we invest equally in all the different stocks in the portfolio we calculate the risk-return profile of the portfolios. We took the portfolios in accordance to that investment profile used to calculate risk profile for diversification. The return-risk profiles of the portfolios are presented below:

Table 6 : Portfolio Return and Risk Sharpe Ratio

As we know investors are by nature risk averse, they require higher compensation for higher risk in the form of higher return. A common measure of performance is the Sharpe Ratio, also known as the reward-to-variability ratio. The portfolio with the greatest Sharpe ratio has the best performance while the lower the Sharpe ratio, the worse the performance of the portfolio.

Table 7 : Sharp Ratio Computation

Sharp Ratio of Portfolio:	
Square & Ambee	-0.06982688
Square, Ambee & Renata	-0.136894851
Square, Beximco, Renata &Ambee	-0.171278425

From this table above, we see that the portfolio consisting of Square Pharmaceutical and Ambee Pharmaceutical has the highest Sharpe ratio, thus this portfolio has the best performance. At the same time, the portfolio having Square, Beximco, Renata & Ambee stocks has the worst performance.

M-Squared (M^2)

M^2 gives rankings similar to that of Sharpe ratio. But these rankings are easier to interpret as these are expressed in percentage performance. Negative values here mean that the portfolios constructed based on stocks of this sector are performing poorer to the market. From the ranking perspective, portfolio consisting of Square Pharmaceutical and Ambee Pharmaceutical stocks is best while portfolio consisting of the four different stocks is performing the poorest. But these values also indicate that these portfolios perform poorer to the market on a risk- adjusted basis.

Table 8 : M-Squared Estimation

M^2	
Portfolio consisting of Square and Ambee	-0.453%
Portfolio consisting of Square, Renata and Ambee	-1.100%
Portfolio consisting of Square, Renata, Beximco and Ambee	-1.431%

V. Recommendation

From the above findings, we can interpret that diversification works for this sector but the performance of the portfolios are poorer than the market. Thus, this analysis creates room for skepticism. Although diversification leads to reduction of risk but it takes a hit in the return analysis. From the investors' perspective, they should invest in stocks outside this sector. On top

	Monthly Return	Total Risk (Standard Deviation)
Portfolio consisting Square stocks	-2.71%	16.00%
Portfolio consisting Square and Ambee stocks	-0.71%	15.08%
Portfolio consisting Square, Ambee and Renata stocks	-1.06%	13.44%
Portfolio consisting Square, Ambee ,Renata and Beximco stocks	-1.26%	11.93%

of all these, the return on 10 year Treasury bonds is greater that than of the market it can be suggested that a risk-averse investor should rather invest in the bonds. From the various companies' perspective, they should look at the business structure, operational mechanism and capital structure of Ambee Pharmaceutical as it is the only stock that is outperforming the market.

VI. Conclusion

We can see that for this pharmaceutical sector, the effects of diversification hold. As the number of securities of different companies is introduced the total risk is reduced as the unsystematic risk minimizes. But, we see that the performance evaluated by the Sharpe ratio and M-Squared does not provide any positive reading. The period analyzed was just after the Global Recession so this can be one reason why the return on the market as a whole was poorer than that of 10 year Treasury bond. There is scope for further studies to check if investors diversified in different sectors, rather than one, could they avail better returns along with the effects of diversification.

References Références Referencias

1. Baigent, G.G. (2015). M-Squared and ranking issues for risky assets. *Applied Economics Letters, 22(4)* , 247-250.
2. Bangladesh's Corporate World, (2013, November 7). Growth of the Pharmaceutical Sector of Bangladesh. Retrived form http://bangladesh-corporate-world.blogspot.com/2013/11/growth-of-pharmaceutical-sector-of.html
3. Blume, M.E. (1993), The Capital Asset Pricing Model and the CAPM literature, in The CAPM controversy:

Policy and strategy implications for investment management. ICFA Continuing Education, edited by D.R. Harrington and R.A. Korajczyk. AMIR, New York, pp 5-10

4. Brealey, Myers, & Marcus. (2001). *Fundamentals of Corporate Finance.* United States of America: McGraw-Hill Primis Custom Publishing.
5. CFA Institute, (2013). Pricing of risk and Computation of Return. *Corporate Finance and Portfolio Management* (p. 358). Wiley.
6. EBL Securites Limited (EBL). (2015). *Pharmaceutical Sector Overview.* Dhaka.
7. Marte, J. (2012, April). *The Wall Street Journal*. Retrieved September 2015, from http://www.-wsj.com/articles/SB10001424052702304692804577283773166995992
8. Ross. A. W., Wester field, R.W., & Jaffe, W. (2003). Return and Risk- The Capital Asset Pricing Model. *Corporate Finance*. New York: McGraw-Hill/Irwin.
9. Sharpe, F.W. (2014). Summary of Capital Asset Pricing Model. Retrieved from HYPERLINK "http://www.valuebasedmanagement.net/methods_capm.html" http://www.valuebasedmanagement.-net/methods_capm.html