



Inspiring Excellence

## **Internship Report**

ON

Effects of Diversification and Portfolio Performance  
of the Ceramic Sector of Bangladesh

### **Submitted To**

**Dr. Mamun Habib**

Associate Professor

BRAC Business School

BRAC University

### **Contributor**

**Rubaiyat Al Jalil**

ID: 12204101

BRAC Business School

BRAC University

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## Letter of Transmittal

1<sup>st</sup> December, 2016

Dr. Mamun Habib

Associate Professor

BRAC Business School

BRAC University

Subject: Submission of internship report on “Effects of Diversification and Portfolio Performance of the Ceramic Sector of Bangladesh.”

Dear Sir,

It is my great pleasure as I stand at the brim of my graduation with my internship report which I humbly place before you for evaluation and approval. The report titled “Effects of Diversification and Portfolio Performance of the Ceramic Sector of Bangladesh” have led me through many informative experience which I have analyzed to best suit the objective of my report. I have no doubt, my contribution will be best evaluated on your sharp scale of acceptance & analytical remarks and will be reflective of my diligent efforts.

Thus, I am submitting my report which, hopefully you will discover to be well explored, informative and a symbol of my efforts and patience. However, in case of further clarification or elaboration as to my report, I would welcome the opportunity to consult with you to explore how my findings could best meet your needs.

Yours Sincerely,

.....

Rubaiyat Al Jalil

ID: 12204101

BRAC Business School

## Declaration by Student

This is to notify that this report “Risks and Opportunities of Foreign Investments in Frontier Capital Markets: An Analysis on Bangladesh Outlook” has been prepared as a part of my internship formalities. It is an obligatory part of the BBA program to submit an internship report. Moreover, I was inspired and instructed by my supervisor Dr. Mamun Habib, Associate Professor, BRAC Business School, BRAC University.

.....

Rubaiyat Al Jalil

ID: 12204101

Bachelor in Business Administration

Major in Finance and Accounting

BRACUniversity

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My heartiest gratitude to Mr. Ahsanur Rahman (Head of International Trade and Sales, BRAC EPL Stock Brokerage Ltd.). A big contribution to my learning process would go unmentioned without few other names; FahmidaAnjuman (Deputy Manager), RifatHasanKanak and KaziAminul Islam (Assistant Manager) and Sheikh Mohibul Islam Rumi (Executive). The time during the program would be nothing without the enthusiasm and imagination from the team of International Trade and Sales. The learning process from the professional exposure has been a tremendous journey filled with guidance from all the seniors and my supervisor. Acknowledging the contribution of these amazing people brings me great joy as reciprocation on my learnings and the people who cooperated at every juncture.

## Executive Summary

This paper strives to empirically identify whether portfolio diversification within the ceramic sector of Bangladesh reduces the overall portfolio risk or not. Moreover, the objective also entails the performance of the portfolio consisting of securities from one single sector. Several portfolio and diversification measurement techniques have been used, namely Modigliani measure, Sharpe ratio, risk-return relationship and variances. The paper theorizes on the explanation laid out by the Capital Asset Pricing Model and are reflective of its various risk and return characteristics.

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## Chapter 1: Overview of the Organization and Bangladesh Capital Market

### 1.1 Company Profile

BRAC EPL Stock Brokerage Limited (BESL) is one of the leading stock brokers in the country. The company offers brokerage services to international institutions, domestic institutions, retail clients and non-resident Bangladeshis (NRBs). It is also the pioneer and leader in facilitating foreign portfolio investments in Bangladesh and boasts one of the best Equity Research teams of the country.

Previously known as Equity Partners Securities Limited (EPSL), the company was formed in early 2000 as a brokerage house licensed by the Securities and Exchange Commission of Bangladesh. In August 2009, BRAC Bank limited acquired 51% of its equity and renamed the company as BRAC EPL Stock Brokerage Limited.

BESL has membership at both of the country's stock exchanges; the Dhaka Stock Exchange (DSE) and the Chittagong Stock Exchange (CSE). Presently there are 7 branches with most situated in the capital and the rest in various divisions.



## 1.2 Mission

“We strive to develop a sustainable growth model that will guide us to market leadership through advanced client technology and superior client service. We aim to create a highly visible brand by developing a diverse talent pool and synergy within the group”.

## 1.3 Vision

“To be the trusted broker of choice for all investors by offering unrivalled level of investment expertise and customer service”.

## 1.4 Core Values

- ↳ Customer focus
- ↳ Innovation
- ↳ Integrity
- ↳ Core Values

## 1.5 Board of Directors

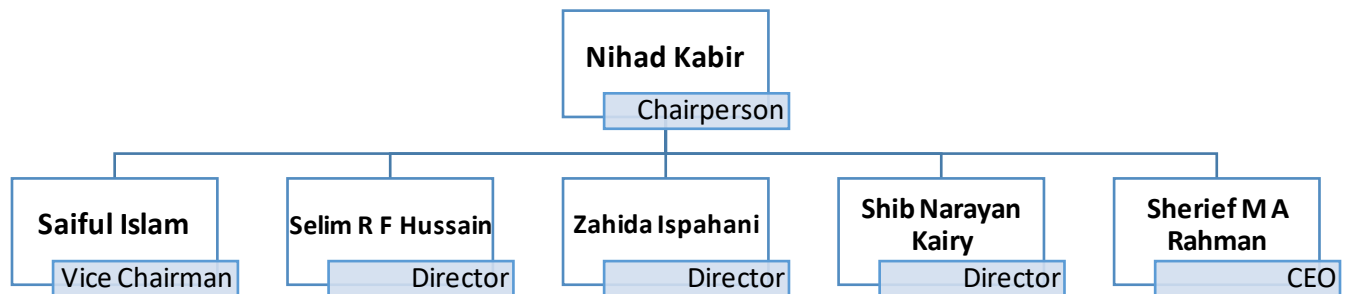


Figure 1.1: Board of Directors of BRAC EPL Stock Brokerage Limited

## 1.6 The Management

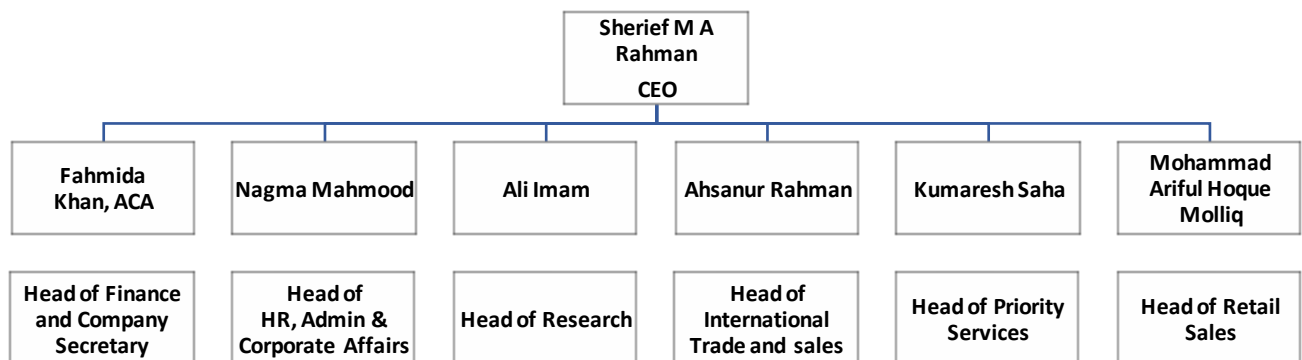


Figure 1.2: The Management of BRAC EPL Stock Brokerage Limited.

## 1.7 Functions of BESL

BRAC EPL serves a very broad market offering brokerage services to suit the needs of several niche within the market. Services are provided to subcategories of the market with one being local investors and another as foreign.

Since its inception, BESL have served as one of the leading brokerage service provider. With its unique selling proposition that distinguishes the services of BESL from its competitors, it has held a strong foothold in capital market services. The services can be distinctive under brokerage services, research solutions and value-added services.

### **Brokerage Services:**

- ↳ Brokerage services to individual clients both local and NRB
- ↳ Services to institutional clients
- ↳ Services for fund managers
- ↳ Appointment of sales representatives
- ↳ Trade execution in both Dhaka and Chittagong Stock Exchange
- ↳ Margin Facilities
- ↳ Retail trading booth
- ↳ Order placement through e-mail and telephone
- ↳ Separate trading booth for retail and VIP clients
- ↳ Opportunities for trading in different financial instruments
- ↳ Priority services

### **Research Solutions:**

- ↳ Market overview on weekly and monthly performance of the stock market
- ↳ Performance outlook covering different sectors
- ↳ Industry/ Corporate research report
- ↳ Half yearly political and economic update

**Value Added Services:**

- ↳ Portfolio services on request
- ↳ Trade confirmation through e-mail or preferred method
- ↳ Account modification services

## 1.8 Services Provided by BESL

**Depository Services:** Full depository services that comprise opening and maintenance of BO account, dematerialization and re-materialization of instruments, transfer and transmission of instruments, pledging-unpledging through CDBL<sup>1</sup>.

**Trading Services:** Dedicated towards developing a solid trading infrastructure. Being founded upon the urge to be the market leader, BESL have already taken some big strides towards success by establishing spacious trading floor, female trading booths, multiple VIP Trading booths and separate Tele-trading booths.

**Margin Facility:** BESL also arranges margin facilities for clients by teaming up with BRACEPL Investments. In a nutshell, any investor who wants to trade on margin account can avail the same via BRAC EPL Stock Brokerage Limited.

**Institutional Help Desk:** Any institution or large investor can avail customized client service through a separate institutional help desk at BRAC EPL Stock Brokerage Limited.

**Tele/E-mail Trading:** As it is not always possible for an investor to visit physically and submit his order, BESL allows placement of order over Phone and via E-mail.

**Female Trading Booth:** BRAC EPL Stock Brokerage Limited maintains separate female trading booths to facilitate trading for women investors.

**VIP trading Booth:** Since institutional investors' need seclusion while making their investment, BRAC EPL Stock Brokerage Limited has established separate VIP Trading booth in every outlet.

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<sup>1</sup> CDBL stands for Central Depository Bangladesh Limited.

**Client Services:** BESL believes that "Quality makes a sale but Salesmanship Makes a resale". Holding this belief as the key criterion, they have formed a fine tuned team of customer service that is composed of a group of fresh business school graduates and veteran customer care personnel who are amiable, efficient and receptive to customers' queries.

## 1.9 Experience at BESL

“If you’re offered a seat on a spaceship, don’t ask what seat! Just get on.”

-Sheryl Sandberg

The tenor of internship is a greater opportunity to learn rather than apply. This opportunity to work at BRAC EPL Stock Brokerage Limited has been a true learning experience being exposed to a professional environment. Hard work, passion and determination are the three things I found to be more valuable than competence, efficiency and success. The last day at work was as pleasant as the very first day. Equipped with no expertise and prior knowledge of working with professional traders it was the drive to learn that made up for a fruitful and inspiring experience. Being an intern for the International Trade and Sales Department has helped me gather practical knowledge about capital markets and trade operations.

## 1.10 Job description and Tasks Performed

“Responsibility and scrutiny at every step of the process”- could be the job description in a nutshell. Broadly, most of the work performed as an intern have had significant impact over the operation and added value throughout the service chain.

Basic job description can be divided into three categories depending on the time they are performed:

- ↳ Pre Trade: Tasks performed before trading started on the stock exchange
- ↳ During Trade: Tasks performed during trade time
- ↳ Post Trade: Tasks performed on after-trade hours

### **Pre trade**

Before trading starts at 10:30 am on the stock exchanges there were several preparations that needed to be made. These tasks include:

- ↳ Screening morning news for economic, financial and stock market related news that may impact intraday trading<sup>2</sup>.
- ↳ Preparing report entailing relevant news and corporate events
- ↳ Briefing reported news and impacts and their likely stock or sector specific impacts
- ↳ Analyzing corporate earnings declaration
- ↳ Preparing earnings comparison sheet
- ↳ Delivering Pivot table, Spot and Record sheets
- ↳ Preparing and delivering pre-market commentary

### **During Trade**

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<sup>2</sup> Intraday trading: the buying and selling of a security within a single trading day.

Responsibilities during trade time becomes more analytical and the tasks performed alongside observing everyday trade are as follows:

- ↳ Keeping records of sessional volume<sup>3</sup> changes at a specific interval
- ↳ Analyzing volume records to prepare specific notes
- ↳ Briefing changes in sessional volumes
- ↳ Assisting with trade order execution
- ↳ Screening DSE news-wire for updates on stock specific or sector specific news
- ↳ Briefing relevant updates regarding sector or stock specific news and events
- ↳ Assisting trade operation with technical analysis<sup>4</sup>
- ↳ Preparing and delivering midday update entailing overview of the market

### **Post Trade**

Following tasks were performed during after trade hours:

- ↳ Preparing and delivering Market wrap reflecting overall market performance for the trading day
- ↳ Updating Spot, Record and Settlement information
- ↳ Preparing Spot and Record sheet
- ↳ Updating market information and events
- ↳ Keeping stock specific data
- ↳ Assisting with order records

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<sup>3</sup> Volume: refers to the value of the assets traded on the stock exchanges

<sup>4</sup>Technical analysis: is a security analysis methodology for forecasting the direction of prices through the study of past market data, primarily price and volume.

## 1.11 Overview of Bangladesh Capital Market

Frontier markets are a group of developing countries that exhibit characteristics similar to emerging markets but are in earlier stages of macroeconomic and capital markets development (Senay, 2015). Bangladesh is one such frontier market. Over the last 12 years, the Bangladesh economy has sustained average GDP growth of around 6% per year, accompanied by significant shifts in the sectoral output, away from agriculture to industry and services, towards an increasing contribution of the private sector to growth in investment (Amit, 2016).

The following table shows some selected indicators of capital market developments in Bangladesh referring to three choice years: year 2007 representing the pre-bubble era, year 2010 representing the peak bubble year and finally 2015 showing the recent scenario.

<b>Indicators</b>	<b>FY2007</b>	<b>FY2010</b>	<b>FY2015</b>
Number of listed securities	281	279	330
Issued Equity and Debt (Billion BDT)	83.7	213.1	1092
Market Capitalization (Billion BDT)	412.2	2277	3251.0
Turnover (Billion BDT)	164.7	2714.3	476.7
General Price Index	2149.3	6153.7	4586.9
DSE Broad Index	N/A	N/A	4583.1
DSE 30 Index	N/A	N/A	1769.4

Source: DSE website and research

Table 1.3: List of market indicators by years.

Dhaka Stock Exchange (DSE), the prime exchange of Bangladesh although being formally inaugurated in 1954, market activity started becoming noticeable during 1990. Until the 1990s, with regard to both the existing exchanges, the Dhaka Stock Exchange (DSE) and the Chittagong Stock Exchange (CSE), standard indicators of market performance – number of equities traded, average turnover and market capitalization to GDP ratios – remained significantly lower than indicators for regional counterparts (Amit, 2016).

Dhaka Stock Exchange (DSE) is registered as a Public Limited Company and its activities are regulated by its Articles of Association rules & regulations and bye-laws along with the Securities and Exchange Ordinance - 1969, Companies Act - 1994 & Securities & Exchange Commission Act - 1993.



Bangladesh capital market to this day has had several ups and downs mostly due to regulatory loopholes. The stock market history of the country is witness to two busts one occurring in 1996 and the latest in 2010. The regulatory environment was inadequate and market regulations outdated and not systematically enforced. In this milieu of weak institutional structure and inadequate governance, the market experienced its first speculative bubble and burst in 1996-1997. Investors who were affected due to the bubble and burst stayed away from the market for the next several years.

Under reformed market structure the stock market gained momentum during late 2008 to 2010 period until finally collapsing for the second time in 2010. This stirred several movements to restructure the market making it fit for all levels of investment. With several changes put into place among which introduction of new indices and computing algorithms are most notable. Currently Dhaka Stock Exchange offers three indices: DSEX-the benchmark index, DSE30-constituting 30 of the top listed companies reflecting performance of the country's economy and DSES-a modern Shariah index.

## Chapter 2: Research Background

### 2.1 Foreword on Diversification

Diversification is a procedure that reduces risk by allocating investments among assorted financial instruments, industries and other categories. The rationale behind this practice asserts that a portfolio of different kinds of investments will, on average, yield higher returns and pose a lower risk than any individual investment found within the portfolio. Diversification strives to smooth out unsystematic risk events in a portfolio so that the positive performance of some investments will neutralize the negative performance of others. It aims to maximize return by investing in different areas that would each act in response differently to the same affair. Most investment professionals agree that, although it does not guarantee against loss, diversification is the most important component of reaching long-range financial goals while minimizing risk. Therefore mutual funds are operated to diversify the risk of portfolios.

### 2.2 Bangladesh Ceramic Sector in Brief

Ceramic sector is one of the thrust sectors in Bangladesh. There are many Ceramic companies such as Shinepukur, Monno, Bengal Fine, Standard, Peoples and National Ceramic, RAK, Fu Wang, China-Bangla, FARR, Modhumoti, ATI, Sunflower, Great Wall, Dhaka-Sanghai and Mir. Though there are so many companies who are doing their business in the country only five are limited and listed in DHAKA STOCK EXCHANGE. The trade information of the financial sector from the DHAKA STOCK EXCHANGE of ceramic industries from 2012 to 2014 were subject of study for this paper. Four listed Ceramic Companies (Shinepukur Ceramic, Monno Ceramic, RAK Ceramic, Fu-Wang Ceramic) are chosen to facilitate the analysis.

## 2.3 Insight on Ceramics Companies

### **Fu-Wang Ceramics**

FU-WANG Ceramic Industry Limited, the pioneer ceramic manufacturer in Bangladesh was established in May 1995 as a joint venture company. Subsequently, in 1998, it was listed in the Dhaka and Chittagong capital markets. Since then, it has been operating as a public limited company with an authorized capital of Tk. 1 billion and a paid-up capital of Tk. 930 million. FU-WANG has engaged in production of various types of wall and floor tiles. Within a short period, the business expanded its market share by its unique quality, competitive price, exclusive designs, and wide variety of sizes and models. Its effective and creative marketing campaign enabled the company to establish its brand value in the tiles market in Bangladesh. FU-WANG Ceramic Industry Limited meets European standards in production. The company is also exporting its products to the North Eastern region of India.

### **RAK Ceramics**

RAK Ceramics has been established itself as one of the leading ceramic brand by delivering quality products. RAK Ceramics (Bangladesh) ltd. is a UAE-Bangladesh joint venture of RAK Ceramics Ltd. The Company is engaged in manufacturing and marketing ceramic and sanitary ware products.

<b>Landmarks</b>	<b>Significant year/ Numbers</b>
Converted into Public LTD	2009
Total employees	15,000
Total countries its operate	160
Established ETP	March, 2009
Turnover Growth Rate of RAK	33.26% (9 years)

Table 2.1: List of important events of RAK Ceramics by significance.

The Company is headquartered in Dhaka with manufacturing facilities at Gazipur. The company is listed with the Dhaka and Chittagong stock exchanges. RAK Ceramics is Bangladesh's largest ceramic tiles and sanitary ware manufacturer. They have raised the benchmark for the others in ceramics industry space. RAK Ceramics (Bangladesh) Limited, a UAE-Bangladesh joint venture company, was incorporated in Bangladesh on 26, November 1998 as a private limited company. It has started its commercial production on 12 November, 2000.

### **Monno Ceramics**

MONNO Ceramic Industries began producing porcelain tableware for the Bangladesh home market in 1985, and secured its first export order the following year. As the original exporter of porcelain dinnerware 'Made in Bangladesh' MONNO is proud to contribute to the growth of the Bangladesh economy. MONNO offers products in Porcelain, New Bone China, Ivory China, and real Bone China. In fact they source the materials in their bone china body and glaze from Stoke on Trent, to which is added pure water filtered from their own wells. So MONNO likes to think of it as 'English' Bone China. At the time of writing the MONNO Group is currently building a hospital as will further benefit its employees and residents in local communities.

### **Shinepukur Ceramics**

SHINEPUKUR Ceramics Limited (SCL) was incorporated in Bangladesh on 26th January 1997 under the Companies Act, 1994 as a private Company and commenced its manufacturing operation in 1999. It was converted into a public Company on 7 May 2008. The registered office of the Company is located in Dhanmondi R/A, Dhaka. The industrial units are located at BEXIMCO Industrial Park, Sarabo, Kashimpur, and Gazipur. It is engaged in manufacturing and marketing of high quality Porcelain and high value added Bone China Table wares, which it sells in the local as well as international markets. SCL has no subsidiary or associate-Company. Bangladesh Export Import Company (Beximco) Ltd owns its 100% shares, thereby becoming its holding Company. SHINEPUKUR Ceramics is a member of the Largest Private Sector Conglomerate, BEXIMCO. SHINEPUKUR have certified by ISO 9001/2000.

## 2.4 Scope

While analyzing the data of the four companies, the portfolio return and the risk of the portfolio were examined. The risk-adjusted return was studied through sharpe ratio and Modigliani risk-adjusted performance ( $M^2$ ) was studied to measure the risk-adjusted returns. Analysis was carried out to know how the risk diversification works on this sector by evaluating diversification effects on these four ceramics company.

## 2.5 Objective

The main objective of the study is to evaluate the diversification effect of the Ceramic sector of Bangladesh. The other objectives are:

1. To know the individual performance of these companies
2. To develop a knowledge about the risk and return of the industry
3. To compare the effect of portfolio through portfolio variances.

The four ceramic companies that are chosen for the research are:

- ↪ FU-WANG Ceramics Industry Ltd,
- ↪ Monno Ceramics Industry Ltd,
- ↪ RAK Ceramics (Bangladesh) Ltd,
- ↪ Shinepukur Ceramics Ltd.

## 2.6 Limitations

The model of the study depends on past returns that may fail to give conclusive answers on future performance of the companies and sector.

## 2.7 Methodology

The study comprises of accumulated data and their analysis through Excel. Riding on the assumption derived from the Capital Asset Pricing Model that claims increasing the number of securities on a portfolio will result in the reduction of risk exposure. To empirically establish this assumption within a single sector, several portfolio and risk analysis tools have been applied to reach at conclusions for the aforesaid research objectives. The sample data for the study has been accumulated from Dhaka Stock Exchange website and the time frame was determined to be of three years (2012-2014).

## Chapter 3: Literature Review

### 3.1 CAPM

A model that attempts to describe the relationship between the risk and the expected return on an investment that is used to determine an investment's appropriate price. The capital asset pricing model provides a theoretical structure for the pricing of assets with uncertain returns (Bollerslev, Engle, & Jeffrey, 1988). CAPM<sup>5</sup> says that the expected return of a security or a portfolio equals the rate on a risk-free security plus a risk premium. If this expected return does not meet or beat our required return, the investment should not be undertaken. The commonly used formula to describe the CAPM relationship is as follows:

$$\text{Expected Return} = r_f + \beta(r_m - r_f)$$

$r_f$  = risk free rate

$\beta$  = Beta

$r_m$  = return on the market

The capital asset pricing model provides a formula that calculates the expected return on a security based on its level of risk. The formula for the capital asset pricing model is the risk free rate plus beta times the difference of the return on the market and the risk free rate.

The general idea behind CAPM is that investors need to be compensated for investing their cash in two ways: (1) time value of money and (2) risk. (1) The time value of money is represented by the risk-free ( $R_f$ ) rate in the formula and compensates investors for placing money in any investment over period of time. (2) Risk calculates the amount of compensation the investor needs for taking on additional risk. This is calculated by taking a risk measure (beta) that compares the returns of the asset to the market over a period of time and to the market premium ( $R_m - R_f$ ).

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<sup>5</sup> Capital Asset Pricing Model: The formula for calculating the expected return of an asset given its risk.

### 3.2 Diversification

Diversification is a method of portfolio management whereby an investor reduces the volatility (and thus risk) of his or her portfolio by holding a variety of different investments that have low correlations with each other reduce systematic risk. Diversification cannot eliminate all variance (Markowitz, 1952). In a well-conceived portfolio, this can be accomplished at a minimal cost in terms of expected return. Such a portfolio would be considered to be a well-diversified.

The acquisition of a group of assets in which returns on the assets are not directly related over time. An investor seeking diversification for a securities portfolio would purchase securities of firms that are not similarly affected by the same variables. For example, an investor would not want to combine large investment positions in airlines, trucking, and automobile manufacturing because each industry is significantly affected by oil prices and interest rates. Proper investment diversification, requiring a sufficient number of different assets, is intended to reduce the risk inherent in particular securities. Diversification is just as important to companies as it is to investors.

### 3.3 Market or Systematic Risk

Market risk is the risk that the value of an investment will decrease due to moves in market factors. Market Risk is also referred to as systematic risk or non-diversifiable risk. Market risk is comprised of the “unknown unknowns” that occur as a result of everyday life. It is unavoidable in all risky investments. It can also be thought of as the opportunity cost of putting money at risk.

Every investor faces market risk as a securities market follows economic indicators, recessions and the normal business cycle. The most basic strategy for minimizing market risk is diversification. A well-diversified portfolio consists of securities from various industries, asset classes and countries with varying degrees of risk. The specific risks will offset each other but some market risk will always remain.

Because of market efficiency, you will not be compensated for the additional risks that arise from failure to diversify your portfolio. This is extremely important for those who may have a large holding of one stock as part of an employer-sponsored incentive plan. Specific risk exposes you to adverse events on a company or industry level in addition to adverse events on a global, economic level.



### 3.4 Specific or Unsystematic Risk

It is also called the diversifiable risk or residual risk. The risk that is unique to a company such as a strike, the outcome of unfavorable litigation, or a natural catastrophe that can be eliminated through diversification.

#### **Unsystematic risk**

The risk that is specific to an industry or firm. Examples of unsystematic risk include losses caused by labor problems, nationalization of assets, or weather conditions. This type of risk can be reduced by assembling a portfolio with significant diversification so that a single event affects only a limited number of the assets.

By owning stocks in different companies and in different industries, as well as by owning other types of securities such as Treasuries and municipal securities, investors will be less affected by an event or decision that has a strong impact on one company, industry or investment type. Examples of unsystematic risk include a new competitor, a regulatory change, a management change and a product recall.

### 3.5 Sharpe Ratio

The Sharpe ratio indicates whether a portfolio's returns reflect smart investment decisions or are a resultant of excess risk. This measure is useful because although one portfolio may reap higher returns than its peers, it is good investment only if those higher returns are not a result of taking too much additional risk. The greater the portfolio's sharpe ratio the better is it's risk adjusted performance.

The greater a portfolio's Sharpe ratio is, the better its risk adjusted performance has been. Over the past 30 years, the Sharpe Ratios of the Risk Parity and the equal weighting portfolio have been much more stable across decade-long sub-periods than either the 60/40 portfolio or the optimized portfolios(Chaves, Hsu, Li, & Shakernia, 2010). The Sharpe ratio is a ratio of return versus risk.

The formula is:

$$S = \left( \frac{R_p - R_f}{\sigma_p} \right)$$

Where:

S = Sharpe Ratio

$R_p$  = The expected return on the investor's portfolio

$R_f$  = The risk-free rate of return

$\sigma_p$  = The portfolio's standard deviation, a measure of risk

The higher the Sharpe ratio, the more return the investor is getting per unit of risk. The lower the Sharpe ratio is, the more risk the investor is shouldering to earn additional returns. Thus, the Sharpe ratio ultimately "levels the playing field" among portfolios by indicating which are shouldering excessive risk.

In addition to relying only on historical returns, one problem with the Sharpe ratio is that illiquid investments lower a portfolio's standard deviation (because those investments appear to be less volatile). The ratio is also distorted if the investments don't have a normal distribution of returns.

### 3.6 M2 or Modigliani Risk-Adjusted Performance

M2 is a measure of the risk-adjusted returns of some investment portfolio. It measures the returns of the portfolio, adjusted for the risk of the portfolio relative to that of some benchmark. In simple words, it measures the returns of an investment portfolio for the amount of risk taken relative to some benchmark portfolio. Franco Modigliani and Leah Modigliani (Developer) believed that an ordinary investor would find it easier to understand the Modigliani measure compared to Sharpe ratio. The reason behind this was that their measure is expressed in percentage points. It shows how well the investor is rewarded for taking a certain amount of risk, relative to the benchmark and the risk free rate. A fund which has taken same risk as that of the benchmark but generates better returns will have superior risk return trade-off as compared a fund that has taken a significantly higher risk, but gives almost similar returns as that of the benchmark.

## Chapter 4: Analysis

All the data are collected from Dhaka Stock Exchange for the study. The mathematical results of these four companies are done in Microsoft Excel through the Excel functions. Risk measurement technique, Return measurement technique and sharp technique has been used in this paper. Standard deviation, Co variance, return on portfolio etc. are also utilized for our study purpose. To conduct the research, the closing share price of the last date of every month from 2012-2014 of the four company from the trade information of DSE were taken. The returns are computed afterwards.

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

The average return from the four years return were calculated through the AVERAGE function of Excel. The four years return were put together to find out the standard deviation of the return for every company.

### 4.1 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. Excel Function was used to find out the SD.

Excel Function = STDEVP (Return of the four years)

### 4.2 Co-Variations

Covariance measures how two variables move together. It measures whether the two move in the same direction (a positive covariance) or in opposite directions (a negative covariance). The variables are the return of the closing prices. In Excel the Covariance's were computed through the COVAR functions. {COVAR (RA, RB)}. The returns of two companies here as it measures between two company's variable. We have got eight covariance of these four ceramics company.

### 4.3 Portfolio Variances

The variance of a portfolio's return is a function of the variance of the component assets as well as the covariance between each of them. Portfolio variance looks at the covariance. It is used to reduce the risk of the securities. Portfolio variance is calculated by multiplying the square d weight of each security of company by its corresponding variance and adding two times the weighted average weight multiplied by the covariance of all individual company's security pairs. To evaluate we assume Fu-Wang ceramics (F) as the standard company and the whole weight of the portfolio is 1. So, for computing portfolio variances of one company's security we choose only the Fu-Wang ceramic's variances (as its weight is 1, Variances\*1= Variances). Then we add Monno ceramic (M) security to the portfolio as another asset. For this purpose we assumed F for Fu-Wang and M for Monno. Then calculate for these two company's weight (1/2, as the portfolio weight is divided into two securities) and Covariance.

The formula used is  $\sigma_P^2 = w_A^2 \sigma^2(R_A) + w_B^2 \sigma^2(R_B) + 2*(w_A)*(w_B)*Cov(R_A, R_B) \dots\dots\dots(1)$

Here we put  $\sigma$  from the SD of returns of the companies. As Total weight is 1, Weight of the two companies are 0.5 each.

Again the computation is done considering 3 companies; the third company being RAK Ceramic denoted as R.

Portfolio variances  $\sigma_P^2 = w_A^2 \sigma^2(R_A) + w_B^2 \sigma^2(R_B) + w_C^2 \sigma^2(R_C) + 2*(w_A)*(w_B)*Cov(R_A, R_B) + 2*(w_A)*(w_C)*Cov(R_A, R_C) + 2*(w_B)*(w_C)*Cov(R_B, R_C) \dots\dots\dots(2)$

The weight of each company then stands at 0.3333 or (1/3).

Lastly, to find the portfolio variances for all four companies, all four companies were considered; the fourth company being Shinepukur Ceramics denoted as S.

$\sigma_P^2 = w_A^2 \sigma^2(R_A) + w_B^2 \sigma^2(R_B) + w_C^2 \sigma^2(R_C) + w_D^2 \sigma^2(R_D) + 2*(w_A)*(w_B)*Cov(R_A, R_B) + 2*(w_A)*(w_C)*Cov(R_A, R_C) + 2*(w_B)*(w_C)*Cov(R_B, R_C) + 2*(w_A)*(w_D)*Cov(R_A, R_D) + 2*(w_B)*(w_D)*Cov(R_B, R_D) + 2*(w_C)*(w_D)*Cov(R_C, R_D) \dots\dots\dots(3)$

Therefore, the assigned weight becomes 0.25 (1/4) for each asset on the portfolio. From these variances the SD ( $\sigma_P$ ) was calculated by using excel function SQRT.

#### 4.4 Portfolio Return

Portfolio return is the monetary return experienced by a holder of a portfolio. It can be calculated on a daily or long-term basis to serve as a method of assessing a particular investment strategy. Dividends and capital appreciation are the main components of portfolio returns. Three portfolio returns were found: one for 2 companies, one for 3 companies and the last one for all 4 companies.

**Return on portfolio for F&M:**  $w_A$  (AVG Return) +  $w_B$  (AVG Return) .....(4)

**Return on portfolio for F, M&R:**  $w_A$  (AVG Return) +  $w_B$  (AVG Return)+  $w_C$  (AVG Return) .....(5)

**Return on portfolio for F,M,R&S:**  $w_A$  (AVG Return) +  $w_B$  (AVG Return)+  $w_C$  (AVG Return) +  $w_D$  (AVG Return) .....(6)

Average return comes from the company's return and weight calculation is the same thing that we did for the portfolio variances.

#### 4.5 Sharpe Ratio

In Finance, the Sharpe Ratio is a measure for calculating risk-adjusted return. Many institutional investors use the traditional Sharpe ratio today to examine the risk-adjusted performance of funds of hedge funds (Gueyie, 2003). The Sharpe ratio is often used to compare the change in a portfolio's overall risk-return characteristics when a new asset or asset class is added to it. The Sharpe ratio can also help explain whether a portfolio's excess returns are due to smart investment decisions or a result of too much risk. The computations were carried out by adding one company with the standard company at a time to calculate the risk-adjusted return for all three possible groups: F&M, F,M&R, F,M,R&S.

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

The monthly risk free rate from another group were collected.

For 1st two companies (F&M), Portfolio return is the answer from (4). The monthly risk free rate from another group were collected. Standard deviation of portfolio was the SQUARE root of the result of (1).

After adding another security (RAK), for the Sharpe ratio (F,M&R), the portfolio return would be the (5) and the Standard deviation of portfolio was the SQUARE root of the result of (2).

When the last security (Shinepukur) was added, for the Sharpe ratio (F, M, R & S), the portfolio return would be the (6) and the Standard deviation of portfolio was the SQUARE root of the result of (3).

The risk free rate would be the same for each Sharpe ratio.

#### 4.6 Modigliani–Modigliani Measure

Modigliani–Modigliani measure is known as M<sup>2</sup>. It measures the returns of the portfolio, adjusted for the risk of the portfolio relative to that of some scale. It is derived from the widely used Sharpe ratio, but it has the significant advantage of being in units of return, which makes it dramatically more intuitive to interpret.

The formula of  $M^2 = (R_p - R_f) * \sigma_M / \sigma_P - (R_m - R_f)$

For the calculation the same procedure is followed (by adding one security for each new combination) that were followed for portfolio return and Sharpe ratio.  $\sigma_M$  (Standard Deviation of Market) is given by the other group which is 7.11%. Return on market is -0.01%. To calculate for Fu-Wang and Monno we take (4) as  $R_p$ , SQUARE root of (1) as  $\sigma_P$ .

To calculate for Fu-Wang, Monno and RAK we take (5) as  $R_p$ , SQUARE root of (2) as  $\sigma_P$ .

To calculate for Fu-Wang, Monno, RAK and Shinepukur we take (6) as  $R_p$ , SQUARE root of (3) as  $\sigma_P$ .

By doing so the M<sup>2</sup> was calculated.

These are formulas and functions used to carry out the analysis for this diversification analysis.

## Chapter 5: Findings of the Study

Four Ceramics companies are the targeted companies. All data that are subject of the study have been collected from exchange website and public databases.

Here 3 year returns of FU-WANG Ceramics, MONNO Ceramics, RAK Ceramics and SHINEPUKUR Ceramics are calculated with the standard deviation and Average return.

### 5.1 Covariance

Covariance was computed with reference to a base company, in each case choosing a different company that gave four different combinations. The following are the findings of the covariance for the combinations. The first set combinations are for Fu-Wang (F) as a base company.

Covariance (F&M)	0.010025414
Covariance (F&R)	0.007298025
Covariance (F&S)	0.008848203

Table 5.1: Set of combinations for covariance with Fu-Wang Ceramic as base company

The second set of combinations appear with Monno Ceramics (M) as the base company.

Covariance (M&F)	0.010025414
Covariance (M&R)	0.006722227
Covariance (M&S)	0.009250927

Table 5.2: Set of combinations for covariance with Monno Ceramic as base company

Thirdly, taking RAK ceramics as base company another set of covariance is computed.

Covariance (R&F)	0.007298025
Covariance (R&M)	0.006722227
Covariance (R&S)	0.006652619

Table 5.3: Set of combinations for covariance with RAK Ceramic as base company

And the last set of covariance sets Shinepukur Ceramics (S) as the base company.

Covariance (S&F)	0.008848203
Covariance (S&M)	0.009250927
Covariance (S&R)	0.006652619

Table 5.4: Set of combinations for covariance with Shinepukur Ceramic as base company

## 5.2 Portfolio Variance & Standard Deviation

The following segment illustrates all the portfolio variances and the standard deviation (Portfolio risk) with Fu-Wang Ceramics (F) as the basic company. Four variances were calculated with Fu-Wang as the lone investment, then adding Monno Ceramics (M) to the portfolio, increasing the portfolio size by adding RAK Ceramics (R) and lastly adding Shinepukur (S) to the portfolio.

<b>Portfolio Variances</b>		<b>Standard Deviation (Risk)</b>	
Portfolio variance for F	0.109416	SD of Portfolio for F	33.08%
Portfolio Variance for F & M	0.011998	SD of Portfolio for F & M	10.95%
Portfolio Variance for F,M&R	0.010414	SD of Portfolio for F,M&R	10.21%
Portfolio Variance for F,M,R&S	0.010054	SD of Portfolio for F,M,R&S	10.03%

Table 5.5: List of Portfolio Variances and Standard Deviation

Here we see, an individual investment of Fu-Wang ceramics deals greater risk than a combined portfolio of Fu-Wang and Monno Ceramics. This is due to the the covariance between the stocks. 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 (Chowdhury, 2015). Although the effect of diversification is miniscule in this portfolio, the effects of diversification is present. As different stocks are added to the portfolio, there is a reduction in the aggregate risk. Thus, it can be concluded that the diversification of the specific or unsystematic risk holds for the Ceramic Industry.



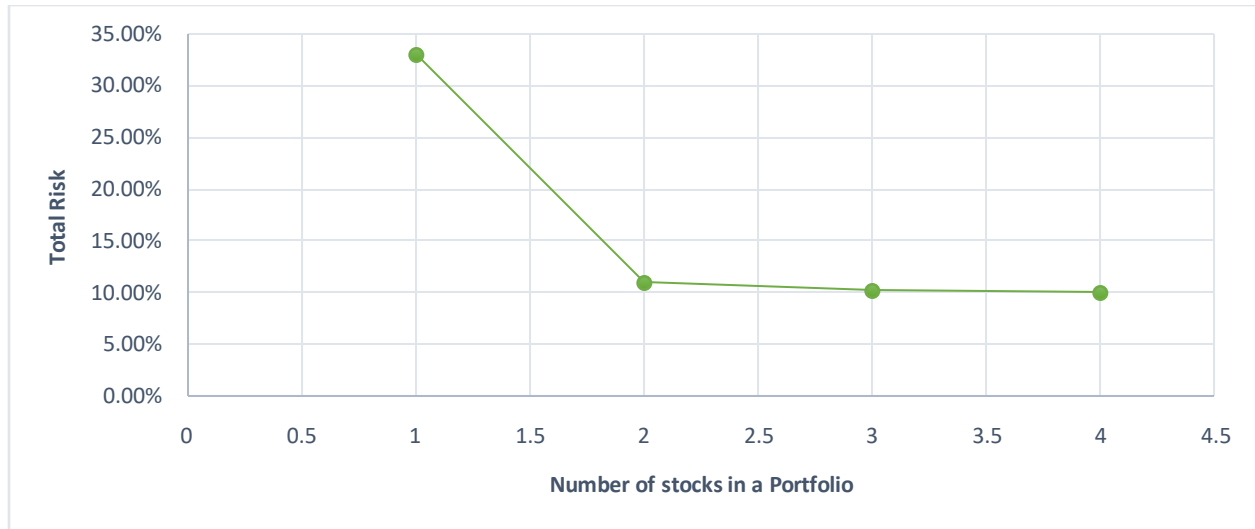


Figure 5.1: Graph showing the relationship between number of stocks in portfolio and the relative risk

### 5.3 Performance of the Portfolio

Analysis of the closing stock prices of three years have been accumulated for the stated companies. The following chart accumulates the average stock return for the four securities and the market index and the average standard deviation for each stock return along with the risk free rate.

Particulars	Average Return	Standard Deviation
Market index	-0.01%	7.11%
Risk-Free rate	0.55%	N/A
Fu-Wang	-2.35%	10.94%
Monno	-1.20%	12.64%
RAK	-0.14%	13.30%
Shinepukur	-2.02%	13.28%

Table 5.6: List of average return and standard deviation by different indicators and securities

Above are the risk and return profile of the individual stocks. All the stocks have performed poorly due to the poor market performance. The negative market return suggests that a market consisting of these stocks alone is not investment worthy and is subject to high degree of volatility. Also, it is seen that the return for a 10 year T-Bond exceeds market return.

## 5.4 Sharpe Ratio & M squared for the Portfolio

Sharpe ratio and  $M^2$  are both calculated with the assumption that there will be equal investment in all the different stocks. The portfolios are taken in accordance with the investment and are presented below, along with the total risk (standard deviation).

Portfolio Constituents	Monthly return	Total risk (standard deviation)
F	-2.35%	33.08%
F&M	-1.83%	10.95%
F,M&R	-1.27%	10.21%
F,M,R&S	-1.46%	10.03%

Table: 5.7: List of monthly return and total risk by portfolio constituents

A common measure of performance is the sharpe ratio, also known as the reward-to-variability ratio. The greater the sharpe ratio of the portfolio, the greater the performance.

Portfolio	Sharpe ratio
F&M	-0.2173
F,M&R	-0.1783
F,M,R&S	-0.2004

Table 5.8: List of Sharpe ratio by portfolio size

The portfolio consisting of Fu-Wang, Monno Ceramic and RAK Ceramic stocks have the highest sharp ratio signifying the best performance and consequently, the lowest performing portfolio is the one consisting of Fu-Wang & Monno Ceramic.

Portfolio	$M^2$
F&M	-0.9805%
F,M&R	-0.7033%
F,M,R&S	-0.8603%

Table 5 v.9: List of  $M^2$  estimations by portfolio

M<sup>2</sup> 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. M<sup>2</sup> estimation for the above portfolios show that the portfolio consisting of Fu-Wang, Monno and RAK Ceramics is the best performing and consequently, the poorest performing portfolio is the one comprising Fu-Wang and Monno Ceramics. The negative values also indicate that the above portfolios perform poorer than the market on a risk adjusted basis.

## 5.5 Recommendation

The above findings illustrate that although diversification reduces the overall portfolio risk the sector is a poor investment choice as the overall market return is negative suggesting an inefficient market. Investors should consider investment in stocks outside the sector. The companies need to improve their business structure, operational mechanism and capital structure.

After evaluating for several risk and portfolio performance indicators, the following recommendations can be provided:

- ↳ The ceramic sector, depending on the basket of instruments subjected to the analysis, is not a well performing sector for investment.
- ↳ A portfolio consisting of assets only from this sector may not provide healthy returns.
- ↳ The individual performance of the companies show sluggish returns indicating poor investment choice.
- ↳

## 5.6 Conclusion

Although the effects of diversification holds to the sector the measure of performance evaluated by the Sharpe ratio and M-Squared does not give vibes of healthy return. Though there are limitations to the forecasting model as past performance is no absolute guarantee for future returns. It can also be recommended on the sectoral front, that the individual performance of the ceramic sector is positively correlated to the overall market performance. The findings gathered for the studies carried out on this paper reflect the performance of the particular time frame from which the data belongs. Any future change in the market dynamics or sector specific changes in volatility and liquidity may cause changes in the risk factor calculated.

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