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Diversified Portfolio: Evidence from Bombay Stock Exchange (BSE) in India

Dr. Seema Shokeen
Assistant Professor
Department of Business Administration
Maharaja Surajmal Institute, New Delhi
Email ID : seemashokeen@msi-ggsip.org

ABSTRACT

This paper studies the effect of diversification with the help of analyzing the Markowitz model. It highlights that how many securities should include in a well diversified portfolio. Keeping in view of present study, the main data used in the study is secondary in nature and the data related for this study has been collected from the Centre for Monitoring of Indian Economy (CMIE) prowess database software. The present study is for eleven years starting from 1 January, 2005 to 31 December, 2015. The sample size includes a total number of 225 securities and population consists of all securities listed on BSE-500. The study used daily adjusted closing prices of listed 225 securities of BSE-500. The BSE Sensex is taken as the market proxy. The results of the present study suggested that a well diversified portfolio should include 10-15 securities. The results of the study are consistent with the previous studies such as Evan and Archer (1968) and Irala and Patil (2007). As far as this type of research is essential due to the interest of investors, researchers and financial analysts. Therefore, this research will be valuable for interested parties, investors, researchers that contribute towards the perceptive of the Indian stock market.

Keywords: Bombay Stock Exchange, Diversification, Investors, Portfolio

INTRODUCTION

A well-designed portfolio will combine investment assets that have different attributes. The core idea here is expressed in the classic advice "Don't put all your eggs in one basket." If you drop the basket, you're toast. (Technically you would be egged, but you get the point). By diversifying across various unrelated investment assets, your portfolio should be less susceptible to large losses. And if we can avoid or minimize large losses, our overall investment experience should be better (Israelsen 2010, p. 63). It is not surprising that this problem

has received a great deal of attention. It has major implications for the structure and very existence of financial intermediaries, as well as for the behavior of all investors (Elton and Gruber, 1977). Diversification is one of the important concepts of finance. Simply it says, Diversification is the technique of reducing risk. Moreover, to determine the exact size of a well diversified portfolio is the core of the field of finance. There have been so many securities available for investors for investing and due to the uncertainty most of the securities are risky. A portfolio selection is a big problem and diversified portfolio how it makes, also a doubtful issue. Much of the early literature on diversification effect in the capital market showed that there is a significant effect of diversification. The study given by Statman (1987) concluded that a well diversified portfolio must include 30 securities. Surprisingly, the study of Gupta and Khoon (2001) concluded that a well diversified portfolio must include up to 27 securities and Evan and Archer (1968) concluded that a well diversified portfolio must include 10 stocks. However, a well diversified portfolio concept is found controversial issue in different markets.

Theoretical Perspective of Markowitz Model

Markowitz pioneered in developing a well defined theoretical structure for portfolio analysis that can be summarized as follows. First, the two relevant characteristics of a portfolio are its expected return and some measure of the dispersion of possible returns around the expected return, the variance being analytically the most tractable. Second, rational investors will choose to hold efficient portfolios, which are those that maximize expected returns for a given degree of risk or, alternatively and equivalently, minimize risk for a given expected return. Third, it is theoretically possible to identify efficient portfolios by the proper analysis of information for each security on expected return, the variance in that return, and the co-variance of return for each security and that for every other security (Farrell, 1976).

In the 2008, Hiriyappa in his book ‘investment management’ explained the diversification concept as “A portfolio that is invested in multiple statements whose returns are uncorrelated will have an expected simple return which is weighted average of the individual instruments returns. Its volatility will be less than the

weighted average of the individual instruments volatilities. This is diversification".

The present paper formulate a well diversified portfolio selection problem, so as to find out how many securities will sufficient for a well diversified portfolio. In the context, the main objective of the present paper is to study that how many securities are enough for a well diversified portfolio. The paper also highlighted that whether the results of the present study are consistent with he results of past studies or not.

Review of Literature

The two articles which were authored by Markowitz and Roy published in 1952 about the behavioural basis. There is no depth of literature on the issue of diversification effect. The review of literature shows that there are some studies on diversification effect. But most of the studies showed different results. In the Indian context, very few studies have explained the concept of a well diversified portfolio. Therefore, this present research work has attempted to study a well diversified portfolio concept. A brief review in the context of diversification effect is presented as follows:

Evans and Archer (1968) estimated the relationship between diversification and the level of variations of portfolio returns. The study used 470 of the securities listed on Standard and Poor's Index. The results of the study suggested that a somewhat stable and predictable relationship existed between the number of securities included in a portfolio and portfolio dispersion. The study also explained that for the purpose of concluding portfolio according to their methodology, there is a need to perform on marginal analysis.

Wagner and Lau (1971) conducted a study on the effect of diversification on risk and in their study showed that the rate of return on well diversified low risk portfolios was significantly lower than the return on well diversified higher risk portfolios. The study suggested that the investment performance can often be improved by expanding the list of qualified securities to include higher return, higher risk stocks, while offsetting the increase in market risk through more effective diversification.

Elton and Gruber (1977) presented the formula for determining the effect of diversification on risk and showed that estimating expected variance and total risk

seems to be very good but much cruder in estimating variance in variance.

Statman (1987) conducted a study on how many stocks make a diversified portfolio. The study showed that for borrowing investors, a well diversified portfolio must include 30 stocks and for lending investors there must be at least 40 stocks. The conclusion of this study was that the extensively accepted idea that the benefits of diversification are practically exhausted when the number of stocks reaches 10 to 15.

A study of diversification in the Johannesburg Stock Exchange by **Neu-Ner and Firer (1997)** questioned how many randomly selected Johannesburg Stock Exchange (JSE)'s shares are required to achieve a well diversified portfolio. The population studied included all securities listed on the main board of the Johannesburg Stock Exchange (JSE) during the period June 1993 to June 1996. The study concurred with the study of Statman (1987)'s findings that a well-diversified portfolio of randomly chosen shares on the Johannesburg Stock Exchange (JSE) must include at least 30 shares. It also concluded that significant benefits of diversification could be achieved by holding smaller portfolio.

Another study conducted by **Gupta and Khoon (2001)** examined the relationship between the portfolio risk and the number of stocks in a portfolio in the period of September 1988 to June 1997 to determine the optimum size of portfolio of stocks. In the study a sample of 213 stocks traded on Kuala Lumpur Stock Exchange (KLSE) were used. The results of the study revealed that the diversification benefits are available up to the 27 securities.

Statman (2004) expressed that the benefits and costs of diversification under the rules of mean–variance portfolio theory are different from those under the rules of behavioral portfolio theory. The study concluded that the reduction of risk was not always a benefit in behavioral portfolio theory. It explained that the optimal number of individual stocks under the rules of behavioral portfolio theory was the number that balances the chance for uplift into riches against the chance of a descent into poverty. The rules of optimal diversification in behavioral portfolio theory were similar to the rules of suitability that govern brokers and financial advisors. Suitability regulations require brokers to make sure that an investor's desire for upside potential did not breach the investor's need for downside

protection. It also suggested that the rules of diversification in behavioral portfolio theory were not as precise as the rules in mean–variance portfolio theory, they were clear enough. It expressed that investors, financial advisors, and companies sponsoring 401(k) plans must be careful to draw a line between upside potential and downside protection in such a way that dreams of riches did not plunge investors into poverty.

On the other hand, **Irala and Patil (2007)** also studied the concept of portfolio size and diversification by using a monthly data during the study period of January 1999 to January 2005. The study suggested that a very high degree of diversification was possible in India and also concluded that a portfolio size of 10-15 stocks was found to be appropriate as the reduction in risk was only marginal thereafter.

Goetzmann and Kumar (2008) examined the diversification choices of individual investors during a six-year period in the U.S. capital market history. The present study used a data from U.S. discount brokerage house and found that the sample was under-diversified.

Al Suqaier and Al Ziyud (2011) examined the effect of diversification on Amman Stock Exchange during the study period of 2/12/2005 to 13/3/2010. In the study, for the purpose of testing the hypothesis, a sample of 100 companies was used. The results of the study revealed that diversification increase with a decrease rate.

In a nutshell, on the basis of above mentioned studies, the present study concluded that there is a continuous need of undertaking the study on diversification effect. Based on these studies, the present study made an attempt to investigate that how many securities make a well diversified portfolio.

Data Base and Research Methodology

The present study is empirical in nature which aims to examine the diversification effect with the help of selected securities of BSE-500. Keeping in view of present study, the main data used in the study is secondary in nature. The present study is for eleven years starting from 1 January, 2005 to 31 December, 2015. The sample size includes a total number of 225 securities and population consists of all securities listed on BSE-500. The study used daily adjusted closing prices of listed 225 securities of BSE-500. The selection of securities varies on the basis of the listing in BSE-500,

market capitalization, trading volume and the availability of data. The securities were selected from different industry groups. The data for the selected securities were extracted from the various websites such as www.bseindia.com, www.yahoofinanceindia.com and the Centre for Monitoring of Indian Economy (CMIE) prowess database.

Daily return: Daily returns on securities are calculated by applying the following formula: -

$$R_{it} = \ln\left[\frac{P_t}{P_{t-1}}\right] * 100$$

Where R_{it} is return on security i in time period t, P_t is securities price at the time t, P_{t-1} is securities price at the time period t-1

Market return: Market returns on securities are calculated by applying the following formula: -

$$X_{it} = \ln\left[\frac{I_t}{I_{t-1}}\right] * 100$$

X_{it} is the return on index, I_t is the closing value and I_{t-1} is the opening value

Portfolio return: Portfolio return has been calculated by using this formula:

$$R_P = \sum_{i=1}^{N} w_i(\alpha_i + \beta_i R_m)$$

Where R_P is the portfolio return and w_i is the weight give to security i.

Portfolio Variance: Portfolio variance has been calculated by using this formula:

$$\sigma_P^2 = \left[\sum_{i=1}^{N}(w_i\beta_i)^2\sigma_m^2\right] + \left[\sum_{i=1}^{N} w_i^2 e_i^2\right]$$

Where σ_P^2 is variance of the portfolio, σ_m^2 is the expected variance of the index, $w_i^2 e_i^2$ is the weighted average of error term of each security in the portfolio.

Portfolio Beta: Portfolio beta has been calculated by using this formula:

$$\beta_P = \sum_{i=1}^{N} w_i \beta_i$$

Where β_P is the portfolio beta and β_i is the beta of individual securities.

Risk Reduction: Markowitz (1952) in their study explained that the variance of a portfolio of *N* assets is given by:

$$\sigma_p^2 = \sum_{i=1}^{N} w_i^2 \sigma_i^2 + \sum_{i=1}^{N} \sum_{j=1}^{N} w_i w_j \sigma_i \sigma_j \rho_{ij}$$

$$j \neq i$$

Where $\sigma^2{}_P$ = the portfolio variance

ρ_{ij} = correlation between asset i and j

σ_i^2 = variance of the asset i

N = number of assets

In other case where σ_i equals the $\bar{\sigma}$ and ρ_{ij} equals the $\bar{\rho}$. After it the equation becomes:

$$\sigma_p^2 = \sum_{i=1}^{N} w_i^2 \bar{\sigma}^2 + \sum_{i=1}^{N} \sum_{j=1}^{N} w_i w_j \bar{\sigma}^2 \bar{\rho}$$

$$j \neq i$$

Here that be noted for any given w_i, the sum of all w_j for $j \neq i$

That will be equal to (1- w_i):

$$\sigma_p^2 = \overline{\sigma}^2 \overline{\rho} + \overline{\sigma}^2 (1 - \overline{p}) \sum_{i=1}^{N} w_i$$

In this equation assuming equal weights, after that the equation becomes to:

$$\sigma_p^2 = \overline{\sigma}^2 \overline{\rho} + \overline{\sigma}^2 (1 - \overline{p}) \frac{1}{N}$$

Results and Analysis

Results of Portfolio size and portfolio risk (Effect of diversification)

Table 1 presents the result of the diversification effect. Using data for 225 securities over the period of January 2005 to December 2015 showed that as more and more securities increase in the portfolio, the portfolio risk declines. In the current study to examine the diversification effect, securities are randomly selected assuming equally weighted portfolios. The results of the diversification effect have been measured by using the Markowitz model. Table 1 shows that as the number of securities in portfolio increases, the portfolios risk as measured by the standard deviation decreases, which indicates the existence of a negative relationship between portfolio size and portfolio risk. The risk of first randomly selected security came out to be 15.23 percent. After adding one more security, the risk fell to 13.2 percent. The overall risk reduces from 15.23 percent to 7.22 percent. It also concluded that portfolio diversification is applicable in Indian stock market. It is also very interesting to note that a well diversified portfolio should include 10 to 15 securities. The results are also supported the results of Evan and Archer (1968) and Irala and Patil (2007) but in contrast to the study of Gupta and Khoon (2001).

Table 1

Results of Portfolio size and portfolio risk (January 2001-December 2011)

(Effect of diversification with the help of daily data)

No. of Securities in Portfolios	Portfolios Standard Deviation (Portfolios Risk)	Unique Risk	Proportion of unique risk in total risk (percent)
1	15.23	14.1	92.5804334
2	13.2	12.11	91.7424242
3	12.3	11.25	91.4634146
4	11.76	10.69	90.9013605
5	11.4	10.3	90.3508772
10	10.4	9.3	89.4230769
15	9.9	7.27	73.4343434
25	9.4	6.8	72.3404255
35	9.12	6.23	68.3114035
50	8.86	6.25	70.5417607
70	8.57	6.02	70.2450408
90	8.34	5.75	68.9448441
110	8.14	5.42	66.5847666
130	7.95	5.22	65.6603774
150	7.78	5.1	65.5526992
170	7.62	5.01	65.7480315
225	7.22	5.05	69.9445983

Note: results are based on selected 225 securities of Bombay Stock Exchange (BSE)

Conclusion and Scope for further research

The study applied the applications of Markowitz model to examine the diversification effect. It is very interesting to note that a well diversified portfolio should include 10 to 15 securities. The results are also supported the results of Evan and Archer (1968) and Irala and Patil (2007) but in contrast to the study of Gupta and Khoon (2001). The present study concluded that portfolio diversification is applicable in the India stock exchange. It revealed that as the number of securities in portfolio increases, the portfolios risk as measured by the

standard deviation decreases, which indicates the existence of a negative relationship between portfolio size and portfolio risk. The limitation of this study is that it was carried out in only the Indian stock exchange and the results of the study may not be replicable to other countries stock exchange.

The further study may be attempted to focus on other stock exchanges. Moreover, further research could be made to analyzed the risk and return of different securities on the basis of daily, weekly, monthly, quarterly, half yearly data, yearly data and can check that the mean return and risk of different intervals are equal or not. The effect of diversification on r-square values deserves the further analysis. There is a need to carry out more research regarding this study.

References

1. Al Suqaier, Faten Shukri., & Al Ziyud, Hussein (2011). The Effect of Diversification on Achieving Optimal Portfolio. *European Journal of Economics, Finance and Administrative Sciences*, 32, 1450-2275.
2. Elton, Edwin J., & Gruber, Martin J. (1977). Risk Reduction and Portfolio Size: An Analytical Solution. *The Journal of Business,* 50(4), 415-437.
3. Evans, John L., & Archer, Stephen, H. (1968). Diversification and the Reduction of Dispersion: An Empirical Analysis. *The Journal of Finance,* 23(5), 761-767.
4. Farrell, James L. (1976). The Multi-Index Model and Practical Portfolio Analysis. Virginia: *The Financial Analysts Research Foundation Charlottesville.*
5. Goetzmann, William N., & Kumar, Alok (2008). Equity Portfolio Diversification. *Review of Finance,* 12, 433–463.
6. Gupta, G., & Khoon, Ch'ng Huck (2001). How Many Securities Make a Diversified Portfolio in KLSE Stocks. *Asian Academy of Management Journal*, 6(1), 63-79.
7. Hiriyappa, B. (2008). Investment Management. New Delhi: *Published by New Age International (P) Ltd.*
8. Irala, Lokanandha Reddy., & Patil, Prakash (2007). Portfolio Size and Diversification. *SCMS Journal of Management,* 4(1), 1-6.

9. Israelsen, Craig L. (2010). 7 Twelve: A Diversified Investment Portfolio With a Plan. New Jersey: *Published by John Wiley & Sons, Inc.*
10. Neu-Ner, MA., & Firer, C. (1997). The benefits of diversification on the JSE. *Investment Analysts Journal,* 46, 45-59.
11. Statman, Meir (1987). How Many Stocks Make a Diversified Portfolio. *Journal of Financial and Quantitative Analysis,* 22(3), 353-363.
12. Statman, Meir (2004). The Diversification Puzzle. *Financial Analyst Journal*, 60(4), 44-53.
13. Wagner, W. H., & Lau, S. C. (1971). The Effect of Diversification on Risk. *Financial Analysts Journal,* 27(6), 48-53.

Websites:

- www.bseindia.com
- www.yahoofinanceindia.com
- www.indianofline.com
- www.capitalmarket.com
- www.goidirectory.com.
- www.cmie.com
- www.sciecnedirect.com