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Portfolio Selection: Using Markowitz Model on selected Sectors Companies in India

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Abstract: ***As we know that portfolio management means diversification of scrip at last minimize portfolio risk. First part of paper presented research methodology and second part presented the how the portfolio diversification help investors for switching portfolio on basis proportion with reference to change risk and return trade off. For diversification of portfolio researcher followed Markowitz model selected three major sectors liked FMCG, Banking, IT, Infrastructure and Auto mobile for analysis of proportion of investment with number of different combination. Researcher found that co efficient of correlation between for the entire sector will high variance due to the high market fluctuation with industry performance. It must be positive return with minimize total portfolio risk. Markowitz model also focus on how to set efficient frontier with diversification of portfolio and reached line have positive correlation between scrip's, those scrip categories from difference sectors.***

Keywords: Markowitz Model, Diversification of Portfolio, Proportion of Investment, co variance, co efficient of correlation, efficient frontier, Expected Return, Portfolio Risk.

I. INTRODUCTION

Economic growth is one of the ultimate goals of any country in which different sector provide vital role in that. The banking sector binge the barometer of an economy is reflective of the macro economic variables Banking system continues to deal to deal with improvement in asset quality, execution of prudent risk management practices and capital adequacy. The fast moving consumer good segment is the 4th largest sector in Indian economy with market size of more than 10%.Infrastructure growth rate in India GDP came to 8.5%. IT sector also successful in maintain its competitiveness in the global market. The growth rate are recorded 22.4%.India has become one of the international player in automobile market and which is one of the fastest growing sector in India. As portfolio selection is most important part is lending and borrowing rate on total market capitalization.

II. RISK AVOIDANCE

It includes not performing an activity that could carry risk. An example would be not buying a property or business in order to not take on the liability that comes with it. Another would be not flying in order to not take the risk that the airplane was to be hijacked. Avoidance may seem the answer to all risks, but avoiding risks also means losing out on the potential gain that accepting (retaining) the risk may have allowed. Not entering a business to avoid the risk of loss also avoids the possibility of earning profits.

III. PORTFOLIO DIVERSIFICATION

The variance expression in reveals the usefulness of diversification in reducing risk attributed to the correlation that exists between asset returns. Before going into the detail of holding the optimal diversification weights, we present a simple example of why diversification works.

IV. MARKOWITZ MODEL THEORY

Harry M. Markowitz is credited with introducing new concepts of risk measurement and their application to the selection of portfolios. He was started with an idea of risk aversions of average investors and their desire to maximize the expected return with the least risk. Markowitz model is thus a theoretical framework for analysis of risk and return and their inter-relationships. He used the statistical analysis for measurement of risk and mathematical programming for selection of assets in a portfolio in an efficient manner. Research framework led to the concept of efficient portfolios. An efficient portfolio is expected to yield the highest return for a given level of risk or lowest risk for a given level of return. Markowitz generated a number of portfolios within a given amount of money or wealth and given preferences of investors for risk and return.

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V. LITERATURE REVIEW

Varian (1993) succinctly reviews the history of modern portfolio theory as follows: Markowitz's groundbreaking research on portfolio optimization was published in March 1952 in an article titled 'Portfolio Selection' in the Journal of Finance. Thirty-eight years passed before he was jointly awarded the Nobel Prize for Economics with Merton Miller and William Sharpe (Varian 1993:159f). Markowitz solved the problem of minimizing a portfolio's variance, given an expected return and covariance matrix of shares in a portfolio, and demonstrated the importance of this to investors.

However, one of the biggest criticisms of Markowitz's model is that it does not produce portfolios that are adequately diversified. McLeod (1998) noted that portfolio managers believe that the Markowitz model gives unrealistic portfolios, which are not properly diversified. When the model was applied to a South African dataset he found only four out of seven indices were ever included, with one of them never having more than 3% of funds allocated. Bowen (1984) noted that the Markowitz model required large volumes of data and found that it was difficult to estimate covariance. He doubted whether the predictions from the model would be reliable and concluded that 'semantic and statistical barriers exist that prevent the average businessman from coming to grips with the approach' (Bowen 1984:21).

Possible reasons:

The conceptually demanding nature of the theory:

The fact that most investment companies are not structured to use a mean-variance optimization approach; and anecdotal evidence that portfolio managers find the composition of optimized portfolios counter-intuitive. In other words, for every possible target portfolio return there is a unique portfolio of assets that will give the required return at a minimum variance. These define Markowitz's 'efficient Frontier'.

Ample work has been done on pricing asset due to its vital importance in finance literature. Several researches have been conducted in the area of pricing stock prices Harry Markowitz (1952) gave portfolio theory in his research "portfolio selection", Sharpe (1964) and Linter (1965) introduced capital asset pricing model, Sharpe was awarded with noble prize for his work on capital asset pricing model, Stephen A. Ross (1976) came up with arbitrage pricing theory which is much flexible in comparison to portfolio theory and capital asset pricing model because it can incorporate many factors for the purpose of asset pricing .

VI. OBJECTIVE OF STUDY

- To calculate the return of scrip with reference to portfolio diversification.
- To calculate the risk of scrip with reference to portfolio diversification.
- To calculate the portfolio return of different portfolios designed for the combination of various sectors companies.
- To understand, analyze and select the best portfolio among set of portfolio.

VII. PROBLEM OF THE STUDY

MPT assumes that investors are risk adverse, meaning that given two portfolios that offer the same expected return, investors will prefer the less risky one. Thus, an investor will take on increased risk only if compensated by higher expected returns. Conversely, an investor who wants higher expected returns must accept more risk. The exact trade-off will be the same for all investors, but different investors will evaluate the trade-off differently based on individual risk aversion characteristics. The implication is that a rational investor will not invest in a portfolio if a second portfolio exists with a more favorable risk expected return profile – i.e., if for that level of risk an alternative portfolio exists that has better expected returns.

"PORTFOLIO SELECTION USING MINI-MAX APPROCH SELECTED SECTOR IN INDIA"

VIII. SAMPLE SIZE

From this research, select different sector industry.

1. HDFC BANK
2. DLF
3. HUL
4. TATA MOTORES
5. INFOSYS

IX. HYPOTHESIS

H_0: There is no significance difference on selection of portfolio for diversification.
H_1: There is significance difference on selection of portfolio for diversification.

X. FUNDAMENTAL VARIABLE USED FOR SECURITIES SELETION

No	Fundamental Criteria	HDFC bank		HUL		DLF		INFOSYS		TATA MOTORES	
		2015	2014	2015	2014	2015	2014	2015	2014	2015	2014
1	Market capitalization	27364.92	271662.68	171735.44	175857.60	23483.43	24552.71	263735	251607.32	118356.58	122345.83
2	Earnings per share	40.73	35.34	19.95	17.88	5.28	2.96	105.91	178.40	-14.72	1.04
3	Book value per share (Rs)	247.39	181.23	17.21	15.15	96.69	93.43	418.54	736.64	46.10	59.51
4	Current ratio	0.04	0.06	0.75	0.74	1.87	1.64	3.41	3.70	0.42	0.43
5	Dividend payout ratio(cash profit)	18.44	17.96	70.52	68.10	35.78	58.90	39.08	32.03	26.96	26.96
6	Dividend per share	2	2	2	2	2	2	3	3	2	2
7	Earning retention ratio	80.38	80.67	11.12	22.74	62.22	61.64	56.51	64.51	25.83	25.83
8	Net operating profit per share	196.38	171.47	24.07	129.69	16.39	21.3	411.85	776	112.76	106.53
9	Net profit margin (%)	18.91	20.61	14	13.80	24.59	13.39	25.71	22.99	-13.05	0.97
10	Operating profit per share (rs)	36.61	29.65	24.07	20.69	9.18	0.92	59.50	219.23	-3.84	-2.83
11	Quick ratio	16.71	8.45	0.47	0.44	2.07	1.65	3.39	3.65	0.42	0.36

Source: www.bseindia.com and www.moneycontrol.com

Beta

While standard deviation determines the volatility of a fund according to the disparity of its returns over a period of time, beta another useful statistical measure, determines the volatility (or risk) of a fund in comparison to that of its index or benchmark. A fund with a beta very close to 1 means the fund's performance closely matches the index or benchmark. A beta greater than 1 indicates greater volatility than the overall market, and a beta less than 1 indicates less volatility than the benchmark.

Expected Return

Expected return is calculated as the weighted average of the likely profits of the assets in the portfolio, weighted by the likely profits of each asset class. Expected return is calculated by using the following formula:

$$E(R) = \sum_{i=1}^{n} P_i \times R_i$$

Standard Deviation

As with many statistical measures, the calculation for standard deviation can be intimidating, but, as the number is extremely useful for those who know how to use it, there are many free mutual fund screening services that provide the standard deviations of funds.

Co-Efficient Co-Variance

In probability theory and statistics, covariance is a measure of how much two random variables change together. If the greater values of one variable mainly correspond with the greater values of the other variable, and the same holds for the smaller values, i.e., the variables tend to show similar behavior, the covariance is positive. A distinction must be made between (1) the covariance

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of two random variables, which is a population parameter that can be seen as a property of the joint probability distribution, and (2) the sample covariance, which serves as an estimated value of the parameter.

Set of portfolio:

A. Portfolio in HDFC, HUL and DLF
B. Portfolio in HUL, DLF and Infosys
C. Portfolio in DLF, Infosys and TATA Motors
D. Portfolio in Infosys, TATA Motors and HDFC

A. Portfolio in HDFC, HUL and DLF

Table 1.1
Proportion of portfolio in HDFC , HUL and DLF

Expected Return	Risk	HDFC	HUL	DLF
121.66	1.90	0.5	0.3	0.2
120.31	2.43	0.4	0.2	0.4
118.35	2.99	0.2	0.2	0.6
118.14	2.77	0.1	0.4	0.5
Standard Deviation		**1.24**	**1.57**	**4.05**
Correlation Co-efficient		**0.10**		

Source: www.bseindia.com

The above table shows that the construction of the portfolio with three scrip, while construction of the portfolio proportion is highlight risk level. While calculating portfolio expected return with reference to proportion of investment in portfolio. Portfolio expected return indicated average return of the portfolio as well as risk.

Table 1.2
Markowitz Portfolio co-efficient

Proportion	0.5:0.3:0.2	0.4:0.2:0.4	0.2:0.2:0.6	0.1:0.4:0.5
Expected Return	121.66	120.31	118.35	118.14
Portfolio Variance	1.9	2.43	2.99	2.77
portfolio Risk	7.68	9.71	8.57	7.78

Source: www.bseindia.com

Table shows the portfolio on the basis of proportion of HDFC, HUL & DLF script. Investor always expects that their portfolio provide them a more return. In these tables it is clearly shows that the proportion 2:2:6 provide a less return with a high variance and comparatively high risk. But inventors want to take a proportion of 5:3:2 then it does provide a high return, low variance and low risk. With comparison to other investment these is favourable.

B. Portfolio in HUL, DLF and Infosys

Table 2.1
Proportion of portfolio in HUL, DLF and Infosys

Expected Return	Risk	HUL	DLF	Infosys
119.13	3.38	0.5	0.3	0.2
120.34	4.20	0.4	0.2	0.4
121.16	5.27	0.2	0.2	0.6
120	5.23	0.1	0.4	0.5
Standard Deviation		1.57	4.05	6.91
Correlation Co-efficient		0.01		

Source: www.bseindia.com

Table 2.2
Markowitz Portfolio co-efficient

Proportion	0.5:0.3:0.2	0.4:0.2:0.4	0.2:0.2:0.6	0.1:0.4:0.5
Expected Return	119.13	120.34	121.16	120
Portfolio Variance	3.38	4.20	5.27	5.23
portfolio Risk	21.79	22.72	20.04	18.20

Source: www.bseindia.com

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Table shows the portfolio on the basis of proportion of HUL, DLF & Infosys script. In these table it is clearly shows that the proportion 2:2:6 provide a high return with a high variance and comparatively high risk. But if we take a proportion of 1:4:5 then it does provide a good return, moderate variance and low risk. So with comparison to all other investment proportion it would more profitable.

C. Portfolio in DLF, Infosys & TATA Motors

Table 3.1
Proportion of portfolio in DLF, Infosys & TATA Motors

Expected Return	Risk	DLF	Infosys	TATA Motors
118.162	4.47	0.5	0.3	0.2
117.51	3.76	0.4	0.2	0.4
117.65	3.33	0.2	0.2	0.6
119.16	4.12	0.1	0.4	0.5
Standard Deviation		4.05	6.91	1.90
Correlation Co-efficient		0.014		

Source: www.bseindia.com

Table 3.2
Markowitz Portfolio co-efficient

Proportion	0.5:0.3:0.2	0.4:0.2:0.4	0.2:0.2:0.6	0.1:0.4:0.5
Expected Return	118.62	117.51	117.65	119.16
Portfolio Variance	4.48	3.76	3.33	4.12
portfolio Risk	23.91	24.63	21.88	19.57

Source: www.bseindia.com

Table shows the portfolio on the basis of proportion of DLF, Infosys & TATA Motors script. In these table it is clearly shows that the proportion 4:2:4 provide a low return with a low variance and high risk. But if we take a proportion of 1:4:5 then it's providing a high return, high variance and low risk. So with comparison to all other investment proportion it would more profitable.

D. Portfolio in Infosys, TATA Motors & HDFC

Table 4.1
Proportion of portfolio in Infosys, TATA Motors & HDFC

Expected Return	Risk	Infosys	TATA Motors	HDFC
121.77	4.27	0.5	0.3	0.2
122.85	3.64	0.4	0.2	0.4
123.22	3.89	0.2	0.2	0.6
121.59	2.075	0.1	0.4	0.5
Standard Deviation		6.91	1.90	1.24
Correlation Co-efficient		0.036		

Source: www.bseindia.com

Table 4.2
Markowitz Portfolio co-efficient

Proportion	0.5:0.3:0.2	0.4:0.2:0.4	0.2:0.2:0.6	0.1:0.4:0.5
Expected Return	121.77	122.85	123.22	121.59
Portfolio Variance	4.27	3.64	2.51	2.07
portfolio Risk	11.48	14.18	12.49	10.99

Source: www.bseindia.com

Table shows the portfolio on the basis of proportion of Infosys, TATA Motors & DLF script. In this table it is clearly shows that the proportion 5:3:2 provide a low return with a high variance and moderate risk. But if we take a proportion of 2:2:6 then it's providing a high return, low variance and moderate risk. So with comparison to all other investment proportion it would more profitable.

XI. OUTCOMES & FINDINGS

1. Portfolio selected on the basis of high return, low variance and low risk.
2. In first script the proportion of 5:3:2 are ideal for an investment.

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3. Second and third script the proportion of 1:4:5 are more efficient.
4. Calculation of forth script the proportion of 2:2:6 are ideal one.

The finding of the study indicate that the share market in India support the efficient market theory, though the market responds quickly. For construction of efficient portfolio it's required to minimize the risk level. With the help of a beta here we can easily calculated the systematic risk. Total portfolio risk is reduced by mitigating systematic risk with asset allocation and unsystematic risk with diversification. With the help of both risk management solution such as asset allocation, diversification and valuation timing. Used properly, a manager can increase portfolio returns and reduce risk to optimize an investment portfolio.

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