CONSTRUCTIONOF OPTIMAL EQUITY PORTFOLIO USING THE SHARPE INDEX MODEL WITH REFERENCE TO AUTOMOBILE,PETROLEUM AND BANKING & INSURANCE SECTORS IN INDIA FROM2013-2014

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Abstract : Indian securities market is a highly volatile and sensitive market where portfolio construction is highly important toget good returns. Thus the main focus of this research is to construct an optimal equity portfolio with the help of Sharpe index model. In this research,Automobile,Petroleum and Banking & Insurance sector has been taken into consideration for constructing the optimum portfolio. Fifteen companies M&M ,TATAMOTORS ,HERO MOTOCO ,ASHOK LEYLAND LTD ,BOSCH LTD ,ONGC, BPCL ,RELIANCE INDUSTRIES LTD, IOC,CASTROL INDIA LTD ,IDBI ,YES BANK ,CANARA BANK, AXISBANK ,LIC HOUSING FINANCE have beenselected and excess to beta ratio has been calculated and ranked the companies based on that ratio. The cut-offpoint was calculated based on the highest value and cut-off point should be used to calculate the proportion ofmoney to be invested in each stocks. This research findings and suggestions would be helpful to investors forinvesting in Automobile,Petroleum and Banking & Insurance sector.

IndexTerms- : Risk, Return, Portfolio, Residual Variance, Sharpe.

I. INTRODUCTION

Indian securities market came into existence as a most predominant market due to the globalisation and liberalisation which happened in the year of 1990's. Though it happened to be a predominant market, only less than 2% of total population invests in stocks. Primarily it has been divided into two parts, Primary market and secondary market. IPO happens in primary market and trading of issued shares will happen in secondary market. Security analysis and portfolio management will help to construct the optimum portfolio for the equities market and helps to make the right decision for investment.

1.1 SECURITY ANALYSIS

Fundamental Analysis

Fundamental Analysis refers to the evaluation of securities with the help of certain fundamental business factors such as financial statements, current interest rates as well as competitor's products and financial
market. Financial statements are nothing but proofs or written records of various financial transactions of
an investor or company. Financial statements are used by financial experts to study and analyze the
profits, liabilities, assets of an organization or an individual.

Technical Analysis

Technical analysis refers to the analysis of securities and helps the finance professionals to forecast the price trends through past price trends and market data.

Statement of Problem

The portfolio should not be constructed based on the brand identity, current performance etc because that would not help investors in achieving the anticipated return. The main aim of portfolio construction is
diversification and to maintain perfect negative correlation between the securities. Also, holding two or
three stocks is always better than holding one. The optimum portfolio gives the investors a better clarity to
invest the right proportion of money in the right stock and it helps the investors to get maximum returns with minimal risk. Automobile,Petroleum and Banking & Insurance sectors are growing sectors in India. Entertainment

II OBJECTIVE OF THE STUDY

1. To study the relative market performance of 15 companies belonging to Automobile,Petroleum and Banking & Insurance sector, listed in National Stock Exchange of India.
2. To construct an optimal portfolio and analyze its risk and return, for the investments made by investors.
3. To calculate the proportion of money to be invested by investors out of their investment.
4. To guide investors to find out the company that gives the maximum return with minimum risk

2.1 SCOPE OF THE STUDY

Scope of the study is to construct the optimum portfolio in Media and Entertainment sector to reduce its risk and maximise the profits. Based on the historical performance, risk and return of those companies
should be analysed and top companies should be selected for construction of portfolio.

2.2 LIMITATIONS

1. Portfolio is constructed based only on risk and return
2. Study is restricted only to a particular sector (Automobile,Petroleum and Banking & Insurance) and also limited to only 15companies listed in National Stock Exchange of India.
3. Stock prices considered only for 1 year so that the real impact cannot be found.
4. All the calculations could not be brought into the report.
5. This research should not be suitable for short-term investment

2.3 METHODOLOGY

Descriptive study has been done for the construction of portfolio of stocks where results obtained on the
selected companies. Secondary data is taken for the study and data has been collected from various sources like National stock exchange website, Reserve Bank of India website and from databases like EBSCO, Proquest. Data collected for one years from April 2013 to March 2014.

Sample Population : Automobile,Petroleum And Banking & Insurance Sectors .

Sample Size : 15

Sampling Technique: Random Sampling.

The steps in constructing the portfolio using the Sharpe Method are as follows. (All calculations are done in MS Excel).

i. Find the excess return to β ratio

ii. Arrange the calculated excess return to β ratio in the descending order.

iii. Find the cut-off points

III REVIEW OF LITERATURE

NancyBeneda (2004), explained a simplified model for quantifiably measuring and managing various types of risk, as a portfolio of risks. An asset management firm may face a variety of risks due to the broad nature
of various investments. The technique utilizes computerized simulation and optimization modeling. The
software used to administer the simulations is Crystal Ball. The use of simulation allows risk managers to
combine the various categories of risk a firm faces into one risk portfolio. These techniques will enable risk managers to have the information needed to achieve the desired level of overall firm risk and the expected cost of managing risk.

Woo Gon Kim, Jun Zhong, Ming-Hsiang Chen and Ersem Karadag John A Haslem (2003), he usedData envelopment analysis (DEA) to identify the large-cap mutual funds in the 1999 Morningstar 500 that are efficient or inefficient. An attempt is made to identify the financial variables that differ significantly between efficient and inefficient funds, and to determine the nature of these relationships. According tostudy findings, there are identified input/output and profile variables that are significantly differentbetween the 1999 Morningstar 500 large-cap mutual funds that are DEA performance-efficient andinefficient. The Sharpe index represents the DEA output variable. That is, the findings indicate thevariables that are significantly different between performance-efficient and inefficient funds and thenature of their relationships. The variable values associated with efficient funds are relatively conservativein nature, not aggressive.

Markus Ebner and Thorsten Neumann (2008), this paper explained the correlation instabilities in US stock returns and derive Variance – Covariance Matrices from time-varying factor model estimates. So, they used three different estimation approaches to overcome the problem: (1)moving window least squares, (2) flexible least squares and (3) the random walk model. The results suggest that a time-varying estimation of return correlations fits the data considerably better than timeinvariant estimation and thus, increases the efficiency of risk estimation and portfolio selection

Combination of securities to diversify the risk involved and earn safer returns.(i.e)holding of two stocks rather than one is less risky.

IV WILLIAM SHARPE MODEL:

It is one of the modern approach in constructing portfolio to maximize the return for given level of risk.

The model focus on:

-security return relatively with market index return

-both systematic & unsystematic risks are calculated.

-beta is the deciding factor to measure the systematic risk

Steps involved:

-here3industrial sectors and 5 companies from each sector is chosen to construct with their 1 years past data from 1-04-2013 to 22-03-2014

-find out the market risk and individual risk

-find out excess return to beta ratio

-risk free return is based on the T-bill rate

-rank the securities from highest to lowest

-find out cutoff point

-stock with above cutoff point possesses high excess return to beta ratio

-stocks below cutoff point possess low excess return to beta ratio

-market portfolio is constructed based on the return yielded.

IV ANALYSIS

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TABLE-1

CALCULATION OF EXCESS RETURN TO BETA RATIO AND SORTED IN DESCENDING ORDER OF THEIR RETURNS

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S.No	SECURITIES	Ri	Rf	β	σ^2ei	(Ri-Rf)/(β)	Rank
1	M&M	16.83	9	0.84	3.37	9.32	6
2	TATAMOTORS	44.59	9	0.21	4.83	169.48	1
3	HEROMOTOCO	39.31	9	0.71	2.97	42.69	4
4	ASHOKLEYLAND LTD	-1.05	9	0.84	6.24	-11.96	10
5	BOSCH LTD	18.16	9	0.21	1.69	43.62	3
6	ONGC	9.2	9	1.22	4.65	0.16	8
7	BPCL	24.18	9	1.19	6.08	12.76	5
8	RELIANCEINDUSTRIES LTD	15.83	9	0.1	2.98	68.30	2
9	IOC	-1.77	9	0.78	4.45	-13.81	11
10	CASTROLINDIALTD	-9.95	9	0.23	1.58	-82.39	15
11	IDBI	-26.22	9	1.25	4.38	-28.18	13
12	YESBANK	-16.94	9	0.64	15.48	-40.53	14
13	CANARABANK	-34.54	9	1.79	9.66	-24.32	12
14	AXISBANK	16.11	9	1.16	7.92	6.13	7
15	LICHOUSINGFINANCE	8.4	9	1.59	6.65	-0.38	9

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TABLE-2 CALCULATING CUT-OFF POINT

RF=   9   σ^2m=   1.33

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S.No	SECURITIES	Ri	β	σ^2ei	(Ri-Rf)β/σ^2 ei	sum(Ri-Rf)β/σ2ei	σ2m*[sum(Ri-Rf)β/σ2ei]	β^2/σ^2ei	sum[β^2/σ^2ei]	1+σ^2[sum[β^2/
1	TATAMOTORS	44.59	0.21	4.83	1.55	1.55	2.06	0.01	0.01	
2	RELIANCEINDUSTRIESLTD	15.83	0.1	2.98	0.23	1.78	2.36	0.00	0.01	
3	BOSCHLTD	18.16	0.21	1.69	1.14	2.91	3.88	0.03	0.04	
4	HEROMOTOCO	39.31	0.71	2.97	7.25	10.16	13.51	0.17	0.21	
5	BPCL	24.18	1.19	6.08	2.97	13.13	17.47	0.23	0.44	
6	M&M	16.83	0.84	3.37	1.95	15.08	20.06	0.21	0.65	
7	AXISBANK	16.11	1.16	7.92	1.04	16.12	21.45	0.17	0.82	
8	ONGC	9.2	1.22	4.65	0.05	16.18	21.52	0.32	1.14	
9	LICHOUSINGFINANCE	8.4	1.59	6.65	-0.14	16.03	21.32	0.38	1.52	
10	ASHOKLEYLANDLTD	-1.05	0.84	6.24	-1.35	14.68	19.53	0.11	1.63	
11	IOC	-1.77	0.78	4.45	-1.89	12.79	17.01	0.14	1.77	
12	CANARABANK	-34.54	1.79	9.66	-8.07	4.73	6.28	0.33	2.10	
13	IDBI	-26.22	1.25	4.38	-10.05	-5.33	-7.08	0.36	2.46	
14	YESBANK	-16.94	0.64	15.48	-1.07	-6.40	-8.51	0.03	2.49	
15	CASTROLINDIALTD	-9.95	0.23	1.58	-2.76	-9.16	-12.18	0.03	2.52	

TABLE-3

S.No	SECURITIES	β	σ^2_{ei}	Ri	Rf	C	$Z_i = \beta/\sigma^2_{ei}((R_i-R_f)/\beta-C^*))$
	CALCULATING THE PROPORTION OF INVESTMENT IN VARIOUS SECURITIES						
1	TATAMOTORS	0.21	4.83	44.59	9	2.03	6.90
2	RELIANCEINDUSTRIESLTD	0.1	2.98	15.83	9	2.32	1.93
3	BOSCHLTD	0.21	1.69	18.16	9	3.69	4.08
4	HEROMOTOCO	0.71	2.97	39.31	9	10.58	7.63
5	BPCL	1.19	6.08	24.18	9	11.01	0.39
6	M&M	0.84	3.37	16.83	9	10.75	-0.36
						∑Zi	20.58

S.No	SECURITIES	Zi	SUM(Zi)	Xi=Zi/sum(Zi)	Xi(%)
	TABLE-4				
	CALCULATION OF PROPORTION (Xi)				
1	TATAMOTORS	6.90	20.58	0.34	34
2	RELIANCEINDUSTRIESLTD	1.93	20.58	0.09	9
3	BOSCHLTD	4.08	20.58	0.20	20
4	HEROMOTOCO	7.63	20.58	0.37	37
5	BPCL	0.39	20.58	0.02	2
6	M&M	-0.36	20.58	-0.02	**-2**
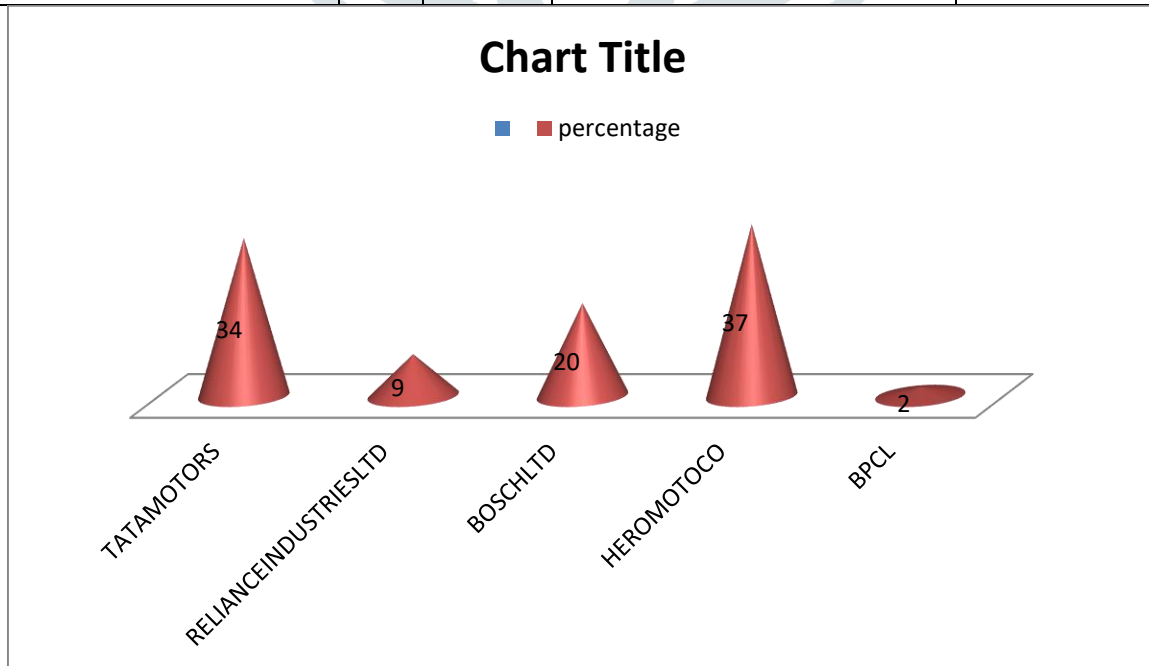
INTERPRETATION:

Normally, if the Z_i value is negative →the stock must be sold earlier in short position.Here 1 company have a negative value. If the Z_i value is positive →the stock could be kept for long to earn higher return in long position.Here, in the securities analyzed, 6 companies were shortlisted and it has been constructed as a portfolio with its respective occupancy of returns.Also, it is not necessary to take all the 5 but as per the individual's willingness to reduce risk and earn higher return for the given level of risk.

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M&M ,TATAMOTORS ,HERO MOTOCO ,ASHOK LEYLAND LTD ,BOSCH LTD ,ONGC, BPCL ,RELIANCE INDUSTRIES LTD, IOC,
CASTROL INDIA LTD ,IDBI ,YES BANK ,CANARA BANK, AXISBANK ,LIC HOUSING FINANCE

M&M
TATAMOTORS
HEROMOTOCO
ASHOKLEYLAND LTD
BOSCH LTD
ONGC
BPCL
RELIANCEINDUSTRIES LTD
IOC
CASTROLINDIALTD
IDBI
YESBANK
CANARABANK
AXISBANK
LICHOUSINGFINANCE