Role of Return, Risk, And Correlation In Investment Decisions And Portfolio Selection

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INTRODUCTION

Stock market is an economic barometer of a country. It facilitates flow of funds from those who have excess funds to those who are in need of funds. It is the lifeblood of a financial system of a nation. It is highly sensitive and quickly responds to incidents that happen in any corner of the world. Because of these reactions, the stock market is highly volatile. The volatile nature of a stock market makes it difficult to predict the stock returns. The uncertainty in stock returns can be quantified and categorized into two types of risks. One is an ***unsystematic risk*** which is firm specific risk and can be diversified. Next is ***systematic risk*** which is influenced by market factors and cannot be diversified. Furthermore, the uncertainty of when to buy and when to sell the stocks prevails all the time. Even after all these uncertainties, a large number of investors tend to invest their money in common stocks. Such investment in common stocks can provide more substantial returns than the returns provided by corporate and government bonds.

Since return from investment on common stock is uncertain, knowing the nexus between return and risk will be crucial for investors. This helps them to maximize their return and minimize their risk. The general principle is that securities that have higher returns tend to have higher levels of risk. No security dominates any other by having higher level of return and lower level of risk at the same time. Markowitz (1952) argues that by combining different sets of securities, investors can eliminate the unsystematic risk. He also suggests considering the correlation among the securities while designing a portfolio. On the other hand, systematic risk is indicated by beta coefficient. It could be argued that there is a relationship between beta coefficient and stock volatility. The beta coefficient of a stock indicates its relation with the market. The possible increase and decrease in the price of a stock can be predicted in relation to possible increase and decrease in market. This study aims to investigate the return and risk nexus of the S&P CNX NIFTY stocks. This study evaluates the investment strategies like buy and hold, and market timing. Furthermore, this study measures the role of correlation in investment decisions.

OBJECTIVES OF THE STUDY

1) To compare the performance of stocks with performance of market.
2) To compare the holding period return with daily average return and annualized return.
3) To carry out Industry wise comparison of unsystematic risk.
4) To measure the relation among the stocks that belong to the same industry as well as with the market index.

PERIOD OF THE STUDY

Period of the study ranged between 31-12-2008 to 31-12-2009. During this period, there were 244 trading days in National Stock Exchange (NSE) India.

SAMPLE

For the purpose of this study, stocks listed in S&P CNX NIFTY were considered as sample and S&P 500 was considered as market index. S&P CNX NIFTY is a well diversified composite index with fifty most actively traded stocks. Five stocks (Bharti Airtel, Jindal Steel, Reliance Capital, Reliance and TCS) were removed from analysis due to insufficient data. Final analysis includes only 45 stocks. These 45 stocks represent 13 different industry types (See table 1). Table 2 depicts the number of stocks belonging to each industry type.

DATA AND DATA SOURCE

The study data consisted of daily closing prices of the sample stocks and daily closing index value of S&P CNX 500.

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The data were obtained from NSE (www.nseindia.com). In all, there were 11,224 trading days during the study period. After the data were obtained, box plots were drawn to identify outliers and data inconsistencies. Of the 50 stocks, five stocks have inconsistent or insufficient data. Those stocks were not considered for further analysis.

Table 1: Industry Wise Classification Of Sample Stocks

	Stock	Industry		Stock	Industry		Stock	Industry
1	Hero Honda	Automobile	16	DLF	Construction	31	BPCL	Oil & Gas
2	M&M	Automobile	17	JPASSOCIA	Construction	32	Cairn	Oil & Gas
3	Maruti	Automobile	18	Unitech	Construction	33	Gail	Oil & Gas
4	Tata Motors	Automobile	19	Hindunilvr	Diversified	34	ONGC	Oil & Gas
5	Axis Bank	Bank	20	ITC	Diversified	35	NTPC	Power
6	HDFC Bank	Bank	21	ABB	Electrical	36	Powergrid	Power
7	ICICI bank	Bank	22	BHEL	Electrical	37	Relinfra	Power
8	PNB	Bank	23	L&T	Electrical	38	Rpower	Power
9	SBI	Bank	24	Siemens	Electrical	39	Tatapower	Power
10	ACC	Cement	25	Suzlon	Electrical	40	Hindalco	Steel
11	Ambujacem	Cement	26	HDFC	Finance	41	Sail	Steel
12	Grasim	Cement	27	IDFC	Finance	42	Sterilite	Steel
13	HCLTECH	Computers	28	Cipla	Pharma	43	Tatasteel	Steel
14	Infosystch	Computers	29	Ranbaxy	Pharma	44	Idea	Telecom
15	Wipro	Computers	30	Sunpharma	Pharma	45	Rcom	Telecom

Table 2: List Of Stocks In Each Industry Type

S.No	Industry	No. of Stocks	S.No	Industry	No. of Stocks	S.No	Industry	No. of Stocks
1	Automobiles	4	5	Construction	3	9	Oil & Gas	4
2	Banks	5	6	Diversified	2	10	Pharma	3
3	Cement	3	7	Electrical	5	11	Power	5
4	Computers	3	8	Finance	2	12	Steel	4
						13	Telecom	2

RESEARCH METHODOLOGY

Microsoft Office Excel 2003 and SPSS 12 for Windows were used to calculate the Holding Period Return (HPR), daily return, standard deviation, and correlation coefficient among the stocks. Dividends paid during the study period, transaction costs, brokerage charges, taxes, and other charges were ignored.

HOLDING PERIOD RETURN (HPR)

HPR is the total return on an asset over the period during which it was held. It is the percentage by which the value of an asset has grown from a particular period. In this study, HPR was calculated for four different holding periods. Considering closing price of respective stocks as on 31-12-2008 as a base period price, HPR for each stock has been calculated for the last trading days of March, June, September, and December months of year 2009.

$$HPR = (P_1 - P_0)/P_0 * 100$$

DAILY RETURN

In this study, the author calculated daily returns from stocks using Continuously Compounded Rate of Return (CCRR) method. It is assumed that stock prices are lognormally distributed, that is, the Natural logarithm (ln) of stock prices is normally distributed.

$$R_i = \ln(P_t / P_{t-1})$$

Unlike a normal distribution, a lognormal distribution is not symmetrical. Also, a log normally distributed variable has a minimum value of zero and maximum value of infinity, whereas a normally distributed variable has a minimum value of minus infinity and maximum value of infinity. Because stock prices cannot have a value less than zero, they can be represented by a lognormal distribution but not by a normal distribution.

STANDARD DEVIATION

Standard deviation was used to calculate the stock price volatility. It measures how widely values are dispersed from the average.

$$\sigma = \sqrt{(\sum X - \mu)^2 / N - 1}$$

ANNUALIZED RETURN

Annualized return was calculated using the below equation :

AR = Sum Of Daily Average Returns Or Daily Average Returns * No. Of Trading Days

ANNUALIZED STANDARD DEVIATION

Annualized standard deviation was calculated using the below equation

$$A\sigma = \sigma * \sqrt{T}$$

CORRELATION

$$Correl_{xy} = Cov(x,y) / \sigma_x * \sigma_y$$

Table 3: Frequency Distribution Of Annualized Returns (3a) And Industry Wise Details Of Stocks Those Outperformed The Market (3b)

Table 3(a)

Range (%)	No. of Stocks	%	Cumulative %
<25 %	4	8.89	8.89
25 - 50	8	17.78	26.67
50 - 75	20	44.44	71.11
75 - 100	4	8.89	80.00
100 - 125	7	15.56	95.56
125 - 150	1	2.22	97.78
150 - 175	1	2.22	100.00

Table 3(b)

Industry	No. of Stocks	Stocks outperformed Market
Automobiles	**4**	**4**
Banks	5	2
Cement	3	1
Computers	**3**	**3**
Construction	3	1
Diversified	2	0
Electrical	5	1
Finance	2	1
Oil & Gas	4	1
Pharma	3	1
Power	5	1
Steel & Metal	**4**	**4**
Telecom	2	0

Table 4: Showing Holding Period Returns (HPR), Annualized Returns and Standard Deviations

STOCK	Industry	Jan-Mar	Jan-June	Jan-Sep	Jan-Dec	Daily Avg Return (%)	S D (%)	Annual-ized Return (%)	Annual-ized S D (%)
S&P CNX 500		**-0.04**	**51.14**	**79.40**	**88.57**	**0.26**	**2.02**	**63.38**	**31.42**
Automobile									
HERO HONDA	Automobile	33.29	73.91	108.10	113.74	0.31	2.50	75.92	38.94
M&M	Automobile	39.76	151.82	221.75	293.75	0.56	3.48	137.12	54.30
MARUTI	Automobile	49.91	105.49	227.07	199.90	0.45	2.59	109.84	40.35
TATAMOTORS	Automobile	12.79	81.89	269.82	395.18	0.66	4.19	160.06	65.28
Banking									
AXISBANK	Banks	-17.78	64.90	95.20	96.00	0.28	3.67	67.25	57.18
HDFCBANK	Banks	-2.50	49.56	65.32	70.51	0.22	2.34	53.34	36.46
ICICIBANK	Banks	-25.73	61.17	102.54	95.72	0.28	3.95	67.16	61.54
PNB	Banks	-21.88	28.68	51.44	72.05	0.22	2.95	54.25	46.05
SBIN	Banks	-17.20	35.42	70.31	76.06	0.23	3.09	56.52	48.24
Cement									
ACC	Cement	19.63	59.48	70.83	81.70	0.25	2.67	59.69	41.69
AMBUJACEM	Cement	0.79	24.91	42.26	48.82	0.16	2.75	39.74	42.80
GRASIM	Cement	29.70	89.48	127.38	102.90	0.29	2.68	70.72	41.84
Computers									
HCLTECH	Computers	-11.49	61.27	195.58	222.03	0.48	3.89	117.01	60.63
INFOSYSTCH	Computers	18.69	59.26	106.77	133.19	0.35	2.39	84.64	37.25
WIPRO	Computers	5.36	61.93	157.97	191.35	0.44	2.73	106.89	42.52
Construction									
DLF	Construction	-40.71	10.15	55.24	28.02	0.10	4.86	24.72	75.80
JPASSOCIAT	Construction	1.39	146.71	186.32	77.03	0.23	5.50	57.08	85.75
UNITECH	Construction	-14.15	95.94	164.21	102.46	0.29	5.30	70.56	82.60
Diversified									
HINDUNILVR	Diversified	-5.11	6.87	4.91	5.79	0.02	1.99	5.63	30.98
ITC	Diversified	7.66	11.09	35.73	46.07	0.16	2.27	37.97	35.37
Electrical									
ABB	Electrical	-5.97	71.53	72.86	69.04	0.22	2.77	52.49	43.14
BHEL	Electrical	10.86	61.75	70.91	76.38	0.23	2.57	56.75	40.04
LT	Electrical	-13.23	102.62	118.31	116.81	0.32	3.23	77.37	50.30
SIEMENS	Electrical	-6.57	64.42	94.16	102.94	0.29	3.49	70.80	54.40
SUZLON	Electrical	-32.02	66.53	47.03	45.02	0.15	5.10	37.20	79.55

Table 4: Showing Holding Period Returns (HPR), Annualized Returns and Standard Deviations (Contd.)

Finance									
HDFC	Finance	-4.99	57.75	87.67	80.02	0.24	3.31	58.83	51.62
IDFC	Finance	-19.01	103.22	118.64	130.99	0.34	3.96	83.79	61.81
Oil & Gas									
BPCL	Oil & gas	-0.01	14.36	52.63	68.98	0.22	2.52	52.42	39.23
CAIRN	Oil & gas	7.00	35.28	52.19	63.99	0.20	2.94	49.57	45.80
GAIL	Oil & gas	19.08	39.81	74.13	100.39	0.29	2.50	69.54	38.98
ONGC	Oil & gas	16.95	59.99	75.69	76.59	0.23	2.63	56.88	41.00
Pharma									
CIPLA	Pharma	17.93	35.77	50.00	79.56	0.24	2.24	58.55	34.95
RANBAXY	Pharma	-34.34	-2.97	59.90	105.25	0.30	3.74	71.91	58.38
SUNPHARMA	Pharma	4.44	2.48	32.28	41.78	0.14	2.81	34.88	43.76
Power									
NTPC	Power	-0.42	8.00	18.36	30.48	0.11	2.04	26.60	31.87
POWERGRID	Power	14.97	31.57	32.23	32.47	0.12	2.51	28.05	39.08
RELINFRA	Power	-11.04	106.51	110.74	97.89	0.28	4.29	68.18	66.91
RPOWER	Power	-14.67	39.64	39.93	29.30	0.11	3.06	25.68	47.70
TATAPOWER	Power	2.60	53.55	75.94	84.40	0.25	2.60	61.17	40.46
Steel & Metals									
HINDALCO	Steel	1.26	68.19	151.07	212.94	0.47	3.90	114.10	60.86
SAIL	Steel	24.45	95.03	120.52	211.87	0.47	3.78	113.73	58.98
STER	Steel	37.49	133.37	198.39	232.01	0.49	4.05	120.00	63.16
TATASTEEL	Steel	-5.20	79.86	134.55	184.39	0.43	4.30	104.51	67.08
Telecom									
IDEA	Telecom	-4.84	35.42	42.92	10.26	0.04	3.29	9.77	51.32
RCOM	Telecom	-23.04	27.40	36.16	-24.14	-0.11	4.27	-27.59	66.51

ANALYSIS

COMPARATIVE PERFORMANCE OF STOCKS

When the annualized returns from stocks were compared with market index, of the total 45 stocks, 21 stocks (47%) out performed the market and 24 stocks (53%) reported lower returns than the market. Tata Motors was the top performer with 160% annualized returns, followed by M&M (137%) and Sterilite Industries (120%). Annualized returns of nine stocks were above 100%. Only two stocks (Idea, Hind-ULL) reported less than 10% annualized returns. RCom is the only stock that reported negative return (-28%). Table 3 (a) depicts the frequency distribution of annualized returns, and annualized returns of all stocks are presented in Table 4.From Table 3(a), it is evident that 44% of sample stocks reported annualized returns between 50% and 75%. Of the total stocks, nearly 73% (33) of stocks annualized returns were more than 50%. Only 9% of the sample reported annualized returns of less than 25%. When annualized returns from stocks of similar industry are evaluated, all the stocks belonging to Automobile (4 stocks), Computers (3 stocks), and Steel & Metal (4 stocks) out performed the market index (see: table 3 b). Not even a single stock from Telecom & Diversified industry sectors out performed the market.

BUY AND HOLD STRATEGY VS. MARKET TIMING STRATEGY

The buy and hold strategy suggests that the longer we hold a stock, the more likely we are to earn good returns. Efficient Market Hypothesis (EMH) strongly supports the buy and hold strategy. EMH argues that a stock is fairly valued at all times, and it is impossible to earn abnormal profits. On the other hand, proponents of Market Timing strategy advocates that money can be made in short term by buying on lows and selling on the highs.

When one year holding period returns (HPR) was compared with annualized returns, holding period returns of all the stocks outperformed the annualized returns. HPR of Tata Motors was 235% more than its annualized return. Similar to this, HPR of M&M (157%), Sterilite (112%) and HCL TECH (105%) reported excess than their respective annualized returns. An interesting point was observed while analyzing HPR of four different time periods. Stocks (DLF, Suzlon, Ranbaxy, ICICI etc.) those reported negative returns in first holding period (t = 31/03/2009 and t_0 = 31/12/2008) conversely reported positive returns in next time periods. However, RCOM is the only stock that reported negative returns in start and end holding periods. Banking and finance sectors stocks reported negative HPR in the first period. By the end of the year, those stocks reported an average of 80% HPR. Another interesting point that needs to be examined is how long one needs to hold the stocks. This point arises because 14 of the sample stocks reported maximum HPR during the holding period ending 30/09/2009 and the same stocks reported less returns when they are held till the year end. However, HPR of 31 stocks were high during the period ending 31/12/2009.

Highest Volatility Was Observed In These Stocks: JP Associates (86%), UNITECH (83%), Suzlon (80%), DLF (76%), Tata Steel (67%), and Reliance Infra (67%). On the other hand, **Lowest Volatility** was observed in the stocks like Hindustan Uniliver (31%), NTPC (32%), CIPLA (35%), ITC (35%), HDFC Bank (37%), Infosys (37%), and Hero Honda (38%).

CORRELATION ANALYSIS

By investing in different stocks, investors can reduce the risk in their portfolio. The fundamental premise behind diversification is that portfolio risk and volatility and can be lowered by investing in a number of different asset classes which have varying levels of risk, volatility and returns. In order to achieve effective diversification, portfolio holdings should not be highly correlated. When highly correlated markets become volatile, a portfolio which is simply allocated across different assets classes may experience instability and risk.

From the Table 5, it is evident that all the stocks have significant positive correlation with the market index. It can be said that all the stocks in S&P CNX NIFTY are moving in tandem with the market. However, few stocks have very high positive correlation (L&T (.83), Reliance infra (.83), SBI (.82), Sail (.81) etc.) and few stocks have weak positive correlation (BPCL (.33), HLL (.35), Sun Pharma (.36), Cipla (.40) and Hero Honda (.49). While selecting stocks for a portfolio, we need to take note of correlations. By combining high correlation stocks with low correlation stocks, we can minimize the portfolio risk. Cross order correlations were performed among the stocks that belong to similar industry types. Thirteen (13) such cross order correlation tables (See: Tables 6-18) were drawn using SPSS 12.0 for windows. Cross order correlation results supports the argument that stocks belonging to similar industry move in same direction.

Tables 6 - 18 present the cross order correlation analysis. Even though the stocks belonging to similar industry have significant positive correlation, few stocks have weak correlation. For example, these industry types: Construction (.23), Diversified (.27), and Telecom (.34) had weak correlation. In banking industry, ICICI bank had a weak correlation with other banks. Power sector had a significant correlation among all the stocks. Cross order correlation plays vital role in designing style investment portfolios. It helps us to understand the movements of stocks that are part of the same industry type.

CONCLUSION

It is assumed that investment in common stocks provide more returns than any other financial assets. Current study provides evidence to this argument. Seventy three percent of sample stocks reported annualized returns of 50% and above and 18% of stocks reported annualized returns between 25% and 50%. Earlier research reported mixed results with regard to buy and hold strategy, and market timing strategy.

Table 5: Showing Correlation Between S&P 500 And Sample Stocks

1	L&T	.828(**)	16	STER	.734(**)	31	ACC	.632(**)
2	RELINFRA	.827(**)	17	IDEA	.720(**)	32	NTPC	.622(**)
3	SBIN	.819(**)	18	JPASSOCIAT	.718(**)	33	WIPRO	.570(**)
4	SAIL	.808(**)	19	HINDALCO	.715(**)	34	AMBUJACEM	.563(**)
5	RCOM	.807(**)	20	CAIRN	.708(**)	35	GRASIM	.548(**)
6	ICICIBANK	.804(**)	21	ONGC	.706(**)	36	INFOSYSTCH	.547(**)
7	RPOWER	.774(**)	22	SUZLON	.700(**)	37	GAIL	.539(**)
8	TATASTEEL	.772(**)	23	HDFC	.698(**)	38	ITC	.527(**)
9	IDFC	.767(**)	24	PNB	.693(**)	39	MARUTI	.527(**)
10	AXISBANK	.766(**)	25	M&M	.678(**)	40	RANBAXY	.520(**)
11	UNITECH	.752(**)	26	TATAPOWER	.675(**)	41	HEROHONDA	.484(**)
12	DLF	.745(**)	27	TATAMOTORS	.658(**)	42	CIPLA	.397(**)
13	BHEL	.740(**)	28	HCLTECH	.643(**)	43	SUNPHARMA	.365(**)
14	HDFCBANK	.738(**)	29	POWERGRID	.638(**)	44	HINDUNILVR	.354(**)
15	SIEMENS	.736(**)	30	ABB	.632(**)	45	BPCL	.328(**)

** Correlation is significant at the 0.01 level (2-tailed). *Correlation is significant at the 0.05 level (2 tailed)

CORRELATIONS

Table 6: Correlations Among Automobile Stocks

	HERO HONDA	M&M	MARUTI
M & M	.408(**)	1	
MARUTI	.541(**)	.413(**)	1
TATAMOTORS	.506(**)	.403(**)	.468(**)

Table 7: Correlations Among Banking Stocks

	AXISBANK	HDFCBANK	ICICIBANK	PNB
HDFCBANK	.430(**)	1		
ICICIBANK	.309(**)	.383(**)	1	
PNB	.433(**)	.534(**)	.349(**)	1
SBIN	.536(**)	.560(**)	.283(**)	.538(**)

Table 8: Correlations Among Cement Stocks

	ACC	AMBUJACEM
AMBUJACEM	.448(**)	1
GRASIM	.416(**)	.399(**)

Table 9: Correlations Among Computer Stocks

	HCLTECH	INFOSYSTCH	TCS
INFOSYSTCH	.428(**)	1	
TCS	.500(**)	.602(**)	1
WIPRO	.454(**)	.591(**)	.571(**)

Table 10: Correlations Among Construction Stocks

	DLF
UNITECH	.229(**)

Table 11: Correlations Among Diversified Stocks

	HINDUNILVR	JPASSOCIAT
HINDUNILVR	1	.269(**)
JPASSOCIAT	.269(**)	1

Table 12: Correlations Among Electrical Stocks

	ABB	BHEL	SIEMENS	SUZLON
BHEL	.461(**)	1		
SIEMENS	.804(**)	.359(**)	1	
SUZLON	.331(**)	.260(**)	.225(**)	1
L&T	.783(**)	.311(**)	.621(**)	.204(**)

Table 13: Correlations Among Finance Stocks

	HDFC	IDFC
HDFC	1	
IDFC	.431(**)	1

Table 14: Correlations Among Oil & Gas Stocks

	GAIL	BPCL	CAIRN
BPCL	.618(**)	1	
CAIRN	.272(**)	.317(**)	1
ONGC	.493(**)	.552(**)	.349(**)

Table 15: Correlations Among Pharma Stocks

	CIPLA	RANBAXY
RANBAXY	.436(**)	1
SUN	.605(**)	.445(**)

Table 16: Correlations Among Power Stocks

	NTPC	POWERGRID	RELINFRA	RPOWER
POWER GRID	.478(**)	1		
RELINFRA	.344(**)	.402(**)	1	
RPOWER	.482(**)	.636(**)	.511(**)	1
TATA Power	.532(**)	.474(**)	.405(**)	.563(**)

Table 17: Correlations Among Steel Stocks

	JINDAL STEEL	SAIL
SAIL	.318(**)	1
TATASTEEL	.432(**)	.438(**)

Table 18: Correlations Among Telecom Stocks

	IDEA	RCOM
IDEA	1	
RCOM	.341(**)	1
** Correlation is significant at the 0.01 level (2-tailed).		

This study reveals that one year holding period returns of all the sample stocks outperformed their annualized daily returns. That means the longer the stock is held, the better the returns are. At the same time, investors should also note that they should monitor the stock price on a continuous basis. Fourteen of the sample stocks reported highest holding period returns during nine months holding period.

(Contd. On Page 52)

residential property to meet their increased living expenses. It is expected that measures for enhancing the attractiveness of the product would evolve in due course, thereby not only expanding the market, but also the course of financial intermediation in the country. The reverse mortgage loan enabled annuity is a beginning in this direction.

BIBLIOGRAPHY

1. Census of India, 2001
2. Guide to Reverse Mortgages, National Reverse Mortgage Lenders Association (NRMLA), United States of America.
3. Home Equity Conversion Mortgage Policy, Housing and Urban Development Department, United States of America.
4. Reverse Mortgage Loan enabled Annuity: Operational Guidelines, National Housing Bank (2009).
5. Reverse Mortgage Loan: Operational Guidelines, National Housing Bank (2006).
6. www.chip.ca
7. www.nhb.org.in
8. www.seniorsfinance.com.au
9. www.uklifetimemortgage.co.uk

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It suggests that investors should sell the stock when it meets their expected return. Another important finding of the study is that only 47% of the stocks outperformed the market index. Significant positive correlations were found among the stocks and market index. This suggests that all stocks are moving in tandem with the market. Based on this, investors are advised to design a portfolio in which an equilibrium is maintained among high and weak correlation stocks.

LIMITATIONS

As the study is confined to blue chip and most actively traded stocks, investors should be vigilant in relating these results to mid-cap and small-cap stocks. The study period may also have its impact on the results. Similar results may not be expected in some other time period.

FUTURE RESEARCH

In future, studies should concentrate on mid-cap and small-cap sectors. There is also a need to conduct the impact of systematic risk in stock performance and portfolio selection.

BIBLIOGRAPHY

1) Markowitz, H. M. (1952). "Portfolio selection." Journal of Finance, Vol 7(1), 77-91.
2) Sharpe, W. F. (1964). "Capital asset prices: a theory of market equilibrium under conditions of risk." Journal of Finance, Vol 19(3), 425-442.
3) Fama, E. F., & French, K. R. (1992). "The cross-section of expected stock returns." Journal of Finance, Vol 47(2), 427-465.
4) Fama, E. F., & French, K. R. (1993). "Common risk factors in the returns on stocks and bonds." Journal of Financial Economics, Vol 33(1), 3-56.
5) Sharpe, W. F. (1964). "Capital asset prices: a theory of market equilibrium under conditions of risk." Journal of Finance, Vol 19(3), 425-442.