Comparative Study of Stock and Bond Markets Volatility and Returns Performance

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Abstract

The paper aims to compare the equity and bond market performance and volatility based on the risk associated with them. The benchmarks were considered for equity (sensex) and bond market (composite bond index) for the period of 3 years starting from April 2014 to March 2017. Modigliani risk adjusted method (MM) has been used to measure the returns performance of both the asset classes. The historical volatility has been applied with the standard deviation for bonds and stocks calculated and the result has been compared to know which of the market indicator has the greater volatility during the study period. The volatility of equity during the study period is more when compared to the bond market volatility. The MM approach reveals that the performance of the stock market was better and greater than the bond markets during the period of study.

Key words: Equity, Bond, Indices, Volatility, Risk free return.

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1. INTRODUCTION

Bonds and equities are the two securities which are used by investors for balancing their asset class or portfolio. The purpose depending on the market conditions, the policy makers and investors try to balance the return on the investments by trying to understand the relationship between equity and bonds. Asset prices or volatility is influenced by many shocks in the market which are generally unpredictable and in certain cases there can be sudden decline in the liquidity of a particular asset class. There is a need to understand the relationship between the return and risk values of a particular security. A security with high volatility will have greater risk. There have been many studies in the past on various aspects such as risk and return relationship, volatility and liquidity relationships of the stock and fixed income securities. The volatility calculations also reveal the relationship of the security values and its changes with respect to the time period. If the security changes its direction rapidly over a short period of time, it can be classified as a risky asset. If the asset takes a longer period of time for changing or reacting as per the market conditions it can be called a less risky security. The M^2 risk adjusted performance approach is based on the Sharpe ratio but it is more advantageous than Sharpe as it can be expressed in terms of percentage returns when compared to a bench mark. The general standard deviation of returns over a time period reveal the spread out from the mean value. A low standard deviation of the returns reveals lesser deviation from the average.

2. REVIEW OF LITERATURE

Marshall E. Blume, Donald B.Keim and Sandeep A. Patel (March, 1991): The authors have investigated about the long-term low grade bonds, their risk and returns aspects. The objective of the paper was to compare the long-term low grade bonds with the long-term treasuries and long-term high grade bonds and compare the risk and returns and their sensitivity to the volatility of interest rates. The data was studied for 12 years form 1977-1989. Despite this complexity there was no evidence that low-grade bonds are systematically over or under-priced.

Francis A. Longstaff and Eduardo S. Schwartz (1993), researched on the risks involved in fixed income portfolios. The risk of the bond generally consists of the interest rate risk and interest rate volatility. The objective of the paper was to show that interest rate volatility has consequential influence on bond prices. The data has been studied from 1964-1989 for 25 years. Regression of changes in short-term interest rates and change in interest rate volatility on changes in yields to maturity. Longstaff and Schwartz model has been used for analyses of change in prices to volatility of interest rates. The results showed that changes in the volatility of interest rates can have large effects on the prices and yields of bonds. In case the volatility risk is not hedged the portfolio managers will incur loss when interest rates change.

Michael H. Hopewell and George G. Kaufman (1973) the objective of the paper stated that for a given basis point change in market yield percentage changes in bond prices vary proportionately with duration and are greater, the greater the duration of the bond. That is price volatility of a bond is related to duration of the bond rather than term to maturity of the bond. Method of Differentiation has been used for proving that duration is a more accurate measure for price volatility than maturity.

Murray R. Hutchings and John S. Mc Callum (Dec, 1975) explain the relationship between bond price volatility and yield to maturity. The objective of the paper was to identify the specific market conditions under which the generally accepted price to maturity relationship does not hold good. The derivative formula has been applied, where change in price for a change in yield is analyzed for various maturity levels. The implications of the research were that in specific conditions where irrespective of any 'n' (maturity) the bond price volatility increases or decreases with a change in coupon rate and yield. They suggest that bond investors in general should not expect a decrease in volatility with maturity.

Richard L. Norgaard (Sep. 1974): They have compared the yields of stocks and bonds. The objective of study stated that the higher mean yield of stocks was offset by the lower variance of yields of bonds. The geometric mean was used to calculate holding period yields as the dividends and interests were assumed to be reinvested. The research proves that the probability of receiving a higher yield by investing in a portfolio of bonds or mixed portfolio of stocks and bonds is relatively less when compared to the portfolio of only stocks and approaches to zero as the holding period increases beyond one year. The research suggests that the portfolio managers should purchase stocks rather than mixed portfolios. The limitations of study include sample size, random selection of securities, annual holding periods.

Nianyun Cai (Feb, 2008) analyses the relationship between Corporate bond returns and volatility. The literature survey had evidence on the importance between idiosyncratic equity risk and its relationship to bond returns or its impact on bond yields. The current papers objective was to prove that bond volatility has a higher correlation to contemporaneous bonds excess returns. The data has been taken for 9 years from 1996 to 2005. The Lehman Brothers Corporate Index has been used for the purpose of decomposition of the bonds. They conclude that corporate bond volatility has both slow moving and time to maturity components and both idiosyncratic risk and bond volatility forecast the bond excess returns for a period of three and six months.

X. Henry Wang and Bill Z. Yang (2010): The paper states that YTM precisely measures total rate of return when the bond is valued at its amortized book value. There have been critics in the past for such a kind of practice could not be applied in the bond market as the amortized book value of the bond may not be the same as its market value. Despite the above criticism the author stated that any assets rate of return could be valued based on amortized book value. Examples are used to prove the above hypothesis. The author concludes that the YTM exactly equals this theoretic rate of return based on amortized book value. The current market price of bond always fluctuates around its amortized book value, when it is close to maturity.

3. OBJECTIVES OF THE STUDY
- To measure and compare the volatility of the equity and bond bench marks
- To study and compare the equity and debt market benchmark returns performance measure.

4. SCOPE OF THE STUDY
The present study has emphasized on the equity market and debt market segment for three years period i.e., April 2014 to March 2017. The study had considered equity market bench mark indicator as sensex and debt market bench mark indicator as composite bond index (CBI).

- Repo rate-RBI,
- Sensex – BSE India,
- Composite bond Index (CBI) – NSE India.

5. RESEARCH METHODOLOGY

The present study has been done on the secondary data by applying statistical methodologies. The following are the tools which were considered for study.

Volatility: The volatility method has been applied on the equity market bench mark (sensex) and debt market benchmark (CBI). This method will evaluate the volatility based on the historical data.

$$Volatility = \sqrt{\frac{\sigma}{p}}$$

Modigliani Risk Adjusted Method: The performance measure method of M square will measure the returns performance based on the risk free rate of return. In this study sensex and composite bond index indicators were considered.

$$M^2 = S * \sigma_B + \overline{R_f}$$

Where

σ_B = Excess returns of bench mark portfolio compared against σ_D

$\overline{D}$ = Average of D

σ_D = Standard deviation of D

$S = \dfrac{\overline{D}}{\sigma_D}$

$D = R_P - R_f$ (R_P = Portfolio return and R_f = Risk free rate)

6. LIMITATIONS OF THE STUDY

- In the study Repo rate has been considered as a risk free rate of return.
- In the study no economic factors were considered. There may be many economic factors might be influenced the equity and debt market benchmarks during the study.

7. DATA ANALYSIS

Table 1: To measure and compare the volatility of the equity and bond bench marks

SENSEX Volatility				
Date	**STDEV**	**TRADE DAYS**	**STDEV/days**	**VOLATILITY**
3/31/2015	1,938.51	244	7.94	2.82
3/31/2016	1,455.27	246	5.92	2.43
3/31/2017	1,189.69	247	4.82	2.19
Average	1,527.82	245.67	6.22	2.49

The above table 1 depicts the historical volatility of the equity bench mark index sensex for the three years period. In the year 2014 to 15 volatility (2.82) is observed to be higher than the other two years period volatility. The sensex three years average volatility is found to be 2.49.

Table 2: Composite Bond Index Volatility

Date	STDEV	DAYS	STDEV/days	VOLATILITY
31/03/2015	27.74	244.00	0.11	0.34
31/03/2016	5.70	246.00	0.02	0.15
31/03/2017	18.98	247.00	0.08	0.28
Average	17.47	245.67	0.07	0.26

The above table 2 reflects the bond bench mark volatility for the three years period i.e., from 2014-15 to 2016 – 2017. The calculated value of the CBI (0.34) in the year 2014-15 is observed to be greater than the other two years period. The Three years average volatility is found to be 0.26.

Comparison: The volatility has been calculated for the sensex and composite bond index for three years and observed that the equity market (sensex) volatility has been greater than the debt market (CBI) volatility (2.49 > 0.26).

Table 3: To study and compare the equity and debt market returns performance measure.

Date	Sensex			Composite Bond Index		
	R_p	R_f	$D= R_p - R_f$	R_p	R_f	$D= R_p - R_f$
Apr, 2014	-0.127593	0.666667	-0.794259	0.41263	0.66667	-0.254
May, 2014	8.094353	0.666667	7.427687	1.66792	0.66667	1.00125
June, 2014	2.952945	0.666667	2.286278	-0.057	0.66667	-0.7237
July, 2014	1.483833	0.666667	0.817166	0.27886	0.66667	-0.3878
Aug, 2014	4.541726	0.666667	3.87506	-0.3243	0.66667	-0.991
Sep, 2014	-0.882254	0.666667	-1.548921	0.47443	0.66667	-0.1922
Oct, 2014	4.884976	0.666667	4.21831	2.15088	0.66667	1.48422
Nov, 2014	2.992098	0.666667	2.325432	1.03158	0.66667	0.36491
Dec, 2014	-3.712234	0.666667	-4.378901	1.25166	0.66667	0.585
Jan, 2015	4.64377	0.645833	3.997937	1.62264	0.64583	0.9768
Feb, 2015	0.335997	0.645833	-0.309836	-0.4165	0.64583	-1.0623
Mar, 2015	-5.097399	0.625	-5.722399	-0.3395	0.625	-0.9645
Apr, 2015	-4.419051	0.625	-5.044051	-0.5883	0.625	-1.2133
May, 2015	1.228966	0.625	0.603966	-0.2923	0.625	-0.9173
June, 2015	-0.244749	0.604167	-0.848915	-1.4158	0.60417	-2.02
July, 2015	0.334358	0.604167	-0.269809	0.41849	0.60417	-0.1857
Aug, 2015	-6.754766	0.604167	-7.358933	0.10425	0.60417	-0.4999
Sep, 2015	1.783866	0.5625	1.221366	1.3206	0.5625	0.7581
Oct, 2015	1.662335	0.5625	1.099835	-0.3289	0.5625	-0.8914
Nov, 2015	-1.556827	0.5625	-2.119327	-0.9041	0.5625	-1.4666
Dec, 2015	-0.198209	0.5625	-0.760709	-0.0998	0.5625	-0.6623
Jan, 2016	-2.937399	0.5625	-3.499899	-0.1293	0.5625	-0.6918
Feb, 2016	-7.342769	0.5625	-7.905269	-0.8184	0.5625	-1.3809
Mar, 2016	6.570869	0.5625	6.008369	1.37649	0.5625	0.81399

Apr, 2016	1.333537	0.541667	0.79187	0.30634	0.54167	-0.2353
May, 2016	4.839374	0.541667	4.297707	0.03611	0.54167	-0.5056
June, 2016	1.069816	0.541667	0.52815	0.3644	0.54167	-0.1773
July, 2016	3.341142	0.541667	2.799475	1.81057	0.54167	1.2689
Aug, 2016	1.603571	0.541667	1.061905	0.40143	0.54167	-0.1402
Sep, 2016	-1.961477	0.541667	-2.503144	0.64165	0.54167	0.09999
Oct, 2016	-1.068502	0.520833	-1.589335	-0.0747	0.52083	-0.5956
Nov, 2016	-4.39006	0.520833	-4.910894	3.58707	0.52083	3.06623
Dec, 2016	0.250528	0.520833	-0.270305	-2.8021	0.52083	-3.3229
Jan, 2017	3.987562	0.520833	3.466728	-0.294	0.52083	-0.8149
Feb, 2017	2.138042	0.520833	1.617208	-2.8122	0.52083	-3.3331
Mar, 2017	2.194312	0.520833	1.673478	0.92367	0.52083	0.40283

Table 4: Modigliani Risk Adjusted Performance Method

Performance Measure	Mean D	S	Mean R_f	σ_B	M^2
SENSEX	0.008	0.002	0.59	1.22236	0.59413
CBI	(0.36)	(0.29)	0.59	3.57945	(0.45)

The above table 4 shows the Modigliani risk adjusted method for the two asset classes (equity and debt). The sensex has been considered from the equity segment and the returns performance has been analyzed for three years period. The M square is observed to be positive 0.59413 for equity benchmark and debt market bench marks performance (0.45). The M square measures the returns performance based on the risk of the asset by considering the risk free rate of return. The M square result reveals that the sensex returns performance 0.59413 is superior than the composite bond index returns performance (0.45).

8. FINDINGS OF THE STUDY

- The study observed that equity market bench mark sensex volatility in the year 2014 – 15 had recorded high volatility with 2.82.
- The three years average volatility of the sensex is found to be 2.49.
- The debt market normally has less volatility. In the study NSE traded composite bond index has been considered and measured the historical volatility. The volatility for three years result stated low volatility 0.26.
- The performance has been measured with the help of Modigliani risk adjusted method and result reveals that for the equity market benchmark 0.59413 return performances is greater than the debt market benchmark return performance (0.45).

9. CONCLUSION OF THE STUDY

The paper titled ''Comparative study of stock and bond market volatility and returns performance'' has considered equity and bond market assets for the period of April, 2014 to March, 2017, to compare the return performance based on the risk associated with their returns. The study result reflects that the equity market benchmark historical volatility and returns performance found to be superior to the bond benchmark. Hence, there is a further scope to do

research in this area by considering the various economic factors and intra-asset class effects which can also be explored in equity and debt market segments in India, so that investors will be benefited.

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