

# Comparing the Performance of Fixed Income Index with Stock index and Currency: An Evidence by Indian Financial Market

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## **ABSTRACT:**

The study has assessed the co-movements and volatility contagion among the three major segments of the Indian financial market viz. Equity, Bond and Currency. The results are expected to furnish an insight into diversification in the minds of venture capitalists. We have taken S&P BSE Sensex, S&P BSE India Bond Index, and Exchange rate as variables for the period from January 2016 to April 2021. In order to identify the opportunity of diversification and volatility behaviour, various econometrics tools have been deployed namely Johansen Cointegration test, GARCH (1,1) and MGARCH BEKK Model. The descriptive statistics proclaim that the Bond index extends the blended investment opportunities merely to those investors who prefer to make high returns with less risk. Furthermore, the study also reveals that there is no co-integration among the variables, hence the diversification objective is served. The GARCH (1,1) shows all the indices are affected by the news which is broadcasted in the market and as well as by volatility of the last preceding day. As per the results of the BEKK MGARCH, we could see that spill-over does not exist among the indices in long run and short run both except than Equity index and Exchange rate. As all the series show spill-over effect mainly by their own previous day's volatility only. Utilizing these results, managers across the globe can make smart decisions about the creation of portfolios, especially in the Indian context.

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## 1. INTRODUCTION:

A well-functioned and efficient financial market makes an integral part of any economy. Financial markets include both the debt and equity markets. These markets are essential for providing capital to the corporations to fund their expansion plans. Myers and Majluf (1984) in their seminal work have highlighted a “pecking order theory”, indicating that corporations would first opt for internal sources of funding and over to external sources only if these prove insufficient. Within external sources, companies prefer the debt route and resort to equity funding as the last option.

Over the last three decades, India has made massive strides in the development of its equity market and brought it to world-class standards by improving infrastructure, bringing in transparency, the evolution of new products and a widening of its investor’s base. However, the same cannot be said about the corporate debt market which has lagged in development and is overshadowed by the government bond market.

The corporate bond market faces challenges various such as finance sector skew, poor trading volumes and little appetite for debt rated in the ‘A’ category and below. There is a huge opportunity gap lying in the development of the corporate bond market in India. In order to improve the current situation, it is important to study and access the connections of the fixed income instrument market with other segments of the market.

The Reserve Bank of India (RBI) withdrew the 20 percent limit on investments by FPIs in corporate bonds of an entity with a view to encouraging more foreign investments on 15th February 2019. RBI has gradually opened FPI limits which have increased FPI participation and ownership since the year 2013. FPI holdings have increased from 1.4% in September 2013 to 3.13% in December 2016.

The financial markets are an interconnected web. We generally see that the prices of commodities affect the movement of the currency and vice versa. The same relationship is seen in currencies and bond spread. The exchange rate can affect the decision of central banks regarding monetary policy around the world, same as monetary policy can also dictate price movement of the currency.

In this concern, we have to analyse the performance of the Indian bond market in the presence of changes in the price of equity and currency. As well as we have also to assess the integration of the Indian bond market with the other significant segments of the Indian economy.

## 2. REVIEW LITERATURE

### Review of literature is as under:

Fama and French (1993) have tried to identify risk factors in the returns on stocks and bonds. An overall market factor and factors related to firm size and book-to-market equity are stock market factors. The remaining two are from the bond market, related to maturity and default risks. The study showed that stock returns got affected due to the stock-market factors, and they are linked to bond returns through shared variation in the bond-market factors. Except for low-grade corporates, the bond-market factors capture the common variation in bond returns. Most importantly, the five factors seem to explain average returns on stocks and bonds.

Cappiello, Engle and Sheppard (2006) have examined the behaviour of two asset classes viz. equity and government bond by using the Dynamic Conditional Correlation Model. It is found in the study that both asset classes show asymmetric conditional correlation but equity responds stronger than the bond to any negative news.

Fidora, Fratzscher and Thimann (2007) have analysed the impact of the exchange rate on the Bond and Equity market by using the Markowitz portfolio selection model. The study revealed that the real exchange rate is not only factor, which can affect the financial markets. It is very less impactful to determine them.

Cai, Helwege and Warga (2007) have analysed the reasons for underpricing of initial public offerings and seasoned offerings of the corporate market. The study assessed the under-pricing due to information problems and liquidity problems. It is found in the study that information problems lead to underpricing, with support of both the book-building view of underpricing and asymmetric information theory.

Becker and Ivashina (2015) examined the investor's propensity to buy a riskier investment in the corporate bond market in order to achieve higher returns on the basis of the decision of Insurance companies. The study has utilized the data for the period of 2003 to 2010 of the US Corporate bond market. Ideally, a company should invest in higher-rated bonds to avoid the risk, but the study revealed the biasness of insurance firms towards high yield bonds by considering business cycle being most pronounced during economic expansions. It is also characteristic of the firms with poor corporate governance and for which the regulatory capital requirement is more binding.

Bai, Bali and Wen (2016) have investigated the return of future bond returns by deploying distributional characteristics of corporate bonds. The results indicated a significantly the link between volatility (skewness) and expected returns, whereas kurtosis did not make a robust incremental contribution to predictability. These findings remained intact after controlling for transaction costs, liquidity, and bond characteristics.

Ederington, Goh, Lee and Yang (2019) have investigated the effects of the repeal of credit rating agency exemptions from Regulation Fair Disclosure. They find that prior to the repeal, rating changes were informative in both stock and bond prices, but no longer in the stock market thereafter. Furthermore, they suggest that the continued bond market price reaction is primarily due to the different regulatory effects between investment grade and speculative bond designations.

Isakin and Pu (2019) have examined the relationship between political risk and credit control. Their empirical evidence indicates that the value of credit control increases with political risk among firms with an investment-grade rating, large size, less leverage, and lower equity volatility.

Baek, Lee and Glamboisky (2019) have shown that abnormal returns generated through currency carry trades are a function of cross-country yield curves. Higher currency carry returns are generated when yield curve interest rate gaps are wide over all maturities. They also provide evidence that systematic cross-country inflation gaps, economic cycles and monetary policies explain the carry returns.

Kim, Cho and Ryu (2019) propose a model for estimating the default probability of a construction surety bond by using a unique and high-quality dataset. The result confirms that account receivables can increase the default risk. Second, endogenous variables of the surety bond are also robust indicators of default. Finally, default forecasting has much greater forecasting power than models based on the credit rating.

We have reviewed numerous studies related to corporate bonds. These studies have talked about liquidity problems, various risk factors of bonds, price discovery of bonds, relationship with the equity stock market, corporate governance, impact of rating, etc. The maximum studies are based on US, China and European markets.

After reviewing the various reputed research papers, we have seen that there are very fewer studies that have been conducted on the performance and volatility behaviour of the equity index, bond index and currency in the Indian context.

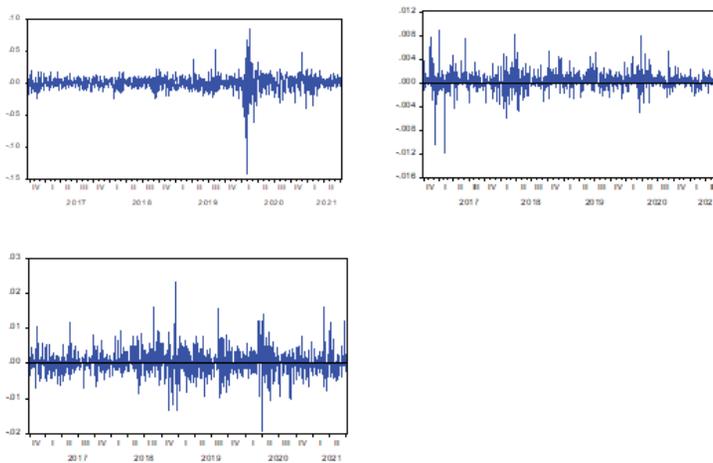
The Indian economy has faced various significant events like demonetisation, reforms of bond market and Covid 19 Pandemic, so it is important to study the behaviour of the Indian financial market in the last 5 years' period.

### 3. DATA AND METHODOLOGY

In order to understand the opportunity of portfolio diversification among the Indian financial market, we have studied Equity index performance, Bond index performance, performance of Rupee and their co-movements.

S&P BSE Sensex is one of the oldest stock indices available in the system. Almost every significant company is listed on the BSE. Sensex has recorded a high jump. Thus, Sensex has been taken into the consideration as an equity index. Further S&P BSE India Bond Index has been considered in the study as it is calculated to trail the performance of local-currency denominated government and corporate bonds from India. Further to track the performance of the Currency of India, we have taken the exchange of the rupee against the US Dollar in our study. The daily closing prices have been extracted from the official website of SP Dow Jones, BSE India Ltd and Investing.com for the period of January 2016 to April 2021. Here, this period includes various significant events in the Indian Economy viz Demonetization of the Rupee, Reforms of investment in Indian Bonds and Covid 19 Pandemic.

Figure 1



Note: Prepared by Author

Figure 1 is a graphical re-presentation of the return of each series. In the study, DSPE denotes log return of Sensex, DSPB denotes log-returns of S&P BSE Bond index and log return of Exchange rate is indicated by DEX. From a quick look at the graphs, it can be seen that in a certain time frame, indices are showing higher volatility than other timeframes. High spikes show high volatility in returns. Moreover, we observe maximum volatility clustering in the Equity index during Covid 19 Pandemic Period as spikes are strenuous between the 1st quarter of 2020. Furthermore, the Bond index is showing the highest spikes in late 2016 and early 2017. But these observations are not enough to the model of portfolio diversification. Hence, we have to analyse these variables by advanced econometrics tools like Johansen Cointegration model, Univariate GARCH and Multivariate GARCH Models.

#### **4. RESEARCH QUESTIONS:**

Some questions are to be answered in this study. We have mentioned them below:

- The risk and return profile of major segments of Indian Financial market viz Equity, Bond and Currency indices.
- Is there any long-run relationship between all three segments?
- Is there any spillover effect of volatility in all the segments of the financial market?

#### **5. EMPIRICAL ANALYSIS:**

- Descriptive Analysis

In order to understand the performance of any investment alternative, we consider associated risk and return. Thus, in the study, we have calculated descriptive statistics of the returns of the three series which are taken in this study namely Equity Index, Bond Index and Exchange rate and portrayed in Table 1. We can see in the table that the equity index is the most profitable and risky investment, as it shows the highest mean (0.000608) and standard deviation (0.011708). The bond index is also a profitable investment with having moderate risk and return (0.001522 and 0.000294 respectively). The exchange rate of the rupee is showing the least return and risk than the other two investment alternatives.

	<b>DSPB</b>	<b>DSPE</b>	<b>DEX</b>
Mean	0.000294	0.000608	9.06E-05
Median	0.000265	0.000917	0
Std. Dev.	0.001522	0.011708	0.00352421
Skewness	-0.23679	-1.75109	0.39652322
Kurtosis	11.79495	29.73904	7.03089223
Jarque-Bera	3998.362	37483.25	869.86947
Probability	0	0	1.29E-189
Observations	1237	1237	1237
Note: Prepared by Author			

The stationarity of the variables is verified by the ADF test. The ADF test reveals that all the indices are non-stationary at level but become stationary after first differencing. Hence, we can proceed with further analysis with the same variables.

- Johansen Cointegration test

<b>Unrestricted Cointegration Rank Test (Trace)</b>				
<b>Hypothesized No. of CE(s)</b>	<b>Eigenvalue</b>	<b>Trace Statistic</b>	<b>0.05 Critical Value</b>	<b>Prob.**</b>
None	0.006983	13.35409	29.79707	0.8748
$r \leq 1$	0.003132	4.713664	15.49471	0.8384
$r \leq 2$	0.000686	0.846262	3.841466	0.3576
<b>Unrestricted Cointegration Rank Test (Maximum Eigenvalue)</b>				
<b>Hypothesized No. of CE(s)</b>	<b>Eigenvalue</b>	<b>Max Eigen Statistic</b>	<b>0.05 Critical Value</b>	<b>Prob.**</b>
None	0.006983	8.640424	21.13162	0.8603
$r \leq 1$	0.003132	3.867402	14.2646	0.8731
$r \leq 2$	0.000686	0.846262	3.841466	0.3576
Trace test indicates no cointegration at the 0.05 level Max-eigenvalue test indicates no cointegration at the 0.05 level				
Note: Prepared by Author				

In order to identify the opportunity of diversification among the investment alternatives, cointegration has been checked in long run in the study. We have

deployed the Johansen Cointegration test. This test is based on Eigen Value and Trace Statistics with the hypotheses that there is no cointegration among Bond index, Equity Index and Exchange rate. Table 2 is showing the results of Johansen Co-integration test for the three studied series, and it is found that there is no cointegration among the indices.

- GARCH (1,1)

Further, we have analyzed the behavior of volatility of the three investment alternatives. In order to measure the volatility clustering and persistence, we have deployed the GARCH (1,1) model and prepared Table 3. In table 3, (A) denotes the Arch term, which shows the effect of the news of the last day and the Garch term (B) indicates the effects of the last days of volatility. In addition to this, the sum of (A+B ) shows the persistence of volatility in series.

<b>Table 3: GARCH (1,1)</b>						
	<b>DSPB</b>		<b>DSPE</b>		<b>DEX</b>	
	<b>Coefficient</b>	<b>Prob</b>	<b>Coefficient</b>	<b>Prob</b>	<b>Coefficient</b>	<b>Prob</b>
C	1.97E-08	0.000	2.28E-06	0.000	8.16E-07	0.000
A	0.045673	0.000	0.114974	0.000	0.08785512	0.000
B	0.947270	0.000	0.864525	0.000	0.84665609	0.000
A+B	0.992943		0.979499		0.9345112	
Note: Prepared by Author						

In this table 3, we can see that values of (A) and (B) are positive and significant for all the indices, which show all the indices are affected by the news which is broadcasted in the market and as well as by volatility of last preceding day. The Sum of (A+B) is about to unit which implies that shock will have an indefinite effect.

- MGARCH BEKK

BEKK model is a MGARCH model. Here, we have examined the volatility spill-over among the indices and also the impact of a given index's previous volatility as well. Furthermore, in table 4, ARCH and GARCH terms are demonstrated, which are outcomes of the BEKK model for each index with respect to other indexes. Here ARCH term (A) shows the impact of shock in the short-run or impact of previous day market volatility while GARCH-term (B) measures the impact of residual of one index on the volatility of another, more specifically it measures volatility spill-over in long run. The outcomes of the MGARCH-BEKK model are shown in Table 4.

<b>Table 4: MGARCH BEKK</b>				
	<b>Coeff</b>	<b>Std Error</b>	<b>T-stat</b>	<b>Significance</b>
Mean Model(D_BOND)				
1. Constant	0.030619872	0.004212456	7.26889	0
Mean Model(D_EQUITY)				
2. Constant	Constant 0.105949343	0.020645244	5.1319	0.00000029
Mean Model(D_EXCHANGE_RATE)				
3. Constant	0.009165135	0.009277474	0.98789	0.32320592
C(1,1)	0.014210701	0.002643018	5.3767	0.00000008
C(2,1)	-0.012609806	0.045364832	-0.27796	0.78103974
C(2,2)	0.157381923	0.022223459	7.08179	0
C(3,1)	0.012835414	0.013288819	0.96588	0.33410388
C(3,2)	0.01951717	0.016741023	1.16583	0.24368361
C(3,3)	-0.027088874	0.023402129	-1.15754	0.24705226
A(1,1)	0.193231815	0.016204951	11.92425	0
A(1,2)	0.075216429	0.119594353	0.62893	0.52939514
A(1,3)	-0.035277989	0.035988573	-0.98026	0.32696012
A(2,1)	0.002723177	0.001842364	1.47809	0.13938412
A(2,2)	0.339204253	0.023353671	14.52467	0
A(2,3)	-0.014466789	0.004417514	-3.27487	0.0010571
A(3,1)	0.006967087	0.007659236	0.90963	0.36301658
A(3,2)	0.099458329	0.064448253	1.54323	0.12277554
A(3,3)	0.101152061	0.017760536	5.69533	0.00000001
B(1,1)	0.976764428	0.003345062	292.00185	0
B(1,2)	-0.018896251	0.031193406	-0.60578	0.54466279
B(1,3)	0.004995293	0.008833347	0.5655	0.57173102
B(2,1)	-0.000553821	0.00082543	-0.67095	0.50225351
B(2,2)	0.928139397	0.010337009	89.78801	0
B(2,3)	0.009646689	0.001738602	5.54853	0.00000003
B(3,1)	-0.001495059	0.001661675	-0.89973	0.36826393
B(3,2)	-0.068000842	0.024081837	-2.82374	0.00474669
B(3,3)	0.987057715	0.004797885	205.72766	0
Note: Prepared by Author				

Here in Table 4, we can see that the Arch term is significant for pairs viz (1,1), (2,2), (2,3) and (3,3). The results indicate that all three series are showing short-

run volatility spillover by their own previous day volatility only but the equity index shows short-run volatility spillover on exchange rates also. GARCH terms are showing almost the same interpretation as the Arch term. As per the table, GARCH terms are significant for the pairs namely (1,1), (2,2) (2,3) (3,2) and (3,3), which indicates that volatility spillover exists due to their own previous day volatility in long run mainly. But the Exchange rate and equity index show bidirectional volatility spillover in long run.

## **6. CONCLUSION AND POLICY IMPLICATIONS**

The study has assessed the co-movements and volatility contagion among the three major segments of the Indian financial market viz. Equity, Bond and Currency. The results are expected to furnish an insight into diversification in the minds of venture capitalists. The descriptive statistics proclaim that investment in equity provides high returns but with high risk. This can be more fruitful for risk-taking investors. Further, the investment in bonds is for moderate risk takers and keeping investment in currency is the least risky investment. This affirms that the Bond index extends the blended investment opportunities merely to those investors who prefer to make high returns with less risk. Furthermore, the study reveals that the Equity index, Bond index and Exchange rate exhibit a very insignificant level of co-integration for the period hence the diversification objective is served. The behaviour of volatility is analysed by GARCH (1,1) and MGARCH BEKK models. The GARCH (1,1) shows all the indices are affected by the news which is broadcasted in the market and as well as by volatility of the last preceding day. As per the results of the MGARCH BEKK, we could see that spill-over does not exist among the indices in the long run and short run both except than Equity index and Exchange rate. As all the series show spill-over effect mainly by their own previous day's volatility. By analysis of financial Integration with other significant economies, this study will be very advantageous to corporate managers and policymakers in providing them the knowledge and understanding required to comprehend the factors that determine the future returns and risk in the Indian financial market. Utilizing these results, managers across the globe can make smart decisions about the creation of portfolios especially in the Indian context.

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