Short Term Market Variables and Yield on Bonds: A Statistical Analysis

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ABSTRACT

"Indian debt market lacks depth"- The myth continues even after six years when the secondary market first opened its doors for bond trading in 2003. Since then, the corporate world has used the debt market as a major source of fund because this not only reduced their cost of fund but also enhanced their access to a larger pool of fund. Debt market went hand in hand with the equity market and hence followed the trend of ups and downs (volatility) as the equity market did.

Several studies have been made on the impact of various macro and micro economic factors on the bond yield and hence the fluctuations of the yield curve (bond yield against the maturities). The movement of the yield curve is a complicated matter considering the huge number of factors impacting this movement in different ways that varies with time and market scenarios. This implies the inefficiency of the mathematical models to track these movements. Hence, the necessity of statistical analysis based upon past data arises.

This paper intends to carry on a statistical analysis on the impact of five macroeconomic factors on the bold yield. Inflation, USD INR spot rate, crude price and RBI cash balance are the factors chosen on the basis of past research papers and the availability of data. The paper also intends to give a comparative analysis of the impact of these factors on the short-term bond yields against that of the long-term bond yields. Statistical tool like multiple regressions is considered for the analysis of three years of data, which is fairly supported by graphical representations. Finally, the paper, being based only upon the statistical analysis, gives conclusion based upon the historical analysis of the available data.

Keywords: Bond yield., Inflation, USD, INR Spot rate, Crude price and RBI cash balance

INTRODUCTION

Debt markets in India have suffered from chronic neglect on the part of policy makers, despite the fact that there is clear evidence of fairly strong debt preference among households for their financial investment portfolio. Very little has been done to create the infrastructure required for an efficient and developed debt capital market. In fact, the debt markets in India are currently at a similar stage of their evolution as the equity markets were prior the reform process in the early 1990s. In other words, the market, especially the secondary market, is really limited to a few brokers and institutional investors, with very inadequate provisions for active participation by the small investors. Even less progress has been made in creating the infrastructure and in implementing the policy regime that is needed to facilitate the evolution of the Indian debt capital market into a global participant. Thus, the Indian debt market is more or less restricted to a fairly small set of domestic institutional investors, all of whom are probably driven by roughly the same needs and by similar expectations.

The most distinguishing feature of the debt instruments of Indian debt market is that the return is fixed. This means, returns are almost risk-free. This fixed return on the bond is often termed as the 'coupon rate' or the 'interest rate'. Therefore, the buyer (of bond) is giving the seller a loan at a fixed interest rate, which equals to the coupon rate.

This paper intends to carry on a statistical analysis on the impact of five macroeconomic factors on the bold yield. Inflation, USD INR spot rate, crude price and RBI cash balance are the factors chosen on the basis of past research papers and the availability of data.

LITERATURE REVIEW

The yield curve, which plots a set of interest rates of bonds of different maturities, describes the relationship among short-term, medium-term, and long-term rates at a given point in time. It has been the subject of much research in the finance literature, because it is the natural starting point for pricing fixed-income securities and other financial assets.

As per Collin-Dufresne, Goldstein, and Martin (2001), there are positive and negative correlations and Interplay of factors affecting bond yields. As per research carried out

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by investors' perspective journal, credit risk has a positive correlation with the bonds yield movement but it has a limited impact on the movement of investment grade bonds. The more volatile high yield bonds have a 20-30% impact in yields due a change in the credit risk quality of the bond.

"The segment market theory":

The extreme opposite of the expectations theory — the segmented markets theory — sees bonds of different maturities as segmented and not substitutes in any way. As such, the likelihood that a bond of a specific tenor would be chosen by an investor is not the same for any other tenor. Simply put, the theory is about specific investor preferences and how this play into the supply and demand of the bond.

The segmented markets theory observes that preference of investors generally lies on short-term bonds. Common sense would prove this true as short-term bonds give faster returns and bear less interest risk. Such being the case, demand for short-term bonds are higher than the appetite for their long-term counterpart. With this relatively higher demand, short-term bonds are then priced higher and so interest rates are lower compared to bonds of longer maturities. Conversely, as the bond matures longer, demand for it slows down, thus its price becomes lower and its interest rate, higher. This explains the upward sloping yield curve.

However, again, the segmented markets theory is flawed in the sense that it does not explain an inverted yield curve where interest rates for short-term bonds are higher than bonds of longer maturities.

Given the two theories' limitations, the two are combined to come up with the liquidity premium theory.

Frederic Mishkin wrote in his book "Monetary Economics and Financial Markets" that the liquidity premium theory "states that the interest rate on a long-term bond will equal an average of short-term interest rates expected to occur over the life of the long-term bond plus a liquidity premium (also referred to as a term premium) that responds to supply and demand conditions for that bond."

What this theory says, in essence, is that bond yields are not just a function of preferences alone or of expectations per se but rather of both. The theory assumes that bonds of different maturities are substitutes but not perfect substitutes. Investors would still prefer short-term bonds but to induce them to hold long-term bonds, a positive liquidity premium must be offered. This explains why even when future short-term interest rates are not expected to rise or fall significantly, the normal yield curve slopes upward — the positive premium on long-term bonds keeps interest rates on these bonds relatively higher. This theory also explains why yield curves tend to have an especially steep upward slope when short-term interest rates are low and have a tendency to be flat or, worse, inverted when short-term interest rates are high.

When current short-term interest rates are low, investors expect future short-term interest rates to rise to some normal level such that the average of future expected rates would be high relative to the current. With the addition of the positive liquidity premium for bonds with longer maturities, long-term interest rates would indeed become substantially higher than short-term rates resulting in a very steep upward sloping yield curve.

Conversely, an inverted yield curve shows very high short-term rates that people expect them to come back down by so much. As the average expected future rates drop sharply, even the positive liquidity premium could not offset the falls such that long-term rates drop below the current short-term rates.

Finally, there is the most attractive feature of this theory — what the yield curve's slope implies.

As earlier explained, a steeply rising yield curve indicates that short-term interest rates are expected to rise in the future while a moderately steep one indicates that rates are not expected to rise or fall much in the future. A flat yield curve, on the other hand, says that short-term interest rates are expected to fall but only moderately in the future. An inverted yield curve tells us that short-term interest rates are expected to fall sharply in the future.

EXPECTATIONS THEORY:

Empirical evidence suggests this hypothesis often overstates future short-term interest rates. This over-estimation may be due to the higher risk premium associated with holding a long-term debt security whose yield is more uncertain due to potential changes in interest rates.

PREFERRED HABITAT THEORY:

The preferred habitat theory is an expansion on the expectations theory which suggests that long-term yields are an estimate of the future expected short-term yields. The reasoning behind the expectations theory is that bond investors only care about yield and are willing to buy bonds of any maturity, which in theory would mean a flat term structure unless expectations are for rising rates. The preferred habitat theory expands on the expectation theory by saying that bond investor's care about both maturity and return. It suggests that short-term yields will almost always be lower than long-term yields due to an added premium needed to entice bond investors to purchase not only longer term bonds, but bonds outside of their maturity preference.

ANALYSIS

The impact of the five market variables on the bond yield is analyzed with the help of Multiple Regressions.

Dependent variable : Bond yield

Independent variables : Inflation,
USD INR spot rate,
Crude oil price, Repo and Reverse repo

Correlation of market variables with bond-yield:

Bond Yields (considered across all maturities) have positive correlation with all factors except USD INR Spot Rate and Reverse Repo Amount. The positive correlation indicates that the bond yield moves in the same direction as that of these factors if they are considered in isolation.

The correlation table shows that inflation has higher positive correlation than that of other variables. Economic growth affects long-term interest rates through inflation expectations. Inflation expectations are generally the main driver of long-term interest rates. The increase in interest rate affects the yield in the similar manner. The increase in yield reduces the bond price.

Looking at the output across all maturity bonds, it can also be concluded that inflation has higher positive correlation with the yield for low maturity bonds and it declines gradually when the maturity period increases. This happens due to the sentiments driving the bond market. If the bond market believes that inflation risks are big enough to prompt the RBI to raise interest rates, short-term interest rates will rise faster than long-term interest rates and thereby flatten the yield curve.

Crude oil price have also high positive correlation as per the table. Crude price has indirect impact on the bond yield. Increase in crude price increases the cost of production of goods, resulting a high inflation. That ultimately increases the bond yield.

USD INR Exchange rate has negative correlation on bond yield as per the statistical analysis. Empirical analysis suggests that appreciation of dollar against rupee makes the market unattractive for investments. That reduces the cash inflow into the market and hence the reduction of interest rate. That pushed the bond yield in a negative direction.

Reverse Repo Balance with RBI shows strong negative correlation with bond yield. Reverse repo amount shows the deposits of the banks with RBI. An increase in this deposit reduces the liquidity in the market. This in turn reduces the interest rate and ultimately the bond yield.

Tables below show the correlations of the market variables with the bond-yield.

Table 1:

Pearson Correlation	**Bond Yield**									
	1 year	**2 year**	**3 year**	**4 year**	**5 year**	**6 year**	**7 year**	**8 year**	**10 year**	**11 year**
Inflation	0.794	0.741	0.602	0.585	0.684	0.647	0.657	0.646	0.591	0.602

Table 2:

Pearson Correlation	**Bond Yield**									
	1 year	**2 year**	**3 year**	**4 year**	**5 year**	**6 year**	**7 year**	**8 year**	**10 year**	**11 year**
USD INR Spot Rate	-0.631	-0.655	-0.564	-0.772	-0.580	-0.543	-0.5418	-0.532	-0.589	-0.564
Crude Prices	0.628	0.681	0.687	0.521	0.698	0.712	0.693	0.741	0.684	0.687
Reverse Repo Amt	-0.809	-0.723	-0.529	-0.670	-0.585	-0.540	-0.526	-0.497	-0.538	-0.529
Repo Amount	0.405	0.387	0.325	0.173	0.352	0.297	0.330	0.350	0.294	0.325

Goodness of fit of the regression models:

The coefficient of determination (R-square) has significantly higher value 0.8 - 0.9 (close to 1) for short maturities (Y1 - Y4). The value of R-square falls into an average of 0.6 - 0.7 for longer maturities.

This goes to show that the regression equations obtained from the analysis capture good amount of total variance of data for short maturity bonds. The five market variables contribute to the bond yield fluctuation in a significant manner. This would allow capturing future yield movements for short term bonds in precision.

At the same time the comparatively low R-square value for long maturity bonds indicates the availability of other significant factors those impact the bond yield.

Table 3:

	Bond Yield									
	1 year	**2 year**	**3 year**	**4 year**	**5 year**	**6 year**	**7 year**	**8 year**	**10 year**	**11 year**
R square	0.894	0.836	0.623	0.723	0.704	0.648	0.637	0.660	0.627	0.623
Adjusted R square	0.891	0.831	0.609	0.711	0.695	0.634	0.625	0.648	0.614	0.609

Check for Autocorrelation and Multicollinearity

Durbin Watson Ratio for the model is within the range of -2 to 2. This indicates the existence of negligible autocorrelation among the error terms.

Autocorrelation signifies the correlation between the error terms associated with the coefficient of the variables. For a model to be consistent and error free, a low autocorrelation is desired.

Table 4:

Auto-correlation	**Bond Yield**									
	1 year	**2 year**	**3 year**	**4 year**	**5 year**	**6 year**	**7 year**	**8 year**	**10 year**	**11 year**
Durbin Watson	0.372	0.286	0.219	0.236	0.203	0.277	0.225	0.275	0.217	0.219

Variance Inflation Factor (VIF) values across all the maturities are below 10. This signifies that there exists very low correlation among the independent variables. Even if the correlation matrix shows some kind of correlation among the variables,that has no significance when we consider the model as a whole.

Multicoll-inearity	**Bond Yield**									
	1 year	**2 year**	**3 year**	**4 year**	**5 year**	**6 year**	**7 year**	**8 year**	**10 year**	**11 year**
Inflation	4.536	4.570	4.536	2.988	4.488	3.939	4.536	4.681	4.617	4.598
USD INR Spot Rate	3.545	3.535	3.545	4.079	3.513	3.593	3.545	3.485	3.437	3.525
Crude Prices	3.609	3.644	3.609	2.579	3.595	3.683	3.609	3.841	3.501	3.515
Reverse Repo Amt	4.180	4.188	4.180	4.693	4.113	3.424	4.180	4.058	4.249	4.328
Repo Amount	1.440	1.439	1.440	1.206	1.439	1.380	1.440	1.501	1.448	1.405

Final Regression euations obtained from SPSS:

Y1	11.58 + 0.182*Inflation + (-.132)*USD_INR_Spot + 0.006*Crude_Price + (-0.001)*Reverse_Repo_Amt + .000*Repo_Amt
Y2	11.653 + 0.141*Inflation + (-0.131)*USD_INR_Spot + 0.008*Crude_Price + 0.000*Reverse_Repo_Amt + .001*Repo_Amt
Y3	11.58 + 0.182*Inflation + (-0.132)*USD_INR_Spot + 0.006*Crude_Price + .ooo*Reverse_Repo_Amt + .000*Repo_Amt
Y4	8.843 + 0.117*Inflation + (-.073)*USD_INR_Spot + (-.019)*Crude_Price + .000*Reverse_Repo_Amt + 5.391E-5*Repo_Amt
Y5	9.445 + 0.089*Inflation + (-.071)*USD_INR_Spot + .009*Crude_Price + .000*Reverse_Repo_Amt + .000*Repo_Amt
Y6	7.960 + .067*Inflation + (-.037)*USD_INR_Spot + .011*Crude_Price + .000*Reverse_Repo_Amt + .000*Repo_Amt
Y7	8.308 + .068*Inflation + (-.041)*USD_INR_Spot + .010*Crude_Price + .000*Reverse_Repo_Amt + .00000*Repo_Amt
Y8	7.902 + .043*Inflation + (-.032)*USD_INR_Spot + .013*Crude_Price + .000*Reverse_Repo_Amt + .000*Repo_Amt
Y10	9.140 + 0.044*Inflation + (-0.058)*USD_INR_Spot + 0.012*Crude_Price + (-0.000)*Reverse_Repo_Amt + .000*Repo_Amt
Y11	8.758 + .042*Inflation + (-.047)*USD_INR_Spot + .012*Crude_Price + .000*Reverse_Repo_Amt + .000*Repo_Amt

The equations show that the slope of inflation with bond yield decreases gradually with the bond maturity. That indicates a formation of a convex yield curve (considering only the impact of inflation on yield).

The t-test in the analysis proves the significance of all the coefficients in the models. But, the higher slope of inflation shows that it has much higher impact on the bond yield across all maturities than the other four market variables. The slope declines with the maturity of the bond because inflation has much higher impact on the short-term interest rate rather than that of the long-term ones.

USD INR exchange rate has high negative slopes with bond yield. But the slope declines with the increase in bond maturity. This goes in sync with the previous explanation that says that the exchange rate impacts the fund inflow to the country in a negative manner. That reduces the interest rate and hence the bond yield. This impact is more visible in case of short term bonds as per the regression equations.

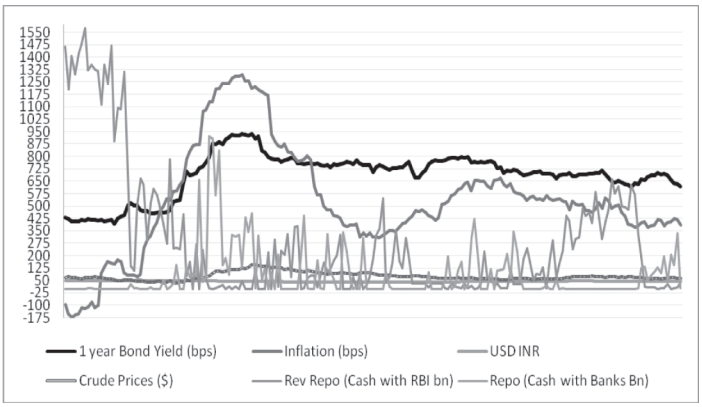
Crude oil price has positive slope with the bond yield. As explained before, this is due to the fact that increase in oil price adds to inflation and hence, it indirectly increases the bond yield. But, the regression equations also show that the slope is marginally lower in case of short-term bonds than that of the long-term ones. Hence, on the basis of statistical analysis, it can be concluded that crude oil price has more impact on the long-term bond yields than that of the short-term ones.

Though repo and reverse-repo balance has theoretical impact on the bond yield, the statistical analysis didn't find a consistent relationship between these factors. Regression equations contain both positive and negative coefficients for the two factors. This inconsistency shows that the impact of these two market variables on the bond yield might be getting nullified due to the other major factors, which is not getting captured in the regression equations. However, with this analysis it would be difficult to conclude the impact of repo and reverse-repo on the bond yield.

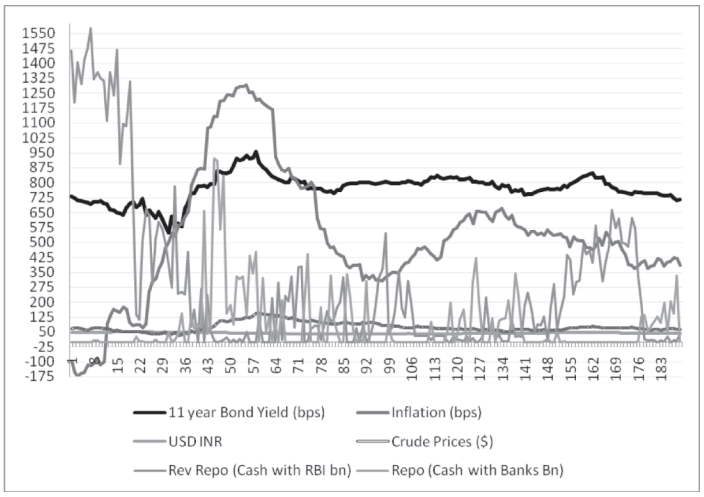
A Comparative Analysis between a short-term and long-term bond yield :

Following graphs explain in detail the movement of the yield curve with respect to the independent factors considered in the analysis.

Short-term: 1 Year Bond Yield



Long-term: 11 Year Bond Yield



The movements of the curves in the graphs show that inflation has more impact on the yield of a short-term bond than that of a long-term one. This is for a simple fact that inflation always has a short-term impact on the bond market (a part of literature review). When inflation increases the bond value decreases for a short period of time. That has an obvious positive impact on the yield as the price and yield of a bond are inversely proportional to each other.

Reverse repo amount is the cash balance that RBI has or the money that Banks deposit with RBI. Graphs show that the reverse repo balance has high negative correlation with the bond yield. By comparing the graph of the short-term bond with that of the long-term it can be concluded that the slope of the reverse repo factor with yield doesn't change with maturity.

LIMITATIONS OF THE ANALYSIS:

The paper has certain limitations with respect to the selected data for analysis. Only the weekly data has been considered for the analysis. This is due to the fact that the inflation data is available only on a weekly basis. Hence, to match other data with that of inflation, all other factors are also considered on weekly basis.

Along with the above assumption, our study considers that the inflation data are collected on Fridays instead of Saturdays. This is because of the simple fact that the bonds don't trade on Saturdays while the inflation data is collected only on Saturdays for the whole week. So, the assumption eliminates this time mismatch of data in order to conduct the statistical analysis.

SUMMARY

The paper has tried to model a relation between the market variables and the bond yields. This has been done for the bonds of different maturities from 1 year to 11 years and the relation has been captured by 5 macro and micro market variables viz. inflation, exchange rate, crude prices, repo and reverse repo which govern the cash balances with RBI. This research has found some kind of relation between these chosen variables and the bond yield of different maturities. While some of the factors have more correlation with the bond prices, others are quite insignificant in affecting the yield. The results of regression model also depicted that the bonds of different maturities generally move together with any given variable i.e. any variable would affect the bond price of shorter maturity same as that of longer maturity.

It confirms also that the changing fundamentals affect bond prices. The empirical results show also that the movement in micro market variables like exchange rate volatility and the fluctuations in liquidity - governed by repo and reverse repo - affect bond pricing. Some of the models in form of regression equations presented in the paper seem to be potentially useful in decision making or forecasting by investors, primary dealers, central bank (RBI) and fiscal authorities.

APPENDIX

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for B		Collinearity Statistics	
Model	**B**	**Std. Error**	**Beta**	**T**	**Sig.**	**Lower Bound**	**Upper Bound**	**Tolerance**	**VIF**
1. (Constant)	11.580	.910		12.725	.000	9.782	13.377		
inflatation_index	.182	.023	.449	8.052	.000	.137	.226	.220	4.536
Spot_rate	-.135	.019	-.337	-6.847	.000	-.170	-.094	.282	3.545
crude_price	.006	.003	.097	1.949	.053	.000	.011	.277	3.609
reverse_repo	.000	.000	-.297	-5.554	.000	-.001	.000	.239	4.180
repo	.000	.000	.059	1.880	.062	.000	.001	.694	1.440

a. Dependent Variable: yield_1

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for B		Collinearity Statistics	
Model	**B**	**Std. Error**	**Beta**	**T**	**Sig.**	**Lower Bound**	**Upper Bound**	**Tolerance**	**VIF**
1. (Constant)	11.653	.977		11.926	.000	9.723	13.584		
inflatation_index	.141	.024	.409	5.810	.000	.093	.189	.219	4.570
spot_rate	-.131	.021	-.392	-6.332	.000	-.172	-.090	.283	3.535
crude_price	.008	.003	.161	2.554	.012	.002	.014	.274	3.644
reverse_repo	.000	.000	-.185	-2.764	.006	.000	.000	.243	4.118
repo	.001	.000	.085	2.145	.034	.000	.001	.695	1.439

a. Dependent Variable: yield_2

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for B		Collinearity Statistics	
Model	**B**	**Std. Error**	**Beta**	**T**	**Sig.**	**Lower Bound**	**Upper Bound**	**Tolerance**	**VIF**
1. (Constant)	11.295	1.000		11.290	.000	9.317	13.273		
inflatation_index	.150	.024	.563	6.161	.000	.102	.198	.173	5.795
spot_rate	-.113	.022	-.405	-5.186	.000	-.156	-.070	.236	4.234
crude_price	.003	.003	.079	1.052	.295	-.003	.009	.257	3.889
reverse_repo	.000	.000	-.100	-1.118	.265	.000	.000	.180	5.555
repo	.000	.000	.071	1.534	.127	.000	.001	.681	1.469

a. Dependent Variable: yield_3

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for B		Collinearity Statistics	
Model	**B**	**Std. Error**	**Beta**	**T**	**Sig.**	**Lower Bound**	**Upper Bound**	**Tolerance**	**VIF**
1. (Constant)	8.843	1.224		7.225	.000	6.417	11.268		
inflatation_index	.117	.029	.351	4.071	.000	.060	.175	.335	2.988
spot_rate	-.073	.022	-.331	-3.286	.001	-.116	-.029	.245	4.079
crude_price	.019	.005	.312	3.885	.000	.009	.028	.388	2.579
reverse_repo	.000	.000	-.147	-1.359	.177	.000	.000	.213	4.693
repo	5.391E-5	.000	.006	.115	.908	.000	.001	.829	1.206

a. Dependent Variable: yield_4

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for B		Collinearity Statistics	
Model	**B**	**Std. Error**	**Beta**	**T**	**Sig.**	**Lower Bound**	**Upper Bound**	**Tolerance**	**VIF**
1. (Constant)	9.445	.884		10.684	.000	7.699	11.191		
inflatation_index	.089	.022	.376	4.079	.000	.046	.132	.223	4.488
spot_rate	-.071	.019	-.309	-3.784	.000	-.108	-.034	.285	3.513
crude_price	.009	.003	.276	3.341	.001	.004	.015	.278	3.595
reverse_repo	.000	.000	-.088	-1.000	.319	.000	.000	.243	4.113
repo	.000	.000	.066	1.271	.206	.000	.001	.695	1.439

a. Dependent Variable: yield_5

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for B		Collinearity Statistics	
Model	**B**	**Std. Error**	**Beta**	**T**	**Sig.**	**Lower Bound**	**Upper Bound**	**Tolerance**	**VIF**
1. (Constant)	7.960	.974		8.170	.000	6.031	9.888		
inflatation_index	.067	.023	.312	2.924	.004	.022	.112	.254	3.939
spot_rate	-.037	.020	-.188	-1.850	.067	-.077	.003	.278	3.593
crude_price	.011	.003	.379	3.674	.000	.005	.017	.272	3.683
reverse_repo	.000	.000	-.122	-1.223	.224	.000	.000	.292	3.424
repo	.000	.000	.031	.486	.628	.000	.001	.725	1.380

a. Dependent Variable: yield_6

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for B		Collinearity Statistics	
Model	**B**	**Std. Error**	**Beta**	**T**	**Sig.**	**Lower Bound**	**Upper Bound**	**Tolerance**	**VIF**
1. (Constant)	8.308	.849		9.783	.000	6.630	9.985		
inflatation_index	.068	.021	.333	3.225	.002	.026	.110	.220	4.536
spot_rate	-.041	.018	-.205	-2.252	.026	-.076	-.005	.282	3.545
crude_price	.010	.003	.357	3.880	.000	.005	.016	.277	3.609
reverse_repo	.000	.000	-.096	-.974	.331	.000	.000	.239	4.180
repo	.000	.000	.040	.696	.487	.000	.001	.694	1.440

a. Dependent Variable: yield_7

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for B		Collinearity Statistics	
Model	**B**	**Std. Error**	**Beta**	**T**	**Sig.**	**Lower Bound**	**Upper Bound**	**Tolerance**	**VIF**
1. (Constant)	7.902	.898		8.795	.000	6.126	9.679		
inflatation_index	.043	.021	.220	2.066	.041	.002	.085	.214	4.681
spot_rate	-.032	.019	-.158	-1.719	.088	-.070	.005	.287	3.485
crude_price	.013	.003	.472	4.889	.000	.008	.019	.260	3.841
reverse_repo	.000	.000	-.127	-1.278	.203	.000	.000	.246	4.058
repo	.000	.000	.060	.997	.321	.000	.001	.666	1.501

a. Dependent Variable: yield_8

Coefficients[a]

	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for B		Collinearity Statistics	
Model	**B**	**Std. Error**	**Beta**	**T**	**Sig.**	**Lower Bound**	**Upper Bound**	**Tolerance**	**VIF**
1. (Constant)	9.140	.947		9.653	.000	7.269	11.011		
inflatation_index	.044	.024	.203	1.890	.061	-.002	.091	.217	4.617
spot_rate	-.058	.020	-.265	-2.864	.005	-.097	-.018	.291	3.437
crude_price	.012	.003	.375	4.015	.000	.006	.018	.286	3.501
reverse_repo	.000	.000	-.154	-1.501	.135	.000	.000	.235	4.249
repo	.000	.000	.039	.644	.521	.000	.001	.691	1.448

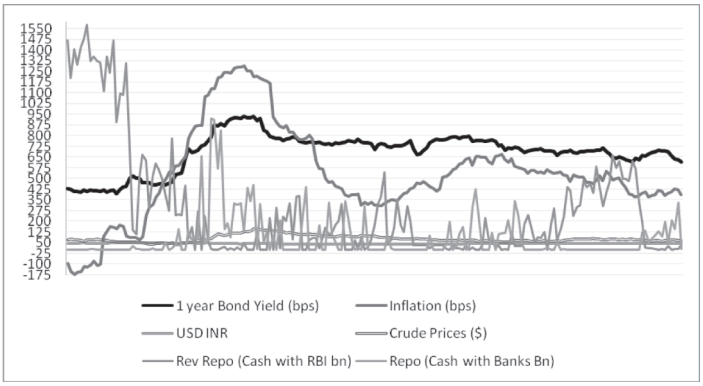
a. Dependent Variable: yield_10

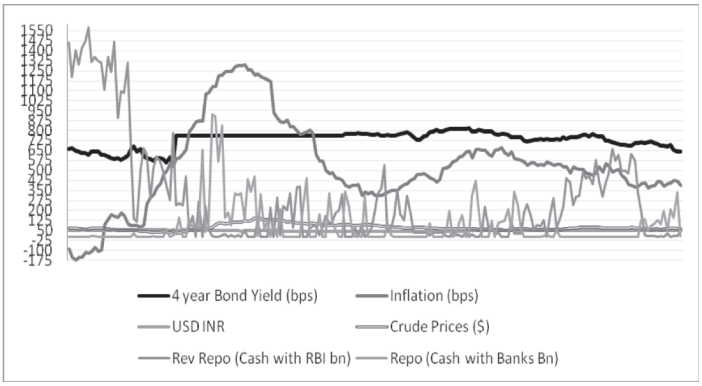
Coefficients[a]

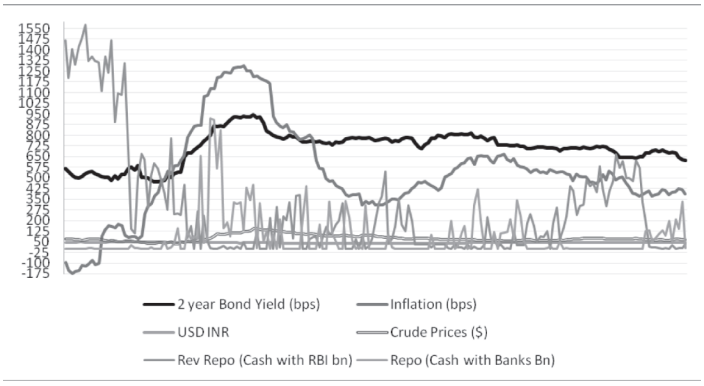
	Unstandardized Coefficients		Standardized Coefficients			95% Confidence Interval for B		Collinearity Statistics	
Model	**B**	**Std. Error**	**Beta**	**T**	**Sig.**	**Lower Bound**	**Upper Bound**	**Tolerance**	**VIF**
1. (Constant)	11.580	.910		12.725	.000	9.782	13.377		
inflatation_index	.182	.023	.449	8.052	.000	.137	.226	.220	4.536
spot_rate	-.132	.019	-.337	-6.847	.000	-.170	-.094	.282	3.545
crude_price	.006	.003	.097	1.949	.053	.000	.011	.277	3.609
reverse_repo	.000	.000	-.297	-5.554	.000	-.001	.000	.239	4.180
repo	.000	.000	.059	1.880	.062	.000	.001	.694	1.440

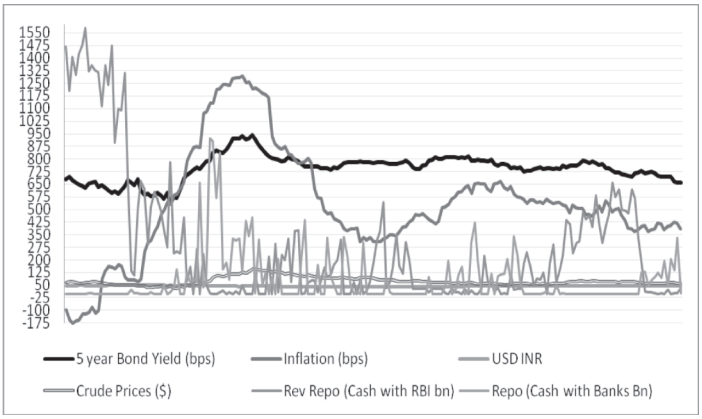
a. Dependent Variable: yield_1

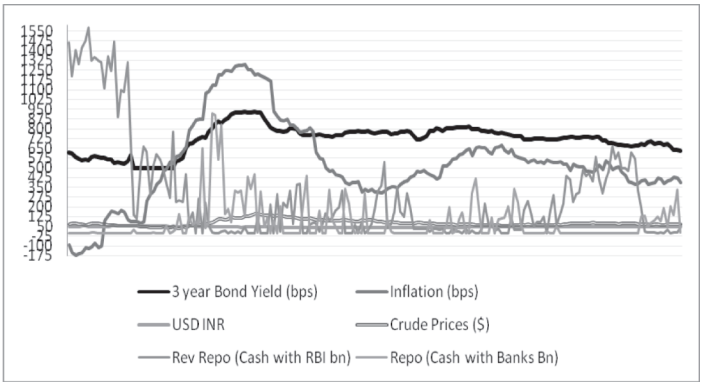
GRAPHS depicting the variation of bonds of different maturities with the dependent variables :

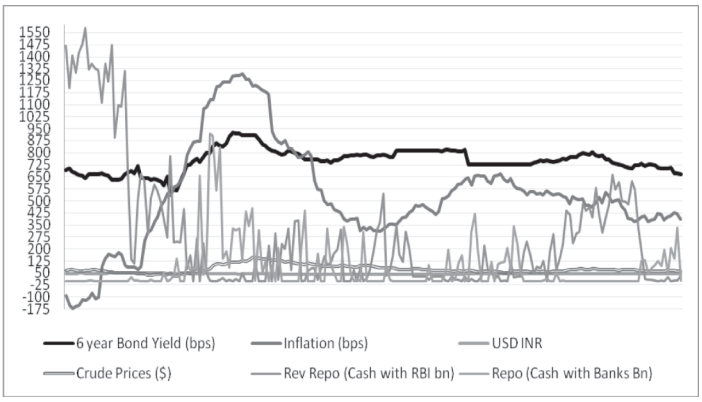


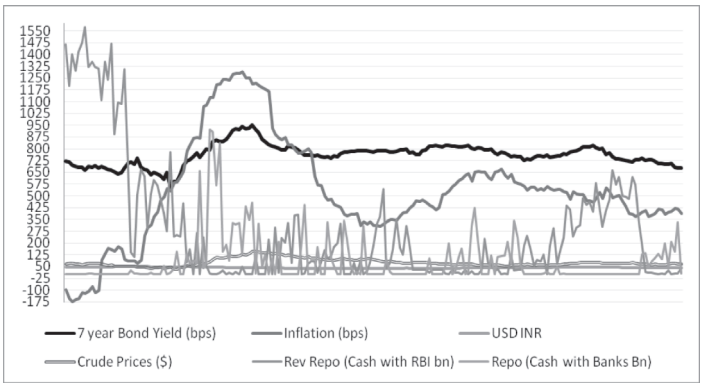


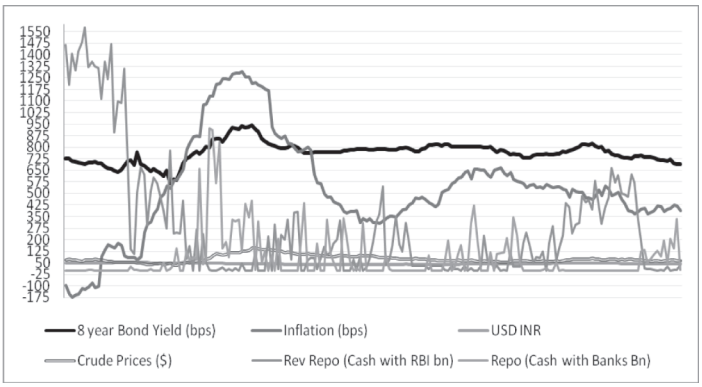


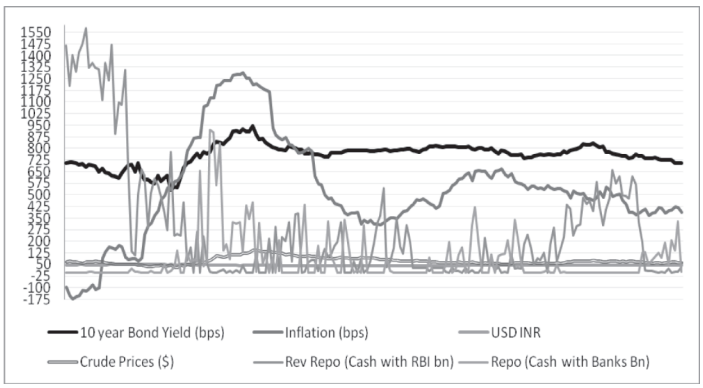


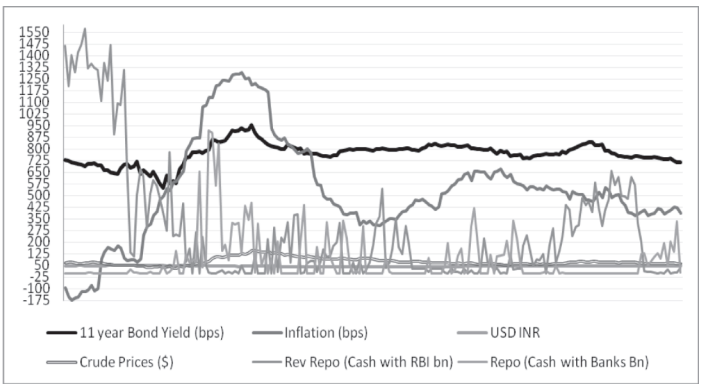












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